# AI-AUGMENTED CONCEPTUAL MODEL OF COMPROMISE INTEREST BALANCING AMONG INSURANCE MARKET PARTIES

**Badri Gechbaia[1], Budiukov Y.[2], Lobach O.[2], Romanenkov Y.[3], Kharuta V.[4]**

[1]Batumi Shota Rustaveli State University, Batumi, Georgia
[2]National Technical University "Kharkiv Polytechnic Institute", Kharkiv, Ukraine
[3]Kharkiv National University of Radio Electronics, Kharkiv, Ukraine
[4]National Transport University, Kyiv, Ukraine

**Abstract.** An AI-augmented conceptual model of compromise interest balancing among insurance market parties (the insurance agent, the client, and the regulator) is proposed, based on Quality Function Deployment (QFD) methodology. In the model, the agent's goals (commission rate, number of transactions, low chargeback rate, licence security) serve as WHATs requirements, while the mechanisms for their achievement (HOWs) are represented by two groups of means: satisfying client needs and complying with regulatory standards. A five-stage AI-QFD model is developed with clearly defined integration points for four artificial intelligence tools. The model enables objective formation of the "requirements–actions" matrix based on real data, replacing expert assumptions with measurable indicators and achieving a balance among agent profitability, client satisfaction, and regulatory compliance. It is demonstrated how the AI layer transforms the classical two-dimensional QFD matrix into a three-dimensional decision-support instrument for investment and insurance decisions.

**Keywords:** quality function deployment, artificial intelligence tools, AI-QFD, insurance agent, insurance, InsurTech, performance criteria, decision support.

**Introduction.** The contemporary annuity insurance market is characterized by a structural conflict of interests among the insurance agent (maximization of commission income), the client (optimal protection at an acceptable price), and the regulator (ensuring suitability and consumer protection) [1].

A systematic review of AI applications in annuity sales business processes [2] revealed uneven technological maturity across available solutions and the absence of a formalized instrument for aligning the interests of these parties. The classical QFD model serves as an effective tool for mapping consumer requirements to product characteristics [3]; however, it lacks a mechanism for the simultaneous consideration of conflicting requirements from multiple parties and relies on subjective expert assessments, which constrains its application in insurance processes where regulatory compliance and recommendation transparency are paramount. To overcome these limitations, AI-QFD is proposed – an augmented model in which the agent's goals serve as WHATs requirements, while client needs and regulatory standards constitute the HOWs mechanisms for their achievement. This approach replaces subjective assessments with data from specialized AI tools and introduces a three-dimensional matrix structure through multi-source evaluation.

**Formulation of the problem.** To develop a conceptual AI-QFD model that simultaneously addresses both limitations of classical QFD in the context of the annuity insurance market: first, to replace subjective completion of the relationship matrix $R_{ij}$ with objective assessments from specialized AI tools; second, to provide a structured representation of dual-perspective logic – whereby the insurance agent's goals (WHATs) are achieved through client need satisfaction and regulatory compliance (HOWs). The model must be suitable for subsequent mathematical formalization and verification on real agent data.

**The purpose of the work.** To develop a conceptual AI-augmented QFD model that addresses the limitations by integrating artificial intelligence at all stages of QFD construction, and that provides a structured representation of the mechanisms through which the insurance agent's goals are achieved via client needs and regulatory standards within a unified matrix.

**Solving the problem.** The construction of the AI-QFD model is proposed to proceed through five sequential stages corresponding to the classical QFD structure [3], with mandatory integration of four specialized AI tools: LLM assistant, Rate Aggregator, Suitability Checker, and Compliance Monitor.

Stage 1. Formalization of WHATs (insurance agent goals). This stage involves the collection and structuring of key agent performance criteria: income per hour, average commission, number of deals per month, chargeback rate, license safety, referral rate, and repeat purchase rate. AI tool: the LLM assistant performs automatic structuring of the agent's informal goals, identification of implicit criteria, and generation of a complete standardized WHATs list.

Stage 2. Assignment of WHATs weights. Weight coefficients are assigned to agent goals, taking into account two external constraints – client needs and regulatory standards. AI tools: Suitability Checker verifies that the proposed weights do not conflict with regulatory minimums for suitability; Compliance Monitor flags chargeback rate and license safety as non-reducible criteria.

Stage 3. Formation of HOWs (mechanisms for achieving agent goals). HOWs are structured into two groups: through client need satisfaction (client intake, income gap analysis, risk tolerance, liquidity timeline, asset analysis, carrier due diligence, etc.) and through regulatory compliance (suitability analysis, conflict of interest disclosure, NIGO control, written rationale, chargeback risk, etc.). AI tools: the Rate Aggregator gathers current rates for client-oriented HOWs; the LLM assistant generates client-oriented documentation and automated written rationales for regulatory HOWs.

Stage 4. Construction of the relationship matrix $R_{ij}$. Assessment of the strength of association between each agent goal (WHATs) and each achievement mechanism (HOWs) across two blocks (client, regulator). Key innovation: instead of subjective symbols (●◎△·), all four AI tools independently evaluate each cell using SHAP-based interpretation [4] the final $R_{ij}$ value is formed as a weighted aggregation accounting for the contribution of each AI tool.

Stage 5. Calculation of technical priorities $TI_j$ and generation of recommendations. Priorities of HOWs mechanisms are computed and results are verified. AI tools: the Compliance Monitor ensures that no regulatory mechanism falls below the normative threshold [5]; the LLM assistant automatically generates a written rationale based on the final ranking. In the resulting model, regulatory mechanisms take the top positions, thereby confirming the model's compliance-protection function for the agent.

**Conclusions.** The developed five-stage AI-augmented conceptual QFD model transforms the classical requirements alignment tool into a modern three-dimensional decision-support mechanism for the annuity insurance market. The key feature of the model is its dual-perspective representation: agent goals (WHATs) are achieved through client satisfaction and regulatory compliance (HOWs). The integration of specialized AI tools at each stage ensures objectivity of assessments, automated verification of compliance constraints, and generation of evidence-based recommendations. The model is suitable for subsequent mathematical formalization and empirical verification using real agent data.

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