

The UN/CEFACT XML Business Messaging Standard: A Potential Source Of Competitive Advantage.

Douglas S. Hill

University of Southampton, Highfield, Southampton, SO17 1BJ, UK
dsh1e08@soton.ac.uk

ABSTRACT: This paper explores the potential value proposition that could be created in supply chains on adoption of the electronic business messaging standard directory; UN/XML, developed by the United Nations, UN/CEFACT and offers a framework to aid managers in deciding if UN/XML should be applied in their organizations.

1. INTRODUCTION

Global Fast Moving Consumer Goods (FMCG) supplier and retailer supply chains have become increasingly international in character as an effect of the expanding global market place. This is emphasized by Halldorsson *et al.* (2008) who reported that \$24 trillion US dollars worth of imports and exports were recorded by the WTO in 2006, nearly double the figure reported in 2001. As a result of increased globalization, the lack of a unifying global electronic business messaging standard in international supply chain management is proving to be a constraint on inter-company business messaging operational efficiency.

This paper explores the potential value proposition that could be created in supply chains for global FMCG stakeholders by the adoption of the XML (Extensible markup language) electronic business messaging standard directory, also known as UN/XML, which has been developed by the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT).

Due to the relative immaturity of the UN/XML electronic messaging directory, which was only released in 2007, there is a paucity of implementations so no quantifiable benefits of adoption can be reported in any industry sector. With this in mind, the consolidated aims of the research were to canvass global FMCG stakeholders' qualitative opinions on the

possibilities that could arise from the adoption of UN/XML in creating a sustainable competitive advantage.

One of the most important technological inflection points is the advent of the Internet which has pervaded almost every facet of society and, not least, the world of business. Indeed, the Internet's affect on society has been so profound that Castells (1998a) talks about the networked society in terms of a technological revolution, on par with the great industrial revolution of the eighteenth-century. Castells (1998b) goes on to elaborate that in the 90's business realized the extraordinary potential of the Internet and quickly latched onto its revenue generating possibilities. However, whilst the commercial benefits of the 'Internet revolution' have not been lost on most of the business community, the underlying technology used to embrace competitive business benefits enabled by the Internet is, nevertheless, sometimes subtle to detect.

Familiar technologies should be watched closely, but less familiar ones may have as great, if not greater, an impact on users and vendors. (Knox *et al.*: 2006, p6)

The use of the Internet, as both a medium to transmit business messages to trading partner applications and to improve transparency and efficiency in supply chain, has over the last few years become

more common place in order to leverage the well researched benefits of EDI (e.g. Witte *et. al.*:2003, Chong & Ooi:2008). This development is well demonstrated through the number of organizations which now use the Internet as a web-sales, however, new, and/or lesser known Internet based technological advances have begun to ignite the imagination of some advanced strategic supply chain thinking organizations in the search for new efficiencies and advantages over the competition.

This technological trend in trade circles is embodied by the recent release of UN/XML. This candidate message specification, released on the 3rd April 2007, was an initial attempt at filling the deficiency in the market for a unified and global XML business message standard. UN/ECE CEFACT, United Nations Economic Commission for Europe (2007), stated in press release that the launch of the inaugural messages in their UN/XML directory was simple to justify given the potential operational gains that could be harvested from implementing global UN/XML messages.

1.1 Problem statement

The primary focus of the paper is to identify the potential for UN/XML to deliver sustainable competitive advantage for the FMCG sector, and also to identify potential contestable competitive advantage. A secondary aim is to investigate whether the benefits of adoption could be of an indirect nature, that is to say, not primarily due to the messaging directory *per se*, but be derived from a more causally ambiguous path.

Without a common standard messaging directory, each organization must indulge in the substantial extra cost of reformatting business messages requiring expensive data conversion software in order for their applications, and those of their trading partners, to accept and process electronically transmitted business information. This problem can lead to operational inefficiencies in the supply chain that negatively influence the value chain and, in a competitive environmental sector such as FMCG where cost is often a large factor of competitiveness, can lower an organization's competitive advantage. Indeed, several empirical studies have shown that compatible IT, when shared across supply chain trading partners, improves communication (Hoyt & Huq, 2000), which in effect leads to the production of superior integration and increased strategic capabilities (Mukhopadhyay & Kekre, 2002, p1308).

The solution seems apparent; simply adopt an international electronic messaging standard so that data translation between applications becomes redundant and reduces integration costs between trading parties! The issue of messaging standards diversity however is still very much an area where the world is divided and each country, region or even sector, potentially can prefer one electronic business messaging standard over another.

2. Literature review

Using generic IT as an enabler for the development of further higher value processes is not a new phenomenon, indeed, IT can be viewed as a catalytic converter for improving the efficiency of data transfer between trading partner functions in the supply chain (M^cAdam and M^cCormack: 2001, p115: Hammer: 2001, p199)

The business problem discussed here is whether or not global FMCG retailers and suppliers can create a significant benefit by adopting an IT technology, the new UN/XML messaging directory, in what can be described as an unsettled and globalized business environment (Lopez: 2005, p661, Smith: 2003, p1).

The following literature review outlines some of the current thinking behind three major areas that the author feels are integral when explaining the potential for a messaging standard:

- Competitive advantage
- Integration
- Resources and capabilities

The three areas should be considered as a 'package' and the leading Leitmotivs which are used in the analysis section to demonstrate where the sample thought the weight of benefits could materialize.

2.1 Sustainable and contestable competitive advantage

A main component for understanding the aims of this study is to define what is meant by sustainable competitive advantage and what the factors are which provide a company with a sustainable competitive advantage. Porter (2001a, p70) famously describes sustainable advantage as "*a company doing something better than the competition which adds value to the organization*". The desired end result for an organization, whether it follows a strategy of 'cost

focus' or 'product differentiation', (Jobber: 2004, p688) is where a sustainable competitive advantage can be gained by improving operational effectiveness through a given resource management strategy. This is when company resources are configured better than the competition and used across an organization; here a cross functional heterogeneous resource will outperform and produce a hard to imitate advantage (Halldorsson *et al.*: 2007, p288). However, inimitability does not last forever (Collis and Montgomery: 1995) and the rate of the decay of the advantage depends on the fierceness of competition in a given sector (Reed & Defillippi: 1990, p89). If it is agreed that an advantage can deteriorate, the fully sustainable competitive advantage seems more hypothetical than a concrete and achievable goal.

Lending from Collis and Montgomery's continuum of strategic resource model (1998), the author asserts that there is also a continuum of competitive sustainability that ranges from 'non-sustainable' through to 'fully sustainable', the latter being a theoretical limit. Everything which is less than a fully sustainable competitive advantage should be considered as a contestable advantage where the effects of competitive advantage are time bound in nature, but nevertheless they can also give rise to a limited competitive advantage. Eisenhardt and Martin (2000, p1106) call this phenomenon a strategic challenge and maintain that the capabilities that drive competitive advantage are themselves unstable and unsustainable. One such competitive capability driver, relevant for the context of this paper, is that electronic business messaging integration, otherwise known as Electronic Data Interchange (EDI).

2.2 Interoperability issues - integration

If there are advantages to be gained from smoothing E-Commerce EDI interoperability issues then why has there been no attempt to rectify this? Not surprisingly there have been several well intentioned initiatives to address this issue. Witte *et al* quote Van Amerom and Speyer saying that it was clear [back in the 70's] that 'some' standardized format for transmitting data and documents was required and, as a result of the counterproductive confusion surrounding the proprietary standards [the US EDI standard], ANSI X12 was born (2003, p59).

Collaborative cluster models of development, such as the previously mentioned ANSI initiative, have been, and still are, typical in the world of standardization. Many documented benefits of industrial

cluster models (Carpinetti *et al.*:2008) also hold true for intangible EDI standards, which have proven to be, in general, geopolitical and/or sector driven in nature. Here one only needs to think of EDI standards' organizations such as GS1 (serving primarily FMCG) or SWIFT (banking), ACORN (insurance) which, whilst being global organizations, tend to be sector specific. However, all cases of EDI standardization initiatives have been overtaken before they could become a truly global [horizontal standard], such as UN/EDIFACT (Clarke, 2001 cited in Hsieh & Lin: 2002, p71) which never gained traction in North America or Asia. Before any EDI business harmonizing initiative can achieve a foothold, several legacy issues need to be addressed. Smith (2003, p98) delivers five main challenges that he considers are the chief barriers to business messaging interoperability

- Reluctance to 'give up turf', a lack of trust between messaging standards organizations
- Incompatible operating systems and varying scopes of standards
- Failure to see the need for multiple groups contributing to eBusiness standardization
- Lack of knowledge of other groups
- Lack of a common vocabulary and international outlook.

Smith (2003, p98) goes on to offer a case for the XML syntax and claims that it can solve these issues of business messaging harmonization.

Creating and adopting and converging XML standards will enable universal interaction and collaboration in industry and accelerate global use and acceptance of XML.

Crucially, whilst showing insight, Smith does not say how this convergence could be achieved to address his own five barriers to business messaging interoperability! With trade and commerce standing to (potentially) gain so much by using a harmonized messaging approach when exchanging business messages electronically, there have naturally been attempts to develop a common standard, however to-date, both US and Europe have had little motivation to 'give up turf' in the standards' battle (Smith: 2002, p98). Furthermore, Asia has shown a reluctance to apply a costly, relatively non-internet and web service 'friendly', business messaging syntax such as UN/EDIFACT or X12, which are inherently

inefficient for modern day Internet based business. Up until 2007, there was no one unified, or even pre-dominant, XML business messaging standard in the world and the XML standards created to date have typically been designed in isolation for industry verticals and critically, not based on a common vocabulary or message assembly.

Whilst EDI has been promising to reach a strategic inflection point since the hype surrounding XML's introduction in the late nineties, the take-off of XML point never really materialized. This has been mainly due to the lack of a truly global XML messaging standard where business requirements could be collated into a superset messaging standard, itself based primarily on a common business messaging vocabulary. The adoption of the UN/XML standard has the possibility of bridging current geopolitically-centric issues associated with standards adoption:

Bridge the gap between North America (X12 legacy) and rest of world.

Asia to large extent has no legacy and will 'jump' directly to XML

Europe and South America predominantly use the legacy UN/EDIFACT standard

The UN/CEFACT XML core component library, which makes up the individual pieces of the UN/XML messages, is currently being expanded by major standards organizations and is now in a phase of development where these major stakeholders are converging on an agreed common vocabulary for basic business messaging. All stakeholders must now recognize that, along with increased technological advances in Internet communication infrastructure, the release of the UN/XML business messaging directory puts the final piece of the jigsaw puzzle in place. It opens the door for general adoption of a common business messaging standard on a global scale using a common vocabulary and structure to improve resource allocation and build improved capabilities.

2.3 Competing on resources and capabilities

Whilst resources can be configured in different constellations, some capabilities they produce can be similar, common and so it follows, substitutable making imitability a characteristic of non-sustainable advantage (Eisenhardt and Martin: 2000, p1110). Whilst platforms for advantage need to have key features in common to be effective and leverage

scales of economy, these advantages are short lived, it is then up to organizations to find the advantage in differentiating the application of the imitable capabilities.

Porter's stance claims that if IT activities, [such as EDI], can be carried out better than the competition, then this is a type of operational efficiency that will generate a novel capability. Porter (2001b, p28) goes on to say that by adopting a common platform, [such as UN/XML], across the value chain, architecture, and standards make it possible to create integrated systems that are customized to an organization. This approach of acquiring a 'hard to copy' capability has the ingredients to become a competitive advantage and strengthens the argument for a unified standard, particularly one based on Internet technology that opens up new avenues for a transparent supply chain and the possibilities for increased sharing of information with trading partners.

2.4 Strategic applications of standards - eGovernment & eProcurement

Governments and supranational organizations are naturally keen to implement the savings that eCommerce in the public sector can achieve, but simultaneously, they need to ensure they promote an open standard with neutral credentials which are globally applicable. Currently, there are two main drivers which are why European governments are looking towards eCommerce solutions to release financial savings and adhere to European Commission eDirectives, the business case for governments and governmental agencies therefore stems from:

- **European governmental impetus & EC legal framework:**

- **A legal driver for the adoption of eGovernment activities:** Governments are actively adopting eGovernment solutions as part of the EC directives 2004/17/EC (EC Directive on eProcurement procedures covering utilities such as water, energy) and 2004/18/EC (EC Directive on eProcurement procedures covering awards of public works & services contracts) and additionally the i2010 which is driving the momentum of eGov solutions across Europe (the ECs strategic plan for eGovernment up to the year 2010 – The action plan aims to have 100% electronic availability of public sector procurement procedures above the legal thresholds by 2010). (IDABC, 2006)

- **eGov Timing:** eGovernment solutions are becoming more important to administrations as governmental agencies look towards already applied best practices in other countries that have released substantial amounts of time and cost savings by using tools/keys/best practice solutions.

Traditionally, choosing the EDI standard has primarily been the domain of the large buyer (Hsieh & Lin: 2002, p68), this choice in turn is usually driven by geographical region and the vertical in which an organization finds itself in. The choice of standard therefore seems linked more to legacy pressure of the prevailing market sector than strategic choice. This still holds true but all organizations can leverage, not just the integration benefits that come from EDI adoption, but also if they apply themselves strategically, longer term indirect strategic benefits can also be captured (Mukhopadhyay & Kekre, 2002, p1302).

For commercial organizations, the adoption of UN/XML could be wise preparation and a move towards a more positive, integration based, strategic positioning in the face of growing eProcurement initiatives in governmental circles, notably in Northern Europe. In Denmark, eGovernment initiatives have already mandated the use of XML in the public sector (proprietary, non UN), but are ready to move to an International UN/XML standard when the directory is fully available (Schade-Sørensen: 2007).

If the organization aims to supply the European public sector, which is showing signs of enthusiasm for UN/XML, then the adoption of the standard could provide these organizations with a strategic advantage with an 'eGovernment ready' position within their sector. So, by early adoption of UN/XML, organizations could be well positioned to adhere to eGovernment requirements and at the same time, these standards will be consistent and compatible with what is used in commercial supply chains based on global standards.

Therefore it could be claimed that whilst UN/XML adoption is indeed imitable it could give adopters first move advantage vis-à-vis the competition and endow them with a certain flexibility to enable a rapid response to a public sector buyer's request to tender, or sell using UN/XML. However, as Porter (1991) states, when reviewing strategy, scope and choice of 'where to play' is essential. If the public sector is not in scope, this particular strategic application of UN/XML is of less importance.

3. Research Hypothesis and Research Methodology

In an effort to measure the effectiveness of UN/XML in delivering either a direct or indirect advantage, three propositions were created to measure the research sample's opinions on which components of advantage would derive benefits of adoption over the three time frames: Short, mid and long term.

Hypothesis No.	Hypothesis
H1	UN/XML drives - Superior integration capabilities - for global FMCG
H2	UN/XML drives - Better strategic positioning – for global FMCG
H3	UN/XML drives – Improved processes – for global FMCG

Table 1.0 The three research hypotheses

3.1 Participating organisations – The research sample

Whilst care was taken to use a representative sample of participants of the FMCG total population, the sample used is still to be considered a 'judgmental sample' (Albright, Winston, Zappe:2006:379). Nevertheless, the author endeavored to acquire a knowledgeable cross section of FMCG stakeholders from across the globe: NB 84% of the sample was aware that UN/CEFACT was in the process of creating an XML messaging directory making the sample's appreciation of UN XML potential particularly relevant.

The sample itself consisted of senior managers with many years IT experience in applying EDI solutions from:

- The Danish Ministry of science – Senior standards adoption program leader.
- Three UN/CEFACT Permanent group members - Senior officers of the trade and business group.
- Nine GS1 organisations - Senior standards managers from: Europe, Australasia. Africa, South America, North America and Central America.
- One large national IT service provider from Europe.
- Eleven global Multinational FMCG retailers and suppliers – IT directors and senior managers.

3.2 The research structure

The method of determining the content of the questionnaire was a deliberate process that followed a pre-conceived research structure, a schematic outline of which can be seen in Figure 1.0.

The questionnaire was designed to collect qualitative stimulus data that could be sent to all types of stakeholder; FMCG suppliers and retailers, GS1 Organisations, governmental bodies and other standards bodies such as UN/CEFACT. The questions were devised so as to stimulate replies that would specifically require a response that would indicate how an interviewee viewed a particular activity which was associated to a component of strategic advantage; Better Integration, improved processes, or furnish the organisation with a strategic advantage.

The weight of the interviewee's response was taken to be an indication of whether the activity was a strong driver for sustainable competitive advantage within their organisation or whether it could be adopted to create a contestable advantage that would create a temporary, but perhaps foundational, advantage for the implementer.

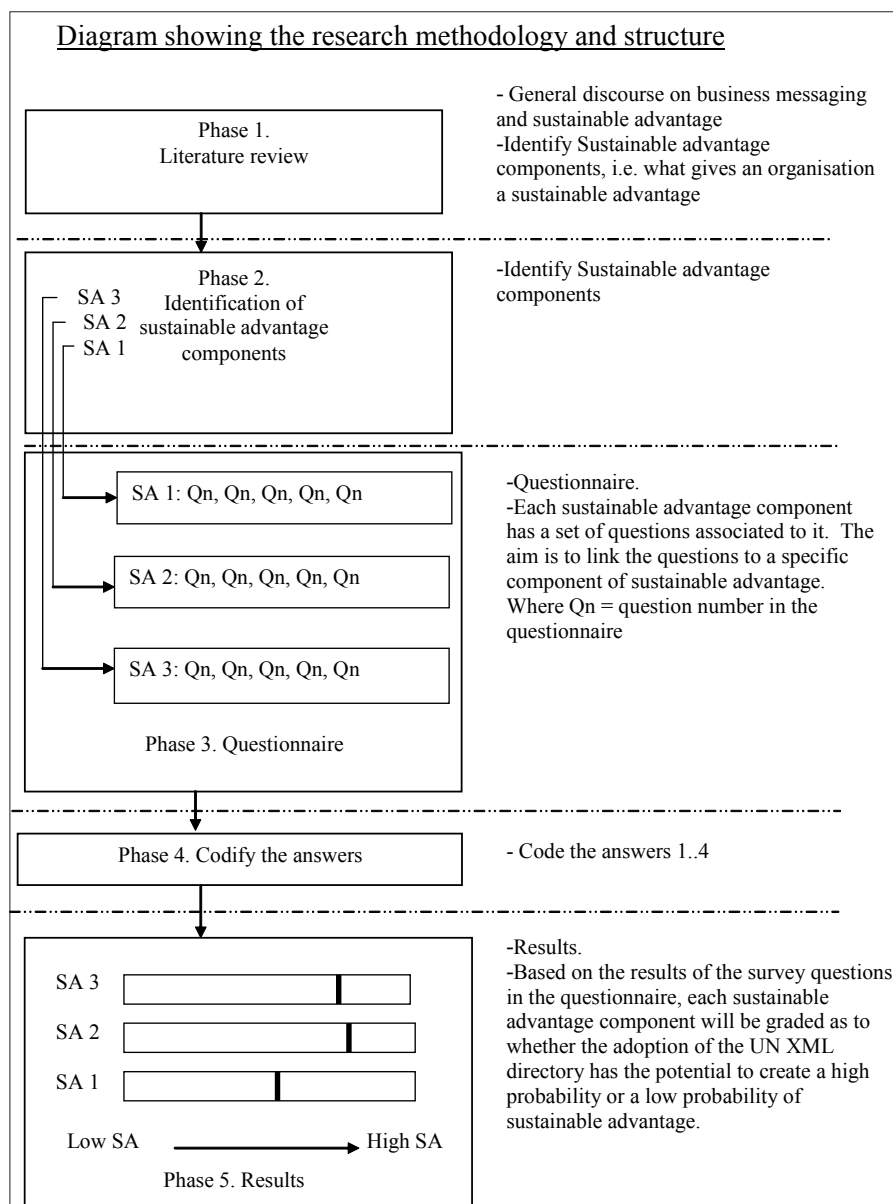


Figure 1.0 Research structure

3.3 Data collection techniques

The research consisted mainly of qualitative data stemming from primary and secondary data sources, plus stimulus and non-stimulus data. Primary data collection was derived from interviews and observation processes, while secondary data came from existing evidence based on previous research, white papers and internal reports organisations. The primary data was divided into stimulus and non-stimulus data dependent on whether or not the data stemmed from an interview (stimulus data) or whether it was an observed process or event witnessed by the author whilst being involved with both the UN/CEFACT and the GS1 GSMP event.

	Primary data		Secondary data
	Stimulus data	Non-stimulus data	
Qualitative data	Interviews & Questionnaires	Observational	Whitepapers, theoretical, academic articles & UN/CEFACT archives.
Quantitative data	NA	Some basic statistics are derived from the stimulus data questionnaire	International reports statistical data referring to the uptake of XML technology

Table 2.0 Research entities: Components of sustainable advantage

Due to the strategic and complex nature of the research, the author assumed the role of interviewer and ‘devil’s advocate’ during the completion of many questionnaires and ‘walked through’ the questions in detail with the interviewees. Here the author presented the UN XML subject matter in both a positive and negative light in an attempt to stimulate the interviewees thought processes.

4. RESEARCH RESULTS

In order to ascertain the potential of UN/XML’s ability to develop a grade of competitive advantage FMCG stakeholders were interviewed to determine their appreciation of how the UN/XML could create value in their supply chains. Qualitative data research methods were used and drawn from twenty five global FMCG stakeholders’ organizations stemming from industry, governmental agencies and GS1 national member organizations which were targeted from every continent (except Antarctica). In the author’s opinion, the wide spread of national and global players interviewed makes for a limited, but representational, cross section of larger EDI enabled organizations associated with the global FMCG sector who have a vested interest in developing, or maintaining, a competitive advantage.

4.1 Survey Part One

The results of Survey 1, dealing with the H1 proposition, are the most conclusive of all three surveys undertaken. Over the three time frames for each question asked, the sample, , makes a clear distinction between the short, mid and long term benefits relating to the applicability of UN/XML to become a driver for superior integration. The first survey indicates that the sample thought that the likelihood of UN/XML adoption, and benefits, will grow over time.

Survey 1 – UN/XML as a driver for **Superior Integration**

Survey Question	Short term: Pres - 3 yrs μ value	Mid term: 3 – 7 yrs μ value	Long term: >7 yrs μ value	F statistic	p value Sig. 99% conf
UN/XML adoption could reduce integration issues with trading partners.	2.2	2.8	3.4	14.1	<0.0001
UN/XML adoption could breakdown the standards divide across global regions.	1.7	2.2	3.0	10.4	<0.0001
UN/XML adoption could increase the speed of on boarding of new suppliers	2.4	3.0	3.2	4.9	<0.01

Key for short, mid and long term likelihood of UN/XML adoption

- 1 = Low likelihood
- 2 = Possible likelihood
- 3 = High likelihood
- 4 = Very high likelihood

Table 3.0 Mean values of Survey 1 responses over three time frames with 99% significance

4.2 Survey Two

In reviewing the opinions of the research sample in regards to the H2 proposition, a significant trait of this second survey is that there is a relatively flat mean average response by the sample for all the questions over all time frames, although on the whole still quite a high potential for advantage evaluation; all *Means* = >2.

Survey 2 shows that the sample thought there is no real difference in the amount of strategic positioning benefit over the time frames indicated. Nevertheless, all mean values are above two indicating that there are some benefits associated to UN/XML adoption.

Survey 2 – UN/XML as a driver for **Better Strategic Positioning**

Survey Question	Short term: Pres - 3 yrs μ values	Mid term: 3 – 7 yrs μ value	Long term: >7 yrs μ value	F statistic	p value Sig. 99% conf
UN/XML adoption could give my company a strategic competitive edge.	2.1	2.3	2.5	1.8	0.17
UN/XML adoption could lead to post acquisition benefits.	2.7	2.9	3.0	0.6	0.55
A precondition for general implementation of UN/XML by my organisation is the adoption of the messaging set UN/XML by global ERP vendors.	2.0	2.4	2.5	1.9	0.16

Key for short, mid and long term likelihood of UN/XML adoption

- 1 = Low likelihood
- 2 = Possible likelihood
- 3 = High likelihood
- 4 = Very high likelihood

Table 4.0 Mean values of Survey 2 responses over three time frames with 99% significance

4.3 Survey Three

The third and final survey tested the H3 proposition. It delivered a quite high general appreciation for the likelihood of UN/XML adoption gaining applicability over time.

The survey shows a marginal difference over the time frames, but most questions received a rating which points towards a high(er) likelihood of UN/XML adoption over all periods, especially in the mid and long term.

A striking trend for all three surveys is that each respondent thought that the likelihood of UN/XML adoption will grow over time, and notably, not once was this pattern broken.

Survey 3 – UN/XML as a driver for **Improved Processes**

Survey Question	Short term: Pres - 3 yrs μ value	Mid term: 3 – 7 yrs μ value	Long term: >7 yrs μ value	F statistic	p value Sig. 99% conf
My company’s processes could be better adapted and customised if ERP “off the shelf” solutions were based on a stable UN/XML messaging standard.	2.3	2.7	2.8	3.2	0.04
Proprietary business messaging standards in the FMCG sector are a constraint for implementing transparent supply chain activities. UN/XML could alleviate this and improve my process flow.	2.9	3.0	3.1	2.4	0.79
On adopting UN/XML in the indicated time frame my organisation could better cut across verticals and leading to improved shared processes.	2.3	2.8	3.0	4.6	<0.01

Key for short, mid and long term likelihood of UN/XML adoption

- 1 = Low likelihood
- 2 = Possible likelihood
- 3 = High likelihood
- 4 = Very high likelihood

Table 5.0 Mean values of Survey 3 responses over three time frames with 99% significance

5. DISCUSSION

5.1 Superior integration

Naturally when researching the effects of a messaging directory the direct benefits of integration are easier to predict. Most global organizations have experience with EDI standards and can simply apply the adage that the value of a network (in this case a UN/XML user community), is proportional to the number of users in the network community. EDI adoption rates in the past have proven that once traction in the market place is achieved there is a viral effect which has a tendency to propagate the standard. The risk here of the sample getting the prediction wrong is negligible given the sample’s experience in EDI systems so there is a low amount of risk involved with this prognosis, hence the relative bullish prediction of the positive effects on adoption over time.

The single biggest risk is that a competing standard could usurp a sector or position in the market before UN/XML gains traction in the market place. Alternatively, there is a risk of opportunism on the part of the system providers where they could deviate so much from the standard that their own proprietary position and customization costs are preserved. This approach could be seen as serving no one apart from the software vendor’s own interests. Aggarwal *et al.* (2006) make an interesting contribution to the debate of whether

XML standardization increases a software house's value in the eyes of the stock market. They take a slightly different tack on standardization and attack the issue from a software sales perspective, i.e. whether software houses are more likely to generate wealth for shareholders by promoting open or proprietary standards. Interestingly enough, the results of Aggarwal *et al's* research indicated that investors in software houses were more willing to invest in proprietary standards than in open source. This is not surprising as proprietary standards are a source of revenue where the gains however are for shareholders and not end users who must deal with the plethora of differing XML interface standards.

5.2 Better strategic positioning and improved processes

The next two survey results are more independent of the pure, direct adoption of UN/XML and rely more on the individual firm's managerial qualities in the development of strategies and processes. This is where the 'rubber meets the road' and indirect benefits, differentiation based on standardization, takes place. The indirect benefits derived from better strategic positioning and improved processes, whilst appearing causally ambiguous, are based on the adoption of UN/XML. The ambiguity could be an explanation why the sample was more wary in their predictions over time and felt it difficult to quantify future benefits.

This approach is not a surprise as there is inherently supplementary risk involved here as there are more 'moving parts' and network chains in the scuffle for deriving an increased strategic position over the competition. This type of caution exercised by the sample could merely add weight to the argument that the positive direct benefits in survey one are more foreseeable.

5.3 Discussion synthesis

From the results gained from the study, it could be inferred that whilst organizations seek divergent operations and strategy from their sector norm in order to gain an advantage through the components of advantage, the sample viewed standards development as a fundamental factor in achieving higher level routines.

It is noteworthy that the FMCG stakeholders in the sample indicated that the use of a converging global standard, UN/XML, is recognized by them as being

a potential catalyst for differentiating their sets of capabilities, what the author has termed, the 'standards paradox' (standards initiating differentiation). If UN/XML therefore can evolve from its current status of an anticipatory standard, it could be regarded as a future enabling standard. UN/XML may well become an adjunct capability which becomes what Halldorsson and Skjøtt-Larsen (2004, p198) term a 'generative mechanism' of competitive advantage. In itself, UN/XML does not create a sustainable competitive advantage, but could be a foundation for the development of strategic attributes that require the 'launch pad' of a common, standardized basis.

5.4 The VRIN model. (Valuable, Rare, Imperfectly imitable and Non-substitutable)

The study results demonstrated that the research sample thought UN/XML could add to an organization's competitive advantage through several channels via the three components of advantage researched that were deemed applicable to the FMCG sector in the context of UN/XML adoption.

Component of sustainable advantage	Specific area of benefit where UN/XML could add value
Superior integration (Low VRIN)	<ul style="list-style-type: none"> α) Reduce general integration costs β) Bridge the geographic standards' divide χ) Increase the speed of on-boarding new suppliers
Better strategic positioning (Medium VRIN)	<ul style="list-style-type: none"> α) Improved readiness for new areas of opportunity (i.e. eGovernment ready). β) Early adopter advantage (quicker through the learning curve) χ) Post acquisition benefits. Increased operational efficiencies when acquiring or merging with another company using the same messages and component vocabulary
Improved Processes (High VRIN)	<ul style="list-style-type: none"> α) Differentiated logistical/ warehousing/purchasing/stores arrangements and/or services enabled through standardized software based on UN core component library

Table 6.0 Components of Advantage and Areas of Specific Benefit for Adopters

The measure of the value of a resource in creating sustainable competitive advantage was found to be in the VRIN resource framework, where the harder the component of advantage is to imitate, the higher its value has in maintaining a competitive edge. (Barney, 1991; Conner & Prahalad, 1996; Nelson, 1991; Peteraf, 1993; Wernerfeld, 1984, 1995, cited in Eisenhardt & Martin, 2000, p1105).

It is evident that a key to using UN/XML as a tool for divergence and differentiation is the timing of the adoption of the standard, that is, early or intuitive adoption. The latter is possibly the most significant and relates to the ability of an organization to determine when exactly the best point in time would be to implement UN/XML; this is the UN/XML technological inflection point and, like most inflection points, notoriously difficult to predict.

The research consensus was that early adoption could be initially less rewarding than adoption in the mid and longer term specifically when regarding the potential for developing a contestable advantage. However, despite the relative lack of perceived potential for ROI in the short term, early adoption was, nevertheless, thought to be a foundational aspect of strategy on which to build more rewarding capabilities for the mid/long term. Managers consid-

ered that by earlier adoption than the competition, the lessons learned and the transition through the learning curve, could give them a timing advantage, which is all important in etching out high grade contestable advantages through well grooved procedures.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Is sustainable competitive advantage derivable from UN/XML?

The study set out with two aims: Firstly, to review whether key FMCG stakeholders considered that UN/XML had the power to deliver a sustainable competitive advantage and secondly, whether the sources of the advantage were of a direct or indirect nature. With a view to answering the first aim, the study indicated that the adoption of UN/XML could indeed possibly provide a contestable advantage but does not deliver a fully sustainable advantage either as a direct or indirect consequence of adoption. However, all three capability components of advantage which were investigated showed some signs that they could deliver a degree of contestable competitive advantage when applied as a packaged bundle of resources.

6.2 A managerial framework for UN/XML adoption

Managers need to be in a position where they can make decisions about whether or not UN/XML adoption is right for them. The study suggests that the following example framework for analysis could be used as a managerial tool to aid this decision making process.

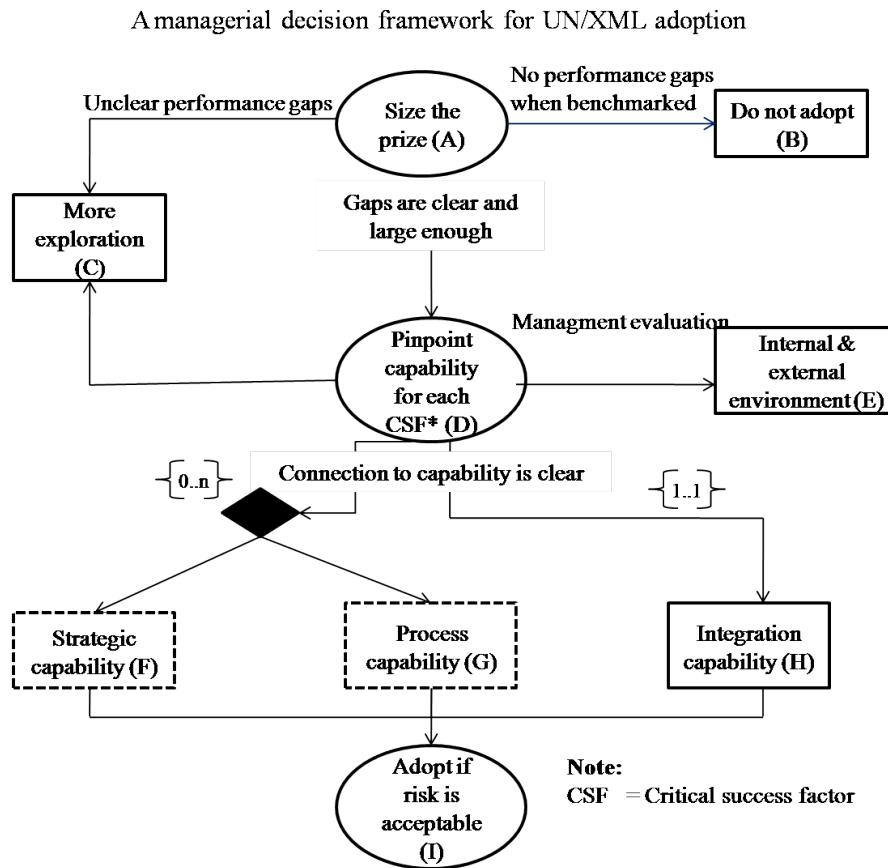


Figure 2.0 UN/XML adoption framework

Adapted from Goold and Campbell's synergy and parenting framework (1998)

The notes below are an example of an application of the adoption framework when applied to UN/XML. The integration capability will always be used in the context of UN/XML adoption as this is the enabling capability which releases indirect benefits of adoption. Some companies may use different capability classifications other than strategic and process capabilities dependant on their critical success factors.

A. Sizing the prize. This initial stage is where management review, either internal performance indicators or an external industry benchmark such as the Global Commerce Initiative (GCI), to evaluate whether or not their critical success factors (CSF) are performing when measured against an industry index. The underperforming Critical Success Factors will be the units of analysis that the company uses in the examination of whether UN/XML is worth adopting, or not.

B. If there are no serious gaps in the performance review driven from the benchmarking exercise whilst sizing the prize, then there may be no initial need for UN/XML adoption.

C. Where the benchmarking results are unclear more exploration is required.

D. Once an organization has reviewed its CSF against the benchmark and chosen which are to be used in the analysis, the CSFs then should be associated to a component of advantage such as strategic, or process. This

will aid managers in viewing the benefits of adoption as a holistic system and better connect the causality of strategic and process capabilities with UN/XML integration capabilities.

E. The executive management review the patterns of causality and decide what benefits UN/XML adoption brings with it. This stage happens in parallel to D and is, in essence, the most important stage of the whole exercise. *This is where strategic thinking takes place.*

F. Assign chosen CSFs to a capability

G. Assign chosen CSFs to a capability

H. Assign chosen CSFs – Integration capability mandatory in this model

I. Management decides whether or not the benefits of UN/XML adoption, in this instance CSFs in the capabilities, F, G and H, warrant implementation.

Recommendations from the study

As an initial step to optimizing, or even developing, a competitive advantage using UN/XML the paper sug-

gests that the UN/XML adoption framework be used.

A holistic, systems view approach is suggested when adding value in the supply chain and, when crafting a strategy to achieve this, components of advantage should be seen as a synergistic set of competencies rather than isolated components. Superior integration could give an organization more operational efficiencies but unless it is blended with other components of advantage, such as improved processes, the best possible contestable competitive advantage may not be achieved. From the study it was apparent for the need to keep abreast of an organization's external environment and that higher level strategic managers may benefit from a longer term view of their business messaging policy given that globalization will undoubtedly continue to develop.

Whilst there is no doubt merit in the adage, 'never change a running system', a general stock take of an organization's messaging standards and a review of how these capabilities fit into their organization's strategic plan could be advised which, at a minimum, may serve as peace of mind that the organization's EDI strategy is on the right track. At best, this approach could deliver contestable advantages in previously hidden areas.

References

- Aggarwal, N. Dai, Q., & Walden, A. E. (2006). 'Do Markets Prefer Open or Proprietary Standards for XML Standardization? An Event Study', *International Journal of Electronic Commerce*, p132. [Online]. Available from: <http://search.ebscohost.com/login.aspx?direct=true&db=buh&AN=22665269&site=bsi-live>, (Accessed: 22 March 2007).
- Albright, S., Winston, W. & Zappe, C. (2006). 'Methods for selecting random samples'. In: 3rd ed. *Data analysis & decision making*. Mason, USA. Southwestern, p379
- Carpinetti, R.C. L., Galdamez, E. V. C., Gerolamo, M. C. (2008). 'A measurement system for management performance of industrial clusters', *International Journal of Productivity and Performance Management*, Vol. 57 No. 5, p407
- Castells, M. (1998a). *The rise of the network society* (Vol. 1). Padstow, Great Britain: T.J. International Limited. p30
- Castells, M. (1998b). *The rise of the network society* (Vol. 1). Padstow, Great Britain: T.J. International Limited. pp354-355
- Chong, A. and Ooi, K. (2008). 'Adoption of inter-organizational system standards in supply chains'. *Journal of Industrial Management & Data Systems*, Vol.108 No. 4, p530
- Collis, D. and Montgomery, C. (1995). Competing on resources IN: The Harvard Business Review., ed. *Corporate Strategy*, Boston: Continuum, 33-62.
- Collis, D. and Montgomery, C. (1998). Creating corporate advantage IN: The Harvard Business Review., ed. *Corporate Strategy*, Boston: Continuum, 1-32.
- Eisenhardt, K. M., and Martin, J. (2000). 'The Evolution Of Firm Capabilities'. *Strategic Management Journal*, Vol. 21, No. 10/11. p1110
- Eisenhardt, K. M., and Martin, J. (2000). 'Dynamic capabilities: What are they?', *Strategic Management Journal*, Vol. 21. p1105
- Goold, M and Campbell, A. (1998). Desperately seeking synergy IN: The Harvard Business Review., ed. *Corporate Strategy*, Boston: Continuum, 63-93. p88
- Halldorsson, A., Kotzab, J., Mikkola, H., & Skjøtt-Larsen, T. (2007) 'Complementary theories to supply chain management'. *Supply Chain management: An International Journal*, Vol. 12 Issue 4, p288
- Halldorsson, A., & Skjøtt-Larsen, T. (2004). 'Developing logistic competencies through third party logistics relationships'. *International Journal of Operations and Production Management*, Vol. 24, No. 2. p198
- Halldorsson, A., Larsen, P., and Poist, R. (2008). 'Supply chain management: A comparison of Scandinavian and American perspectives'. *International Journal of Physical Distribution and Logistics Management*, Vol. 38, No. 2. p126
- Hammer, M. (2001). The Super Efficient Company IN: The Harvard Business Review. ed. *Advances in Strategy*, Boston: Continuum, 199-224.
- Hoyt, J & Huq, F. (2000), 'From arms-length to collaborative relationships in the supply chain'. *International Journal of Physical Distribution & Logistics Management*, Vol. 30 Issue 9, p756
- Hsieh, C & Lin, B. (2004). 'Impact of standardization on electronic data interchange might affect B2B development in the real world of business'. *Journal of Industrial Management and data systems*, Vol. 104, p68
- Hsieh, C & Lin, B. (2004). 'Impact of standardization on electronic data interchange might affect B2B development in the real world of business'. *Journal of Industrial Management and data systems*, Vol. 104, p71
- IDABC (2006), '2010 The e-procurement target for Europe'. Available Online: <http://ec.europa.eu/idabc/en/document/5467/5584>, (Accessed 14 January 2009)
- Jobber, D. (2004). Principle and Practices of Marketing 4th Ed, 'Analysing competitors and creating advantage', Berkshire, SL6 2QL UK, Hill-McGraw International (UK)
- Knox, R. E., Abrams, C., Friedman, T., Feinberg, D., Harris-Ferrante, K., Logan, D., Valdes, R., Bell, T., Knox, M., Wagner, R., Scholler, D., Rishel, W., Kenney, L.F., Cearley, D.W., Harris, R.G., Silver, M.A., Witty, R.J., Hieb, B.R., Bitterer, A., Allan, A., Phifer, G., & Schlegel, K. (2006) 'Emerging TECH; Hype cycle for XML Technologies, 2006', *Gartner report*, p6 [Online]. Available from: http://www.gartner.com/it/products/hc/hc.jsp#_x, (Accessed: 6 April 2007).
- Lopez, V. S. (2005). 'Competitive advantage and strategic formulation'. *Management decision*, Vol. 43, No. 5, p661
- M^cAdam, R. and M^cCormack, D. (2001). 'Integrating business processes for global alignment and supply chain management'. *The Business Process Management Journal*, Vol. 7, No. 2, p115
- Mukhopadhyay, T., & Kekre, S. (2002). 'Strategic and operational benefits of Electronic Integration in B2B Procurement Processes'. *Management Science*, Vol. 48, no. 10 October, p1308
- Porter, Michael E (2001a), Strategy and the Internet. 'Harvard Business Review'; Mar2001, Vol. 79 Issue 3, p62-78, 17p
- Porter, E. M. (2001). 'Strategy and the internet, advances in strategy', Harvard Business School Publishing Corporation. p28
- Porter, E. M. (1991). 'Towards a dynamic theory of strategy'. *Strategic Management Journal*, Vol. 12 pp101-102
- Reed, R., & Defillippi, R. J., (1990). 'Causal ambiguity, barriers to imitation, and sustainable competitive advantage'. *The Academy of Management Review*, Vol. 15, No 1. p89
- Schade-Sørensen, H. (2007). [Research Interview with the Danish National Telecom and IT agency, Danish Ministry of Science and Technology], 25 April 2007.
- Smith, A. (2003). 'Exploring potential strategic impacts of XML-related technologies', *Information Management & Computer Security*. Vol.11. p98 [Online]. Available from: <http://www.emeraldinsight.com/10.1108/09685220310468673>, (Accessed 23 April 07)
- UN/CEFACT. (2007). UNECE Press release, Nr. ECE/TRADE/07/P02) [Online]. Available from: http://www.unece.org/cefact/prs/pr07_trd02e.pdf, (Accessed 22 April 2007)
- Witte, Carl L., Gründhagen, Marko and Clarke, Richard L. (2003). 'The integration of EDI and the Internet'. *Information systems management*, Vol. 20. No 4, p59.

THE AUTHOR

Douglas S Hill is an MBA graduate from The University of Liverpool, UK, and currently a PhD Management candidate studying with the Supply Chain Research Group at The University of Southampton, UK. His research interests are specifically in the application of technology as a driver for competitive advantage, transparency, networks and inter-organizational relationships.

Douglas has substantial experience in technological solutions centered on the standardization and application of data transfer between companies and for the last seven years he has been a serving member of both the GS1 & Danish delegations to the United Nations trade facilitation arm, UN/CEFACT.

NB. This research was undertaken whilst at The University of Liverpool, UK but has subsequently been amended whilst at The University of Southampton.