

A Framework of Expert System for Mitigating Financial Frauds and Cybercrimes



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ABSTRACT: *To prevent the financial fraud, and money motive offenses, we have introduced an expert system. Many earlier researchers also have developed such models and practicing it. We in this work, have described some issues relating to the current problem and proposed a common country-specific approach for developing an expert system. We expect good impact of the proposed security model for financial frauds and cybercrimes.*

Keywords: Contraband, Expert System, Tax System, Smuggling, Financial Fraud

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1. Introduction

A correctly functioning tax and customs administration and its related systems is crucial for the national security of any country. In this contemporary globalized world, there is a constant need for increasing the measures which would guarantee the effective work of the tax and customs administrations. Upon entering the EU and expecting to join the Schengen group, Bulgaria has become an external border for the European community. An increase is expected in the interest of criminal organizations attempting illegal transborder activities. The criminal organizations can afford the latest technology, and their illegal activities finance lucrative relationships with key decision-makers, experts, IT specialists [1, 2, 3, 4].

International criminal cooperation makes detection and termination of such schemes even more difficult. The customs and tax administration is countering smuggling and contraband by:

- Performing routine checks at border points;
- Customs intelligence and investigations;
- Special officers and informants in order to combat customs and tax fraud and violations;
- Processing of customs declarations and company financial reports via the tax administration.

The main drawback of the above measures is that they are being done sporadically or during campaigns, following a signal or request, which means that:

- The offense is investigated after its completion, i.e. the revenue is received and the damages are done;
- Collection of evidence is hindered, as attempts are made at cleaning company and personal records; it is difficult to establish accurate type and quantity of the goods etc.;

The processing is done by a person and the human factor is present, allowing for possibility of corruption, extortion, influence etc.

2. Expert Systems for Detecting Financial and Customs Violations

Due to the electronic nature of the information relating to financial transactions and customs activities, expert systems for detection of trans border violations exist in many countries, These information systems use financial and customs data mining and generate possible customs violations and money fraud by searching for irregularities within certain quantities. Such systems are difficult to port or even adapt in Bulgaria because of different:

- *legal base* – customs, financial etc.;
- *databases of different administrations* – Varying formats of data gathering, data consistency. It is possible that a foreign expert system uses electronic data which is not available in Bulgaria;
- *quantitative data and its related indicators*. For example Bulgaria cannot be compared to the similarly sized Netherlands, nor with the dramatically different Brazil. Some indicators may be utilized with Romanian ones, albeit at a different ratio;

Systems that use data mining can make correlations, detect tendencies and anomalies within databases containing customs declarations, financial transfers and sales data from the tax administration. Various mathematical apparatus can be used for the knowledge gen-158

Decision support expert System for Prevention of financial Violations, including statistical methods, fuzzy logic, neural networks, image recognition, machine self-improvement, genetic algorithms, decision-trees, associative rules etc. A starter-class of similar systems can search for unusual values or anomalies in the data stream

3. Precursory Data Analysis

In relation to all of the above, it is suggested that an integrated expert system for detection of financial, tax and customs violations is designed and implemented, which would process and analyze in real time the movement of documents, financial flows and goods. In order to accomplish that, a criterion system is needed which would include various indicators. Based on this system are the so called indicators for possible fraud. The following data is processed: goods, payments, supporting documents, dates, companies, and other information including banks, shipping companies info, warehouses, customs intelligence data and also wire-tapping.

Movement of the goods . Goods and accompanying documents are verified. There are standard routes for international shipping. The following data is examined:

Trade chains:

- producer – wholesaler – seller – client;
- producer – wholesaler – producer;
- producer – wholesaler – exporter;
- importer wholesaler – seller – client; Searching for data anomalies within:

- *quantity* – Sudden increase or decrease in operating balances, import/export levels or sales. Every deviation (anomaly) is an indicator for unusual situation and must be investigated further;

- *no economic logic* – An example could be excessive shipping charges or unusual routing, misleading value, re-exportation of the capitals and goods to the country of origin or to a country where similar goods are cheaper, cyclic movement of money and goods.

Document Processing

A search for the following is done:

- *relations to compromised companies* – including companies owned or run by people/shareholders which have a history of customs fraud;

- *double accounting* – used by the companies in order to conceal tax and customs fraud;

- *forged or fake documents* – companies are forging documents related to goods' origin and quality of services.

Finance and Cash-flow

The aim is to analyze cash-flows in order to detect anomaly (irregularity) within the flow of goods and documents. The following is processed:

- *nominal wire transfers* – related to companies' attempts at covering customs or tax fraud. Usually somebody makes unusual and large bank withdrawals in cash from a company's account, international transactions or unusually high-priced consulting services. Usually exact shipping or transport data is missing;

- *inconsistency between cash and goods flows* – such behavior usually indicates selling of contraband goods and/or goods for which state collectables are owed (VAT, excise, duty etc.). Companies and shareholders.

In order to cover large transactions or deals, a set of companies is used or new companies are being registered.

Analyzing companies and related persons can point out in the direction of possible risk company or behavior.

Additional Information

Additional information may be obtained from the following sources:

- *intelligence information* – mobile data interception, GPRS, internet data, bank statements and transactions, wire-tapping. "Mole-searching"

- Introducing various disturbances in order to observe the behavior;

- *movement of vehicles* – processing GPS data, border points data, traffic cameras.

4. Structure of the Systems

A structure of the proposed system is given in [4]. Information is received via different administrative databases i.e. tax administration, customs, statistics and special sources (DB0,..., DBn). Different databases are integrated through Common Database API. The normalized data is transformed into metadata and organized into Multidimensional cube with its own API. The specialized On-line Analytical Processing (OLAP) engine is looking for correlations pre-set by the user via user interface.

5. Conclusion

The benefits of implementing such a system are obvious:

- Eliminating the human factor in investigating customs violations and disseminating valid and timely information to the competent authorities.
- Reducing the risk and preventing of trans border illegal financial transactions and fraud
- Monitoring and possibly eliminating or reducing the illegal movement of goods, money and give the information to the customs, tax authorities and the police.
- Reduce of the risk of importing /and consuming/ potentially harmful goods and/or foodstuff;
- It is possible to design a mobile app along the user interface in order to notify regional/local

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