Smart Trade Logistics - Compliance as an Opportunity

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Abstract. Facilitation of trade logistics aims at simplification and harmonization of border procedures and related documentation. This is an accelerator for global trade and economic growth and therefore a priority in global trade policy. Trends in logistics and supply chain security and innovations in European customs policy offer great opportunities to increase the efficiency of trade logistics. IT innovations play a crucial role in the realization of these merits. This paper presents a vision on how IT could reap these benefits, with an emphasis on two research projects that specifically address this challenge: CASSANDRA and Extended Single Window.

Keywords: Supply Chain Security, Trade Facilitation, Risk Management, Supply Chain Visibility, System-Based Control, Compliance, Single Window, Green Lanes, Trade Logistics

1 Introduction: Trade Facilitation and Trade Logistics

International trade is the cornerstone of our globalised economy. Global trade volume has increased considerably after the Second World War and equals almost $ 32 trillion in 2008 [1]. Chinese international trade has shown remarkable growth in the last decade. Between 2001 and 2010, the volume almost six folded from $ 510 billion in 2001 to $ 2973 billion in 2010 [2].

Trade facilitation aims at simplification and harmonization of international trade procedures. Trade facilitation looks at operational improvements at the interface between business and government and associated transaction costs. Efficient trade facilitation (e.g. increasing the efficiency of border procedures) can help lower trade transaction costs hence reduce the margin between domestic and international prices to benefit consumers and producers alike [3,4,5].

According to the OECD, trade transaction costs comprise both direct and indirect elements. Direct costs include mostly compliance costs related to supplying information and documents required for the movement of goods or related means of payment, and charges for trade-related services (e.g. trade insurance, port management). Indirect costs include procedural delays (time for customs clearance and cargo handling) related to the

market life of products, e.g. spoilage of agricultural products, product cycles for technology-intensive products. They also include the lack of predictability in the nature, application or interpretation of regulations, formalities and contracts, and costs of lost business opportunities, such as due to delays in a given country affecting the whole global production chain [6].

Trade facilitation has its intellectual roots in the fields of logistics and supply chain management. Whereas a narrow definition of trade transaction costs focuses on the ease and speed of customs procedures, a broader view also includes transportation, distribution and communication issues.

The last couple of years, this broader view is often referred to as trade and transport facilitation, where the focus is not only on customs procedures, but also covering the logistics procedures and documentation [7]. We call this the facilitation of trade logistics, meaning the management of international flows of goods, and related documentation and payments, with a focus on reducing direct and indirect logistical costs through the simplification/harmonization of procedures and documentation.

2 EU Custom Innovations

The international Customs World has changed its scope drastically in the last years, with increased attention to safety and security of both people and goods, following the 09/11 terrorist attacks. This trend is established by the USA by introducing measures like CSI, C-TPAT, the 24-hour-rule and possibly 100% scanning [4]. The taken measures should not lead to hermetically closed borders, with corresponding obstacles for Trade and Logistics. Instead, parties who have proved to be reliable and transparent can make use of simplified Customs procedures (e.g. Green Lanes), with more or less free passage of goods. The World Customs Organization (WCO) has also adapted these developments.

In 2005 the WCO has accepted the ‘Framework of Standards to secure and facilitate global trade’. The implementation of the Framework will not only lead to a safer world trade regime, but will also launch a new vision on working and cooperating for both Customs Authorities and trading partners [8].

As early as in 2003 the EU has published two Announcements on this matter, one about simplified and paperless Customs procedures, the other dealing with Customs role in the integrated management of the external borders. The starting points of these Announcements are elaborated in the eCustoms Program of the EU [9,10].

EU Customs services handle nearly 20% of world imports, some 1,545 million tonnes of sea cargo and 3 million tonnes of air cargo each year. In 2007, EU Customs offices processed 183 million declarations. In addition to collecting over €12 billion annually, EU member states administrations (MSAs) have to guard against smuggling, fraud, environmental contamination and counterfeiting. They protect endangered species, the area’s cultural heritage, and intellectual capital rights. And they collect trade statistics to

help policymakers detect economic trends. Most of these operations have been document- and paper-intensive – that is, until the coming of the EU's eCustoms initiative [11].

The realization of the eCustoms Program goes hand in hand with the modernization of the Customs Code. Both are combined into the Multi Annual Strategic Plan (MASP). This plan contains a list of projects to be realized by the Member States and the European Commission. The MASP should be completed in 2014. These projects will result in a number of custom innovations, including Risk Based Approach, Authorised Economic Operator, System Based Auditing, Single Window and Centralised Clearance.

2.1 Integrated Risk Assessment Approach

The EC wants to develop an integrated risk assessment approach for supply chain security and trade between Europe and the rest of the world. A risk-based approach in designing and managing efficient and secure supply chains on the basis of high quality, integral monitoring data on cargo flows and container integrity is more effective and efficient as scanning 100% of all incoming containers.

The National Customs Authority of the first port of call in Europe performs the security analysis based on the pre-arrival information submitted 24 hours before departure from the port of origin. The results of this risk assessment are being forwarded to the other customs authorities in Europe. Because of this procedure, the EC and its Member States want the risk assessment to be performed according to a common methodology and approach. Also, this approach should if possible build upon the approach proposed in the Import Control System of the EU, which is based on using the information from an Entry Summary Declaration (ENS) and has to be submitted at least 24 hours before departure from a foreign port to a European Customs authority.

The research project CASSANDRA has to answer the question how such an integrated approach for risk assessment would look like and function and whether the ICS system and ENS procedure provide a good basis for such an integrated risk assessment. An elaboration of this project is presented later in this paper.

2.2 Authorized Economic Operator (AEO)

AEOs will be able to benefit from facilitations for customs controls or simplifications for customs rules or both, depending on the type of AEO certificate. Recognition would enable businesses to have their consignments fast-tracked through customs controls (green lanes), though this claim has to be confirmed in reality by being subject to less government controls. If a consignment is selected for examination they will receive priority over non-AEOs. AEOs or authorized carriers, freight forwarders or customs agents acting on their behalf may opt to use a reduced data set when lodging entry or exit summary declarations. The Modernised Customs Code also allows the application of

simplified procedures if Authorized Economic Operators perform self-assessments and take measures to reduce their risks.

2.3 System Based Auditing (SBA)

System Based Auditing is an audit methodology designed to check upon the adequacy and effectiveness of internal controls in both financial and non-financial systems. It covers process and EDP (Electronic Data Processing) auditing, or IT auditing. This way of auditing can be integrated with AEO and other certification schemes. In such an approach, customs audits the implementation of built-in controls by an AEO. Many of these built-in controls are already certified by other certification schemes (e.g. ISO) within organisations. The way customs could apply SBA in practice is one of the research subjects addressed by the Dutch project Extended Single Window.

2.4 Single Window

The objective of a Single Window as described in the eCustoms policy is to enable economic operators to lodge electronically and once only all the information required by customs and non-customs legislation for EU cross-border movements of goods.

The eCustoms Single Window concept aims at co-ordination, by customs, of all cross-border operations and the sharing of related electronic documentation with all border agencies involved in the movement of goods across community borders. The envisaged national single windows will be connected to one another and will be supported by the Single Electronic Access Point (SEAP). The SEAP will allow traders to lodge their electronic pre-arrival/pre-departure, summary and full customs declarations via one single interface of their choice which connects their system with all Member States' customs systems.

The data is automatically made available to any customs office responsible for the place at which goods have been, or are to be, presented, irrespective of the Member State concerned. SEAP can also be used as the entry point managed by one agency which informs the appropriate agencies, resulting in combined controls. The Single Window concept obviously offers more opportunity then just electronic documentation with border agencies, but also offers benefits in the exchange of information between commercial supply chain partners in order to optimize planning processes.

2.5 Single European Authorization/Central Clearance

A Single Authorisation for a simplified procedure provides the possibility of using the local clearance procedure or the simplified declaration procedure to perform the customs formalities in the Member State where the economic operator is established, for his

imports/exports wherever they occur in the Community. A transfer of the goods to the authorised location is possible; subsequently a periodic supplementary declaration is lodged.

A number of customs authorities have, on the basis of agreement with each other, authorised centralised clearance involving simplified entry of goods, which are located in another Member State, for the customs procedure concerned, notably for inward processing, customs warehousing and, less frequently, for release for free circulation. However, these arrangements between Member States are difficult and take a long time to be implemented, as they require long negotiations and considerable compromise between Member States, in order to find the best way of overcoming practical and legal difficulties.

In 2005, the Customs 2007 Project Group on Single European Authorisation (SEA) was given a mandate to examine a common approach in order to encourage the use of Single Authorisations, not only for customs procedures with economic impact and end-use, but also for simplified procedures at import and at export, including cases in which a customs procedure with economic impact is followed by release for free circulation. This is a major facilitation measure as the economic operator can:

- concentrate in-house customs expertise at a single location,
- deal with only one customs administration and
- conduct the formalities etc. in only one language.

As it looks now, realization of Centralised Clearance is far ahead. Some of the issues to be solved before implementing the concept in practice are related to difficulties to centralize parallel processes regarding declaration of VAT and duties at import, and statistical reporting, which are not yet harmonized and show many differences between EU Member States. As long as these issues are not solved, Centralised Clearance offers not much added value compared to the bilateral approach of Single Authorisation for Simplified Procedures. Also other issues regarding distribution of the cost of generating and distributing the taxes and duties among the Member States, trade restrictions based on national regulation and cultural differences between Member States seem to slow down fast implementation of the ambitions formulated in the Modernised Customs Code [12].

3 IT Solutions to Reap the Benefits of Customs Innovation

Several existing solution providers offer fragmented, non-interoperable closed system solutions to comply with requirements for realizing Single Window, System Based Auditing, and Coordinated Border Management. These include a wide range of supply chain visibility solutions, customs solutions, port community systems, etc. However, there is a lack of an integrated interoperable solution framework built on common semantics and standards, resulting in high costs for businesses to comply with current and future

requirements. Compliance to border crossing procedures and regulation requires investment in IT solutions for data exchange and data sharing. Such investment is seen by most trading partners as a cost factor, but there is another side of the coin.

Advanced IT solutions based on semantic models and open standards, like the WCO data model, agreements on IDs (UCR, MRN, container ID, etc.), new technologies like Platform As A Service (cloud computing) and choreography in chains (based on open source) enable management, storage and processing of large data quantities, whereas crawling & indexing of data (search technology approach according to Service Oriented Architecture) support effective integrated risk management approaches.

Such advanced IT solutions not only considerably reduce the cost of compliance, but can also offer new business opportunities like centralized clearance. Moreover, the enhanced supply chain visibility required by customs for their risk based approach can also offer benefits for supply chain partners. As such, it not only enables them to apply the concept to compliance aspects of Corporate Social Responsibility (e.g. fair trade partnership, product safety, logistics carbon footprint analysis, but also bringing synchromodal hinterland transport services to realization. Thus, it offers ‘three for the prize of one’!

4 Research Projects CASSANDRA and Extended Single Window

Two research projects dealing with IT and customs innovations require special attention: CASSANDRA and Extended Single Window. These projects develop the proof of concept for applying semantic web technology for interoperability in freight logistics, both from technical interoperability as from business interoperability perspective.

4.1 CASSANDRA

CASSANDRA is a large collaborative European research project, co-funded by the European Commission, running from 2011 until 2014. The project is led by TNO and includes 28 partners from knowledge institutes, port authorities and port community systems (from Rotterdam, Bremen, Barcelona and Setubal), terminal operators (e.g. European Container Terminals), freight forwarders (DHL, Kuehne+Nagel), logistic service providers, IT and trade solution providers (SAP, IBM, Descartes, Intrasoft, Atos), standardization bodies (GS1) and consultants.

CASSANDRAs main objective is to enable and facilitate the combination of existing and new information sources in supply chains for containers into new and better visibility that allows the assessment of risks by business and government [13].

The proposed solution is to combine new tools, hardware, visibility platforms and other technical solutions in such a way that business and government are enabled to fully adopt a risk based approach to their operational activities, and in particular to combine

two strategic customs approached: the Risk-based approach with the System-based audit approach. As such, it is a much more balanced approach then the US driven approach towards 100% scanning of incoming containers. In its approach, CASSANDRA builds upon the research findings from previous projects like INTEGRITY and ITAIDE.

Currently there is a wide range of information systems along the supply chain collecting and exchanging data and information between different stakeholders (business and authorities), including tracking and tracing systems, supply chain visibility systems, customs declaration systems, maritime/port safety systems, Port Community Systems, supply chain planning/ERP systems, etc. European development of risk assessment instruments in business is in its infancy and governments have little insight/knowledge on risk based approaches in business and reliability of these approaches.

In practical terms CASSANDRA will build the seamless, electronic data 'pipeline' linking the seller/consignor and the buyer/consignee, thus unlocking data from the source for risk assessment purposes. The first idea from such a data pipeline were developed within INTEGRITY and is being further developed in CASSANDRA. Today, customs builds its risk assessment mainly on information from Entry Summary Declarations (ENS), which uses Ship Manifests and Bill of Lading data as the source. In these documents, the data quality of what cargo is being moved is often poor, freight forwarders are not interested in what exactly is being shipped in containers and related documents describe corresponding data fields with 'said to contain' a number of boxes, or STC. This Bill of Lading term is often being used so that the carrier acknowledges the receipt of stated number of packages but is unaware of the exact nature, quantity, and/or value of their contents. This is an important issue because, in case of an insurance claim, the carrier's liability may be limited only to the number of packages (for which a standard compensation is paid) and not to the total value of the claim. Therefore, both freight forwarder and ocean carrier have no interest in enhancing the visibility of what is inside the containers for commercial purposes. However, US Customs insists that reporting carriers cannot use these words in the description of goods appearing on manifests submitted under AMS Reporting. CASSANDRA is exploring ways to capture this data in other ways for customs based risk assessment.

CASSANDRA will facilitate the adoption of a risk based approach in designing and managing efficient and secure supply chains by business. In addition, CASSANDRA will facilitate a dialogue between business and government to gain acceptance of the risk based approach and risk self-assessment by business for supervision by government agencies. This principle of governments' piggy backing on businesses' own risk assessment, an idea that was developed in ITAIDE will be further developed in CASSANDRA and is becoming a central theme in a number of long term strategies among supervision agencies, such as customs and police [14].

The project will demonstrate and implement this approach to risk assessment in three so-called living labs. These are set up around major European tradelanes: Asia – North West Europe, North Europe – US and North Africa – Southern Europe. In CASSANDRA, the focus is on the role of freight forwarders in capturing the data for risk assessment.

4.2 Extended Single Window (ESW)

Extended Single Window is a Dutch research project co-funded by the Dutch Institute for Advanced Logistics (DINALOG), led by TNO and runs from 2010 till 2014. The project involves top researchers from several Dutch universities, Dutch customs, the two Dutch mainports (Rotterdam and Schiphol Airport) and their community systems Portbase and Cargonaut, associations for Shippers (EVO), air freight forwarders (ACN) and fruit and vegetables traders (Frugiventa), and several individual shippers (Flora Holland, Océ, Arrow, Herbalife, Mattel, Doehler).

The vision in ESW is to develop an integrated coordinated border management solution for ports and airports integrating with previous and subsequent procedures for reliable, secure, and cost effective logistic chains as a prerequisite for the Netherlands to serve as an excellent gateway to Europe. This coordinated border management, 'Extended Single Window', requires efficient and reliable information for effective joint supply chain planning by shippers, goods owners, transportation companies, forwarders, terminals and other logistic service providers and to use this information to meet government laws and regulations in a cost effective way, e.g. customs and agricultural procedures and VAT. Re-usability of business data by all government authorities for all types of goods movements is key in this approach [15].

The objective of the project is to create reliable, secure, and cost effective logistic chains throughout the Netherlands supporting all applicable regulations and procedures, by embedding events for government controls in supply chains based on safeguards in processes of certified supply chain partners, re-use of business transaction data by government agencies, and enabling Port or Business Community Systems to behave as one Information Service Bus with innovative IT. Also in this project, secure logistics chains requires the availability of reliable information on the contents of containers for risk assessment performed by Customs, thus finding alternative solutions for the 'said to contain' issue described earlier.

The aim is to identify which safeguards for government controls need to be defined and how they can be supported by advanced IT with contribution of business and government authorities and in close cooperation with various demonstration projects (single window, Authorized Economic Operator (AEO)/system-based controls, centralized clearance/Single Authorization for Simplified Procedures). The approach is expected to lead to a drastic reduction of physical inspections of goods in the mainports by coordinated planning of government authorities, reliable transport to and from hinterland hubs, and administrative cost reduction.

Basic research in advanced information technologies is in Event Driven Architecture with a Logistic Interoperability Ontology to realize piggy-backing and data pull. The research objectives are:

- Design of a smart auditing framework based on Event Driven Architecture and Service Oriented Architecture for logistics and its governance. This includes constructing a model for implementing events as safeguards in business processes to

meet government regulations and procedures in line with the MCC and other applicable (EU) regulations.

- Development of a flexible and scalable Event-Driven Governance and Information Orchestration (EDGIO) model to ensure that information is available where and when needed. Such a model captures organizational and technical issues. The EDGIO model can be used in import/export situations as part of the event driven Information Service Bus (ISB).
- Construction of a Logistics Interoperability Ontology Framework as the basis for the Virtual Logistic Data Space. The ontology is used for describing semantics (1) shared amongst all actors in logistics chains and (2) supporting individual actors in their business processes and mapping their internal data to the shared concepts. Such an ontology framework may consists of components defining the semantics of individual (physical) objects and will build on international developments like the WCO data model and the UN/CEFACT Core Components. Further research is required into the fact that it is required to define different ontologies based on common components of the framework, whereas each ontology defines a specific view on the framework, e.g. an interoperability ontology, an ontology for an enterprise import/exporting for instance electronic equipment and for an enterprise importing/exporting toys. Part of the research will also be on the potential impact on ease of development and application of ontology constructed of components with distributed maintenance.
- Proof of Concept of the Information Service Bus built on the Event Driven Architecture and the Logistic Interoperability Ontology that will have a distributed nature in its realization. From a logistic perspective, the Information Service Bus will act as a virtual logistic data space in which actors share relevant information triggered by events of their business processes. In this way, the ISB will actively support data and process integration.
- Evaluation of the feasibility of the aforementioned concepts by (1) constructing different business models and (2) improving the figures mentioned in section 1.4.3 of this proposal for the added value to supply chain coordination in the Netherlands. The business models will illustrate different implementations of the concepts with their advantages and thresholds for different logistic actors.
- Exploration of the innovation potential of the Information Service Bus and the Virtual Logistic Data Space in terms of audit process redesign and an evaluation framework based on explicit control effectiveness and costs criteria.

In contrast to CASSANDRA, the focus in Extended Single Window is on the role of shippers and consignees in capturing the data for risk assessment.

5 Conclusion

IT and customs innovations offer not just an opportunity to considerably reduce the cost of compliance to border procedures, but also enable new custom facilities and related business opportunities like centralized clearance. Moreover, these solutions can also provide the enhanced supply chain visibility required by customs for their risk based approach, which can also be used by other supply chain partners. As such, compliance is no longer seen as a cost, but as an opportunity.

In order to reap these benefits, research projects like CASSANDRA and Extended Single Window are necessary to develop the prototype solutions and proof of concept, demonstrate them in practice along different trade lanes, work out the business case and business model considerations and prepare for wide scale deployment. In addition, these projects will address several other related research questions, for instance regarding the benefit logic and business case of these concepts.

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