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Presenting an Operational Planning Framework for Customer Relationship Management Using a Multi-Objective Decision-Making Approach: A Case Study of Gol Gohar Mining and Industrial Company

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A B S T R A C T

The aim of this study is to develop an operational planning framework for the development of Customer Relationship Management (CRM) strategies in the Gol Gohar Mining and Industrial Company. This research is grounded in the pragmatism paradigm with a developmental objective and is conducted as a mixed-method (qualitative–quantitative) study using a cross-sectional, survey-based approach (interviews and questionnaires), implemented through field studies in two stages.In the first qualitative stage, the research strategy was based on thematic analysis. Data were collected through semi-structured, in-depth interviews with experts, along with a review of internal company documents and scientific sources. A total of 15 experts in sales, marketing, and customer service at the Gol Gohar Mining and Industrial Company were selected using purposive sampling. The sample size was determined based on the principle of theoretical saturation. Data coding was performed at open, axial, and selective levels using MAXQDA software. As a result, 18 key challenges, 18 corresponding strategies to address them, and 11 developmental objectives were identified and organized within a challenge–strategy–objective conceptual framework. In addition, 14 key success factors in CRM and major resource constraints, including budget and time limitations, were identified to establish a coherent and realistic framework for operational CRM planning. At the end of this stage, the extracted themes and categories were converted into measurable indicators to serve as inputs for the quantitative analysis in the second stage. Research validity was ensured through expert review of the items and thematic analysis of qualitative data, while reliability was confirmed through expert consensus and independent review of the coding process.In the second stage, the research strategy involved quantitative analysis based on the data extracted from the first stage. Quantitative data were collected through a questionnaire derived from the identified themes and strategies and distributed among 15 experts and managers in the mining industry with

at least ten years of professional experience, selected through purposive sampling. Data analysis was conducted using Excel and R software and multi-criteria decision-making methods, including the House of Quality matrix, Analytic Hierarchy Process (AHP), Simple Additive Weighting (SAW), and Goal Programming. The results indicate that successful CRM implementation in the Gol Gohar Mining and Industrial Company requires the simultaneous integration of technological, data-driven, and human-centered initiatives. The findings show that strategies such as CRM system integration, development of managerial dashboards, and establishment of interdepartmental committees exhibit the highest alignment with organizational development objectives and generate the greatest effectiveness under resource constraints.By adopting a mixed qualitative–quantitative approach and integrating thematic analysis with multi-criteria decision-making techniques and goal programming, this study contributes to the existing body of knowledge on CRM. With a specific focus on the mining industry, it provides managers with a structured and evidence-based understanding of CRM challenges, strategies, and success factors, enabling more effective operational decision-making and strategic planning through optimal resource allocation and alignment of technological and human objectives.

Keywords: *Customer Relationship Management; Operational Planning; Multi-Criteria Decision Making; Quality Function Deployment*

1. Introduction

In contemporary competitive markets, organizations increasingly recognize that sustainable performance is no longer achieved solely through product superiority or operational efficiency but through the effective management of customer relationships. The evolution of markets toward customer-centric competition has transformed Customer Relationship Management (CRM) from a technological tool into a strategic organizational philosophy that integrates marketing, operations, information systems, and managerial decision-making. Organizations now operate in environments characterized by intensified competition, empowered customers, and rapidly changing expectations, making long-term relationship development a fundamental determinant of organizational survival and growth (Kumar & Reinartz, 2018; Payne & Frow, 2005).

Historically, CRM emerged as a response to the limitations of transaction-oriented marketing models that emphasized short-term sales outcomes rather than enduring relational value. Early conceptualizations highlighted the need to align organizational processes, people, and technology to build meaningful customer relationships capable of generating loyalty and profitability (Chen & Popovich, 2003). Subsequent research demonstrated that organizations adopting customer-centric strategies achieved higher levels of customer retention, satisfaction, and long-term financial performance, thereby reinforcing CRM as a strategic management paradigm rather than merely an information system (Reinartz et al., 2004; Rust et al., 2004).

The growing complexity of customer interactions across multiple channels has further expanded the scope of CRM. Modern organizations must manage integrated customer journeys that span digital platforms, physical interactions, service encounters, and post-purchase engagement. Understanding customer experience throughout this lifecycle has become essential for value creation, requiring firms to coordinate marketing communications, service delivery, and data analytics in a unified framework (Lemon & Verhoef, 2016). Multichannel customer management strategies enable organizations to synchronize interactions across touchpoints, enhancing satisfaction and loyalty outcomes (Neslin & et al., 2006). Consequently, CRM today functions as a cross-functional organizational capability linking strategic intent with operational execution.

Despite widespread recognition of CRM's importance, empirical evidence indicates that many CRM initiatives fail to deliver expected benefits. Organizations frequently invest heavily in CRM technologies but struggle to translate these investments into measurable performance improvements. The gap between CRM adoption and effective implementation often arises from fragmented organizational

structures, insufficient strategic alignment, and inadequate integration of human and technological resources (Mendoza et al., 2007; Rigby et al., 2003). Successful CRM implementation therefore requires coherent operational planning capable of aligning organizational objectives, customer needs, and resource constraints.

Scholarly research has consistently emphasized that CRM effectiveness depends on a balanced integration of strategic, technological, and organizational dimensions. Strategic CRM frameworks highlight the importance of defining clear value propositions, aligning organizational processes with customer expectations, and developing measurable performance indicators (Payne & Frow, 2013). Similarly, value-focused adoption models stress that CRM implementation should be guided by organizational objectives rather than technology-driven decisions alone (Pedron et al., 2016). These perspectives suggest that CRM success emerges from systematic planning rather than isolated initiatives.

Another critical development in CRM research concerns the increasing role of data analytics and knowledge management. Advances in data mining and analytical technologies have enabled organizations to extract actionable insights from large volumes of customer data, supporting segmentation, personalization, and predictive decision-making (Ngai et al., 2009). Data-driven CRM approaches allow firms to identify profitable customers, forecast behavioral patterns, and optimize marketing strategies, thereby enhancing organizational competitiveness. The integration of artificial intelligence (AI) further expands these capabilities by automating customer analysis and improving decision accuracy (Chatterjee et al., 2020).

Recent studies highlight how AI-enabled CRM systems enhance organizational innovation and strategic responsiveness. AI technologies enable organizations to analyze complex customer behavior patterns, automate customer interactions, and personalize services at scale, creating new opportunities for competitive differentiation (Alnofeli et al., 2025). CRM systems increasingly function as innovation platforms that support organizational learning and adaptive strategy formulation (Lin & Chen, 2025). Empirical findings demonstrate that organizations leveraging advanced CRM technologies achieve superior business performance, particularly in dynamic and data-intensive environments (Martinho et al., 2025).

The strategic importance of CRM becomes even more pronounced in business-to-business (B2B) and industrial contexts, where customer relationships are typically long-term, high-value, and trust-based. In such environments, loyalty is driven not only by product quality but also by service reliability, communication effectiveness, and collaborative partnership development (Arthur & et al., 2024). Direct marketing communication and relationship-based engagement play central roles in maintaining industrial customer relationships and sustaining competitive advantage (Kim & Kumar, 2018). Therefore, CRM implementation in industrial organizations requires structured planning approaches capable of managing complex relational dynamics.

Customer satisfaction and loyalty remain core outcomes of CRM initiatives. Research demonstrates strong links between CRM practices and improvements in satisfaction levels, which subsequently influence loyalty and long-term organizational profitability (Santouridis & Veraki, 2017). Studies on electronic banking and digital service environments further confirm that effective CRM implementation strengthens customer satisfaction through enhanced service quality and responsiveness (Babaei Meybodi & Alirezaei, 2019). Additionally, the relationship between customer satisfaction and loyalty has been extensively validated, emphasizing CRM's role in shaping behavioral commitment and repeat engagement (Anderson & Srinivasan, 2003).

However, organizations continue to encounter substantial challenges during CRM implementation. These challenges include resistance to organizational change, lack of integrated customer data systems, inadequate employee training, and insufficient managerial support (Purnama & Susilowati, 2024). Such barriers demonstrate that CRM implementation is inherently a multidimensional decision problem requiring careful prioritization of strategies and efficient allocation of organizational resources. Without systematic operational planning, CRM initiatives risk becoming fragmented projects rather than cohesive strategic transformations.

To address these complexities, researchers increasingly advocate the application of structured decision-making methodologies within CRM planning processes. Multi-criteria decision-making (MCDM) techniques provide systematic mechanisms for evaluating alternative strategies based on multiple objectives, enabling organizations to balance competing priorities such as cost, effectiveness, and implementation feasibility. The Analytic Hierarchy Process (AHP), introduced as a structured decision-support framework, allows decision-makers to assess relative

importance among strategic criteria through pairwise comparisons (Saaty, 2008, 2013). Subsequent methodological developments have reinforced AHP as a widely accepted approach for complex organizational decision-making (Ishizaka & Labib, 2011).

Complementary techniques such as the Simple Additive Weighting (SAW) method provide quantitative mechanisms for ranking alternatives by aggregating weighted criteria scores, offering transparency and simplicity in evaluation processes (Afshari et al., 2010). These approaches enable organizations to translate qualitative managerial judgments into quantitative decision models, thereby improving strategic clarity and accountability. The integration of decision-analysis methods with CRM strategy formulation represents an important advancement in bridging the gap between conceptual CRM frameworks and operational execution.

From a strategic marketing perspective, CRM value creation depends heavily on identifying key performance drivers. Studies examining CRM value drivers highlight the importance of customer knowledge management, service customization, and coordinated organizational processes in generating measurable outcomes (Richards & Jones, 2008). Social CRM capabilities, incorporating digital interaction and collaborative engagement, further enhance organizational performance by strengthening real-time communication and customer participation (Trainor & et al., 2014). These developments reflect a broader shift toward interactive, data-enabled relationship management models.

Furthermore, CRM research increasingly emphasizes the importance of aligning customer experience management with strategic brand development. Customer-centered brand management frameworks demonstrate that sustained brand equity emerges from consistent relationship experiences rather than isolated marketing campaigns (Rust et al., 2004). Organizations capable of integrating CRM insights into branding strategies can better align customer expectations with delivered value, strengthening competitive positioning.

Recent systematic reviews confirm that CRM continues to evolve toward integration with entrepreneurial marketing and innovation management practices. CRM systems now support opportunity recognition, market adaptation, and innovation processes, reinforcing their role as strategic organizational infrastructure rather than operational tools (Guerola-Navarro et al., 2024). This evolution highlights the necessity of developing operational planning frameworks capable of coordinating CRM initiatives across organizational functions.

Despite these theoretical advancements, a critical gap remains between CRM theory and practice. Many organizations lack structured mechanisms for prioritizing CRM strategies under real-world constraints such as limited budgets, time restrictions, and organizational complexity. Decision-makers often rely on intuition or isolated performance indicators rather than systematic evaluation models, leading to inefficient resource allocation and suboptimal outcomes. Consequently, integrating CRM strategy development with quantitative decision-making approaches has become an important research direction.

In industrial organizations, particularly those operating in resource-intensive sectors, CRM planning must account for multiple and sometimes conflicting objectives, including customer satisfaction, operational efficiency, innovation capability, and financial sustainability. Multi-objective decision-making frameworks offer powerful tools for addressing these challenges by enabling simultaneous evaluation of strategic alternatives across diverse criteria. Such approaches facilitate evidence-based operational planning and support the development of coherent CRM strategy portfolios.

Given the growing complexity of customer ecosystems, the convergence of CRM, artificial intelligence, data analytics, and decision science provides new opportunities for organizations to enhance strategic decision-making. Integrating technological capabilities with structured analytical frameworks enables firms to move beyond reactive customer management toward proactive relationship optimization. This integration is particularly relevant in industrial environments where strategic decisions involve high costs, long implementation horizons, and significant organizational impact.

Therefore, developing an operational planning framework for CRM based on multi-objective decision-making methods represents both a theoretical and practical necessity. By combining CRM strategic principles with quantitative prioritization and optimization techniques, organizations can enhance decision transparency, improve resource allocation, and increase the likelihood of successful CRM implementation.

Accordingly, the aim of this study is to develop an operational planning framework for Customer Relationship Management strategies using a multi-objective decision-making approach in Gol Gohar Mining and Industrial Company.

2. Methods and Materials

This study employs a mixed, decision-oriented framework with a predominant quantitative approach, aiming to develop and optimize Customer Relationship Management (CRM) strategies within the organizational constraints of Gol Gohar Mining and Industrial Company. The research is developmental–applied in nature and focuses on quantitative modeling and analysis. Nevertheless, to ensure the comprehensiveness and realism of the decision-making model, an exploratory qualitative phase was conducted in the preliminary stage of the research, the outputs of which were used as structured inputs for the quantitative analysis. These qualitative findings were not directly incorporated into the interpretation of the results but served a supportive role in formulating the quantitative model.In the qualitative phase, through a systematic literature review and expert thematic analysis, 18 CRM challenges and barriers, 18 strategies for overcoming CRM challenges, 11 CRM developmental objectives, and 14 key success factors for CRM implementation were identified and extracted. This set of variables formed the basis for the decision structure and quantitative modeling in the subsequent phase of the study. For brevity, only the final results of the qualitative phase and their structural diagrams are presented in this article, with the primary focus placed on the quantitative analyses derived from these outputs.

The empirical setting of the study is Gol Gohar Mining and Industrial Company, a large organization operating in a complex business-to-business (B2B) environment. Quantitative data were collected through expert judgments provided by senior managers actively involved in sales, marketing, customer relations, and strategic planning. A purposive sampling method was employed to ensure topical relevance and depth of expertise, resulting in the participation of 15 experts with substantial professional experience in CRM-related decision-making processes.

Based on the outputs of the qualitative phase, four main categories of input variables were defined for the quantitative analysis:

1. CRM challenges and barriers
2. Strategies for addressing CRM challenges and barriers
3. CRM developmental objectives
4. Key success factors of CRM

These variables were employed as criteria and decision alternatives within the multi-criteria decision-making (MCDM) models used in the study. To systematically evaluate and prioritize CRM strategies, an integrated multi-criteria decision-making approach was adopted. In the first step, the Quality Function Deployment (QFD) matrix was used to analyze the matrix-type relationships between CRM strategies and CRM challenges, developmental objectives, and success factors. Relational scores were assigned by experts, and after aggregation, the initial importance weights of the strategies were calculated.

Subsequently, the Analytic Hierarchy Process (AHP) was applied to determine the relative importance of CRM developmental objectives. Pairwise comparison matrices were constructed, normalized, and tested for consistency to ensure the reliability of expert judgments. To reduce bias in weighting the key CRM success factors, the Shannon entropy method was employed, enabling the calculation of objective weights based on data dispersion. Finally, the Simple Additive Weighting (SAW) method was used for the final ranking of CRM strategies by aggregating weighted scores across all criteria.

To identify the optimal portfolio of CRM strategies, a Goal Programming model was formulated in the final stage of the quantitative analysis. This model was designed to minimize deviations from the target levels of the developmental objectives while simultaneously considering multiple potentially conflicting organizational goals, subject to real-world constraints related to available budget and implementation time. These constraints reflect the practical conditions faced by Gol Gohar Mining and Industrial Company in the effective implementation of an optimal CRM strategy portfolio. The weights obtained from the QFD, AHP, Shannon entropy, and SAW methods were systematically integrated into the objective function and constraints of the goal programming model, ensuring that both expert-based priorities and objective data characteristics were simultaneously incorporated into the optimization process. This integration enabled the transformation of qualitative-phase outputs and quantitative analysis results into an executable and realistic strategic portfolio.

The goal programming model was implemented and solved using the R software environment. The sequential integration of QFD, AHP, Shannon entropy, SAW, and goal programming rendered the prioritization and optimization of CRM strategies coherent, transparent, and methodologically robust.Overall, the proposed integrated quantitative framework establishes a structured linkage between the outputs of the qualitative phase and quantitative analyses, supports evidence-based managerial decision-making, and

provides a practical roadmap for CRM strategy development in complex industrial environments.

3. Findings and Results

In the first phase of the study, qualitative data analysis was conducted with the aim of systematically identifying challenges and barriers, strategies, developmental objectives, and critical success factors of Customer Relationship Management (CRM). Prior to the interview analysis stage, a systematic review of the literature on CRM, including its success factors, organizational challenges, and strategic approaches, was carried out.

Subsequently, to validate and contextualize the findings derived from the literature review, qualitative data were collected through 15 semi-structured, in-depth interviews with experts and managers in the areas of sales, marketing, and customer services at GolGohar Mining and Industrial Company. The number of interviews was determined based on the principle of theoretical saturation. Qualitative data analysis was performed using thematic analysis with the support of MAXQDA software. The output of this phase included the identification of 18 key challenges, 18 corresponding strategies, 11 developmental objectives, and 14 critical success factors. In the second phase of the study, quantitative data analysis was conducted based on the outputs of the first phase. Questionnaires were distributed among 15 experts and managers in the mining industry, each with a minimum of ten years of professional experience.

To analyze the relationships among the elements and to determine their relative weights, the Analytic Hierarchy Process (AHP) was employed to extract criterion weights and assess the consistency of expert judgments. Subsequently, Shannon entropy and the Simple Additive Weighting (SAW) method were applied to integrate the weights and perform the final ranking of strategies. In the final stage of quantitative analysis, a goal programming model combined with binary linear programming was implemented using the R software in order to select the optimal portfolio of strategies under the organization's real-world constraints. The formulation of the goal programming model is presented as follows(5,9).

Developmental Objective Equations with Positive and Negative Deviations:

$$\sum_{i=1}^{n} a_{ij}x_j + d_i^+ - d_i^- = G_i \quad for\ i = 1 \ \dots \ n$$

This equation indicates that the actual value resulting from the combination of decision variables, namely $\sum_{i=1}^{n} a_{ij}x_j$ must be compared against the expected or target value G_i should be brought as close as possible.

Resource or Capacity Constraints:

$$\sum C_{mj}x_j \le r_m \ , \quad for\ m = 1 \dots n$$

In this constraint,C_{mj} represents the consumption of the resource m by the decision variable $x_j$and $r_m$represents the total available amount of that resource.

Non-negativity Constraints on Variables and Deviations:

$$x, d^+, d^- \ge 0$$

Decision variables and deviation variables must take non-negative values. Since goal programming is based on the concept of deviations, negative deviations of a negative value or negative decision values are not permissible.

Multi-objective Function with Maximization and Minimization of Different Goals:

$$Min\ z_1 = \sum_{i=1}^{n} a_i x_i \ , \quad Max\ z_2 = \sum_{i=1}^{n} b_i x_i \quad or \quad Max\ z_3 = \sum_{i=1}^{n} c_i x_i$$

These formulations indicate that, in a multi-objective model, some objectives may require maximization (such as profit, return, or quality), while others require minimization (such as cost, risk, or time).

Minimum Goal Achievement Constraint:

$$\sum_{i=1}^{18} m_{ij}x_j \ge r_i \ , for\ i = 1 \dots 18$$

The model must satisfy at least a specified minimum level of performance, coverage, or goal attainment. The coefficients m_{ij}indicate the magnitude of the effect of each decision variable $x_j$on constraint i, and the value $r_i$represents the required minimum expected level.

Combined and Pairwise Constraints:

$$\sum_{i=1}^{18} g_j x_j - \sum_{k=1}^{n} \sum_{j>1}^{n} S_{kj}X_kX_j \le h$$

In this relationship, the linear term $\sum_{i=1}^{18} g_j x_j$represents the independent effect of each variable, while the term $\sum_{k=1}^{n} \sum_{j>1}^{n} S_{kj}X_kX_j$models the joint effects, synergies, or trade-offs between two variables.

Binary Variable Constraints:

$$x1, \dots, x18 = 0 \text{ ي } 1$$

The above formulation specifies that the decision variables are binary. This means that selecting a strategy or

undertaking an action is possible only in two states: either it is selected (1) or not selected (0).

Therefore, in general, X represents the decision variables, corresponding to the 18 strategies. The parameters a_i and b_i are the weights derived from the Quality Function Deployment (QFD) matrix in the mathematical model, which form two maximization objective functions. The parameter c_i denotes the strategy weights obtained using the SAW method, which are employed in the third objective function of the mathematical model. The constraints in the above formulations include the costs and implementation times of the strategies. The following tables present the outputs of the multi-criteria decision-making weighting process, which were subsequently used as inputs for the goal programming model.

Table 1

Weights of Strategy Groups Relative to Barriers and Challenges

Strategies	Symbol in the Model	Weights
Holding specialized training courses in CRM, sales, negotiation, and customer behavior analysis	X1	0.065528
Designing training programs for customers and preparing instructional manuals	X2	0.04834
Evaluating personnel behavior through customer satisfaction indicators and training in effective communication	X3	0.061334
Implementing integrated CRM systems such as Salesforce or Microsoft Dynamics	X4	0.07364
Developing a management dashboard and utilizing business intelligence tools	X5	0.055565
Developing a customer database and implementing CLV analysis and customer journey mapping	X6	0.068341
Redesigning customer interaction processes using a process-oriented approach	X7	0.056006
Establishing an interdepartmental CRM committee to ensure coordination and coherence in implementation	X8	0.057961
Designing a loyalty incentive structure based on customer scoring and ranking	X9	0.0516
Conducting market research and customer segmentation	X10	0.054049
Designing industrial branding strategies and planning the retention of key customers	X11	0.061661
Analyzing competitors and designing a roadmap for entry into diversified markets	X12	0.049646
Developing a CRM implementation roadmap and allocating resources to it	X13	0.054782
Building an organizational culture among employees to facilitate acceptance of CRM system changes	X14	0.051769
Integrating communication channels and designing a multi-layered customer response system	X15	0.05366
Deploying an order monitoring system and automating delivery planning	X16	0.055754
Creating dedicated services for key customers and providing customized support	X17	0.046313
Developing customer-oriented environmental policies and providing quality certifications	X18	0.03405

Table 2

Importance Level of Strategies Relative to Developmental Objectives

Row	Strategies	Weights
1	Conducting Specialized Training Programs in CRM, Sales, Negotiation, and Customer Behavior Analysis	0.04684
2	Designing Training Programs for Customers and Preparing User Manuals	0.06042
3	Evaluating Personnel Behavioral Performance through Customer Satisfaction Indicators and Training in Effective Communication	0.0432
4	Implementing Integrated CRM Systems such as Salesforce or Microsoft Dynamics	0.05812
5	Creating Management Dashboards and Utilizing Business Intelligence (BI)	0.05067
6	Developing Customer Databases and Implementing CLV Analysis and Customer Journey Mapping	0.07567
7	Redesigning Customer Communication Processes with a Process-Oriented (BPM) Approach	0.05887
8	Establishing an Interdepartmental CRM Committee to Ensure Coordination and Coherence in Implementation	0.03986
9	Designing Loyalty Incentive Structures Based on Customer Scoring and Ranking	0.06596
10	Conducting Market Research and Customer Segmentation	0.05891
11	Designing Industrial Branding Strategies and Planning the Retention of Key Customers	0.08041
12	Competitor Analysis and Designing a Roadmap for Entry into Diversified Markets	0.05945
13	Developing a CRM Implementation Roadmap and Allocating Resources Accordingly	0.04324
14	Building an Organizational Culture to Support Employee Adoption of CRM System Changes	0.04936
15	Integrating Communication Channels and Designing a Multilayer Customer Response System	0.05398
16	Implementing an Order Monitoring System and Automating Delivery Scheduling	0.04301
17	Creating Dedicated Services for Key Customers and Providing Customized Support	0.08107
18	Formulating Customer-Oriented Environmental Policies and Providing Quality Certifications	0.03096

Table 3

Weights of Strategies in Achieving Each Success Factor

Strategies	Top Management Support	Clear CRM Strategies	Change Management	Data Quality and System Integration	Selection of CRM Software Appropriate to the Company	CRM Measurement, Monitoring, and Continuous	Customer Data Segmentation and Analysis	Focus on Customer-Centricity and Management of	Flexibility in CRM Customization	Security and Ownership of Sensitive Data	Support for Reporting in Strategic Decision-Making	Project Management and Detailed Planning	Coordination among Technical, Sales, and Logistics	Focus on the Industrial Customer Lifecycle	w
X1	0.0390	0.0392	0.0768	0.0620	0.0570	0.0311	0.0283	0.0287	0.0210	0.0164	0.0133	0.0093	0.0779	0.0262	0.0546
X2	0.0310	0.0254	0.0155	0.0332	0.0289	0.0171	0.0273	0.0425	0.0131	0.0084	0.0117	0.0064	0.0187	0.0609	0.0353
X3	0.0191	0.0283	0.0297	0.0562	0.0333	0.0180	0.0198	0.0366	0.0164	0.0124	0.0105	0.0059	0.0234	0.0508	0.0374
X4	0.0779	0.0740	0.0573	0.1398	0.0711	0.0608	0.0328	0.0369	0.0429	0.0315	0.0485	0.0149	0.0943	0.0338	0.0847
X5	0.0684	0.0486	0.0283	0.1528	0.0421	0.0419	0.0345	0.0237	0.0298	0.0314	0.0541	0.0158	0.0717	0.0245	0.0693
X6	0.0763	0.0646	0.0283	0.1139	0.0518	0.0338	0.0471	0.0399	0.0311	0.0214	0.0343	0.0056	0.0358	0.0546	0.0663
X7	0.0628	0.0515	0.0452	0.1067	0.0763	0.0518	0.0420	0.0339	0.0341	0.0164	0.0392	0.0059	0.0444	0.0465	0.0682
X8	0.0819	0.0914	0.0593	0.0995	0.0991	0.0581	0.0256	0.0270	0.0252	0.0201	0.0287	0.0200	0.0919	0.0250	0.0781
X9	0.0573	0.0399	0.0256	0.0447	0.0325	0.0149	0.0164	0.0362	0.0203	0.0134	0.0158	0.0058	0.0226	0.0508	0.0411
X10	0.0644	0.0537	0.0276	0.0591	0.0825	0.0288	0.0427	0.0333	0.0200	0.0117	0.0363	0.0101	0.0312	0.0440	0.0566
X11	0.0922	0.0972	0.0317	0.0620	0.0518	0.0351	0.0270	0.0366	0.0220	0.0211	0.0250	0.0067	0.0304	0.0512	0.0612
X12	0.0787	0.0885	0.0216	0.0418	0.0649	0.0338	0.0392	0.0234	0.0170	0.0140	0.0230	0.0034	0.0273	0.0338	0.0530
X13	0.0922	0.1030	0.0202	0.0562	0.0930	0.0437	0.0396	0.0240	0.0200	0.0211	0.0283	0.0176	0.0608	0.0157	0.0660
X14	0.0421	0.0298	0.0876	0.0375	0.0596	0.0207	0.0116	0.0132	0.0095	0.0114	0.0109	0.0120	0.0600	0.0135	0.0435
X15	0.0270	0.0247	0.0162	0.0706	0.0386	0.0297	0.0092	0.0287	0.0351	0.0197	0.0283	0.0080	0.0997	0.0444	0.0498
X16	0.0294	0.0247	0.0209	0.0634	0.0421	0.0378	0.0126	0.0277	0.0436	0.0364	0.0271	0.0070	0.0662	0.0360	0.0493
X17	0.0644	0.0544	0.0209	0.0447	0.0456	0.0329	0.0164	0.0362	0.0429	0.0147	0.0145	0.0053	0.0335	0.0554	0.0500
X18	0.0787	0.0508	0.0135	0.0346	0.0272	0.0239	0.0068	0.0132	0.0095	0.0107	0.0129	0.0085	0.0218	0.0300	0.0355

To enhance the accuracy and validity of the results, five selected experts from Gol-Gohar Mining and Industrial Company with the highest levels of expertise were reselected. Based on their judgments, the Quality Function Deployment (QFD) matrix was developed to explain the relationships between Customer Relationship Management (CRM) development strategies and CRM development objectives, and subsequently incorporated into an integrated matrix. The constraints of the goal programming model were defined based on this integrated matrix, along with budgetary and time constraints, all of which were completed and validated by the selected experts. The presented tables report the quantitative values used to define the constraints of the goal programming model.

Table 4

Determination of Strategy Weights in Achieving Each CRM Developmental Objective (Expert Matrix)

Strategies	Enhancing Customers' Perceived Quality of the Gol Gohar Brand	Personalizing the Customer Experience in Sales Interactions	Increasing Industrial Customer Loyalty	Development of a Customer-Centric Service Chain	Digitalization of Customer Communication	Enhancing Behavioral Skills and Professional Sales Competencies	Corporate Innovation and Customer Data Analysis for Decision-Making	Increasing Profitability through Retention of Key Customers	Revenue Growth through Market and Product Diversification	Development of Export Markets Based on Long-Term Relationships	Return on Investment (ROI) of Customer Services
X1	0.027473	0.040302	0.122677	0.056225	0.065068	0.041667	0.05483	0.051919	0.040816	0.0625	0.020649
X2	0.03022	0.027708	0.040892	0.040161	0.030822	0.038889	0.057441	0.074492	0.043367	0.036765	0.038348
X3	0.027473	0.032746	0.04461	0.092369	0.027397	0.033333	0.044386	0.072235	0.045918	0.051471	0.047198
X4	0.071429	0.073048	0.078067	0.092369	0.047945	0.091667	0.093995	0.076749	0.076531	0.095588	0.100295
X5	0.085165	0.050378	0.040892	0.088353	0.041096	0.072222	0.083551	0.051919	0.058673	0.080882	0.109145
X6	0.074176	0.070529	0.063197	0.056225	0.058219	0.063889	0.101828	0.065463	0.061224	0.080882	0.067847
X7	0.06044	0.04534	0.096654	0.040161	0.05137	0.069444	0.078329	0.063205	0.066327	0.040441	0.070796
X8	0.071429	0.083123	0.063197	0.108434	0.119863	0.094444	0.065274	0.056433	0.040816	0.058824	0.076696
X9	0.046703	0.055416	0.081784	0.048193	0.058219	0.033333	0.036554	0.069977	0.058673	0.047794	0.035398
X10	0.063187	0.083123	0.037175	0.040161	0.085616	0.038889	0.096606	0.051919	0.043367	0.036765	0.085546
X11	0.085165	0.110831	0.05948	0.064257	0.082192	0.069444	0.062663	0.060948	0.040816	0.055147	0.056047
X12	0.06044	0.083123	0.040892	0.048193	0.085616	0.052778	0.073107	0.031603	0.043367	0.025735	0.029499
X13	0.068681	0.073048	0.018587	0.060241	0.085616	0.058333	0.075718	0.042889	0.05102	0.058824	0.067847
X14	0.041209	0.012594	0.126394	0.040161	0.041096	0.019444	0.015666	0.020316	0.035714	0.047794	0.041298
X15	0.024725	0.030227	0.018587	0.040161	0.027397	0.044444	0.015666	0.054176	0.079082	0.058824	0.050147

X16	0.032967	0.027708	0.022305	0.028112	0.023973	0.077778	0.013055	0.060948	0.084184	0.088235	0.047198
X17	0.054945	0.050378	0.022305	0.032129	0.047945	0.055556	0.018277	0.06772	0.096939	0.051471	0.029499
X18	0.074176	0.050378	0.022305	0.024096	0.020548	0.044444	0.013055	0.027088	0.033163	0.022059	0.026549

Table 5

Minimum Desired Level of Achievement for Each Developmental Objective

Degree of Importance	Developmental Objectives
0.1966	Enhancing Customers' Perceived Quality of the Gol Gohar Brand
0.1322	Personalizing the Customer Experience in Sales Interactions
0.0986	Increasing Industrial Customer Loyalty
0.1272	Development of a Customer-Centric Service Chain
0.1196	Digitalization of Customer Communication
0.0739	Enhancing Behavioral Skills and Professional Sales Competencies
0.0892	Corporate Innovation and Customer Data Analysis for Decision-Making
0.0312	Increasing Profitability through Retention of Key Customers
0.0491	Revenue Growth through Market and Product Diversification
0.0227	Development of Export Markets Based on Long-Term Relationships
0.0596	Return on Investment (ROI) of Customer Services

Table 6

Estimated Budget and Implementation Time for Each Strategy

Title	Implementation Time of Each Strategy (Months)	Implementation Cost of Each Strategy (Million IRR)
Organizing specialized courses on CRM, sales, negotiation, and customer behavior analysis.	1	248
Designing training programs for customers and preparing instructional manuals.	1	152
Behavioral assessment of staff through customer satisfaction indicators and effective communication training.	2	223
Implementing integrated CRM systems such as Salesforce or Microsoft Dynamics.	8	1656
Creating management dashboards and utilizing Business Intelligence (BI) tools.	4	691
Developing a customer database and implementing Customer Lifetime Value (CLV) analysis and Journey Mapping.	5	613
Redesigning customer interaction processes with a process-oriented approach (BPM).	6	849
Establishing an interdepartmental CRM committee to ensure coordination and consistency in implementation.	1	112
Designing a loyalty incentive structure based on customer scoring and ranking.	3	266
Conducting market research and customer segmentation.	3	235
Designing industrial branding strategies and planning for key customer retention.	3	412
Analyzing competitors and designing a roadmap for entering diverse markets.	4	311
Developing a CRM implementation roadmap and allocating resources accordingly.	3	192
Fostering a culture among employees to embrace CRM system changes.	1	193
Integrating communication channels and designing a multi-tiered response system.	4	416
Implementing an order monitoring system and automating delivery planning.	5	741
Creating dedicated services for key customers and providing customized support.	3	338
Developing customer-centric environmental policies and issuing quality certifications.	3	243
Total	57	7891

In this study, a linear goal programming model was employed to evaluate the optimal combination of Customer Relationship Management (CRM) development strategies under real organizational constraints. Three objective functions were defined based on the results of previous stages, and the mathematical structure of the model was formulated using an integrated matrix along with budgetary and time limitations. The model was implemented and solved using the R software, enabling accurate numerical optimization and result analysis. The findings indicate that the model successfully minimized deviations from the ideal targets and achieved an appropriate balance among the three objectives. Consequently, Strategies 1, 4, 5, 6, and 8 were identified as the optimal CRM strategy portfolio, demonstrating the effectiveness of goal programming as a decision-support tool for multi-objective planning under resource constraints.

Objective function

Strategies - Challenges $Min\ Z1 = 0.0655X_1 + 0.048X_2 + \cdots + 0.0463X_{17} + 0.0340X_{18}$

Strategies - Development Objectives $Max\ Z2 = 0.04684X_1 + 0.0604X_2 + \cdots + 0.0810X_{17} + 0.0309X_{18}$

Strategies - Success Factors $Max\ Z3 = 0.0546X_1 + 0.0353X_2 + \cdots + 0.0500X_{17} + 0.0355X_{18}$

Program Constraints

Combined Matrix (Strategies)

$$0.02747X_1 + 0.03022X_2 + 0.02747X_3 + 0.07143X_4 + 0.08516X_5 + 0.07418X_6 + 0.06044X_7 + 0.07143X_8 + 0.04670X_9 + 0.06319X_{10} + 0.08516X_{11} + 0.06044X_{12} + 0.06868X_{13} + 0.04121X_{14} + 0.02473X_{15} + 0.03297X_{16} + 0.05495X_{17} + 0.07418X_{18} \geq 0.1966$$

Budget

$$(248X_1 + 152X_2 + 223X_3 + 1656X_4 + 691X_5 + 613X_6 + 849X_7 + 112X_8 + 266X_9 + 235X_{10} + 412X_{11} + 311X_{12} + 192X_{13} + 193X_{14} + 416X_{15} + 741X_{16} + 338X_{17} + 243X_{18})$$

Month

$$(1X_1 + 1X_2 + 2X_3 + 8X_4 + 4X_5 + 5X_6 + 6X_7 + 1X_8 + 3X_9 + 3X_{10} + 3X_{11} + 4X_{12} + 3X_{13} + 1X_{14} + 4X_{15} + 5X_{16} + 3X_{17} + 3X_{18}) - (7(x4x8)) \leq 29$$

Table 7

Optimal Values Obtained from Solving the Goal Programming Model

Z3	Z2	Z1
0.353078	0.347000	0.321035

Min Z = d2− + d3− − d1+

Min Z1 = 0.0655X1 + 0.048X2 + … + 0.0340X18 + (d1− − d1+) = 0.321

Max Z2 = 0.04684X1 + 0.0604X2 + … + 0.0309X18 + (d2− − d2+) = 0.347

Max Z3 = 0.0546X1 + 0.0353X2 + … + 0.0355X18 + (d3− − d3+) = 0.353

d1− , d1+ , d2− , d2+ , d3− , d3+ ≥ 0

x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12	x13	x14	x15	x16	x17	x18
1	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0

$d_1^+ = \mathbf{0.009469}$ $d_2^- = 0.028500$ $d_3^- = 0.013548$

The results indicate that the optimal CRM strategy portfolio places strong emphasis on the simultaneous development of human capabilities, data-driven infrastructure, system integration, and effective organizational coordination. In particular, investments in specialized CRM training, advanced customer data management and analysis, integrated information systems, and cross-functional governance mechanisms emerge as the most influential elements in enhancing overall CRM performance (13,19).Overall, the quantitative analysis confirms that an integrated CRM development approach—one that cohesively combines human, technological, and structural dimensions—achieves the highest level of alignment with organizational development objectives.

Rather than relying on isolated or fragmented initiatives, the findings highlight the necessity of a balanced and synergistic strategic combination that ensures both operational feasibility and strategic effectiveness (21).The proposed CRM strategy portfolio provides a data-driven, evidence-based, and operationally executable roadmap for CRM development within the studied industrial context. By explicitly incorporating real-world constraints related to budget and implementation time, this framework offers practical guidance for managers seeking to prioritize and execute CRM initiatives in complex B2B and industrial environments, while simultaneously ensuring sustainable value creation and the effectiveness of long-term customer relationships.

4. Discussion and Conclusion

The present study sought to develop an operational planning framework for Customer Relationship Management (CRM) through an integrated multi-objective decision-making approach within the context of Gol Gohar Mining and Industrial Company. The findings demonstrate that CRM development in complex industrial environments is fundamentally a multidimensional managerial problem requiring the simultaneous coordination of technological infrastructure, human capabilities, organizational structures, and strategic alignment. The results provide empirical evidence that effective CRM implementation cannot be achieved through isolated initiatives but must emerge from a balanced strategic portfolio optimized under organizational constraints.

The quantitative results revealed that strategies related to specialized CRM training (X1), implementation of integrated CRM systems (X4), development of managerial dashboards and business intelligence tools (X5), establishment of customer data infrastructure and Customer Lifetime Value analysis (X6), and creation of cross-functional coordination mechanisms (X8) constituted the optimal CRM strategy portfolio. These findings strongly support the conceptual foundations of CRM literature emphasizing that successful CRM implementation depends on the integration of people, processes, and technology rather than technological adoption alone (Chen & Popovich, 2003). The prominence of training-oriented strategies highlights that human competence remains a critical determinant of CRM success, confirming earlier studies showing that organizational readiness and employee capability development directly influence CRM effectiveness (Mendoza et al., 2007).

The prioritization of specialized CRM training aligns with the strategic CRM framework proposed by Payne and Frow, which emphasizes organizational learning and employee engagement as essential enablers of customer-centric transformation (Payne & Frow, 2005). CRM initiatives frequently fail because organizations underestimate behavioral and cultural adaptation requirements. The present findings indicate that investment in professional skills related to customer behavior analysis, negotiation, and communication enhances organizational capacity to leverage CRM technologies effectively. This result is consistent with research demonstrating that CRM-driven customer satisfaction and loyalty outcomes depend heavily on employee interaction quality and service competencies (Santouridis & Veraki, 2017).

Another central finding concerns the high priority assigned to integrated CRM systems. The optimization model identified system integration as one of the most influential strategies despite its relatively high implementation cost and time requirements. This result supports contemporary evidence indicating that CRM technologies serve as strategic infrastructure enabling organizational coordination, customer data integration, and informed decision-making (Buttle & Maklan, 2009). Integrated systems facilitate the consolidation of fragmented customer information across departments, enabling organizations to manage the entire customer lifecycle more effectively. Empirical research has consistently shown that CRM system adoption positively influences organizational performance when aligned with strategic objectives and operational processes (Martinho et al., 2025; Reinartz et al., 2004).

The importance of technological integration identified in this study also reflects the growing role of artificial intelligence and advanced analytics in CRM environments. AI-enabled CRM systems enhance predictive capabilities, automate customer analysis, and improve strategic responsiveness, thereby strengthening organizational innovation and competitiveness (Alnofeli et al., 2025; Lin & Chen, 2025). The findings therefore confirm that digital transformation is not merely supportive but foundational to modern CRM effectiveness. Moreover, the emphasis on data-driven infrastructure aligns with studies highlighting the role of data mining and analytical capabilities in identifying profitable customers and improving marketing performance (Ngai et al., 2009).

The results further demonstrated that managerial dashboards and business intelligence tools constitute key strategic enablers. These tools allow organizations to transform raw customer data into actionable managerial insights, improving decision accuracy and organizational agility. Such findings align with customer journey management perspectives, which argue that organizations must continuously monitor customer interactions to enhance experience quality across multiple touchpoints (Lemon & Verhoef, 2016). Analytical dashboards support evidence-based management and reduce reliance on intuition-driven decision-making, a problem frequently observed in unsuccessful CRM implementations (Richards & Jones, 2008).

Equally important is the study's identification of customer database development and Customer Lifetime Value (CLV) analysis as central strategic priorities. CRM literature consistently emphasizes that long-term profitability derives from managing customer relationships based on lifetime value rather than short-term transactions (Rust et al., 2004). The findings confirm that industrial organizations benefit significantly from systematic customer segmentation and lifecycle analysis, enabling targeted retention strategies and optimized resource allocation. These results also correspond with research on multichannel customer management, demonstrating that integrated data structures improve customer engagement and loyalty outcomes (Neslin & et al., 2006).

The selection of cross-functional governance mechanisms, particularly the establishment of an interdepartmental CRM committee, represents another significant contribution of this study. Organizational coordination emerged as a low-cost yet highly influential factor supporting CRM success. This finding aligns with prior research emphasizing that CRM initiatives require collaboration among marketing, sales, logistics, and technical departments to achieve strategic coherence (Pedron et al., 2016). Cross-functional integration minimizes organizational silos and enhances information flow, thereby strengthening customer-centric culture development.

From a strategic marketing perspective, the prioritization outcomes also confirm that CRM effectiveness in industrial B2B contexts depends heavily on relationship-oriented engagement rather than transactional marketing approaches. Industrial customers typically require long-term collaboration, customized services, and high levels of trust. Research on B2B loyalty confirms that relational value, communication quality, and service personalization significantly influence customer retention and competitive advantage (Arthur & et al., 2024; Kim & Kumar, 2018). The selected CRM strategy portfolio therefore reflects the unique relational dynamics of industrial markets.

The methodological contribution of this study lies in integrating multi-criteria decision-making techniques with CRM strategy development. The application of AHP enabled systematic prioritization of developmental objectives based on expert judgment, consistent with established decision-analysis theory (Saaty, 2008, 2013). The use of SAW and entropy weighting enhanced objectivity by incorporating both subjective expertise and data dispersion into evaluation processes. Such integration addresses a major limitation in CRM planning, where strategic decisions often lack analytical rigor. Previous methodological reviews have highlighted the effectiveness of structured decision models in managing complex organizational problems involving multiple criteria and conflicting objectives (Afshari et al., 2010; Ishizaka & Labib, 2011).

The goal programming optimization results further demonstrate that CRM strategy development is inherently a multi-objective planning challenge. Organizations must simultaneously maximize customer satisfaction, organizational performance, and strategic alignment while minimizing costs and implementation time. The optimized portfolio identified in this study achieved balanced performance across these dimensions, supporting arguments that CRM success depends on coordinated investment rather than isolated technological adoption (Trainor & et al., 2014). The findings thus extend earlier research emphasizing the need for strategic coherence and operational feasibility in CRM implementation (Rigby et al., 2003).

Another important implication concerns the relationship between CRM and innovation capability. The findings suggest that CRM initiatives not only improve customer management but also stimulate organizational innovation through improved access to customer knowledge and market insights. Systematic reviews indicate that CRM integration with entrepreneurial marketing enhances organizational adaptability and opportunity recognition (Guerola-Navarro et al., 2024). The results of this study reinforce this perspective by demonstrating that CRM planning frameworks can function as mechanisms for strategic innovation in industrial organizations.

Overall, the discussion confirms that CRM effectiveness emerges from synergy among human resources, technological systems, analytical capabilities, and

organizational governance structures. The integrated decision-making framework proposed in this study bridges the persistent gap between CRM conceptualization and operational implementation identified in prior research (Kumar & Reinartz, 2018). By incorporating resource constraints directly into strategic optimization, the model enhances managerial realism and practical applicability. Consequently, the study contributes to CRM literature by demonstrating how quantitative decision-support tools can transform CRM from a conceptual management philosophy into an executable operational strategy.

Limitations

Despite its contributions, this study has several limitations. First, the empirical analysis was conducted within a single industrial organization, which may limit the generalizability of findings to other sectors or organizational contexts. The mining industry possesses specific structural characteristics such as long-term contracts, limited customer bases, and project-oriented operations that may influence CRM priorities differently compared to service or consumer markets. Second, the reliance on expert judgment introduces potential subjectivity, even though methodological safeguards were applied to ensure consistency and reliability. Third, the cross-sectional design captures decision conditions at a specific point in time and does not account for dynamic organizational changes or evolving customer expectations. Finally, although quantitative optimization provided robust strategic prioritization, behavioral and cultural dimensions of CRM adoption were not examined longitudinally.

Future studies may expand this research by applying the proposed framework across multiple industries to enable comparative analysis and improve external validity. Longitudinal studies examining CRM implementation outcomes over time would provide deeper insights into the sustainability of optimized strategy portfolios. Researchers could also integrate advanced analytical approaches such as fuzzy decision-making, machine learning optimization, or big data analytics to enhance model precision and adaptability. Additionally, future research should explore organizational culture, leadership styles, and employee acceptance as mediating variables influencing CRM success. Comparative international studies may further reveal how institutional environments shape CRM operational planning and strategic effectiveness.

From a managerial perspective, organizations should approach CRM implementation as a strategic transformation rather than a technological project. Managers are advised to invest simultaneously in employee capability development, integrated information systems, and data analytics infrastructure. Establishing cross-functional governance mechanisms can significantly improve coordination and reduce implementation resistance. Decision-makers should adopt structured analytical tools for prioritizing CRM initiatives under resource constraints to avoid fragmented investments. Furthermore, organizations should continuously monitor customer data, refine strategies based on performance feedback, and align CRM initiatives with long-term organizational objectives to ensure sustainable competitive advantage.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

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Ethics Considerations

In this research, ethical standards including obtaining informed consent, ensuring privacy and confidentiality were considered.

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