Towards a Generic Model of Electronic International Trade Systems

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Abstract

This research will examine the support of international trade through Electronic Commerce applications. While there has been substantial change to business-to-business commerce by replacing paper based methods with computer and network technologies, many of the commercial practices supporting international trade are still carried out in writing. Notable among these are the bill of lading and the letter of credit. New electronic systems have been launched or announced in the past few months. They vary widely in scope and application. The study seeks to identify the requirements, risks and costs of established, new and proposed electronic systems for international trade in a model that permits useful comparison.

Keywords

Banking IS, Delphi technique, Electronic Commerce, International business

INTRODUCTION

This research proposes a model for comparing new and existing commercial practices for international trade, and to refine and validate that model by a survey of expert opinion taken from academics and practitioners at the forefront of international banking, commerce and law. International trade systems enable buyers to pay sellers for goods and services. They also provide mechanisms to protect the interests of both parties, and those of intermediaries.

Previous research has established that there are several requirements, and risks inherent in international trade and the systems that support it. Indeed the systems usually form part of the cost and are designed to, in one way or another, deal with the risks. For example banks in every country offer a letter of credit, at a cost, which provides a system of trusted third-party guarantees and controlled transfer of title. Letters of credit provide a mechanism to offset the risks of two trading partners, who may not be well-known to each other, exchanging goods for payment at potentially very high monetary value across legal jurisdictions, and often at geographic distance. This research proposes to integrate those requirements, costs and risks into a model that can be used to compare and contrast emerging systems that offer to replace the existing trade mechanisms.

The study proposed here seeks to refine and validate the model using some original refinements to the Delphi method. The Delphi study was originally a paper-based method, and often still is. This study proposes to collect expert opinion via e-mail and fax. But it develops the method further by proposing an internet-based anonymous discussion group to augment the collection of expert opinion between traditional Delphi rounds. The researcher

expects this will quickly develop depth of understanding in some specific questions being investigated.

REVIEW OF INTERNATIONAL TRADING SYSTEMS

United Nations' figures put cross-border trade at about $US 7 trillion per year, and the cost of processing the paperwork for that trade at about 6%, or $US 420 billion per year (Reinbach 1997, Clarke 1999). A large proportion of this worldwide trade is paid for using the international payment instrument known as the *Documentary Letter of Credit*. In Australia, Reserve Bank of Australia reports the volume of letters of credit in their *Bulletin*, tabulated as "Global Off-balance Sheet Business" (RBA 1999, p. 525). This source lists 1998 documentary credits as totaling $AUD 21.3 billion. Using the UN estimate of cost (above) would put the cost of processing the paperwork on Australian letter of credit trade at about $AUD 1.3 billion each year. Clearly, any efficiencies gained in this area would result in substantial savings to importers, exporters and ultimately to the general public.

Most international trading partners use one or more of the traditional paper-based systems for reconciling supply and payment: Letter of Credit, Giro payments, and Open account. The use of cash, credit cards, and other consumer payment systems are rarely used for business-to-business trade between countries. Additionally there are some electronic trading systems already in place to facilitate international trade. The following table offers a comparison between the traditional methods and some recently announced electronic systems for international trade.

The letter of credit and the shipping documents that match them have standard EDI message definitions. The letter of credit is recognised in UN/EDIFACT (see for example the DOCAPP and DOCADV messages in UN/EDIFACT Standard Directory D.99B) and to some degree in ANSI ASC X12 (e.g. the M0 segment of the 304 and 310 transaction sets of X12 version 3). However, the majority of letters of credit are still printed and processed by hand rather than electronically. For example, National Australia Bank (NAB) allows users of their *National Online Corporate* product to open letters of credit, but the resulting letters of credit are printed and processed like traditional documents. Some firms, such as Australian retailer Myer-Grace in Electronic Data Interchange (EDI) transactions with trading partners do use electronic bills of lading (Broadbent & Butler 1993).

System	Description	Paper/ Electronic	Information
Letter of credit	The letter of credit is the most common payment instrument for international trade. It works with other systems, for example the bill of lading, insurance documents, documents of origin and several other trade documents to ensure the transfer of payment in exchange for title is orderly and safe.	Paper: Multi-part forms.	Jonnard's (1998).
Bill of lading	The bill of lading is the traditional contract of carriage by sea. A key feature is that it also serves as the document of title to the goods. This document is an integral part of export/import processing including customs and other government requirements.	Paper: Multi-part forms.	Jonnard (1998).

System	Description	Paper/ Electronic	Information
Open Account	This is the traditional trading account method for established ongoing trading relationships where trust between the trading partners has been established. It is usually combined with Giro or international draft for payments.	Paper: Invoices and statements.	Jonnard (1998); Geva (1995).
Giro transfer	GIRO is a well established system of Electronic Funds Transfer (EFT). Giro has substantially replaced the international draft (cheque). GIRO transactions would typically be carried over the SWIFT network.	Electronic: Over existing SWIFT network.	Geva (1995).
Bolero	Bolero is an electronic registry of Bills of Lading with a secure extranet to facilitate transfer of title. It is run and supported by SWIFT. It went live September 1999.	Electronic: Commenced Sept. 1999.	www.bolero.net
TradeCard	TradeCard is a General Electric Information Systems (GEIS) & World Trade Centers Association (WTCA), system to help buyers and sellers negotiate terms for settlement on-line.	Electronic: Announced 1999.	www.tradecard.com
TradeDoc	TradeDoc is an internet-based service that speeds the letter of credit process by electronically generating the required documents. Electronic trade documents replace paper ones, and exporters can outsource the preparation of these documents to Chase, via a secure Internet connection. TradeDoc is operated by Chase Manhattan bank.	Electronic: Announced Jan.1999.	www.chase.com [corporate frame, news release]
CLS	Continuous Linked Settlement. A Real Time Gross Settlement (RTGS) initiative between national RTGS systems to reduce foreign exchange settlement risk (Herstatt risk). CLS Bank was created by some 60 major foreign-exchange banks. It is based in New York and supported by IBM and SWIFT.	Electronic: Expected in Oct. 2000.	www.clsbank.org (Marlin 1999)
WATCH	Worldwide Automatic Transaction Clearing House. A clearing house for the world's payment clearing houses. Proposed by the North American Clearing House Association (NACHA).	Electronic: Announced 1999, commence July 2002.	www.nacha.org
PayBase	This is a system that Bottomline Technologies have incorporated into First Chicago NBD's Global Payment System (GPS) international treasury and trade architecture. It provides multi-currency LaserCheck draft printing for nations where First Chicago offers paper-based foreign currency payments.	Electronic / Paper hybrid: Commenced 1999.	*Bank Systems & Technology* (1999)

Table 1: Comparison of traditional and emerging trade systems

RESEARCH METHODOLOGY

This research proposes to achieve the following aims:

- Identify the characteristic requirements, costs and risks of systems for international trade that must be provided by any emerging or proposed electronic system to support trade.

- Create a model, which can be used to compare new or existing systems for international trade.
- Apply the model to known trading systems, traditional, new and proposed.
- Verify and validate the model and its sample application via a consensus of expert opinion and by field test in case studies.

To achieve the proposed aims, a methodology is required which will distil expert opinion on issues that are complex, new, and evolving. An element of prediction is required. Those involved in the practice of international trade banking, those developing payment and other support systems for trade, and other researchers who are involved in studying and devising new directions and applications of payment systems to trade, provide the pool of expertise that must be synthesized to deal with the questions at hand.

The Delphi Study technique integrates the judgment of a number of experts. It facilitates feedback, debate and comment in an effort to achieve consensus among a diverse group of participants. Since its inception at Rand Corporation in the 1950s, the Delphi method has "become a widely used tool for measuring and aiding forecasting and decision making in a variety of disciplines." (Rowe & Wright 1999). Review and critique of the method can be found in Hill & Fowles (1975), Linstone & Turoff (1975), Lock (1987), Parenté & Anderson-Parenté (1987) and Adler & Ziglio (1996). Examples of its use can be found in information systems — Neiderman, Brancheau & Wetherbe (1991), international business — Czinkota & Ronkainen (1997) and in banking technology — Prendergast & Marr (1994).

Dalkey (1969), Chapman (1998) and others suggest the Delphi method as a useful method for collecting and analyzing expert opinion in Information Systems, Management and Risk Management studies. Rowe and Wright (1999) even suggest that Delphi groups outperform statistical groups and standard interacting groups. Schmidt (1997) suggests that the rigor of Delphi method may be assisted by non-parametric statistical methods as Delphi often includes the collection of ordinal data. Such quantitative methods might assist in determining the strength of consensus.

Past studies using Delphi have typically used up to thirty experts based on the finding that larger groups create few additional ideas and limit the in-depth exploration of the ones generated (Delbeq Van De Ven & Gustafson 1975, Czinkota & Ronkainen 1997). Prendergast & Marr (1994) second Fusfeld and Forster (1971) in claiming that "a Delphi user could feel fairly safe in choosing a group size of ten to twelve" because "after reading about 13 to 15, the average group error decreases very little with each additional member".

An initial mailing list of about one hundred will be used to solicit participation. The list will be selected with an eye to having participants from the major trading blocks. This will provide a richness of experience and also ensure that factors such as substantial legal differences between say Islamic Law, Civil Law, and Common Law trading environments are not neglected in the validation of requirements, costs and risks. If there are insufficient respondents, a second, or even third, round of invitations should fill void in both number and regional participation.

Also typical of previous Delphi studies is that three rounds of Delphi are considered sufficient, so this study plans to use three rounds, but to extend to further rounds if found necessary. And to supplement inter-round discussion via the use of an Internet-based anonymous discussion forum.

The first round of a Delphi study is typically an open-ended questionnaire. This study proposes to request participants identify the essential characteristics of international payment

methods, but introduce the questions by listing characteristics identified from the literature. This round will request comment on the absolute and relative importance of each characteristic for a useable payment instrument in various scenarios. The first round can expect to solicit several comments on the proposed characteristics, the identification of new characteristics as well as an ordinal ranking of importance of characteristics in a given scenario. It is hoped that other important scenarios will be proposed so that potential instruments can be examined against a broader range of requirements. This material will be grouped and catagorised so that it will be amenable for discussion in subsequent Delphi rounds.

Participants will be asked to elaborate on the organised findings of the first round, resulting in more detailed and informed opinion, including their agreement or disagreement with the other panelists in light of the consolidated information.

A third round would be used to more closely examine areas where there was disagreement between the panelists in round two.

While three rounds of traditional Delphi often yield sufficient depth and consensus for the purpose of an area of inquiry some researchers have either observed that postal mail and other paper based collection methods have resulted in slowness or a desire for more depth (Czinkota & Ronkainen 1997, Rotondi & Gustafson 1996, p.35). The proposed Internet-based discussion forum attempts to go some distance toward rectifying these problems. Put more positively: "the merger of the Delphi method with computer mediated communications … opens the possibility for performance of human groups that exceeds the composite performance curve. We have termed this phenomenon 'collective intelligence'." (Turoff & Hiltz 1996, p. 80). An Internet-based discussion forum tool has been tested and should prove suitable to the task.

This method will validate the identified characteristics and refine the model to identify the relative importance of the required characteristics. The size and relationship of the trading partners, the size of the transactions, and the external environments (for example political and economic) are likely to be moderating variables in any such model. The Delphi process is to be used to verify that the proposed model is correct, and identify other elements that must be included to make the model complete. This concept of a "straw model" was proposed by Rotondi & Gustafson (1996, p. 43) as a useful starting point for a Delphi study that aims to establish a model for an emerging system.

PROPOSED MODEL

Each existing system involves features, costs and risks, and thus opportunities and threats, to the buyer, the seller, financial intermediaries and other participants in trade such as carriers and government agencies. Figure 1 shows a tentative analysis of some of the relationships in a generic trade system. The trade system has requirements, and must deal with costs and risks. Once a more detailed model is established by the Delphi surveys it will be annotated in a formal modeling language.

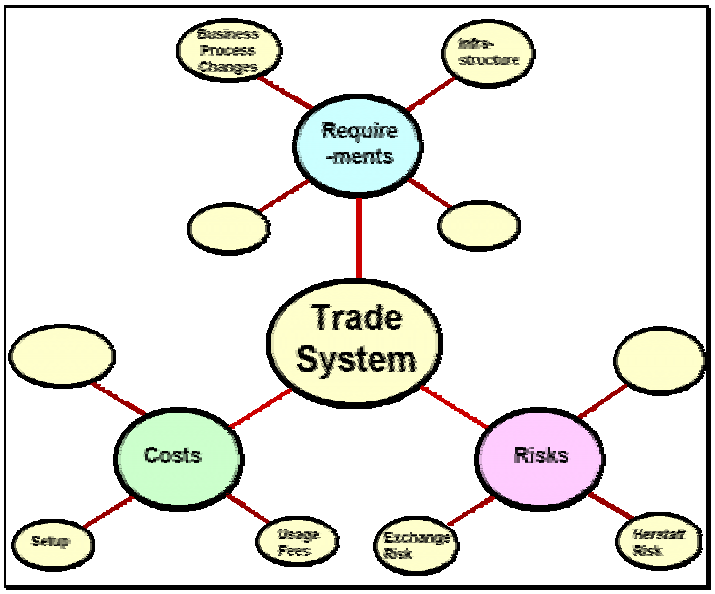

Figure 1: International trade system characteristics under investigation

Examples of the requirements would include the necessary infrastructure and for a new system, changes to existing business processes. For the letter of credit the infrastructure would be the domestic branch banking system and its links to national and international banks via correspondent banking relationships. Examples of risk include classic risks in trade identified from the literature such as: Exchange rate risk (Amann & Rommich 1999, Broll & Eckwert 1999a, DiIorio & Faff 1999); Liquidity (Broll & Eckwert 1999b, Carter 1992); Systemic (Ossola 1980); and Herstatt risk (Sawaichiro 1990).

A new system, such as Bolero, includes requirements such as the alteration of existing business processes to include electronic bill of lading transfer and tracking instead of using paper methods. Required infrastructure would consist of the Bolero virtual private network itself, plus smart-card reader and software. Costs can be itemized, for example bank-fees for the letter of credit; transaction fees for Bolero and other electronic systems. Two papers presented by the researcher summarize risks and requirements discussed in the literature (Dixon & Glasson 1999, and Dixon 1999).

The complete model also includes detail for each line item under Requirements, Costs and Risks. Requirements entries are in practice much more detailed, costs will be measured in dollar terms, risks in terms of Low, Medium, or High.

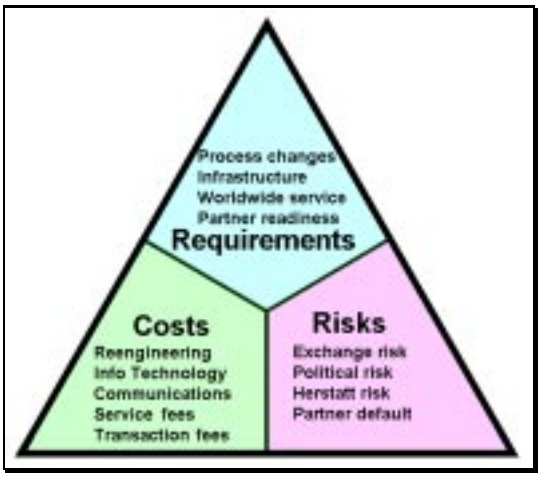

Figure 2: Proposed model incorporating requirements, costs and risks

For any given system then, either traditional or one of the new or proposed systems, one can identify these requirements, costs and risks. They can be summarised in the structure shown in Figure 2. It should be possible to use the same tentative model for each trading system, and thus a mapping can be build identifying one of these triangular model entities for each system. A transformation mapping would appear as shown in Figure 3.

The figure shows a transformation mapping between each system and the proposed model, but also shows that the mapping will be verified by Delphi study, and later by case study on specific trading scenarios, as described below. An aim of the study is to produce a working tool for practical use in selecting suitable trade systems in real trading scenarios.

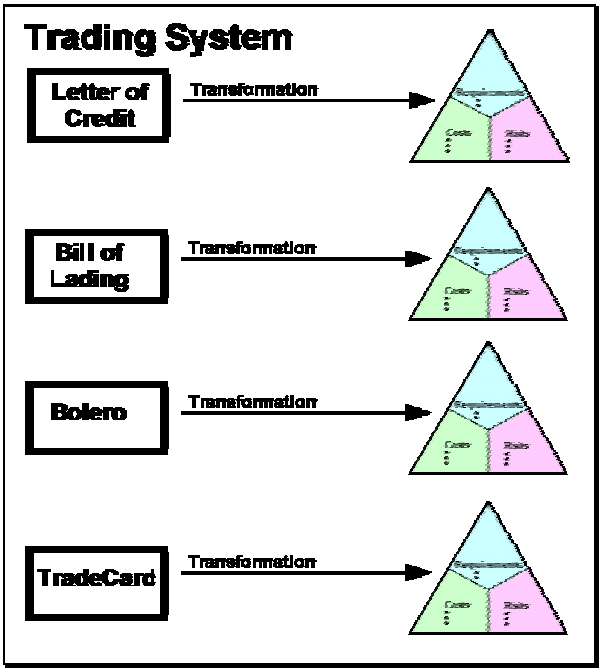

Figure 3: Mapping specific trading systems to the model

Once useful transformation mappings have been developed it will be possible to assess the suitability of each trading system to any given trade requirement. Several ways could be

developed to do this, below a simple Yes/No assessment is presented to illustrate the concept of cross comparing trade systems to a few common trading arrangements (see Figure 4).

This yes/no model is a simplified representation. A more sophisticated cross referencing would involve calculating a score to each scenario/system matching, and then to use the relative scores to recommend the most suitable system for a given scenario.

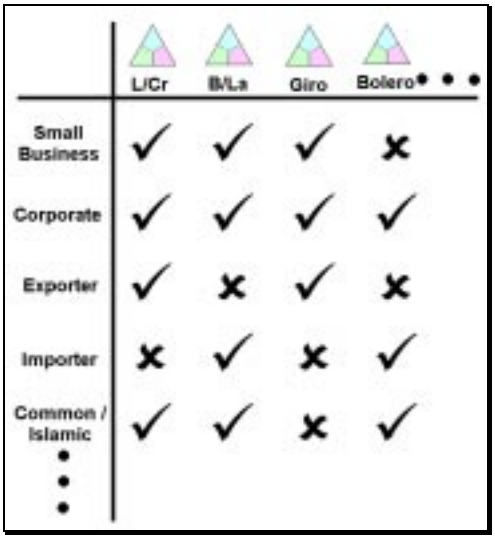

Figure 4: Cross checking trading systems for suitability with specific scenarios

CONCLUSION AND TIMEFRAME

The field of electronic commerce for international trade is rapidly emerging. Trade journal articles have put forward tentative comparisons between some of the new alternatives, for example Clarke (1999), and Reinbach (1997), but a detailed comparison of features, risks and costs is absent from the literature of information systems, international trade, and electronic commerce.

There have been several attempts to extend Delphi method using electronic communication techniques, but the use of an anonymous discussion server is absent from literature to date. Augmenting Delphi with a dedicated anonymous discussion server seems to be a natural extension to this useful method and the researcher hopes to contribute to the literature on this topic during the period of study, not just in the dissertation.

The proposed model will be further refined and translated into a questionnaire for the first Delphi round in the last quarter of 2000. All three rounds of the Delphi study, and the on-going discussions in on-line fora, are anticipated to be finished by first quarter 2001. After the third, and last, Delphi round, the proposed model will be sufficiently refined and reflect a broad consensus of experts from industry and academia. The model can then be validated through application in various scenarios (similar to the framework presented in Figure 4). The validated generic model will prove of great value to businesses involved in international trade to provide guidance in adopting electronic trading systems.

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