APPLYING A WEB-BASED SYSTEM TO IMPROVE SUPPLY CHAIN EFFICIENCY IN THE PHARMACEUTICAL INDUSTRY IN THAILAND

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ABSTRACT

In order to successfully connect the whole supply chain, an information standard is needed to exchange electronic documents between business partners. The XML-based standard is starting to gain popularity over the EDI-based standard in many industries. There are two main standards being implemented by the industry. ebXML is supported by the United Nations and OASIS, while RosettaNet is supported by companies in electronics and high-tech industries. The aim of these standards is to electronically connect companies within the same supply chain, regardless of their size.

In this research, we study a medium size multinational pharmaceutical company in Thailand, and how a web-based system and a business standard for information flow (RosettaNet standard in this case) can be applied to improve efficiency in its supply chain. In particular, we examine the information flow during the process of order transactions between the pharmaceutical company, its customers (hospitals), and its distributors. We first examine the current business process and propose a new process with a web-based system. The new system is examined and the ROI model is analyzed.

Key Words: RosettaNet, Pharmaceutical, XML, Web-based system

INTRODUCTION

The pharmaceutical market differs from almost all other consumer goods in that the buying decision is not made by the final consumer: the drug is usually prescribed by the general practitioner and paid for by the patient (James, 1993). The distribution channel for the pharmaceutical industry can be separated into two main channels. The first channel is through

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hospitals; also know as the ethical sector. The second channel is through drug stores, or Over-The-Counter (OTC). The consumption growth rate is strong in the ethical sector at 21%, while the growth rate in the OTC sector is 9%. A high growth rate persuades all pharmaceutical companies to compete for market share in this industry, especially a share in the ethical sector which is the biggest market in Thailand.

The supply chain of the pharmaceutical industry in Thailand starts from the manufacturer's production. The products are transported from the manufacturer to the distributor's warehouse, and then through the wholesaler, retailer, health centers or private clinics and hospitals before they finally go to the consumers. The hospital channel controls the majority of drugs shipped to consumers, with a market share of 66%, the OTC channel controls 24%, and the remaining share is through retailers at 10% (in the fiscal year 2006).

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LITERATURE REVIEW

Information systems are vital to the coordination of supply chain activities. In addition, firms are able to garner a competitive advantage by matching buyers with sellers before others can do it (Sameer and Jayavel, 2003). In the 1990s, companies focused on the design and implementation of their internal business processes to overcome functional barriers. The 2000s are about the integration between enterprises and inter-enterprise processes; particularly the improvement of supply chain management and customer relationship processes (Diogo and Pinto, 2005). The major enabler is the Internet, which has resulted in entire networks of e-business processes across various organizations (Mathias, 2004). The new focus on e-business is, in part, driven by the adoption of the Web as a new channel for product distribution, marketing, and interaction with customers. The integration of the traditional as well as the Web-oriented functions is the cornerstone of a successful e-business (Shaw, 2003). It could benefit in terms of cost saving by applying e-business between enterprises. For example, Driver and Louvieris (2002) study the significance of XML and related developments as introduced in the context of qualitative information search and extraction from documents. The study shoes the importance of the existence of the XML standard to integrate business partners in the same supply chain in a seamless automated manner. Yu-Cheng et. al. (2005) examine the critical factors in

building a knowledge information system in the pharmaceutical industry.

ROSETTA NET STANDARD

Many companies have enjoyed many benefits from applying a business standard to improve their efficiency and effectiveness. In the electronics industry, Intel has consistently applied the RosettaNet standard to support its supply chain over the past five years. The availability of open standards such as RosettaNet can lower the costs of inter-organizational collaboration significantly, leading to major improvements in the efficiency and effectiveness of electronic information exchange systems. Achieving these gains, however, depends on (1) the successful development of standardized business grammars and processes in specific industries and (2) widespread adoption of these standards by both large and small organizations (John et al., 2005).

RosettaNet is an XML-based standard with strong support from the high-tech manufacturing industry. Since RosettaNet is a widely adopted standard that provides message content, choreography and transport specifications for high-tech manufacturing companies, it is slightly more mature than ebXML. However, its standards development process is targeted at the high-tech industries. The RosettaNet Consortium which began in 1998 now has more than 500 member companies and has become a leading organization in the creation, implementation, and promotion of open e-Business standards and services. In particular, RosettaNet defines a set of XML-based protocols to facilitate secure electronic exchange of standardized business documents between business partners over the Internet. RosettaNet has three key standard specifications:

1. RosettaNet Implementation Framework (RNIF)
2. RosettaNet Business and Technical Dictionaries
3. Partner Interface Processes (PIPs), the RosettaNet specification.

To apply the RosettaNet standard between trading partners, both partners need to agree on the types of business transactions they will conduct over RosettaNet. There are many types of business transactions that are defined in RosettaNet PIPs. Currenly there are 113 PIPs created to support 8 different business activities. For example, there are PIPs created to support the inter-organization information exchanges process on product cataloging process, logistics management, inventory information exchange, order processes. Business partners must choose which PIPs they will support. RosettaNet defines standard protocols for public processes to be used between business partners - the processes that all business partners will follow to accomplish business transactions. However, to accomplish trading entity automation, each trading company must integrate its public processes with its own private processes; a linkage between the communications gateway and back-end ERP systems. Private processes are company-dependent and are outside the scope of RosettaNet standards. Developing

RosettaNet solutions requires reengineering and integration of internal business processes and collaboration of external processes among business partners.

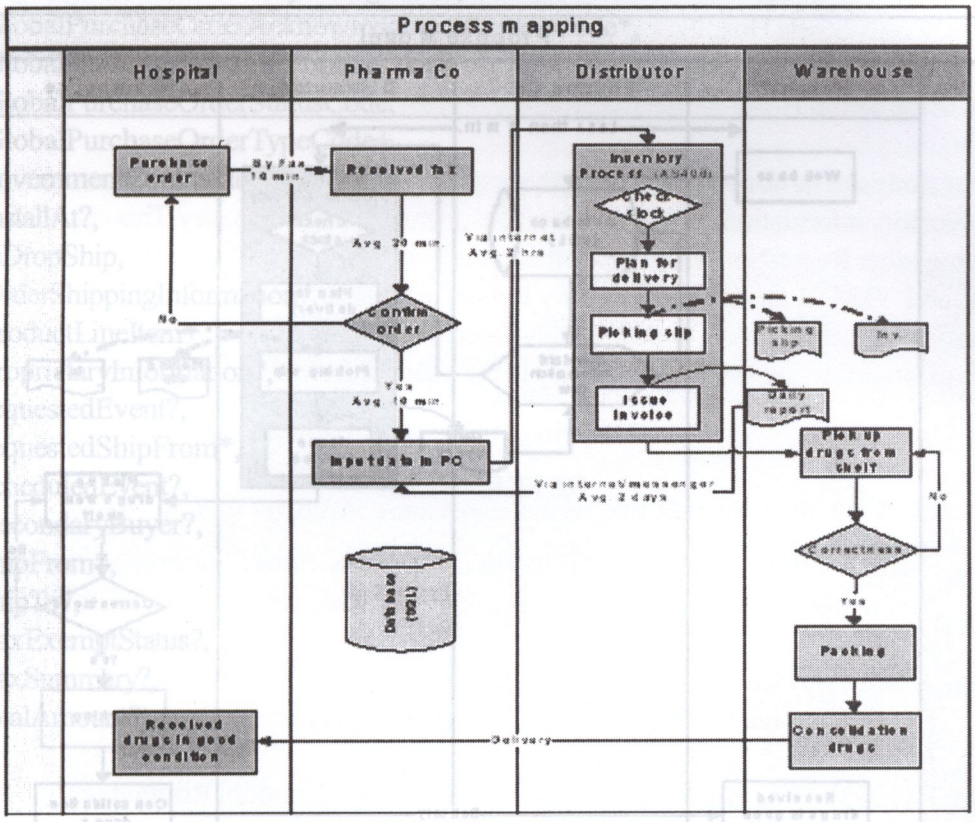
BUSINESS PROCESS RE-DESIGN

To deploy the RosettaNet standard to accommodate the information exchange in the pharmaceutical industry, business processes need to be adjusted to the standard processes defined by RosettaNet. In the original process, hospitals send orders to pharmaceutical companies by facsimile, with one staff receiving faxes and filling orders in the Point of Sale program, and then collecting data in a big batch before passing them through the ERP system to the distributor by e-mail. The ERP system carries out the process of checking stock, checking the customer's credit, planning for delivery, issuing a picking slip and invoicing the distributor and warehouse. After that, the staff in the warehouse would pick up the drugs from the shelf, check, pack, consolidate and deliver to the customer, as shown in Figure 1.

The process mapping as shown in Figure 1 illustrates two problems in the ordering process as follows:

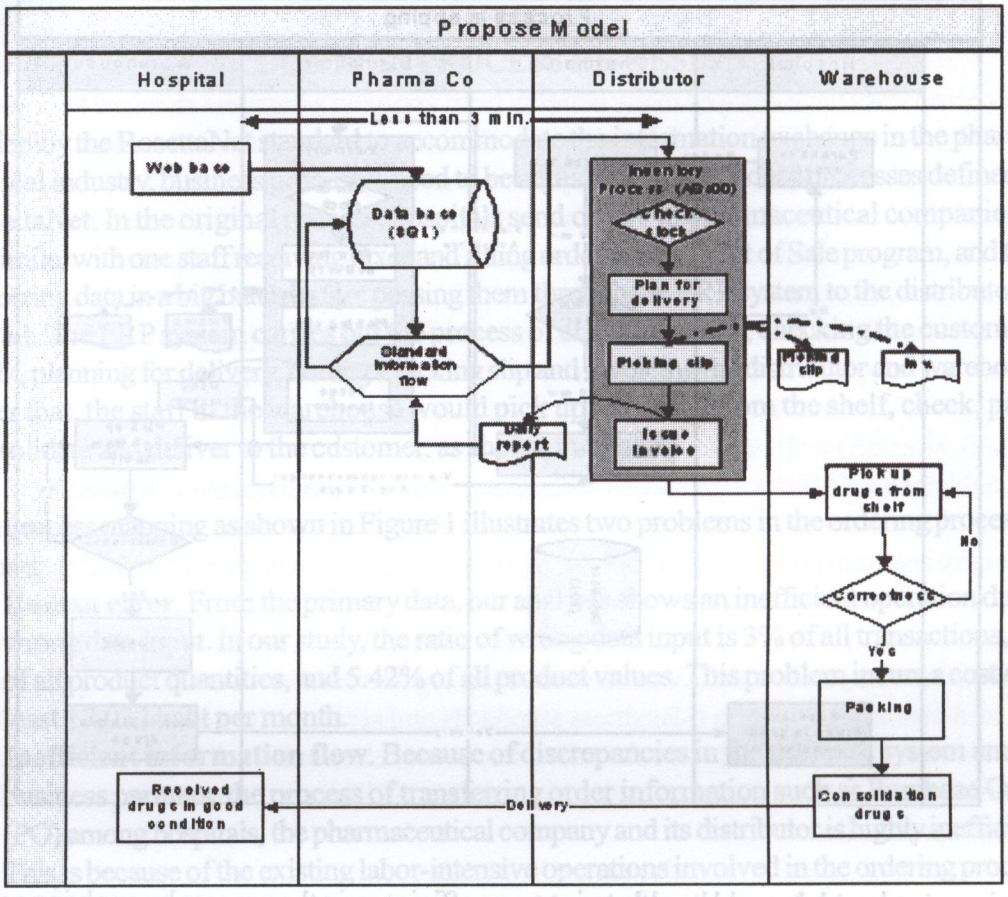
1. **Human error**. From the primary data, our analysis shows an inefficient operation due to wrong data input. In our study, the ratio of wrong data input is 3% of all transactions, 5% of all product quantities, and 5.42% of all product values. This problem incurs a cost of at least 17,032 baht per month.
2. **Inefficient information flow**. Because of discrepancies in the database system among business partners, the process of transferring order information such as Purchase Order (PO) among hospitals, the pharmaceutical company and its distributor is highly inefficient. This is because of the existing labor-intensive operations involved in the ordering process. Therefore, the pharmaceutical company could not utilize its own database to keep information of orders and send information automatically to the distributor.

Figure 1: Previous Ordering Process



Our proposed model would be able to improve efficiency in the process by applying a web-based technology between the hospital and the pharmaceutical company with real time updated order transactions between the pharmaceutical company and its distributor using the RosettaNet Standard, as shown in Figure 2. This new proposed model would create additional benefit to the pharmaceutical company in terms of utilization of the main database (SQL) to record sales orders.

Figure 2: New Web-Based Ordering Process with RosettaNet Message



The RosettaNet's Partner Interface Process (PIP) used in this case is PIP3A4 Request Purchase Order. Figure 3 below shows a part of the XML code defined in PIP3A4. Note that this is a DTD version of PIP3A4. The new schema-based version of PIP3A4 is now also available (www.rosettanet.org).

Figure 3: Example of XML code in PIP3A4

```
<!ELEMENT PurchaseOrder
    (AccountDescription?,
    comments?,
    ContractInformation*,
    DocumentReference*,
    FinancingTerms*,
```

generalServicesAdministrationNumber?,
GlobalConfirmationTypeCode?,
GlobalGovernmentPriorityRatingCode?,
GlobalPurchaseOrderAcknowledgmentReasonCode*,
GlobalPurchaseOrderFillPriorityCode?,
GlobalPurchaseOrderStatusCode,
GlobalPurchaseOrderTypeCode+,
governmentContractIdentifier?,
installAt?,
isDropShip,
OrderShippingInformation?,
ProductLineItem+,
proprietaryInformation?,
requestedEvent?,
requestedShipFrom*,
scheduledEvent?,
SecondaryBuyer?,
shipFrom*,
shipTo?,
TaxExemptStatus?,
TaxSummary?,
totalAmount?)>

RESULTS

The average waiting time in the existing labor-intensive operation process, starting when order sheets are faxed from hospitals to the pharmaceutical company until a staff picks up and keys in the order to a software program before being sent to the distributor, is 2 hours 30 minutes. By contrast, the average time usage after implementing the new system is simulated to be lower than 3 minutes.

CONCLUSIONS

In this research, we proposed a web-based information exchange system for the pharmaceutical industry using the RosettaNet standard. Although the RosettaNet standard originated in the electronics and high-tech industry, it can be applied to other industries as well. This research examines the application of 'PIP3A4 Request Purchase Order' through a web-based system. The results are encouraging.

The pharmaceutical industry in Thailand is undergoing the process of upgrading its information system to link electronic data for business purposes. We found that three hospitals are in the process of developing a web-based system to place orders with pharmaceutical companies. Currently, only Siriraj Hospital has a web-based system to place orders with the Government Pharmaceutical Organization. It is reported by the purchasing manager of the medicine warehouse in the Siriraj Hospital that the ordering process now takes less than 10 seconds.

Further study can be done by extending the scope of the web-based system to cover logistics and inventory information exchange within the pharmaceutical industry. This can be done by applying other RosettNet PIP to support each activity. For example, 'PIP3C3 Notify of Invoice' and 'PIP4C1 Distribute Inventory Report' can be examined and applied to the pharmaceutical industry as well. Finally, a web-based Vendor-Managed Inventory (VMI) system can be examined to increase the efficiency in the pharmaceutical supply chain.

REFERENCES

Diogo, F. and J.J. Pinto, F. (2005), "*Towards a workflow-based integration architecture for business networking*", Business Process Management Journal, Vol.11 No.5, pp.517-531.

Driver, J. and Louvieris P. (2002), "*Integrating the enterprise: the role of a language system for a marketing conception*", Qualitative Market Research: An International Journal, Vol. 5 No.3, pp.172-187.

James, T. (1993), "*The World Pharmaceutical Industry*", London, Routledge.

John, C., Jay, H., Jackson, H., and Thurman, M. (2005), "*RosettaNet for Intel's trading entry automation*", Intel Technology Journal, Vol.9, No.3, pp.239-245.

Mathias, K., (2004), "*E-business process networks-successful value chains through standards*", Journal of Enterprise Information Management, Vol. 17 No.1, pp.20-30.

Sameer, P. and Jayavel, S. (2003), "*Factors influencing global supply chain efficiency: implications for information systems*", Supply Chain Management: An International Journal, Vol.8 No.3, pp.241-250.

Shaw, M. (2003), "*E-business Management: Integration of Web Technologies With Business Model*", Boston: Boston Kluwer Academic.

Yu-Chung, H., Shi-Ming, H, Quo-Pin L. and Mei-Ling T. (2005), "*Critical factors in adopting a knowledge management system for the pharmaceutical industry*", Industrial Management & Data Systems, Vol. 105 No. 2, pp.164-183.