Addressing Technical Issues for Paperless Trading and SW Implementation

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Somnuk Keretho is an assistant professor of Computer Engineering Department, and the founding Director of Institute for IT Innovation (INOVA), a research and development institute of Kasetsart University, Thailand, specializing in ICT-enabled innovation, trade facilitation and e-logistics initiatives including Single Window strategic planning and implementation, enterprise information architecture for e-government and e-business, business process analysis and improvement, data harmonization and modeling, ICT-related standards and interoperability, e-transaction related laws, and process-oriented quality software engineering.

He has leaded several ICT strategic projects at organizational, national and regional levels. For the past seven years, he has assisted Ministry of Information and Communication Technology, National Economic and Social Development Board, Ministry of Transport, Port Authority of Thailand, and Ministry of Agriculture in architecting “Thailand Single-Window e-Logistics” related projects including its national e-logistics strategy, implementation plans, interoperability and standards, harmonization and simplification of trade and transport-related documents and procedures, automatic electronic-gate systems development for the Bangkok Port and the Leamchabang Sea Port, and several related software development projects.

Several of those projects are being aligned with regional and international collaborations, in which Dr. Keretho has actively engaged mostly related to trade facilitation, single window and paperless trading initiatives through UNESCAP, UNECE, APEC and ASEAN. He has played several roles in catalyzing the creation of and actively contributing to the United Nations Network of Experts for Paperless Trade in Asia and the Pacific (www.unescap.org/unnext), and providing several technical supports to the APEC Paperless Trading and ASEAN Single Window Initiatives. He is the main author of the UNNExT Business Process Analysis Guide, the UNNExT Data Harmonization Guide and the UNNExT Managerial Guide for Single Window Planning and Implementation.
To introduce technical issues (what are they, and why they are important) related to SW Implementation

- Process Analysis and Process Improvement
- Data Harmonization & Document Simplification
- e-Message Development
- System Interface & Interoperability
- Online Security
- Use of Technical Standards
- ...
We need to analyze and improve how these processes and documentation handlings are conducted to make these more efficient and effective.
### Documents related to Exportation of Rice

**from purchase order until the cargo container leaving the sea port**

- **Proforma Invoice** (35)
- **Purchase Order** (39)
- **Commercial Invoice** (51)
- **Application for Letter of Credit** (24)
- **Letter of Credit** (32)
- **Packing List** (25)
- **Cargo Insurance Application Form** (20)
- **Cover Note** (23)
- **Insurance Policy** (24)
- **Booking Request Form – Border Crossing** (25)
- **Booking Confirmation – Border Crossing** (30)
- **Booking Request Form – Inland Transport** (16)
- **Booking Confirmation – Inland Transport** (18)
- **Bill of Lading** (42)
- **Empty Container Movement Request (TKT 305)** (20)
- **Request for Port Entry (TKT 308.2)** (27)
- **Equipment Interchange Report (EIR)** (24)
- **Container Loading List** (28)
- **Container List Message** (32)
- **Outward Container List** (34)
- **Master Sea Cargo Manifest** (17)
- **House Sea Cargo Manifest** (37)
- **Export Declaration** (114)
- **Good Transition Control List** (27)
- **Application for Permission to Export Rice (KP. 2)** (24)
- **Sales Report (KP 3)** (21)
- **Application for the Collection of the Permit for the Export of Rice (A. 3)** (35)
- **Permit for the Export of Rice (A. 4)** (35)
- **Application for Certificate of Standards of Product (MS. 13/1)** (44)
- **Certificate of Analysis** (17)
- **Certificate of Product Standards (MS. 24/1)** (45)
- **Certificate of Fumigation** (21)
- **Application for Phytosanitary Certificate (PQ. 9)** (29)
- **Phytosanitary Certificate** (33)
- **Application for Certificate of Origin** (42)
- **Certificate of Origin** (38)

**36 Documents involving 15 parties, and more than 1,140 data elements to be filled in**

* Number in parenthesis is the no. of data elements
Conduct Business Process Analysis
- Exporting Jasmine Rice from Thailand -

16 days required for procedures & documents handling

Time-Procedure Chart

1. Buy - Conclude sales contract and trade terms
2. Obtain export permit
3. Arrange transport
4. Arrange the inspection and fumigation
5. Obtain cargo insurance
6. Provide customs declaration
7. Collect empty container(s) from yard

8. Stuff container(s)
9. Transfer to port of departure
10. Clear goods through customs
11. Handle container at terminal and stow on vessel
12. Prepare documents required by importer
13. Verify the accuracy/authenticity of exported cargo
14. Pay - Claim payment of goods

16 days required for procedures & documents handling

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Exporting Rice
(from purchasing time till the vessel leaving the port)

- 36 required documents (only 4-6 e-documents)
- 15 Stakeholders involved
- 14 big steps (123 small steps)
- 16 days needed (all together)
  - 6 days for regulatory procedures
  - 7 days for transport-related procedures
  - 12 days for traders, banks and insurance procedures
The issue is about Increasing National Trade Competitiveness by improving Import-Export/Transit Procedures and Documents Handlings among Government Agencies, Business Entities and Logistics/Transport Service Providers. This is called “Trade Facilitation” improvement (the third flow of logistics) (This is now the key national development agenda of most countries around the world.)
Some countries are easier & faster to trade, but some countries are more difficult to trade with.

Complications in terms of required documents and procedures, and time for exporting a standardized container of goods (regional averages)

As an example, the average time to export from OECD high-income Countries is about 2 times faster than the Middle East Countries, about 3 times faster than Central Asia Countries (on average).
Economic Impacts
because of the delay on trading across borders

- Each additional day of delay (e.g. because of trade logistics procedures) reduces trade by at least 1%


- “Direct and Indirect Cost from import/export-related procedures and required documents is about 1-15% of product cost.”

Business Process Analysis (BPA) must be conducted during the analysis of any SW project.

Indicators can help decision makers to understand the importance of efficient business processes for improving national competitiveness

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Kazakhstan</th>
<th>Iran, Islamic Rep</th>
<th>Turkey</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documents to export (number)</td>
<td>9</td>
<td>7</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Time to export (days)</td>
<td>76</td>
<td>25</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Cost to export (US$ per container)</td>
<td>3130</td>
<td>1275</td>
<td>990</td>
<td>625</td>
</tr>
</tbody>
</table>

Trading-Across-Border Ranking among 183 countries


The costs and procedures involved in exporting (and importing) a standardized shipment of goods are studied. Every official procedure involved is recorded - starting from the final contractual agreement between the two parties, and ending with the delivery of the goods.
Dr. Somnuk Keretho

ECO-ESCAP Joint Trade Facilitation Forum on Paperless Trade and Single Window Kish Island, 24 - 25 May 2012

### Time & Documents needed for export a standardized cargo* (DB 2012 Report)

#### Iran, Islamic Rep.

<table>
<thead>
<tr>
<th>Export Procedures</th>
<th>Duration (days)</th>
<th>US$ Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documents preparation</td>
<td>12</td>
<td>225</td>
</tr>
<tr>
<td>Customs clearance and technical control</td>
<td>2</td>
<td>175</td>
</tr>
<tr>
<td>Ports and terminal handling</td>
<td>4</td>
<td>225</td>
</tr>
<tr>
<td>Inland transportation and handling</td>
<td>7</td>
<td>650</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>25</strong></td>
<td><strong>1,275</strong></td>
</tr>
</tbody>
</table>

#### Thailand

<table>
<thead>
<tr>
<th>Export Procedures</th>
<th>Duration (days)</th>
<th>US$ Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documents preparation</td>
<td>8</td>
<td>290</td>
</tr>
<tr>
<td>Customs clearance and technical control</td>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>Ports and terminal handling</td>
<td>3</td>
<td>85</td>
</tr>
<tr>
<td>Inland transportation and handling</td>
<td>2</td>
<td>200</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>14</strong></td>
<td><strong>625</strong></td>
</tr>
</tbody>
</table>

#### Export documents

- Bill of lading
- Certificate of Origin
- Commercial Invoice
- Customs export declaration
- Insurance policy
- Packing List
- Technical standard certificate

* More documents will be needed for agriculture or dangerous goods.


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7 documents needed

5 documents needed

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Why trading across borders in some countries are more difficult, time consuming and expensive?

- Procedures and documents handling remain largely paper dependent
- Missing and incorrect documentation slows progress through the supply chain
- Keeping documents & freight in sync is complex and costly
- Multiple parties capturing the same data is inefficient and error prone
- We acknowledge other factors that makes trade in developing countries more difficult, including infrastructure, corruption, land locked, …(but these are not the scope of discussion in this forum)
Business Process Analysis & Improvement

Migrating from the “As-Is” process

- Understanding of the current situation
- Benchmarking with other countries
- Raising issues and priorities for improvement

A stepping stone for the creation of future better processes, e.g. Process Simplification

To the better & more efficient “To-Be” process
Why trading across borders in some countries are easier, faster and less risky?

Mainly because those countries gradually transform/reform their paper-based environments into Collaborative e-Government/e-Business platform.

Paper-based Environment  ➔  Paperless or e-Document Environment
We need to understand "As-Is" conditions in our own country.

About 80% of required documents are physical papers not electronic papers yet. Separate ICT islands

- Declaration
- Invoice
- Packing List

New Generation of EDI (ebXML MS/XML Messages/Digital Signatures)

Paperless Customs Declaration and Clearance Customs Dept

Web-Based Application (Certificate of Origin) Dept of Foreign Trade

Web-Based Application (Health Certificate) Dept of Livestock Development

Web-Based Application (Health Certificate) Dept of Fisheries

Browser (Request for C/O) except Shrimp (Request from Dept of Fisheries)

Browser (Request for Health Cert.)

Server

Exporter

Many Paper Documents

Paper Handling and/or Web-Based Application (Bill of Lading)

Carriers or other logistics service providers

A Case Example of Thailand in 2007
To propose a Conceptual Architecture* of the “To-Be” National Single Window

1. National Single Window
[Goal 1] e-Documents Exchange Hub

Technical interoperability protocols are needed, and common definitions of data elements, and semantic data structures (common data models) among different documents required by different organizations are required also.

One time submission for each data element but multiple usage for different purposes on different ICT platforms

* as initially proposed for discussion and feedback with key stakeholders in 2007.

A Case Example

36
Regulatory Agencies involving with Import/export and logistics procedures

Paperless Customs Declaration and Clearance Customs Dept

Web-Services (ebXML) Application (Certificate of Origin) Dept of Foreign Trade

Web-Services (ebXML) Application (Health Certificate) Dept of Livestock Development

Web-Services (ebXML) Application (Health Certificate) Dept of Fisheries

Web-Services Applications (e.g. Bill of Lading, and other documents)

Carriers or other logistics service providers

Exporter

Exporter

Exporter

Exporter
"As-Is" Business Process Analysis for Exporting Jasmine Rice

Problems:
- Duplicated Information & 3-5 physical visits to different locations
- High Cost and Time for sending and receiving documents
- Possible Data Inconsistency
"To-Be" Paperless Customs Procedures
(an initial concept study in 2005, proposed for the development from the “As-Is (then)” paper-based documents and partial electronic procedures)

A Case Example

Referring to – “Thailand NSW” presentation by Mr. SINMAHAT Kiatjanon, Thai Customs Department - February 2010, Nepal.
Topics of this presentation

To introduce technical issues (what are they, and why they are important) related to SW Implementation

- Process Analysis and Process Re-engineering
- Data Harmonization
- E-Message Development
- System Interface
- Online Security
- Use of Technical Standards
Migrating from Physical Papers

- Trade using paper documents is based on human to human interaction
- Common understanding of
  - who does what and how
  - what information means
  - ..and how it is interpreted
  - ..most of the time
Communication between computers requires precise definitions of
– The processes (who, what, how, when, why)
– the meaning of data (semantics)
– ..and the structure of the data

☐ ..all the time!
### Example – Exchanged Documents

<table>
<thead>
<tr>
<th>Permit for the export of rice by Department of Foreign Trade</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rice Quality Certificate</strong> By The Thai Chamber of Commerce</td>
</tr>
<tr>
<td><strong>Type of Products</strong></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
</tr>
<tr>
<td><strong>Price</strong></td>
</tr>
<tr>
<td><strong>Mode of Transport</strong></td>
</tr>
</tbody>
</table>

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**Permit for the export of rice by Department of Foreign Trade**

**Rice Quality Certificate** By The Thai Chamber of Commerce

**Type of Products**

**Weight**

**Price**

**Mode of Transport**
Example – Defining data element names and definitions for 2 documents by comparing with International Standards

2 documents about exportation of rice

<table>
<thead>
<tr>
<th>Permit for the export of rice</th>
<th>Rice Quality Certificate</th>
<th>Data Element Name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>weight (kg.)</td>
<td>Net Weight (kg.)</td>
<td>Net Weight (item)</td>
<td>[TDED 6020] The measure of the net weight (mass) of this cross-border trade line item, excluding all packaging.</td>
</tr>
<tr>
<td>Unit Price</td>
<td>Price</td>
<td>Unit Price (item)</td>
<td>[TDED 5110] Price per unit of quantity on which an article item amount is calculated.</td>
</tr>
<tr>
<td>Name of transport</td>
<td>Ship’s name</td>
<td>Name of Transport</td>
<td>[TDED 8212] Name of a specific means of transport such as the vessel name</td>
</tr>
</tbody>
</table>
What is Data Harmonization?

- Data harmonization is an act of reconciling the definitions and representation formats of data elements (among a set of relevant documents).
  - It improves the consistency of meanings (semantic) and representation formats of data elements.

- Data harmonization will identify a set of core data elements (data elements expressed using different descriptions but with identical meaning).

<table>
<thead>
<tr>
<th>Core Data Element 1</th>
<th>Definition</th>
<th>Source</th>
<th>Certificate of Product Standards</th>
<th>Phytosanitary Certificate</th>
<th>Certificate of Origin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The first point of arrival in the country of final destination*</td>
<td>Place of destination</td>
<td>Declared point of entry</td>
<td>Destination (Place)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Core Data Element 2</th>
<th>Definition</th>
<th>Source</th>
<th>Certificate of Product Standards</th>
<th>Phytosanitary Certificate</th>
<th>Certificate of Origin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Free form description of the marks and numbers on a transport unit or package**</td>
<td>Shipping mark</td>
<td>Distinguishing mark</td>
<td>Mark</td>
<td></td>
</tr>
</tbody>
</table>

* International Standards for Phytosanitary Measures, Guidelines for Phytosanitary Certificates (Publication No. 12)
** UN/CEFACT Export Certification (eCert) RSM
Data Harmonization/ Standard Project

• Secure the political support and resources to conduct the Data Harmonization and Standards Project

• Agree on the scope of a data harmonization project that matches the scope of the Business Process Analysis

• Define each data element in terms of definition, data type, data format, and data constraints in actual operation

• Analyze data elements across various documents and organize them in a comparable manner

• Map the data elements to selected standard data model, e.g. CCL, WCO DM v3.0, ...
Example - Data Harmonization of 4 documents (Exporting Rice)

- Request Form for Permit for the Export of Rice: 24 Data Elements
- Request Form for Rice Quality Certificate: 63 Data Elements
- Permit for the Export of Rice: 30 Data Elements
- Rice Quality Certificate: 38 Data Elements

Standardization and Data Harmonization:

Standardized Data Set of 4 documents (70 Data Elements)

Standardization and Harmonization can reduce the data elements from 24 + 63 + 30 + 38 = 155 data elements from 4 documents to 70 data elements for a standardized data set.
Example - Data Harmonization of 4 documents
(Semantic Interoperability among these data elements are important)

- Single Data Elements Submission (Electronically)
  - 61 data elements
  - Single Submission Data Model (Exporting Jasmine Rice)

- Single Window Entry
  - 24 data elements

- NSW
  - 63 data elements

- Dept. of Foreign Trade
  - 48 data elements

- The Thai Chamber of Commerce
  - 38 data elements

- Customs
  - Paperless Permit
  - 24 data elements

- Paperless Certificate
  - 48 data elements

This is for illustration only.
Data Harmonization and Business Process Simplification

Preparation of Electronic Documents for Jasmine Rice Exportation

- Export Declaration (159 data elements)
- Application for the Collection of the Permit for the Export of Rice (A.3) (36 data elements)
- Application for Certificate of Product Standards (MS. 13/1) (34 data elements)

Current
- Prepare 3 documents
- 229 data elements (159+36+34)
- Fill data for 3 times
- Pay 2 visits
  ( electronic submission for Customs Dept.)

Future
- Prepare 3 documents
- 169 data elements
- Fill data for 1 time w/o any visit

To be
- 169 data elements

Exporter/Representative

NSW

159 data elements

32 data elements

34 data elements

Royal Thai Customs Dept.

Foreign Trade Dept.

Thai Chamber of Commerce
Topics of this presentation

To introduce technical issues (what are they, and why they are important) related to SW Implementation

- Process Analysis and Process Re-engineering
- Data Harmonization
- E-Message Development

- System Interface and System Interoperability
- Online Security
- Use of Technical Standards
Interoperability

Interoperability is needed for connectivity not only within the country, but also among regional member countries.

Interoperability is needed in 4 levels

- Common Business Process (Process Harmonization)
- Document and Data Simplification (Data Harmonization)
- Common Technical Communication Protocols
- Legal Harmonization

**Standards are needed** to achieve the above interoperability.
Using Standards for Document & Data Simplification

**Objective:** Define data from a business perspective; harmonise, simplify, standardise data and documents

- UNLK: Align documents to international standards
- Code Lists: Define codes and data formats
- UNTDED: Define data using standard semantic
- Compare data among documents and simplify

**Standards & Tools:** UN Layout Key, UNTDED (ISO 7273), ECE/CEFACT Recommendations, CCL, CCTS, WCO Data Model 3.0, IATA,...
ASEAN Data Model uses information parameters from 13 documents for cross-border cargo clearance.
Thai Case Example

TH e-GIF
Thailand e-Government Interoperability Framework

Standard recommendations for Collaborative e-Government,
and particularly for Thailand NSW,
e.g. all 35 government agencies using
ebXML Messaging Services for
e-Document Exchange through NSW exchange hub.

TH eGIF v2.0 developed by KU-Inova (commissioned by MICT).
Components within TH e-GIF

1. National-level policy recommendations for promoting Collaborative e-Government Development


3. Guidelines on how to conduct business process analysis

4. Steps on how to conduct data harmonization exercises with common data set and formats, and e-documents

5. Recommended technical protocols and standards for interoperability and security (95 items within 7 categories)
Conclusions & Recommendations - 1

1. Business Process Analysis (BPA) must be conducted during the analysis of any SW project

   (really understand the as-is procedures and documents handlings, and really understand what should be the new “to-be” processes to be included in the SW master plan).

2. Data Harmonization/Simplification and e-Message Agreement is a necessary exercise

   (as a step to analyze and agree on how to transform paper documents into electronic documents).
3. Prioritize the SW scope(s) for iterative implementation based upon the context, needs and the strategy of the country, e.g.
   Development of e-customs declaration first, then e-cargo clearance at some major ports, etc.

4. Analyze and agree upon the new business process as the common standard for within-the country connectivity, and regional connectivity (e.g. single-stop cargo clearance at the border).

5. Conduct the targeted document and data simplification based on international standards, e.g. UNLK, WCO DM 3.0, CCL, ...

6. Adopt international standards for technical interoperability, e.g. ebXML Message Services, UN/CEFACT XML NDR, Security Standards, ...

7. Develop your SW architecture (Business, Data, Application, Technology)

8. Handle your change management carefully

........
1. UNNExT Guides

2. www.unescap.org/unnex
t

3. UNNExT Managerial Guide on SW Planning and Implementation (in an editorial process, expectedly to be published within 3 months)

4. (Drafting) UNNExT Legal Guide for Single Window/paperless Trade
References

- Eveline van Stijn, Thayanan Phuaphanthong, Somnuk Keretho, Markus Pikart, Wout Hofman, and Yao-Hua Tan, “Single Window Implementation Framework (SWIF),” Free University Amsterdam, Kasetsart University, Bangkok, UNECE and published as an EU-supported ITAIDE D5.0:4b deliverable.


Thank you for your kind attention.

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