INTECH Boosted Customs Risk Detection by 70% Using AI

Summary

A global logistics and cargo management platform was struggling to catch suspicious trade transactions that slipped past their existing rule-based filters. With compliance risks rising and manual reviews overwhelming their teams, they turned to INTECH.

INTECH helped them uncover hidden anomalies, reduce false negatives, and improve detection accuracy by 70% by implementing an AI-powered Integrated Customs System (ICS).

About the Client

The client runs one of the largest digital platforms for cargo and customs. Every day, their system handles hundreds of thousands of import and export transactions from around the world.

Their main work is to help governments and logistics companies ensure that goods entering or leaving the country follow the rules.

They work across different countries, time zones, and trade zones. That means their platform has to be fast, reliable, and very secure.

Even one risky shipment involving tax fraud or illegal goods could create a serious problem that can affect the entire supply chain cycle.

To overcome this, they needed a smarter way to detect customs risks and take corrective action faster.

Client Challenges: When Rule-Based Systems Fall Short

The client's existing legacy system relied heavily on rule-based algorithms. These were static logic checks designed to flag transactions that broke predefined rules.

However, as the trade volume grew, the existing system started missing critical threats. This created two big challenges:

Missed Risks
The system marked risky transactions as 'No Risk', allowing them to pass through without deeper checks.

False Alerts
The system flagged many harmless transactions, flooding analysts with cases that didn't need attention.

As a result, these challenges led to deeper operational issues such as:

Manual Overload
Analysts had to dig through thousands of transactions, most of which were harmless. This left little to no time for meaningful investigation, draining productivity and delaying decisions across departments.

Review Fatigue
When teams spend most of their time chasing false leads, it gets harder to stay sharp. Even experienced analysts started overlooking genuine risks, simply because they were buried under a wave of irrelevant alerts.

This made it clear: the existing rule-based system was no longer reliable.

That's when the client turned to INTECH, seeking an intelligent system that could learn from historical data, detect meaningful patterns, and focus attention on what truly mattered.

INTECH's Solution: Intelligent Integrated Customs Systems

INTECH designed and implemented a custom Integrated Customs System (ICS) that went beyond basic rule checks and introduced deep, intelligent anomaly detection.

The solution was built on three foundational capabilities, each focused on reducing risk, improving precision, and making customs review teams more effective from day one.

Deep Anomaly Detection

- We developed a multi-layered anomaly detection engine that used both statistical methods and real-world business logic.
- We started with value-based analyses, spotting data points that were too high, too low, or the ones that didn't make sense.
- We added statistical models like Interquartile Range (IQR) to detect outliers in volume, pricing, and frequency of transactions.
- These two methods worked together to detect what a rules-based system would never flag in routine shipments
- This foundational layer helped surface risky transactions early without overloading the system with false positives.

Multi-Model Integration

- We introduced an ensemble of machine learning models, each trained to identify risk from a different angle.
- We implemented multiple models, including value-based filters, statistical outlier detectors, Isolation Forest, and XGBoost, allowing us to cross-check transactions across different techniques.
- Each model had a risk confidence score based on its detection logic. While the transactions that triggered multiple models were immediately escalated as high priority.
- This approach helped detect rare but critical issues, such as one-off imports from unexpected countries or product volumes inconsistent with previous history.
- By layering models this way, we avoided tunnel vision and gave the system the flexibility to learn from real-world patterns.

Attribute-Level Analysis

- Our system identified the factors that made a transaction suspicious:
  - **Unusual product movement:** A product code that had not been traded in that region before?
  - **Port anomalies:** Was it a specific port with a sudden increase in volume?
  - **Behavioral deviations:** A business entity behaving outside its normal pattern?
- This gave customs teams the context of the situation.
- This helped them act faster, escalate threats confidently, and eliminate hours of second-guessing.
- These features were built to make risk detection smarter, sharper, and more accurate over time.

Implementation Process

INTECH worked closely with the client's data and compliance teams to implement the ICS in phases.

Our implementation approach followed a carefully structured process that balanced technical excellence with operational realities:

1. **Statistically-Based Anomaly Detection**
   We began by running standalone statistical checks in the background of the existing system. This allowed us to quietly flag anomalies without interrupting workflows so that analysts could review and provide early feedback on results.
2. **ML Model Training and Deployment**
   With early trust established, we moved to training supervised and unsupervised models using real transaction data. The client's historical case outcomes helped us fine-tune predictions quickly.
3. **Voting System Integration**
   Rather than replacing the rule engine, we implemented the weighted voting mechanism that combined decisions from all models and statistical layers.
4. **Analyst Feedback Loop**
   We introduced a simple feedback panel where analysts could tag results as "accurate," "false positive," or "missed anomaly." This feedback became a live training set.
5. **UI Deployment with Minimal Friction**
   Lastly, we delivered the full solution through a web-based dashboard using Streamlit. The client's analysts could filter, review, and act on flagged transactions without needing technical training.

With all layers in place, the system went live. Running fully integrated, learning continuously, and surfacing the right anomalies faster than ever.

Key Outcomes

The implementation of INTECH's Integrated Customs System turned guesswork into guided action. Within a few weeks of deployment, the client began seeing improvements and how confidently they made decisions.

Here are the key outcomes:

70% improvement in anomaly detection accuracy: The AI models flag high-risk transactions that were previously missed, reducing exposure to compliance violations and illicit trade activity.

0.6 to 0.8% of transactions are flagged as high-risk from a base of 500,000 records: This is a precise slice of the data, focusing analyst attention exactly where it is needed without creating alert fatigue.

Manual review load cuts by half: With better scoring, clearer risk visibility, and contextual alerts, the client's team spends less time second-guessing and more time investigating real threats.

Behind these results was a carefully chosen set of tools and technologies. Where each one is selected to support precision, speed, and ease of use for the client's team.

Tools and Technologies Used

INTECH combined reliable development frameworks with scalable machine learning platforms to ensure performance, transparency, and smooth deployment.

- **Python:** Used as the core programming language to build machine learning models, perform advanced data analysis, and support backend development of the ICS.
- **Scikit-learn and XGBoost:** Powered model training, evaluation, and prediction pipelines. These libraries provided the flexibility and speed needed for fast iteration and deployment of supervised and unsupervised models.
- **Pandas and NumPy:** Handled large-scale data wrangling and statistical calculations, making it easy to extract features, normalize values, and build a reliable data foundation for modeling.
- **Streamlit:** Enabled the creation of a clean, interactive web interface, allowing analysts to monitor flagged transactions, provide feedback, and view anomaly insights without writing a single line of code.