CASE STUDY ON THE IMPLEMENTATION OF ROSETTANET STANDARDS

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ABSTRACT

There has been an increasing trend for Electrical and Electronic (E&E) companies to migrate their Supply Chain Management (SCM) online using Internet technologies. In Malaysia however, many of these E&E companies have not or are reluctant to invest in IT to improve their SCM.

In order for companies to successfully migrate their SCM online, they need to solve both technical and business issues that are involved during and after the migration. One example for solving the technical issues is that of the Rosettanet Standards. Rosettanet standards promised to solve the integration issues of online SCM in particular by allowing companies to communicate in the same e-business standards.

This paper presents an on-going study supported by Rosettanet Malaysia. A case study on the implementation of Rosettanet standards in B2B system between Infineon Technologies Malaysia and their suppliers will be discussed. This paper will also give an overview of a work in progress model known as “The RosettaNet Cost Efficiency Model” to measure the business benefits of implementing Rosettanet standards.

INTRODUCTION

The current global competition is putting business pressures on all supply chains to reduce their costs while being more proactive. Supply chain management helps companies to reduce uncertainty and risks along the supply chain, thereby positively affecting the inventory levels, cycle time, processes, and customer services [1].

Supply Chain Management is defined as “the integration of business processes from the end user through original suppliers, that provide products, services and information that add values for customers”. Managing supply chains is difficult due to the need to coordinate several business partners, internal corporate departments, number of business processes, and many customers. It is almost impossible to manage medium to large supply chains manually. [1]

In the past, many companies have invested significantly into Electronic Data Interchange (EDI) as well as Value Added Networks (VANs) to improve communications with their partners. In fact, although the benefits from integrated supply chain management (SCM) differs, they can be significant and are well documented in previous studies.

However, with the development of Internet technologies, many of the EDI and VANs are being replaced E-commerce implementation in the Supply Chain. In International Data Corporation (IDC) 2004 study, it was estimated that the worldwide B2B transaction volume at $1.4 trillion in 2003 and $2.4 trillion in 2004. Market forecasters also
estimated that by 2008, the global B2B market may reach $7 to $10 trillion, continuing to be the major component of the EC market [2].

Goldman Sachs Group in 2001 found that the percentage of Internet based B2B as a proportion of total non Internet B2B commerce increased from 0.2 percent in 1997 to 2.1 percent in 2000 and will grow to 10 percent by 2005 [3].

Although the current network and Internet technologies enable companies to improve their supply chains with their partners, one problem faced by the companies is the lack of both business standards and technical standards which enable them to communicate with each other. By implementing B2B E-commerce in the supply chain management, many companies have been developing communication standards that can be used within the industry. One of the standard among the electrical and electronics industry is the Rosettanet standards which will be discussed later.

This case study aims to provide an overview of Infineon Technologies, in particular Infineon Technologies Malaysia’s B2B Rosettanet implementation with its suppliers. This paper will also discuss the RosettaNet Cost Efficiency Model developed by Infineon Technologies Germany.

INTERNET AND SUPPLY CHAIN MANAGEMENT

The Internet has changed the way companies do businesses. Internet based information systems offer a great opportunity to improve supply chain management [5]. SCM has been enabled by convergence, which refers to the integration of computer and communicating technologies [5]. Convergence is strengthened by the Internet due to the fact that it enables ubiquitous and low cost connectivity. The speedy network transmission also helps businesses to realize seamless and real-time communications and transactions.

Most business view the Internet as an extra distribution channel to most firms. However, the Internet and web technologies can support the entire supply chain’s operations.

Examples of how Internet technologies contribute to SCM include:

1. Developing e-Commerce applications. The Internet offers a variety of supports for online communications and transactions. An example of e-Commerce applications will be online procurement.
2. Order taking can be conducted on EDI, EDI/Internet, or extranet and it can be fully automated. An example can be found in Business to Business (B2B) where orders are generated automatically to suppliers when inventory levels fall below certain levels.
3. Collaborative commerce among members of the supply chain can be done in different areas from product design to demand forecasting. This will result in shorter cycle times, minimal delays and work interruptions, lower inventories and less administrative cost.
4. Applications integration. This is an important IT strategy since it can create or modify the interactions among related applications and to encompass canned software, legacy applications and Web services [7].

B2B SUPPLY CHAIN MANAGEMENT

B2B e-commerce is an e-commerce model where both the buyers and sellers are organizations. B2B process holds many positive attributes. Firstly, it can reduce purchasing costs. For example, a company searching for products online will take less time and electronically processing an order streamlines the ordering procedure.

Secondly, B2B increases the efficiency of the market. Through the Internet, the companies can quickly and easily get quotes from different suppliers.

Thirdly, B2B hosts also give producers a better insight into the demand levels in any given market. “Spot price levels can quickly be determined in everything from paint pigments to plastic cups.” [7].

Lastly, B2B technologies will allow companies to better utilize their inventory and raw materials.

BACKGROUND INFORMATION

Infineon Technologies AG was founded in April 1999 when the semiconductor operations of parent company, Siemens AG, were spun off to form a separate legal entity. Infineon Technologies (Infineon) is engaged in manufacturing, designing, development and marketing of semiconductors. Its primary markets are wireless and wireline communications, automotive, industrial, computer, security and chip card markets. It is headquartered in Munich, Germany and employs about 35,600 people. 7,200 of them involved in research and development

Infineon is among the Worldwide Top 20 Semiconductor Sales Leaders. As of 1st May 2006, Infineon's Memory Products division was carved out as a new company called QIMONDA. It employs about 12,000 people worldwide.

INFINEON TECHNOLOGIES MALAYSIA

Infineon Melaka started operation in 1973 as an incorporation of Siemens Components Sdn Bhd.

The main tasks carried out at Infineon melaka are the assembling and testing of Infineon’s Discrete, Power, Memory and Logic semiconductors. It is the second largest manufacturing site of Infineon worldwide. There are an estimation of 5600 workers working at Infineon Melaka plant.
Infineon Melaka Delivering produces 10 million semiconductors per year which totals up to be a third of Infineon’s total production. The total per annum sales of Infineon Melaka representing about 1.4% of total Malaysian export.

SEMICONDUCTOR INDUSTRY CHALLENGES

Brian Halla, CEO of National Semiconductor once said "Logistics are more important than the product; that's different from the old days." There are many business challenges that are faced by many companies within the semiconductor industry. Some of the challenges include:

- The ability to manage product transitions
- Increasing customer expectations for on-time delivery, upside flexibility, and IT on-boarding
- Complex supply chains including outsourcing, qualification constraints, and hub agreements
- Rapidly changing demand
- Shorter product life cycles
- Long manufacturing cycle times
- Capital-intensive operations

Using Infineon Technologies AG as an example, we can have a clearer picture of some of the issues faced by the semiconductor industry. As mentioned earlier, Infineon’s product
range includes chip for mobile communications, multimedia devices, automobile and industrial electronics, chips for security systems, as well as memory chip. There are many backend production site worldwide and supplying subcontractor companies that are involved in Infineon’s semiconductor production. Given that the plants in Asia, Europe, and the United States are not able to supply all the product ranges, the productions are carried out in several locations across different countries. At such, it is quite normal for a product to travel across the world before the device is finished, packed and shipped to the customer on schedule via one of Infineon’s four distribution centres.

The verticalization of Infineon Technologies “for the fortification of the competitive strength and for the safeguarding of a profitable growth has increased the complexity of logistics”. Traditional logistic techniques have result to high stocks in the warehouses and in the transit. On top of this, “the planning cycles in a globally distributed production structure have been so long due to the laborious alignment that the plan premises were not valid any more when a plan had been adopted”. (Supply Chain Management, Lecture notes, Alain Chong)

Given all these challenges, companies have tried to improve their logistics through good supply chain management, and in Infineon’s case, with the help of B2B in their supply chain management.

INFINEON MALAYSIA PRIOR TO THE IMPLEMENTATION OF B2B

The situation at Infineon Melaka was that they were in the middle of the Supply Chain with no direct link to the end-customer. As a result, some of the problems faced by Infineon Melaka was that they do not have a completely transparent Supply Chain. The planning for Infineon Melaka was done on a small clipping of the supply chain resulting in high stocks to meet the volatile demand.

To overcome the problem, an integration of the complete supply chain on a world-wide basis is needed for Infineon. In order to achieve this, only a world-wide standard agreed by every company in the supply chain can be the basis for this integration. This case study will focus on Infineon Melaka’s implementation of B2B with its suppliers, in particular through using the Rosettanet standards.

Infineon Melaka at the moment has about 500 suppliers from countries such as Malaysia, Singapore, Hong Kong, Taiwan etc. Like many companies, many of the purchasing processes are still conducted manually through the use of Fax, telephone or E-mail. This is not surprising especially among the Malaysian companies as a recent study conducted by IDC on organizations' IT spending trend showed that only 6.2 per cent of the respondents in Malaysia rated SCM as one of their top three IT investment priorities for compared to about 9.3 per cent in the whole of Asia Pacific.

Although some suppliers implement EDI with Infineon Melaka, there are problem typically faced by EDI systems. The problem faced by Infineon Melaka in terms of usage of EDI systems is similar to their counterparts in different regions. In January 2003, Infineon Technologies have 5 different EDI applications world wide in use. 2 are
in the United States, 2 in Europe, and 1 in Asia Pacific. The problems faced when using EDI are:

- Different EDI software vendors
- Different hardware and software platforms (e.g. different operating systems such as Unix and Windows)
- EDI solutions introduced their own maintenance and administrative overheads
- There is a need to have 24 X 7 supports for EDI applications

In order to overcome the problem with existing EDI systems, Infineon Technologies aim to offer a single B2B integration platform to both their customers/partners and their internal ERP systems on a worldwide basis supported and operated 24x7. As part of Infineon Technologies’ plan for their B2B implementation with their suppliers, Infineon Melaka started the implementation of B2B with 20 selected suppliers. The standard used by Infineon Melaka with its 20 suppliers are the Rosettanet standard.

The B2B middleware used at Infineon Melaka is the same with Infineon worldwide, which is the WebMethods. There are two B2B methods between Infineon Melaka and its suppliers, which are the ASP Model and Direct Model.

**ROSETTANET OVERVIEW**

RosettaNet is an independent, non-profit consortium of more than 500 organizations. In 2002, RosettaNet and the Uniform Code Council (UCC) merged to bolster the adoption and development of open e-business process standards across the industries served by the two organizations. The principal goals of RosettaNet focus on the supply chain and its optimization by improving efficiency and performance through enhanced B2B integration. The RosettaNet e-business process standards aim to facilitate speed, efficiency, and reliability to enable greater collaboration and communication between trading partners. RosettaNet provides a common platform of communication, or a common language, that allows the different trading partners involved in a business process to automate that process and to conduct it over the Internet [10].

Rosettanet Malaysia was set up in 2002 to promote and facilitate the adoption and implementation of RosettaNet e-business standards amongst MNCs and SMEs in Malaysia. To facilitate this, the government even proposed a grant of RM5 million for the development Rosettanet [10].

Like many semiconductors companies, Infineon Melaka has chosen the Rosettanet standards. Besides being an industry B2B standards among the E&E industry, there are some reasons for choosing the Rosettanet standards for Infineon Melaka.

The main reason for Infineon Melaka to choose Rosettanet is the potential savings that Rosettanet standards can offer compared to EDI. This is due to several factors. Firstly, the implementation cost for of Rosettanet is much lower as it uses a world wide standard.
Secondly, the transaction costs are reduced due to the direct connections between the suppliers and Infineon Melaka. Lastly, it is flexible in terms of implementing new data links. The suppliers can choose to implement more data links when needed. Thirdly, through using B2B, manual entry, fax and paper documents can be reduced or eliminated.

In terms of data exchange, an advantage of Rosettanet is that there is no batching compared to EDI. All the transactions between Infineon Melaka and its suppliers will be conducted in real time.

In terms of the current business environment, most of Infineon Melaka’s business partners (Customers, Suppliers, Forwards) are prepared to progress to streamline their supply chain through B2B.

**B2B IMPLEMENTATION PROCEDURE**

Infineon Melaka started their implementation plan for B2B with its suppliers in 2005. The initial rollup stage involved 5 suppliers. The second batch of suppliers involved was increased to 20 later on.

Infineon Melaka conducted a suppliers’ briefing prior to the implementation of B2B with the selected group of suppliers. The suppliers were briefed in terms of Rosettanet standards, the aim of implementations, and the advantages of implementing B2B standards. The whole process takes about 1 month before the suppliers confirmed their participation.

**CURRENT B2B MODEL**

The main focus of Infineon Melaka’s B2B priorities are Manufacturing, Order Management and Inventory Management.
To address these focuses, the Partner Interface Procedures (PIP) connections for Infineon Melaka and its suppliers at the moment are 3A4, 3A8, 3C3, and 4C1.

The processes initiated by suppliers are
- 3A4C: Response to Infineon Melaka request for new purchase order
- 3A8C: Response to Infineon Melaka request for a change in purchase order

The processes initiated by Infineon Melaka are
- 3A8R Request Purchase Order Change
- 3A4R Request New Purchase Order
- 4C1 CSR (Consignment Stock Report)
- 3C3 CBR (Consignment Billing Report)
Figure 3: B2B Model (Source: Infineon Technologies, 2006)

Figure 3 shows an overview of the B2B implementation of Infineon Melaka with its suppliers.

As shown in the diagram, Infineon Melaka implements two models with its suppliers 1) ASP Model 2) Direct Model.
ASP MODEL

The ASP model is also known as the 3rd party model. Using this model, communications between Infineon Melaka and its suppliers are through an external website, which is supported by CrimsonLogic in Singapore.

CrimsonLogic was established in 1988 and they were formerly known as Singapore Network Services. One of the service provided by CrimsonLogics is as an application server provider (ASP) for companies. An application service provider (ASP) is a company that offers individuals or enterprises access over the Internet to applications and related services that would otherwise have to be located in their own personal or enterprise computers.

The application provided for Infineon Melaka and its suppliers by CrimsonLogic is the Tradepalette for their Supply Chain. CrimsonLogic’s tradepalette incorporates RosettaNet eBusiness standards. Through using the ASP model, the interactions are conducted using the Internet. Data will be send from Infineon Melaka’s system to CrimsonLogic’s Tradepalette system, which in turns send the necessary data to the suppliers. The suppliers when received the information on the web however, do need to key in the information to their necessary backend system.

The advantages of the ASP model is that it reduces the implementation costs for suppliers. The suppliers do not need to invest in additional hardware or software. All the suppliers need is the Internet connections. In other word, the ASP model can be considered as a type of outsourcing by the suppliers, whereby the applications are provided, supported, and maintained by CrimsonLogic.

The main disadvantage of ASP model is that although data are exchange through CrimsonLogic’s Tradepalette, the backend systems from the suppliers are not connectd the tradepalatte. This means information received through the web from the suppliers will still be needed to key into their backend systems if necessary.

DIRECT MODEL

The main difference between the direct model is that the data will be exchanged directly between Infineon Melaka with their suppliers’ backend systems. There is no need to receive the information from Tradepalette and update their own backend systems.

However, by implementing the Direct Model, the cost of implementation will be higher when compared to the ASP model. The IT department from the suppliers will be heavily involved in the implementation to ensure a successful integration between the two backend systems. At such, the implementation of the direct model will usually take 1-2 months compared to 2-3 weeks when choosing the ASP model.

For suppliers who have chosen to implement the direct model, they will need to maintain their own IT systems. This is consider to be an disadvantage
BENEFITS OF IMPLEMENTING B2B - CALCULATIONS

One problem with information technology implementation is to find out the actual benefits achieved when implemented the system. At the moment, Infineon Technologies Malaysia has not calculate the tangible benefits of implementing their B2B system. One model that can be used is developed by Infineon Technologies in Germany which is known as the RosettaNet Cost Efficiency model. The aim of the model is to calculate the business benefits of implementing RosettaNet standards.

This section explains the RosettaNet Cost Efficiency Model developed by the author with Infineon Technologies Germany. In this sections, detailed explanations are given regarding the model structure as well as various model components such as terminology, business processes, input and decision variables, numerical formulas, etc. The purpose of this section is to give the user of the model a comprehensive understanding of the model structure and guide the user through the information inputs. This model will permit the user to calculate the potential cost savings from RosettaNet implementation.

AN OVERVIEW OF THE COST EFFICIENCY MODEL

The Cost Efficiency Model is designed to capture the tangible benefits that can be achieved through RosettaNet (RN) implementation. The model is intended for use by RosettaNet users from the sell side (supplier) of commercial transactions. The term “tangible benefits” refers to cost savings that arise from reduced consumption of identifiable cost drivers, such as direct labor and material, and can be quantified through numerical calculations. The complete explanation of the model will be presented in the appendix section.

FUTURE DIRECTION AND CONCLUSION

This paper presented an overview of how Infineon Technologies implemented their B2B systems in their supply chain using the RosettaNet standards. It also give an overview of the Cost Efficiency Model which is currently being applied to Infineon Technologies Malaysia and its B2B partners. The current study is still on going, with the author working with Infineon Technologies on gathering the necessary data for the cost efficiency model.

APPENDIX

THE ROSETTANET COST EFFICIENCY MODEL (INFINEON TECHNOLOGIES)

The model contains seven worksheets. Five of the worksheets are dedicated to different RosettaNet business processes: purchase order (PIP 3A4/8), advance shipment notification (PIP 3B2), inventory management for consignment (PIP 4C1), payment
remittance (PIP 3C6) and delivery schedule management (PIP 4A2/3/5). The Cost Efficiency Model also includes a separate worksheet named “process” which is intended to capture inventory savings and early payment discounts. A summary sheet combines all the cost savings from each worksheet and shows the total annual savings that can be achieved by implementing RosettaNet.

**MAJOR BENEFIT CATEGORIES**

The majority of tangible benefits will show up in 5 major categories:

- **Throughput time reduction**: The implementation of RosettaNet will automate many of the current business processes and eliminate a lot of manual transactions. The throughput time reduction addresses labor cost savings through headcount reduction or re-allocation of staff.

- **Paper and office supply consumption**: The automated processes under RosettaNet will eliminate a lot of paper-based transactions such as photocopies and faxes, therefore reducing the actual paper and office supply consumption. Your company will also reduce its usage of certain office equipments such as copy machines, fax machines, etc, thereby reducing your capital equipment expenditures.

- **Data exchange cost**: When RosettaNet integrates with the backend system it enables automatic data transfer between systems of different trading partners. This automated process greatly reduces the use of traditional data exchange methods such as faxes, emails, value-added networks (VANs), data downloads and uploads through web applications. Therefore the costs associated with using these methods will be eliminated as well.

- **Inventory reduction**: The implementation of RosettaNet greatly improves the operational efficiency and data integrity of a company. RN enables data exchange to occur with much greater frequency and accuracy, therefore greatly facilitating collaboration among supply chain partners. RN improves the inventory visibility across the supply chain and reduces the need for safety stock to buffer against forecast variability. RosettaNet also helps reduce the forecasting window and expedites the fulfillment process, therefore shortening product lead-time. All these factors enable a leaner, more responsive supply chain and help your company achieve substantial inventory reduction.

- **Early payment discounts**: Implementation of the RosettaNet PIP for automated invoice and payment remittance process allows your company to expedite the payment process, thereby improving its chances to take advantage of early payment discounts if desired.
COMPONENTS OF THE MODEL (USING PO WORKSHEET AS AN EXAMPLE)

The red boxes are information that needs to be filled out by the user. These are decision variables that are unique to your company. They vary across different companies and a uniform rate cannot be estimated with reasonable accuracy. There are three major types of decision variables in this model.

CURRENT PROCESS COMPOSITION

This data shows the percentage of transactions conducted through manual, EDI or web processes. In our example above, the company currently conducts 50% of its transactions through manual processes, 30% through EDI and the rest 20% through web-based applications.

Definition of web-based applications – this is used only if customer logs onto the website and enters data directly into the system. This category is used when you benefit from the efficiencies gained through website transactions.
Definition of EDI applications – this is used if the EDI data transmitted to the company and is uploaded directly into the MRP system. If you get POs by EDI, print them, and you manually enter the data into your system.

COST DRIVERS

In the example, the cost drivers are number of POs, percentage of PO changes per month, paper consumption, etc. These cost drivers drive the business processes and are major indicators of business volume. They should only be available internally to a company.

COST INFORMATION

An example would be cost per sheet of paper or data exchange cost per transaction. These information are left to be filled by the user because we feel they should vary across different geographical regions, different companies with different operating scales, etc.

Diagram 2

The grey boxes with blue borders are input variables that contain fixed information given by the model. This data should remain fixed unless changed together with the business processes.

Business Process (Manual): steps and process times can be added to the model. The process steps, and times included in this model are estimated according to industry standards. There are three types of input variables in the model:
EFFICIENCY GAIN INDICATOR

The model assumes a completely manual process as the efficiency base line. The indicators show the level of efficiency gains for each process on top of the manual base line when RosettaNet is implemented. For example, if a company currently uses a completely manual process, the efficiency gain from RN implementation should be 1.0, which means 100%; while if the company is currently using EDI, the efficiency gain is estimated to be 0.1, which means implementing RosettaNet will only give the company a 10% savings and the remaining 90% efficiency gain should have been captured when the company implemented EDI.

TIME CONSUMPTION DATA FOR EACH BUSINESS PROCESS

This data is tied with the standard industry transaction processes outlined in the leftmost column and is used to show the amount of time consumed for each step of the business processes. It's based on 100% manual processes and is estimated and verified through company interviews and industry research. In our PO example, a standard PO transaction commonly consists of 4 steps and takes about 5 minutes to complete. This information is then multiplied by the cost driver-number of PO per month to get the monthly time consumption data in the next column. The time consumption information is given in the model and should remain fixed unless a user feels that its business processes and time consumption data deviate substantially from the given industry standards. In this case, the user can choose to fill in its own information using the optional variable box with the green border.

PROCESS EFFICIENCY GAINS

The process efficiency gains give the percentage time reduction for each step of the processes when RosettaNet is in place. In our PO example, efficiency gain for the first step of our PO processes—“receive PO from customer” is 100%, meaning when RosettaNet is implemented, this step is completely eliminated; however since most companies would still file PO hardcopies even after RosettaNet is implemented, the efficiency gain for this step is 0%.

OUTPUT BOX

The output box has a double line border around it. These are output variables that are calculated by the model.

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