2. OVERVIEW OF DATA HARMONIZATION

2.1 TRADE FACILITATION AND DATA HARMONIZATION

International trade procedures encompass all activities ranging from the ordering of goods, physical transfer of goods, and payment for goods along the supply chain (UNECE, 2001). They entail activities, practices and formalities involved in collecting, presenting, communicating and processing data to fulfill business and regulatory requirements prior to and during the movement of goods across borders (OECD, 2002).

Trade documents and data, whether in paper or electronic format, are important as they provide the means to exchange information associated with commercial, transport, regulatory or financial procedures. Traders often face complex and myriad formalities and documentary requirements. They have to deal with repeated requests for the same information. Cumbersome, repetitive and non-standardized trade documents and data required for border crossings are identified by the business community as a major deterrent to entering certain markets (UNESCAP, 2009).

According to the Asia Pacific Economic Cooperation (APEC) Business Advisory Council (1996), each international trade transaction requires an average of 40 documents to meet rules and regulations set for international trade and transport. These documents are made up of approximately 200 data elements of which 15 per cent are repeated at least 30 times and 60 to 70 per cent are repeated more than once.

These documentary requirements are costly and are a major cause of delay in cross-border operations. A study commissioned by the European Commission states that the costs of complying with these requirements amount to accounting for 3.5 to 7 per cent of the value of goods (OECD, 2002). It can be as high as 10 to 15 per cent, if there are typing and other errors (UNCTAD, 1994).

Trade facilitation is recommended by many international and intergovernmental organizations as a strategy to remove the redundancies and bottlenecks in international trade. Although the scope of trade facilitation is defined differently from one organization to another, what is found in many is that the harmonization and standardization of information and information flows associated with international trade transaction are important elements of trade facilitation. As illustrated in Table 2.1, most organizations regard the harmonization and standardization of information and information flows associated with the international trade transaction as one of the key improvement measures for facilitating trade.

Harmonizing data used in trade documents and aligning them with international standards would help automate and streamline trade procedures. Reducing information requirements can benefit the trading community through improved quality and timeliness of data submissions. Streamlined trade procedures and documents can also significantly help reduce transmission cost and improve trade competitiveness.

In the context of trade facilitation, the scope of data harmonization covers the data requirements of all stakeholders in the international supply chain. According to UNECE (2001), stakeholders of the international supply chain are categorized into four groups. They are:
Data Harmonization and Modelling Guide for Single Window Environment

- A supplier (exporter/seller) who sells goods or services as stipulated in a sales contract;
- A customer (importer/buyer) to whom goods and services are sold as stipulated in a sales contract;
- An intermediary who provides commercial, financial, and/or transport services within an international supply chain, such as freight forwarder, customs broker, third party logistics service provider, express integrator, carrier of all modes, port and terminal operator, inland container depot, bank, insurance company, Information Technology (IT) value-added service provider, bank and financial institutions; and
- An authority (including an authorized private inspection agency) of the exporting country, the importing country, and the country in transit, who monitors cross-border movement of goods in a way that reflects national and international public interests.

The United Nations Layout Key for Trade Documents (UNECE, 2002) provides a list of key documents prepared and used by stakeholders in different stages of the international supply chain and categorizes those documents into four document families which are:

- **The Commercial transaction document family**, which includes documents applied between commercial parties in the production, sale and purchase phases of a transaction. The buyer and the seller are key originators of documents in this sector.
- **The Payment document family**, which includes documents that are exchanged between partners in international trade and their banks as well as between banks to

### Table 2.1. Definition of trade facilitation

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<tbody>
<tr>
<td>The simplification and harmonization of trade procedures</td>
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<td>✓</td>
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</tr>
<tr>
<td>The harmonization and standardization of information and information flows associated with the international trade transaction</td>
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<td>✓</td>
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<td>The use, standardization, and improvement of physical infrastructure and facilities</td>
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<td>The harmonization of applicable laws and regulations with the international standards</td>
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<tr>
<td>The automation of trade procedures</td>
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<td>The removal of barriers to the mobility of business people</td>
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process payments for commercial transactions.

- **The Transport and related services document family**, which includes documents relevant to the physical international movement of goods. It covers documents used in 1) the forwarding and handling of goods activities in terminals, warehouses and ports, 2) payment for such intermediary services, and 3) cargo insurance.

- **The Official controls document family**, which includes documents that government authorities in exporting country, importing country, and country where goods are in transit use as one of instruments to facilitate the control of international goods flow.

Given the complex scope of trade facilitation with many stakeholders involved, the efforts required to complete a full scope of data harmonization can be extensive. Under resource constraints, a phased implementation of data harmonization may be considered (see Section 6.3 for further explanation).

### 2.2 WHAT IS DATA HARMONIZATION?

In our daily lives, we often encounter situations where we have to provide our personal or business data in a certain form. As illustrated in Figure 2.1, a form mainly consists of 1) a **data element name** which is also known in UNECE Recommendation No. 1 as a *field heading* expressed in a plain language of text or code specifying the nature of the data in a data field and 2) a **data field** which is an area designated for a specified data entry.

There is always a possibility that each of us interprets each data element differently. For example, a delivery date can mean different things to different parties.

- For a buyer, a delivery date can be "date and optionally time when goods are requested to be delivered."
- For a seller, a delivery date can be "date and optionally time when goods are estimated to be delivered."

### Figure 2.1. Components of a form

<table>
<thead>
<tr>
<th>Field heading or Data Element Name</th>
<th>Data Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>A field identifier expressed in plain language, in full or abbr.</td>
<td>An area designated for a specified data entry</td>
</tr>
</tbody>
</table>

**Form: A data carrier designed to carry a visible record of data entries**

1. Goods consigned from (Exporter’s business name, address, country)

   Reference No.
   ASEAN TRADE IN GOODS AGREEMENT/ ASEAN INDUSTRIAL COOPERATION SCHEME CERTIFICATE OF ORIGIN
   (Combined Declaration and Certificate)
   Issued in (Country)
   See Overleaf Notes

2. Goods consigned to (Consignee’s name, address, country)

3. Means of transport and route (as far as known)
   - Departure date
   - Vessel’s name/ Aircraft etc.
   - Port of Discharge

4. For Official Use
   - Preferential Treatment Given Under ASEAN Trade in Goods Agreement
   - Preferential Treatment Given Under ASEAN Industrial Cooperation Scheme
   - Preferential Treatment Not Given (Please state reason/s)

Signature of Authorised Signatory of the Importing Country
For a driver delivering packages, a delivery date can be “date and period of time during which goods are scheduled to be delivered.” It can also be “actual date and time when goods are delivered.”

Without clear instructions, we provide data for each field heading in a format that we assume appropriate. For example, the data regarding a delivery date of 20 August 2010 can be expressed in various representation formats, i.e.

- DD/MM/YY: 20/08/10
- DD/MM/YY (Buddhist year): 20/08/53
- DD-MM-YYYY: 20-08-2010
- MM/DD/YY: 08/20/10
- MM-DD-YYYY: 08-20-2010
- YYMMDD: 100820
- YYYYMMDD: 20100820
- YYYY-MM-DD: 2010-08-20
- DD MONTH YYYY: 20 August 2010
- MONTH DD, YYYY: August 20, 2010

Party A may provide data for a delivery date using DD/MM/YY format while Party B may use MM/DD/YY format. The provision of data under the same category in different representation formats makes electronic sharing and integration of data within an organization and across organizations incompatible.

In addition, the meaning of a data element can be addressed using different vocabularies. “A hereditary name common to all members of a family,” for example, can be referred to as surname, last name, and family name. The identical meaning of these three different words can be understood by human beings but not by different computer applications built on different platforms. Without reconciling different data elements of identical meaning, electronic sharing and integration of data becomes complex and costly.

Data harmonization is an act of reconciling the definition and representation formats of data elements in a domain of interest. It entails a set of activities that improves the consistency in the use of data elements in terms of their meaning and representation format. Through data harmonization, a set of core data elements (data elements expressed using different vocabularies but with identical meaning) can be extracted. Description of each core data element inclusive of its definition and representation format can then be formalized. Examples of core data elements are shown in Figure 2.2.

Sharing common data with business partners is one way to improve the efficiency of data usage. By sharing common data with partners, those data can be reused in a way that benefits organizational objectives and goals. An electronic document can be a data carrier that facilitates data sharing and reuse beyond what a paper document can offer.

2.3 OBJECTIVE AND GOAL OF DATA HARMONIZATION

The objective of data harmonization, in the context of trade facilitation, is to eliminate redundancies and duplication in international trade data.

Data harmonization enables data interoperability among individual information systems in the international supply chain, including Single Windows, by producing a set of harmonized core data elements with semantic standard.

2.4 BENEFITS OF DATA HARMONIZATION

The standardization of data requirements formalizes the definition and representation format of data elements used by various stakeholders. Clear definitions of data elements enhance the way in which data ele-
ments are interpreted. A clear representation format serves as a guideline for providing accurate data. They contribute to use of better quality data in the business process and reduce the risk of errors, costs and delays.

According to a case experience of the European Commission Taxation and Customs Union,6 the process of standardizing data requirements leads to the discovery of redundancy in data requirements and core data elements. A set of these core data elements then serves as input for the development of a Single Administrative Document (SAD). Given that a SAD contains a minimum list of data elements that every authority responsible for administering border control needs at different points in the trading process and a maximum list of data elements that some authorities may require, it abolishes the use of different administrative forms, removes duplicate data requirements, and simplifies data collection in a border control process.

The outputs of data harmonization provide a basis for coordinated development of various information systems used in the different stages of the international supply chain domain. It sets the semantic standard for different development teams within the trade community to adopt as a basis in developing different information systems.

The results of data harmonization also provide a basis for automating a seamless Business-to-Business (B2B), Business-to-Government (B2G) and Government-to-Government (G2G) information exchange in a Single Window facility; data harmonization provides semantic rules that can be used to govern domestic sharing and integration of electronic data at least within the border. If all the information systems in the supply chain use the same set of data attributes and semantic rules, they can commonly interpret the exchanged data and automatically process it to achieve their intended business objectives.

In summary, the benefits of data harmonization are as follows:

- It provides a common basis for standardizing data for import, export and logistics information.
- It reduces data redundancy and costs of data exchange.
- It ensures data compatibility and enables data interoperability among stakeholders, resulting in further facilitation of trade procedures.
- It facilitates the establishment of Single Window facilities and cross border data exchange among Single Windows.

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