

# Scrutinizing the Dynamics of Global Arms Trade: A New Explainable AI Model Beyond Traditional Methods<sup>i,ii</sup>

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**Abstract:** International arms trade is a global phenomenon shaped by complex geopolitical, economic, and social dynamics. This study compares the results of statistical and econometric analyses of various factors influencing arms trade with those of a hybrid optimization-based explainable artificial intelligence (XAI) algorithm developed for this research. Analyses were conducted using data drawn from the Stockholm International Peace Research Institute (SIPRI), World Bank (including Worldwide Governance Indicators, GDP per capita, and military expenditure shares), and the Economist Intelligence Unit's Democracy Index. Statistical methods revealed interrelationships among variables over time, while econometric models—through panel data and time series techniques—assessed causality and dynamic behavior. However, these conventional approaches showed limitations in capturing multidimensional, non-linear patterns. The proposed explainable AI algorithm is meant to be more effective in modeling complex data structures and producing interpretable outputs through feature importance rankings and decision process visualizations. This study is novel in applying an explainable AI-based classification model to the defence industry and arms trade. Although still under development, the model integrates various components and promises valuable contributions to the literature. A comparative analysis assessed each method's explanatory power, alignment with existing research, and policy relevance. Findings indicate that statistical tools explain simple relationships effectively, econometric models uncover causal links, and explainable AI excels in managing complexity and non-linearity. This research also emphasizes the value of interdisciplinary methods and highlights the growing role of explainable AI in advancing arms trade analysis and informing policy decisions.

**Keywords:** International arms trade, explainable artificial intelligence, comparative analysis

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