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Reducing Internal Information Technology Resource Allocation Through Global Upstream Electronic Business Standards: A Case Study in Novozymes

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ABSTRACT: An increasing number of organisations are beginning to operate in a standardised business process environment suggesting that there is benefit in a standardised business messaging infrastructure.

Novozymes A/S is the first known industrial biotech organisation in Denmark to apply the GS1 and the Consumer Goods Forum's global upstream standards initiative (GUSI) in a Vendor Managed Inventory (VMI) scenario. The combination of applying a standardised VMI business process using the aforementioned integration standards for electronic business messaging and pre-agreed standardised message choreography has been proven by Novozymes to add significant business benefit to their organisation.

This case study methodology outlines the results of Novozymes' application of GUSI standards over three separate implementations replenishing 25 customers' factories and describes the resultant reduction in internal IT effort. The implementation data were collected from a total of twenty five factories (sites) which Novozymes, today, replenish using GUSI VMI. The *'ex post'* results were then compared and interpreted against a Novozymes internal benchmarking analysis which was used an '*ex ante'* base line.

The findings strongly suggest that the GUSI VMI application provides not only reduced integration effort, but also is a foundational basis for higher rent generating processes and improved demand transparency management.

Keywords: GUSI, Supply chain, Integration, Visibility, Standards, VMI

1. INTRODUCTION

1.1 Competing Supply Chains

Global eBusiness standards are required by manufacturers and their suppliers to improve transparency in supply chains to enable higher rent generating processes (Angeles, Corritore, Basu, & Nath, 2001; Fabbe-Costes, Jahre, & Rouquet, 2006; D S Hill, 2009; Hau L. Lee, V. Padmanabhan, & Seungjin Whang, 1997; Lee & Lim, 2005; M E Porter, 2001; Rodon, Ramis-Pujol, & Christiaanse, 2007; Smith, 2003).

However, as much as the application of a standard process or a standard electronic messaging guideline in a dyadic trading relationship is useful, standards are more constructive when rolled out across the value chain where economies of scale can be leveraged and internal effort optimised (Hsieh & Lin, 2004. p. 71). Indeed, with the emergence and subsequent consolidation of trade globalisation (den Butter & Linse, 2008; Hertz & Hultman, 2008; IBM, 2009; Iskanius & Kilpala, 2006), companies compete not against each other, but against supply chains on a international scale (Christopher, 1992; Lambert, Cooper, & Pagh, 1998) .

This trend would suggest that relationships between value chain stakeholders should aim to collaborate in order to reduce total cost within their trading environment. Value chains can be optimised for effectiveness by the implementation of certain vertical integration scenarios such as Traditional Order Management (TOM), or enhanced using processes such as the Collaborative Planning, Forecasting & Replenishment (CPFR®) framework (Akkermans, Bogerd, & van Doremalen, 2004; Barratt & Oliveira, 2001; Skjoett-Larsen, Thernøe, & Andresen, 2003; Småros, 2003; VICS, 2010). TOM, however, can be improved upon through a more intricate collaborative scenario such as Vendor Managed Inventory (VMI) which is designed to smooth the flow of goods and reduce the bullwhip effect ultimately enhancing the economies of involved parties (Disney & Towill, 2003; Holmström, 1998; H. L Lee, V Padmanabhan, & S Whang, 1997; Hau L. Lee, et al., 1997; Lehtonen, Småros, & Holström, 2005).

Nevertheless, where trading party collaboration accords the opportunity to improve supply chain activities, Porter's five forces model of competition observes that one trading partner will, more than likely, hold the power in a trading partner relationship (2008). This would suggest tension between the actors and introduces the perennial themes of trust and risk which need to be addressed before successful business integration can be achieved (Lee & Lim, 2005).

This type of tension can, under some circumstances, be mitigated, reduced, or turned into competitive advantage through the use of standards organisations which can act as neutral brokers in the development and maintenance of supply chain standards and processes. Porter goes as far to say that a great deal of the economic value created by marketplaces can be traced back to the application of standards (2001).

This case study reviews the application of the VMI scenario implemented by a global enzyme manufacturer based in Denmark, Novozymes A/S. It details the benefits of harmonised IT integration and discusses the global upstream standards they have applied in several similar implementations.

Specifically in focus in this review are the internal technical resource allocation and benefits realised through GS1's XML (extensible mark-up language) based electronic data interchange (EDI) standards and aligning message choreography. These elements, which have been experienced by Novozymes, facilitate the improvement of business processes and reduce integration costs between participating value chain members (D S Hill, 2009).

2. LITERATURE REVIEW

2.1 Global Backdrop to Trade Pattern

2.1.1 Globalisation: Patterns of global supply

The growth of globalisation, as emphasized by Halldorsson *et al.*, is illustrated through a report which states that $24 trillion US dollars worth of imports and exports were recorded by the WTO in 2006, nearly double the figure reported in 2001 (2008). Specific emergent patterns of global supply can now be detected (BERR, 2009; EC, 2010a; A Halldorsson, et al., 2008; IBM, 2009) which are materialised as organisations take advantage of low cost manufacturing, or production facilities, across the world. Western organisations are increasingly taking note of emerging markets in India and China and are aggressively expanding their presence in these regions (Pankaj Ghemawat & Hout, 2008). Lessard, however, warns that other contributory factors are at play when organisations choose locations for outsourcing production and that best value should be the criteria for choice rather than purely low cost (2008). Other

research takes a contrary view to the popular belief that humankind is in a globalised community. Ghemawat proposes that commerce is actually in a state of semi-globalisation and, in essence, borders still matter and that internationalization is less advanced that we may think (2006).

Nevertheless, whichever view is ultimately correct, globalisation and the increase in cross-border trade is now a growing trend and is viewed as a path towards competitive advantage through global sourcing (den Butter & Linse, 2008; Hertz & Hultman, 2008; IBM, 2009; Iskanius & Kilpala, 2006). Globalisation therefore is a real enough phenomenon where extended supply chains are increasingly affected by a growing number of logistics actors making tracking and tracing products over longer distances more difficult. Butner notes that the number of transnational organisations in the world doubled between 1995-2007 and the number of subsidiaries tripled, thus suggesting that the effect of increased globalisation is making the ultimate supply chain ever more complex (2010).

So then it follows, globalisation develops the concept of trading bloc economic power, stakeholders ultimately reliant on the whole bloc being as effective and efficient as possible. The North American Free Trade Association (NAFTA), the European Union (EU) and as of January 2010, the Association of South East Asian Nations (ASEAN) are the current economic powerhouses. Are they rivals? Of course, but also extremely inter-dependent as shown by China's exports in 2007, seventy percent of which were bound for Europe (WTO, 2008).

Trading blocs have recognised this interdependency and have begun to put in place initiatives to strengthen their regions. The European Commission's i2010 initiative (Europe's Information Society, 2010) is aimed at making Europe a robust trading bloc through the use of modern technology and, to this point, global supply standards are beginning to play an ever more important part of management strategy. In this macro competitive environment, trading blocs are competing against each other for business and so, to be competitive, organisations have to be interdependent within their supply chain to reap the benefits of economies of scale offered through shared standards and infrastructure.

This issue is reflected in the following pages through the lens of the Global Upstream Supply Initiative (GCI, 2010), as developed by a joint initiative from Consumer Goods Forum (formerly known as the Global Commerce Initiative) and GS1. This paper reviews the benefits of applying standards in an interdependent supply chain through the perspective of a large Danish industrial biotech company, Novozymes A/S.

Novozymes have aligned many of their foundational processes and harmonised some of their business process standards through collaboration and commonly shared infrastructures. These collaborations are realised through the brokerage of standards bodies such as GS1 and the CGF which both support Novozymes by developing common GS1 XML EDI formats (D S Hill, 2009) and business information models, such as the Global Upstream Information Model (GCI, 2010).

2.2 The Global Upstream Supply Initiative - GUSI

The aim of the Upstream Integration Model and the related messaging standards is to provide tighter integration of supply chains without the need for costly and time-consuming customised IT integration projects with every partner. (GCI, 2010).

GUSI was launched in 2004 under the banner of the Global Commerce Initiative (GCI) by a group of companies in Consumer Packaging Goods (CPG). They were interested in investing in the creation of a new business and technical standard targeted on the upstream sector of the supply chain. Since then, The Consumer Goods Forum (CGF) was created in 2009 out of a merger between CIES - The Food Business Forum, the Global Commerce Initiative (GCI) and the Global CEO Forum, which, in total, has impressive combined sales of 2.1 trillion Euros (CGF, 2010).

The CGF, together with the GUSI Working Group and GS1, have successfully designed an upstream process model and the supporting XML business message standards for manufacturers of consumer product goods and suppliers of packaging, ingredients and raw materials.

2.2.1 Key Concepts of GUSI

Upstream integration is all about improving operations by sharing information and improving visibility of demand through the harmonisation of processes and standards. To this end, GUSI standards support the most common business processes used by upstream suppliers and their trading partners. GUSI consists of harmonised application of processes, GS1 product and location keys and GS1 XML business

messages. These standards are a main reason why systems and processes driven by GUSI are optimised and are able to be implemented in a cost effective (profitable) and timely manner (GCI, 2007).

2.2.2 The alignment trap

Improving profitability within a value chain is a fundamental element of business (Porter, 2008) in an environment where globalisation is a growing factor for consideration in supply chain management. Globalisation is putting pressure on extended and complex supply chains making the need for global standards an ever more pressing issue where patterns of global supply are changing (BERR, 2009; EC, 2010b; IBM, 2009). Whilst there is a natural inclination for sales departments to want to comply to the buyers tender requirements, which usually means adopting their standards for the relationship, the pressure to adopt differing EDI standards and customise processes can lead to actual increased costs through a process termed the '*alignment trap*' (Shpilberg, Berez, Puryear, & Shah, 2007).

Porter's (2001) and Hill's (2009; 2008) work indicate that using [foundational] standards to create integrated systems that are specifically customised for an organisation *can* enable a competitive advantage, however, whilst adapting in-house processes or other trading partners' processes and standards, Shpilberg *et al.* maintain that aligning poorly performing IT infrastructures to a business objective will not get the objective accomplished (2007).

Shpilberg's observation is instructive as it reflects the reality of business as it is today in many cases. By constant alignment with buyers' requests, inconsistent systems become complex and lose the reusability aspects of standardised solutions, economies of scale are lost to customised, individual requirements (2007).

CGF representatives from Japan reported that one large Japanese company had in excess of one thousand electronic order profiles for around a thousand trading partners, and, this inefficiency was becoming a problem! (Shibata, Ariga, Suga, & Sato, 2007). This issue is the essence what Shpilberg calls the 'alignment trap'(2007), where organisations cater to trading partner requests for IT alignment. Shpilberg notes that studies show that by aligning IT in a non-structured manner has led to organisations underperforming vis-à-vis those organisations which have applied a standardised approach by as much as 34% increased compounded annual growth over three years (2007). In an attempt to latch onto standards' alignment efficiencies and economies of scale, Novozymes opted to apply GUSI VMI.

2.3 Novozymes Application of GUSI

Novozymes is a global organisation and appreciates that supply chains are becoming increasingly international in character. Participating in a global and complex business environment was proving to be growing constraint on their inter-company operational efficiency.

Whilst endeavouring to minimise the '*IT alignment trap effect*' (Shpilberg, et al., 2007), Novozymes and three downstream manufacturing trading partners implemented the GUSI standards. The application of GUSI necessitates the need for greater inter-organisational relationships with trading partners and standards organisations. This is something that Novozymes has embraced and as a result, has realised supply chain improvements in several areas Table 4-1.

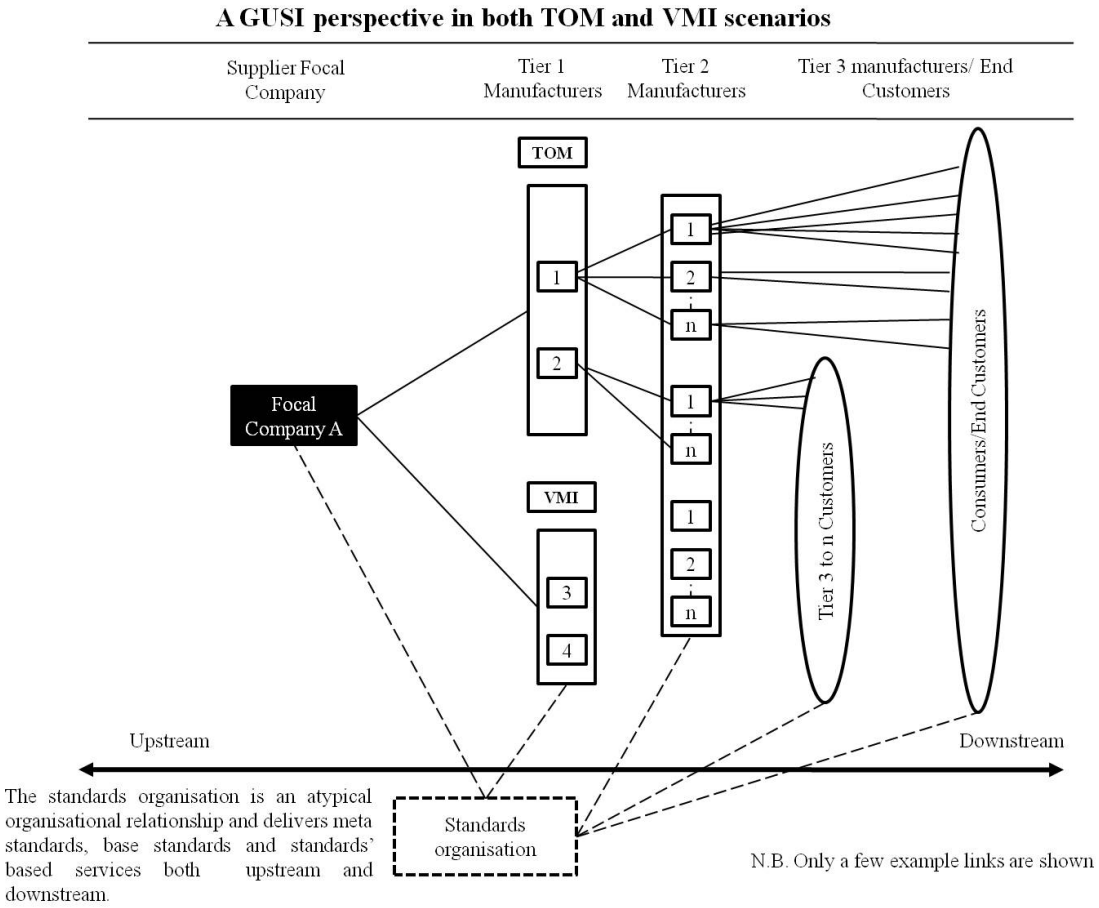
One such benefit can be seen in reduction of internal IT connectivity effort through standardised processes where each successive implementation should become easier for Novozymes through their familiarity with the standard and of course, the back office interface is already in place and embed to VMI routines.

2.4 Standards & Supporting Role Organisations

The adoption of standards in eBusiness is primarily to ease implementation and to share development costs, however, gaining consensus or standardising, is not, as a rule, an easy task. The complexity of developing a solution generally increases through any rise in the number of stakeholders which are part of the standardisation process. This extended complexity is offset against the increased value of the final solution through a greater number of users and the final process simplification. Essentially this is the trade off when developing and applying eBusiness messaging or process standards in larger groups, although as Leonardo da Vinci is said to have put it, "*Simplification is the ultimate sophistication!*"

The neutral broker and standard governance body is then the role that standards organisations play in combination with the stakeholders that apply the standards. The aim is to reduce development costs, reduce the risk of non-adoption by trade and essentially achieve more working together, enable more advantages than through their own efforts (A Halldorsson, Kotzab, Mikkola, & Skjøtt-Larsen, 2007. p. 287).

Figure 1: GUSI perspective



Adapted and customised by the author from: (Lambert, et al., 1998)

The role that standards organisations play in the supply chain is classified by Lambert as a 'supporting member' (Lambert, et al., 1998). These are organisations such as GS1, United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT), International Organization for Standardization (ISO), European Committee for Standardization (CEN) and the CGF run parallel to the entire supply chain and serve the entire trading partner community irrespective of the higher level processes, such as VMI, which are in place (see Figure 2-1). A major component of some standards organisations, e.g. GS1, UN/CEFACT and CEN, as supporting members of the supply chain, is the development of electronic business message models, syntax profiles and process descriptions. GUSI standards, whilst being generally available to members as a guideline, still have to be understood by the adopter and the EDI interface to the back office applications needs to be written. However, once 'learned' and the interface written, this expertise could be described as a meta-competency (Liedka, 1999) that adds to the portfolio of a company's resource expertise .

The value of this case study is to show that collaboratively developed standards, when in this case applied in a vendor managed scenario, equate to improved financial, services, operations and administration processes. It not only defines best practice, but also presents implementing organisations the opportunity to create a competitive advantage by reducing the alignment trap effect (Shpilberg, et al., 2007) and also as a spring board to higher level capabilities through standards and standards bodies.

2.4.1 The role of the standards & the standard's organisation – A neutral broker

Standards *development* and *use* cannot be separated (Fabbe-Costes, et al., 2006). The development of the standards should be made with consent and active

participation of the users involved and the collaboration between two supporting organisations who are promoting the GUSI initiative, GS1 and the CGF, was born from the need to do just this. One of GS1's primary directives in their Global Standards Management Process is that all development should be user driven (GS1 in Europe, 2010) which mirrors the development edict from the CGF, creator of the GUSI model (GCI, 2008) .

Figure 2-1 highlights the role that standards and other supporting members play in involving supply chain members in a downstream (in Novozymes' case) TOM or VMI scenario. The key aspect here is that a focal company cannot normally influence or control the standards or processes of all links in their chain. There are suppliers' suppliers, or customers' customers for example where 'managed [eBusiness standards] links' are not appropriate or not possible (Lambert, et al., 1998). This is where standard organisations and other supporting bodies like CGF can play a role as neutral brokers in eBusiness standards development and as an implementation facilitation body. These standards organisations, such as GS1, are not necessarily bound to any specific sector vertical and can facilitate horizontal standards adoption.

3. METHODOLOGY

3.1 Study background

The research takes the shape of a longitudinal study initiated in 2003, when Novozymes started their GUSI VMI implementations. Whilst the data collected were continuously being used to optimise Novozymes' supply chain operations, this particular data set, as seen in the benefits matrix Table 4-1, was collated in 2008 for an initial draft of a forerunner to this paper. Subsequently the data have been refined and used as the main input for this research.

The data were collected from their large customers which came from the Consumer Packaged Goods (CPG) industry within House Hold Care and includes twenty five GUSI VMI supplied factories and is measured centrally based on data from Novozymes' central SAP system.

3.1.1 Study method

Novozymes made the assumption that when applying GUSI and VMI, the commercial benefits for Novozymes implementation of vendor managed inventories had been analyzed and achieved. The supply chain, logistics benefits or Master data alignment were not considered when analyzing the IT effort business case.

The method of data collection was a collaborative effort between the first, second and third authors, the latter two are involved in applying the standards and scenarios at Novozymes. The data collection took the form of unstructured interviews with Novozymes GUSI team lead for SAP solutions and integration and the Novozymes integration manager (NB the data stems originally from Novozymes' central SAP system).

3.1.2 Entity of analysis

The study is conducted at the level of the firm and, as a result, the entity of analysis is the focal company's dyadic trading relationships with manufacturers that have implemented the GUSI process in a VMI scenario. The benefits under study are those relating to those associated purely with Novozymes' own internal operations, specifically in the area of the technical IT effort expended in establishing EDI (business messaging) connections and VMI.

3.1.3 Level of analysis

Whilst the level of analysis is primarily at the operational level, there are definite strategic aspects to the paper as a whole. Whereas the in-house departmental resource allocated to the job of IT set-up between trading partners deals with operational elements, the conclusions of the case study discuss a more strategic perspective delivered by the application of standard processes and EDI elements in the GUSI model. The paper expands the discussion of basic standards' benefits beyond simply reporting the results of the implementation. It offers a rationale as to why GUSI adoption improves strategic options, essentially using GUSI standards and standards organisations as a springboard for higher rent generating processes.

3.2 Study Limitations

3.2.1 Benchmarking

The case's results are not benchmarked against other organisations so a comparison to the actual value of the gains/benefits reported cannot be applied to an industry sector index. The study is also a cross sectional study which gives the reader an indication of the benefits in a given time frame. However, as the

GUSI model is increasingly adopted, a virtuous circle of standard harmonisation could be expected where the subsequent integration efforts with organisations already applying GUSI with another supplier should in fact speed up implementation even more.

3.2.2 Internal IT effort

No attempt is made to include or discuss benefits, or indeed disadvantages, that could affect Novozymes or their trading partners outside of the scope of the case study. The study is conducted using Novozymes as the focal company as the entity of analysis. Specifically, the case describes the amount of internal IT effort required to create electronic integration between Novozymes and three trading partners and reflects on the resultant improvement in Novozymes' performance.

4. RESULTS

The results of the case study are synthesised in the following benefits matrix which stems from Novozymes' *ex-ante* internal benchmarking against *ex-post* GUSI and VMI implementations from three strategic customers, a total of twenty five factories (sites) which Novozymes, today, replenish using GUSI VMI.

4.1 Novozymes GUSI with VMI Benefits Matrix

Table 1: Benefits matrix

Functional area of benefit	*Type of benefit*	*Benefit*
Service		
Product availability	Fewer stock outs at customer manufacturing plants	1
Trading partner relationship	Improved customer relationship	3
Operations		
Truck fill rate	Optimisation through VMI management	2
Production planning	Fewer changes to the production plan	1
Trading partner integration set up	Quicker on-boarding of new trading partners and related cost savings	3
Administration		
Forecasting accuracy	Reduction in the "bullwhip effect"	2
Reduced rush orders	Increased visibility into future demand reduced costs related to order management	1
More efficient transactional message processing	Stability in, and timing of, message processing	2
Financial		
Manage working capital	Improved cash flow (less finance tied up in stock)	2
Holding costs	Reduction in inventory holding costs and warehouse management	2
Capacity costs	Increased levelling, improved capacity utilisation	1

(Duque & Skøtt, 2009)

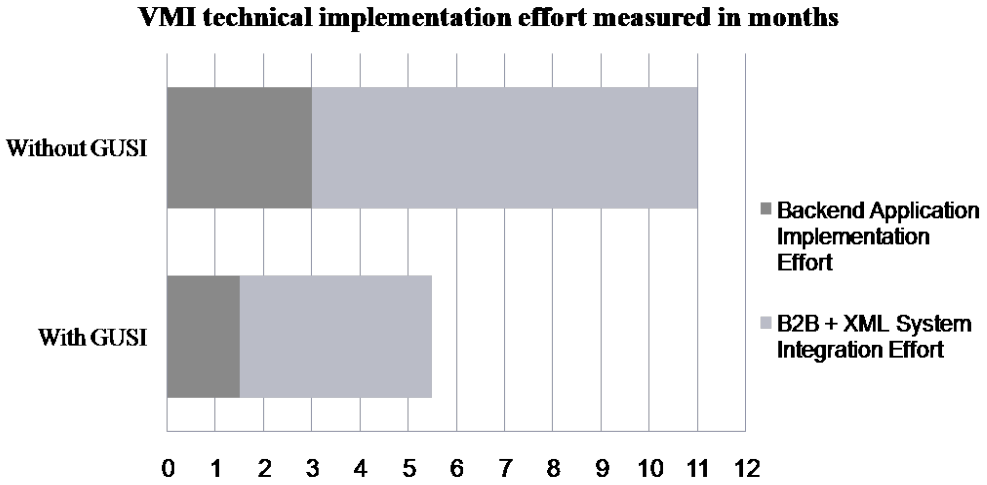
The results in Table 4-1 are based on both tangible benefits (e.g. number of rush orders, forecast accuracy and truck fill rates) as well as the intangible benefit from 'improved customer relationship'. Whereas tangible benefits are measured over time, starting three months after 'go live' with GUSI VMI at a new customer site, 'improved customer relationship' is based on quotes from customers, the development in revenue, customer satisfaction surveys as well as supplier awards received from being a highly rated supplier of supply chain services.

4.2 Area of Benefit

The areas of benefits in Table 4-1 have been graded into three classes ranging from 1 – 3; one shows some benefit, two good benefits and three excellent benefit improvements in the different functional areas.

The discussion in the following section will only focus on the benefits of the '*Trading partner integration set up'* which is an area where 'excellent' improvements were reported in Novozymes' area of Operations.

Figure 2: Technical IT effort, with and without GUSI



Trading partner integration set up improvements (Duque & Skøtt, 2009)

Figure 4-1 shows the implementation effort (in months) using GUSI versus a non-GUSI implementation. The integration and IT effort cover two main areas, namely the Backend application and the B2B integration and are described as follows:

Backend Application: Is the system landscape over which the supply chain optimisation processes was executed. This involved the three following systems in Novozymes' analysis:

– Enterprise Resource Planning (ERP): SAP R/3 & SAP ERP Enterprise Central Component (ECC) 6.0

– Business Warehouse and Business Intelligence (BW/BI): SAP BW & SAP BI

– Supply Logistics Planning and execution: SAP APO (Advanced Planning Organisation)

B2B Integration System: Is the technical landscape executing the process integration management and associated services. For example: System connectivity, message transport, message routing, message and data conversion, data mapping and test monitoring activities. The Integration system involved in the Novozymes scenario:

– B2B Connectivity Landscape: SAP Business Connector, SAP Web Dispatcher and third party AS2 adapter.

– Integration Engine: SAP XI/PI (SAP Exchange Infrastructure/Process Integration).

4.2.1 Results of Trading Partner Integration Setup

Above and beyond the pure time saving aspects to the GUSI VMI implementation, Novozymes realised three major improvements as a result of trading partner integration.

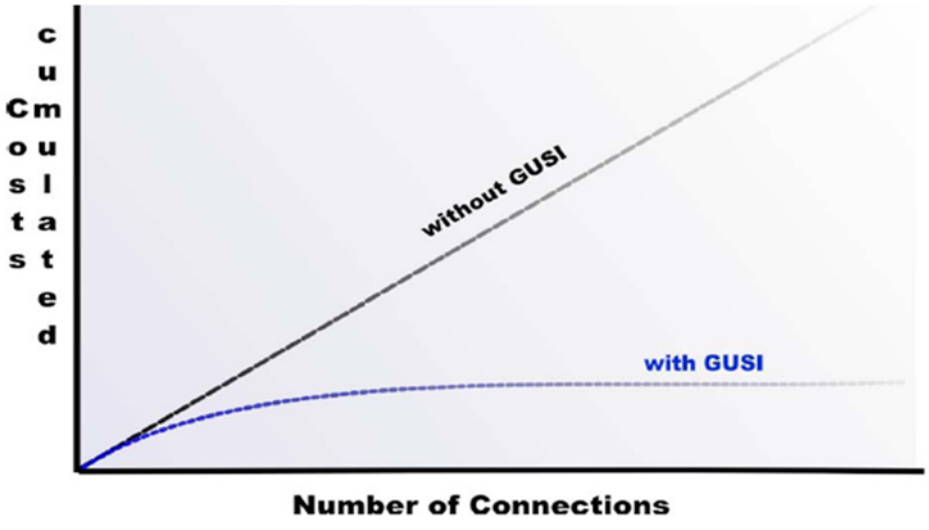
1. **Process alignment:** Partnership agreements and line of business adoption have been shown in Novozymes' GUSI roll-outs to take less time than non-GUSI roll-outs. Whilst the initial start up of GUSI VMI is more complex than in a TOM scenario, GUSI partners now have compatible business processes and terms management making the management of the whole supply process simpler and less complex to manage.
2. **Promoting the GUSI concept to trading partners:** GUSI provides an industry recognized framework for trading partners that are newcomers to the initiative. Novozymes found it easier to 'promote and communicate' the GUSI concept to trading partners because the standardised framework is scalable within the industry and based not on a proprietary Novozymes solution.
3. **Technical connectivity:** Some benefits have been realised by utilizing service providers that have adopted the technical GUSI solution within their service portfolio and have now developed standardised, 'off the shelf' solutions. These solutions have saved both time of development and have been applied as scalable elements across new implementations.

The results in Table 4-1 and Figure 4-1 are the consequence of the internal calculations from Novozymes' team lead for SAP solutions and integration when applying GS1 GUSI in a VMI environment. They are based on *departmental* timeliness and internal efficiency in establishing connectivity as opposed to an *individual FTE* cost reduction analysis. Ultimately, at a pragmatic level, a reduction in integration time must also strongly point towards a reduction in transaction costs economics and associated benefits that go along with quicker on-boarding of customers.

From the Novozymes implementation effort graph, Figure 4-1 it can be seen that there are substantial internal time saving benefits to be gained from implementing GUSI as opposed to customising solutions in a non-GUSI implementation. These benefits can be expected to increase with the number of connections and reduce transaction cost associated with trading partner integration. Figure 4-2, part of a CGF's findings, illustrates the reduction of monetary investment associated with transaction costs when GUSI is applied.

The CGF's 2006 report (GCI, 2006) findings corroborate, to some extent, the benefits indicated by Novozymes' results, albeit with the caveat that Novozymes have not explicitly indicated in Table 4-1 *ex-ante* non-GUSI implementation effort.

Figure 2: Total investment costs as a function of number of connections



Source: (GCI, 2006)

The reduction in IT effort when using GUSI, as opposed to a similar implementation not using the GUSI standards, were calculated by Novozymes at a 1:3 ratio in favour of the GUSI application Figure 4-1. This ratio is also mirrored in an independent analysis with Carlsberg A/S who are also in the process of a GUSI roll-out (D. S Hill & Oscarsson, 2010).

5. CONCLUSION

5.1 Operations benefits

5.1.1 Internal IT effort reduction

The GUSI information model is closely tied to electronic data interchange (EDI) in the form of the GS1 XML business messages that deliver the information payload. Generic benefits of EDI are already well documented in extant literature and are not addressed in this Novozymes implementation results and benefits: See (Angeles, et al., 2001; D S Hill, 2009; Millen & Ukena, 1995; Michael E. Porter, 2001; Rodon, et al., 2007; Smith, 2003).

5.1.2 VMI Replenishment Performance Benefits

In Novozymes' experience, to successfully adopt the concept of VMI companies must consider both the technical aspects as well as business processes. VMI can be implemented as a manual process, but without the support from a technical setup it will not be possible to gain the transactional and resource based benefits (Figure 4-1). GUSI VMI considers both and additionally, it standardises business processes as well as messaging choreography. Without these prerequisites, Novozymes feels VMI would not be scalable and the true benefits from an optimised supply chain may not be achieved.

For VMI to work efficiently, a close partnership was required between Novozymes and their customers. As stock availability information is now shared and made more readily available, uncertainty and risk in the supply chain has been reduced and has led to a minimization in unforeseen events, such as demand variability. Additionally, the improved information flow has allowed Novozymes the flexibility to better plan deliveries to customers and enables the optimisation of transportation.

5.1.3 Reflections of VMI adoption

Depending on the rules and terms defined for the VMI partnership in the agreement, benefits from increased efficiency are experienced from both the customer and supplier perspective. In environments with stable off-takes, high forecast accuracy and repetitive, high volume products, such benefits are highly visible. In these cases, the purchasing/planning function on the customer side will have no, or only little, hands on daily operation – in VMI the vendor takes on the responsibility and effort of ensuring that stock is available at the customer's site.

5.2 Standards Releasing Benefits

Whilst organisations seek divergent operations and strategy from their sector norm, the case study points towards standards as being fundamental in achieving internal operational efficiencies as well as having strategic elements. Here the results indicate that VMI's higher level routines and processes have been optimised by the application of GUSI, namely the GS1 XML electronic messaging and standard message choreography. In Novozymes' experience, the services from GS1 and CGF have resulted in a robust business case with high buy-in potential for trading partners.

The lesson from the case study is that a holistic approach is required when adding value in the supply chain. When crafting a strategy to achieve this, components of advantage should be seen as a synergistic set of competencies rather than isolated resources. Superior integration may give an organisation more operational efficiencies, but unless it is blended with improved processes, such as VMI, optimal performance may not be achieved. Whilst innovative product development is a key driver for Novozymes sustainable growth and profitability, logistical arrangements also make a significant contribution in adding value to Novozymes' overall profitability.

By eliminating inefficiencies in the supply chain Novozymes logistics and supply chain management department is actively contributing to the current and future success of their organisation, partially enabled through the use of GS1 standards and GUSI harmonised processes.

5.3 Implications for Practitioners

In general, it is Novozymes' experience that GUSI VMI leads to closer collaboration between the selling and the buying companies. Handing over the replenishment responsibility to a supplier takes collaboration in a dyadic trading partner relationship

to the next level which requires a high level of trust and dedication from both sides. In general, a close trading partner relationship is built up over the years and not necessarily an outcome resulting solely from a GUSI VMI implementation, however, GUSI VMI is definitely part of a bigger 'package' of collaborative services which the professional supplier must offer to highly valued customers to strengthen the partner relationship.

This study demonstrates that it is possible to improve integration capabilities by applying global upstream standards. In this case, a reduction in time effort of around 60% was reported by Novozymes in total system integration with their trading partners. Additionally, by optimising IT integration, trading partners are on-boarded faster than in a non-GUSI environment with the result that it is possible to make use of the VMI process five months sooner than in a traditional non-GUSI environment.

The true gains within Novozymes are, however, not the reduction in transaction costs and quicker on-boarding of new suppliers, but the buyer being integrated with the product that Novozymes produce; the more efficient the supply of product, the leaner and more cost effective the supply chain. So with this in mind it could be said that processes and procurement scenarios (e.g. TOM & VMI) are enabled more quickly when deployed using foundational eBusiness standards. These types of additional higher rent generating processes have, in Novozymes' case, been seen to improve the demand transparency.

5.4 GUSI, a Normative Prescription for Supply Chain Management

Is there a normative prescription to a successful supply chain scenario? This case study suggests that the application of GUSI reduces internal IT integration effort and plays a role in minimising transaction cost economics (TCE) through reduced IT integration resource allocation. Theory claims that the exchange of demand information from the customer to the supplier (short term material requirements and long term forecast), will reduce the total amount of inventory, and hereby working capital, in the supply chain (Disney & Towill, 2003; H. L Lee, et al., 1997; Hau L. Lee, et al., 1997). This is often referred to as the so-called bullwhip effect. With some customers, it has been possible to reduce inventory levels on both the sides, but due to the very long production lead times, accuracy in long term forecasting from the customer is crucial to achieve this benefit.

However, when studying the case through the resource based view (RBV) lens, the benefits can be more far reaching than simply reducing transaction costs of technical effort and allocation of in-house resource. Whilst transaction costs can be significant and are frequently referred to synonymously with efficiency (Williamson, 1981), it is often the allocation and configuration of bundled resources that provides organisations with greater benefits, vis-à-vis the competition (Wernerfelt, 1984). Of course, at some level, companies diverge process and strategy to maintain, or develop, competitive advantage and the concept of applying a normative prescription to attain advantage may seem counter intuitive to this goal.

This idea can be discussed further by developing a chemistry metaphor. Two chemical compounds may contain the same elements in the same proportion, yet because their atoms are linked together differently, the identities of the substances are distinct (Atkins, 1991). This is the essence of the advantage which Novozymes has created, where the advantage is in the quality of 'the melt'. Whilst individual components of the GUSI VMI implementation are not unique, the aggregation of capabilities adds to competitiveness.

Benefits in a GUSI VMI environment could be summarised as the addition of bundled organisational capabilities, namely, processes, message choreography and master data alignment, all offering the ability to better manage product demand data from the downstream customer. This targeted transparency management is predominantly where demand is met with as little demand distortion between the two parties as possible enabled by efficient and effective business information exchange. This added business value is the ultimate goal of an efficient supply chain and the GS1, CGF, GUSI initiative has been seen by Novozymes as a factor that facilitates the implementation of higher rent generating processes.

6. DIRECTION FOR FUTURE RESEARCH

6.1 Risk Reduction

The case study brings to light the role of the standards organisation as a neutral broker in business standards, specifically their governance, maintenance and development. It could be said that the value of a standard increases proportionally to the amount of users it attracts, so, it is of some impor-

tance to the manager to ensure that any standards which are adopted should be taken up by as many stakeholders as possible to increase the value of the investment. Further studies could review the effect standards organisations have on risk reduction in the areas of adoption and standards maintenance, an important aspect if a community of users want neutral support and governance of foundational standards.

6.2 Master Data

Whilst the GUSI XML business messaging standard prescribes GS1 keys both as the unique identification of; locations, routing endpoints, business roles and unique product identification, the benefits of using GS1 keys is not in the scope of this case study. CGF has made a good attempt to demonstrate the value add of the GS1 master data key, the Global trade Item Number (GTIN) (2007) , but a fuller, academic and open study could open up these benefits to a wider audience. The application of standardised identification is a pre-requisite for Master Data Alignment [product and location] (MDA) and it would be a natural progression in the research to ascertain how GUSI business standards' contribute to the benefits associated with MDA.

6.3 Benchmarking GUSI

It would be of academic, strategic and operational interest to measure results form a specific application of GUSI against those of another organisation or sector benchmark to measure the actual benefit gained from the GUSI implementation. Any new research following this path could be used to correlate with the Novozymes' results and add validation to the adoption potential of GUSI standards.

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