A case study for implementing a B2B collaborative information system: a textile case

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Abstract
Purpose – The purpose of this paper is to discover strategic implications and successful factors leading to the development of an attractive model for other firms to follow based on a typical case study.

Design/methodology/approach – This paper used a case study methodology to examine the case of a business-to-business (B2B) collaborative information system based on the first textile company in Taiwan to implement a RosettaNet-like for B2B process integration.

Findings – The results showed that some key success factors included: support and understanding from the entire team, simple process redesign, standard process development, government support, distinctive operation collaboration model, total support from top management, and an effective and experienced team.

Practical implications – Managerial implications are as follows: employ vertical process integration to quickly exchange data, establish a platform to share information, establish vendor-managed inventory (VMI) to lower costs, and a cross-organization centre to effectively operate the platform.

Originality/value – The complete information structure provided in this case, the distinctive collaborative and the proposed implementation models can all serve as a reference for other enterprises whose size, scope and information technology level are similar to the focal firm in this case.

Keywords Textile industry, Taiwan, Information systems, Data handling

Paper type Research paper

1. Motivation
Sweeping changes brought on by the emergence of the internet and business-to-business (B2B) electronic commerce (EC) has significantly affected enterprise activities. Profit creation methods in this “virtual economy” tidal wave have become a shared concern
around the world. Businesses are increasingly proposing EC strategies (primarily internet-related) to lower costs, elevate efficiency, and strengthen relationships with partners and customers, in hopes of increasing their international competitiveness. The development of effective strategies for achieving competitive advantage through EC will be essential for success in the twenty-first century (Gunasekaran et al., 2002).

To enhance businesses competitiveness, the Australian Government recently funded the “Quick Response” program within the textiles, clothing, and footwear industry (Perry et al., 1999). Similarly, the Industrial Development Bureau (IDB), part of the Taiwanese Ministry of Economic Affairs, also initiated a “B2B Electronic-Commerce Promotion Program” (BECP) in 2000 that encouraged businesses to implement information systems to lower costs and enhance efficiency. The textile industry was listed as one of the key industries to be upgraded under the program (NICI, 2002).

Under the BECP, enterprises apply for funding to implement a B2B information system (B2BIS) by filing a proposal with the IDB, who then appoint a committee to review and guide the proposal until the project is accomplished. Through the support of the BECP, Chia-Her (CH), a Taiwanese textile business, associated with its upstream and downstream partners to collectively implement a B2B collaborative information system. This case also concerns the first non-information technology (IT), non-semiconductor industry in Taiwan to implement a RosettaNet-like for B2B process integration, and the distinctive collaborative model that was employed is worthy of detailed discussion. Therefore, this paper, examines the case in detail, including the implementation procedures, difficulties, performance, strategy implications and critical successful factors. The author also interviewed the project leader and two committee members related to this project to gain a better understanding of the performance. Finally, the implemented B2BIS model is summarized to provide a reference for other enterprises whose size, scope and IT level are similar to that of CH.

2. Literature review

Businesses must invest in IT to remain competitive, and must become increasingly sophisticated in the marketplace if they are to survive in the long-term (Gunasekaran et al., 2001). A number of researchers have examined IT implementation through case studies.

Fu et al. (2004) devised a five steps information system implementation model through a review of the relevant literature and a corresponding case study. Fu et al. (2005) also proposed an implementation model for a wireless exhibition guide system according to the relevant literature associated with mobile commerce and a case study. Yusuf et al. (2004) examined key dimensions related to the implementation of an enterprise resource planning (ERP) system and identified via a case study methodology some core issues that can affect the successful implementation of an enterprise information system. Wu et al. (2006) proposed an IS implementation model after studying four SME cases regarding an implemented ERP system and conducting a literature review. Edwards (2007) employed a case study methodology to better understand the relationships between system usage, business process change, and system change. Lau et al. (2004), through a case study, proposed an infrastructure framework to support the design and implementation of a reverse logistics system.

In terms of a collaborative system aspect, Munkvold et al. (2006) presented an analysis of a collaborative decision-making process related to the selection and
implementation of a new corporate solution for collaboration and information management within a Norwegian oil company. Based on an in-depth case study, Bhandar et al. (2007) indicated that social capital can be leveraged as a motivator, an integrator, and a facilitator during the various stages of a collaborative IS project.

Based on the above literature review, we can see that most research focused on enterprise internal information systems, together with some recent discussion of collaborative system cases. We believe that case studies can lead to valuable findings and implications; therefore, this study also employed an exploratory case study as its research method.

3. Methodology
Experimental research, investigative research, historical research, archival record analyses and case studies are five common methods for social science research (Yin, 1994). Among these methods, when the problem being researched involves a large number of variables and the important issues relate to existing problems, then case studies offer a better approach (Yin, 1994). Gable (1994) compared the advantages and disadvantages of case study research, investigative research, and experimental research and found that case study research has a higher exploratory capability. Yin (1993) listed several specific examples related to education and management information systems along with the appropriate research design for each case. Moreover, Benbasat et al. (1987) concluded that three advantages exist to using case study research within the information management field:

1. the current situation can be understood in a natural and un-manipulated environment, and theories can be derived from actual observations;
2. it is easier to understand the essence and complexity of the process; and
3. facing rapid changes in terms of information management, it is easier to obtain new insights on the research topic using this method.

According to the aforementioned advantages, the case study method was appropriate for this study because centered on the implementation of a collaborative information system.

4. Case study
Two issues should be considered while employing a case study methodology. The first is whether the case is typical, and the other concerns the feasibility of the data collection. In this paper, the case was deemed to be typical because it is the first textile case in Taiwan to implement a RosettaNet-like for B2B process integration. Also the data collection was deemed feasible because the author was familiar with the project leader and two committee members related to this project, and was therefore able to interview these people to acquire more data and information. After reviewing the project final report (IDB, 2003) collected from the IDB project promotion office, the case study proceeded as follows.

4.1 Background of companies
The textile industry generates more foreign exchange for Taiwan than any other industry, with garment fabrics representing about 60 per cent of its export total (TTF, 2006).
ITT, CH, and I-Hwa (IH) are Taiwan’s biggest manufacturing groups of checkered fabrics, a special type of garment fabric:

- CH has a capitalization of TW$4,160 million and owns the largest design capacity, yarn dye capacity, and loom capacity for checkered greige in the world. Its research and development (R&D) department is the benchmark for the checkered greige industry in Taiwan.
- ITT (a customer of CH, and a member of the TAP group) has a capitalization of TW$230 million, and is one of the few garment manufacturers in Taiwan able to offer high wages and yet retain excellent results through sound management and electronic operations. It is an exemplary operation model for the industry.
- IH (CH’s contractor for dyeing and finishing) has a capitalization of TW$2,237 million. It holds the leading position in the world in checkered fabric dyeing and finishing capacity, and has the most stable production quality.

ITT’s partnership with CH and IH has already established a competitive quick-response system that has been in use for some time. The physical proximity of the three companies in terms of location has further consolidated their status as the world’s most competitive combination in checkered greige products. In an attempt to maintain their existing advantages while enhancing overall competitiveness in the modern environment of the “digital economy”, CH, IH, and ITT in combination with their partners have promoted a B2B collaborative information system.

4.2 Promotion procedures

The promotion procedures in this case can be divided to six stages and are described in the following sections.

4.2.1 Promotion organization and project management. To facilitate the execution of the project, it was necessary to establish a promotion organization as follows:

- **Steering committee.** Committee members included CH’s general manager and the relevant department heads (top management) of the three companies. The committee’s main task was to plan and analyze the strategy and business model, to plan the operation model, and to set-up complementary measures for the promotion – while supervising and reviewing project progress and results at regular intervals.
- **Promotion team.** This team included IT and senior staff from the relevant departments of the three companies and important suppliers – including those responsible for data collection, internal and external process analysis, system implementation, and training planning.
- **Software and consultant team.** This team assisted the interface integration, conducted As-Is model analysis, planned the To-Be model, and constructed a B2B platform.

4.2.2 Strategy analysis and planning. The strategic goal of the three companies was to strengthen their marketing, R&D, and operation management capabilities to achieve greater profits, and enlarge market share through a collaborative information system. Ultimately, they hoped to become an international supply centre of fashionable fabrics and garments – hence, the choice of “eFashion” as the title of the project.
In order to improve the value and competitiveness of the supply chain, the steering committee set up three short-term, mid-term, and long-term strategy goals: e-chain (short-term) established a quick response capability to eradicate errors, delays, and personnel costs caused by data transfers or miscommunications, e-community (mid-term) shared the relevant operational data with close partners, and e-collaboration (long-term) became a “virtual total solution provider” of fashion and garments.

4.2.3 As-Is model analysis. The functions of a textile product demand chain (Figure 1) can be divided into five main stages, the:

1. sourcing/fabrication stage where designers search for ideas and decide on ideas, and manufacturers develop relevant products on their own;
2. hand-loom stage where fabric or garment manufacturers produce sample fabric or garments according to customer specifications;
3. trial-weaving stage that allows small quantity productions for designer display;
4. order stage where retail sales have been confirmed by orders; and
5. reorder stage after positive market reaction.

To implement the strategy and business model drawn up by the steering committee, the promotion team subsequently began planning a series of activities to fit in with the strategic goal. The implementation of IT should begin by considering the existing operational process and organizational structure, and then redesigning the process from an IT perspective (in what is known as BPR) to achieve process integration. Therefore, the promotion team first needed to know more about the existing process and problems as related to:

- **Sourcing/fabrication.** All ideas and R&D data came from individual businesses (ex. source yarn, dye, dyeing and finishing, weaving and garment) and designers. The fabric, dyeing and finishing (IH) suppliers delivered the product data they developed in paper form to CH, following which CH and the garment manufacturer (ITT) sent actual samples to designers to facilitate the designing of fashionable garments.

- **Hand loom.** During the hand-loom stage, the designers and garment manufacturer (ITT) couriered actual fabric samples or drawings to CH, asking for an exact hand loom. CH produced the hand loom using the quickest process and couriered it to the designers and garment manufacturer (ITT). Necessary corrections (colour, density, etc.) were communicated by fax. CH also faxed source fabric orders to suppliers during this stage.

- **Trial weaving.** The designer or garment manufacturer (ITT) placed trial-weaving orders with CH by fax. Following this, CH sent notification to the dyeing and finishing factory (IH) via e-mail for greige, after which the factory delivered the finished cloth directly to the garment manufacturer (ITT) for the production of a sample garment. Meanwhile, the dyeing and finishing factory (IH) sent delivery
documents (packing list, test reports, etc.) in paper form to CH for the latter to courier to the garment manufacturer (ITT).

- **Order/reorder.** The designer or garment manufacturer (ITT) placed orders with CH via e-mail. CH, together with the dyeing and finishing factory (IH), performed the same procedures as in the trial-weaving stage, after receiving the orders. After the product was received by the market positively, and the brand company had placed reorders with the garment manufacturer (ITT) through EDI, the reorder process was identical to the order process.

### 4.2.4 Problems

After analyzing the above As-Is model, the key problems regarding the current operation process between CH and its partners could be ascertained (Table I). Because each company had its own information department, as well as different data transfer methods, formats and databases, a lot of manpower and time was required for data delivery and transfer, organization, and maintenance. This wasted both time and labour, and proved extremely inefficient. In addition, because most R&D and design data were still in paper form, they were difficult to maintain, and could not be effectively used to create an index for future references.

### 4.2.5 To-Be model

To solve the problems listed in Table I, the promotion team redesigned the appropriate operational process from customer to supplier according to an IT perspective, and built an integrated platform for a B2B collaborative information system. This platform included an e-vendor-managed inventory (VMI), e-production, and an e-library, all integrated on one platform. The system structure and functions of the platform are shown in Figure 2 and Table II, and the access modes and categories of partners are shown on Table III.

In this platform, the e-VMI system provided access to suppliers and integrated the inventory inquiries, inventory management, and replenishment processes for each party. The e-production accessed partners and customers, performing the electronic functions related to database enquiries, invoice enquiries, order management, and user feedback.

<table>
<thead>
<tr>
<th></th>
<th>With partners</th>
<th>With customers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Order/reorder</strong></td>
<td>Unable to share product data</td>
<td>Unable to check order progress and relevant quality guarantee data online;</td>
</tr>
<tr>
<td></td>
<td>Poor delivery of R&amp;D data; unable to share product quality data</td>
<td>checking could only be done via phone or e-mail; the data are couriered,</td>
</tr>
<tr>
<td></td>
<td>Incompatibility of document formats; redundant document production</td>
<td>lacking efficiency</td>
</tr>
<tr>
<td><strong>Trial weaving</strong></td>
<td>Lack of key fabric alert mechanism</td>
<td>The lack of a uniform color-correction environment resulted in inconsistent</td>
</tr>
<tr>
<td><strong>Hand loom</strong></td>
<td>Errors tended to occur in the manual copying of project data, increasing the</td>
<td>color-correction conditions</td>
</tr>
<tr>
<td></td>
<td>time and manpower needed</td>
<td>Communications by fax instead of an “instant communication” mechanism</td>
</tr>
<tr>
<td></td>
<td>Lack of sample fabric bank hindered the reduction of hand-loom time</td>
<td>wasted time</td>
</tr>
<tr>
<td><strong>Sourcing/fabrication</strong></td>
<td>Businesses in the supply chain were unable to share relevant product data</td>
<td>Design and creativity assistance could not be provided due to lack of a</td>
</tr>
<tr>
<td></td>
<td>Each business individually developed product; transfers of the R&amp;D data in</td>
<td>“sample fabric database”</td>
</tr>
<tr>
<td></td>
<td>paper form wasted time</td>
<td></td>
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</table>

Table I. Problems related to the As-Is model
The e-library was intended to be an integrated, shared database for the whole supply chain. Once the three modules were integrated on the B2B platform, they effectively solved the existing problems related to R&D and database creation resulting from incompatible data formats and different modes of data access. Also, because the B2B
The collaborative information system was always online, members could quickly call up data concerning source fabrics and sales, thereby significantly reduce the costs of supply-chain inventory and response time, and in turn raising competitiveness by a considerable margin. The operational processes with customers and suppliers are described in detail.

4.2.5.1 With suppliers. CH directly keyed in purchase requests into the system, which automatically determined whether a signed approval and price inquiry were necessary. If a signed approval is needed, the tasks were conducted without any need for the data to change hands several times or the risk of errors.

Documents such as a purchase request form, an order form, a quote sheet, a delivery memo, an inspection form, and an invoice (as in the original process) were no longer needed because relevant delivery information and account information could be directly requested and downloaded from the e-VMI system.

4.2.5.2 With partners (IH). The documents on processing methods, as well as invoice and delivery, were also now superfluous. Outsourcing requests and processing conditions could be keyed in directly to e-production, where the format was pre-set, to ensure all requests or conditions were input.

The status of outsourced production could be checked in e-production, eradicating the previous troubles with delays in terms of writing out the documents and delivery schedule. Information on quality failure cases was included in e-production, helping to avoid any repeat occurrences of these failures.

4.2.5.3 With customers (ITT). Documents that were once sent by fax or mail – such as the dyeing and finishing notices, packing lists, test reports, and invoices – were no longer needed, saving time and the cost of manual work. The dyeing and finishing notice keyed in by CH could be directly translated into IH’s production notice, and thereby avoiding any risk due to error, as well as the costs associated with manual labour with repeat operations.

<table>
<thead>
<tr>
<th>Partner category</th>
<th>Criteria</th>
<th>Function</th>
</tr>
</thead>
</table>
| Category A       | High-IT level and accessed as server-to-server  
Long-term, close partnership, essential business  
Uses automatic online replenishment function | All information automatically transferred to others |
| Category B       | Average IT level and accessed as server to browser  
Long-term, close partnership, essential business  
Uses automatic online replenishment function | Automatic notification of replenishment. Information all exchanged on platform |
| Category C       | Average IT level and accessed as server to browser  
Ordinary cooperation, non-essential business  
Only uses online quote enquiry, ordering and account enquiry functions | All information is exchanged on platform |

Table III.
B2B access modes
All relevant delivery information could be checked and downloaded from the e-production system, including packing lists, test reports, inspection reports and invoices, among others. The internal progressions of CH and IH were integrated for ITT to check within e-production.

4.2.6 B2B data interchange. To benefit businesses through substantial cost reduction and improved operational efficiency, a strong demand for integrating and collaborating business processes among category A businesses has emerged. Therefore, after analyzing the applied status of RosettaNet in IT and the semiconductor industry, the software and consultancy firm then developed a B2B integration platform (called eBizarch) based on the principle of the RosettaNet Implementation Platform (RNIF) (Core Specification, Versions 1.1 and 2.0) with CA’s Jasmine ii.

The eBizarch support language is based on PIPScript, a high-level process flow abstraction for RosettaNet-like business processes (i.e. PIPs™). Another language is used to define the relationship between the external data model (including the XML schema and dictionaries used in the business document exchange) and the internal data model (IDB, 2003).

This phase of eFashion dealt only with inter-enterprise collaboration between the cloth-weaving factories and the dyeing and finishing factories, and consisted of seven PIPs™ (Figure 3), which are described.

The weaving factory sent a greige delivery notification with greige to the dyeing and finishing factory (BP2: greige delivery notification). At the same time, the weaving factory created a dyeing and finishing notification stating the processing instructions and related requirements for the dyeing and finishing factory (BP1: dyeing and finishing instructions). After shipment, the weaving factory had to send a shipping notification to instruct the dyeing and finishing factory about the shipping destination and quantity to be shipped (BP3: packing and shipping instruction notification). The dyeing and finishing factory would then deliver a packing list stating the detailed packing information in return (BP4: packing list notification), with a notification of finished goods quantity (BP5: dyeing and finishing goods notification) and complete information of all products in all processes (including greige, processed goods, finished goods and stock) (BP6: inventory notification) to the weaving factory. At the end of every month, the dyeing and finishing factory forwarded invoices to the weaving factory who determined which invoices were payable (BP7: invoice notification).

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**Figure 3.** Custom-made PIPs™ in eFashion

4.3 Difficulties
Possible risks existed during the planning and implementation stage, especially in terms of system set up and upstream/downstream business access. This project met several difficulties requiring various solutions, both of which are as follows.

4.3.1 Partner passive participation. Considering that the quality of workers in the textile industry tends to be lower than that of the IT industry, as well as the system effectiveness, implementation is often difficult due to passive partner participation. This project provided three ways to eliminate these problems:

1. To provide different access modes and lessen access obstacles in the To-Be model, e-production allowed upstream/downstream businesses to conduct enquiries and access information through a simple PC/browser set-up. The e-VMI provided two access modes – server/server and PC/browser – so as not to increase the user burden. Rather, it raised their willingness to access the system and share information.

2. To set-up a trial implementation system that would attract partners, access to a trial system was set-up and tested by trial participants. After ensuring that the system ran smoothly and that its benefits were relatively clear, it was introduced to other upstream/downstream businesses, a process which served to relieve their apprehension about system effectiveness.

3. A consultation web site was set-up to include all information regarding the promotion of this project, including course content, frequently asked questions and answers, and introductions to the eFashion system, which served as a learning channel for suppliers and partners.

4.3.2 Insufficient planning and design ability. Prior to this study, CH and IH had already completed an information project on internal database transfer and had considerable experience in the creation of a relevant information system. Their team could be relied upon to reduce the risk of system failure, but the current platform involved many issues including process reengineering, system planning and design, and process integration, among others. The specific jobs, such as the e-VMI process integration and the process standard development, were deemed to be beyond the capability of the promotion team, and as such an experienced consultancy and software firm was invited to assist in solving these problems.

4.3.3 Lack of process standard for textile industry. The objective of eFashion was to streamline business processes and integrate back-end ERP systems across multiple enterprises in the supply chain. At that time, no process standard solutions existed for the textile industry. Therefore, the software and consultant firm developed a B2B integration platform (called eBizarch) based on the principle of the RNIF after analyzing applications of RosettaNet in the IT and semiconductor industries which solved the problem.

4.4 Performance analysis
During the completion of this project, a total of 150 enterprises accessed eFashion. Five businesses were categorized as A (four customers and one supplier), five businesses were categorized as B (four suppliers and one partner); and 140 businesses were categorized as C (135 suppliers and five partners). In this case, CH exchanged information with ITT via category B mode and with IH via category A mode. In this
way, CH implemented this collaborative information system to integrate the process of ITT and IH through deleting redundant processes and managing everything as a business process. Originally, ITT belonged only to category A. However, during the promotion of the project, other customers became attracted to the system through interactions, and later actively requested access to it, demonstrating the success of the customer-end operation model.

In terms of economic benefits, Table IV shows a conservative performance estimate corresponding to the installation of this project: it should create as much as TW$95 million in tangible benefits a year. CH achieved TW$5.1 billion in revenue, resulting in a yearly loss before project implementation, CH achieved TW$4.8 billion in revenue with 0.2 billions profit after project implementation. Moreover, the deployment of eFashion has resulted in a 40-100 per cent reduction in material shortage costs, inventory costs, administration costs, and inspection costs. Substantial cost reductions improve the capital requirements for a business operation, and also improve the operational efficiency, including a lower turnaround cycle for purchasing, manufacturing, and delivery. Further, the total fulfilment time for repeat orders improved from an original 35 to 25 days. This ten-day improvement was critical to CH in terms of strengthening their competitive position in the textile industry and enhancing the value of the company. It also offers proof of the benefits of the project.

However, the above performance may not always reflect the promotional yield when a project has just been completed. Thus, the author further examined whether the B2BIS case indeed made tangible contributions.

To measure the tangible contributions, two indicators, the ratio of operation expenditure to income (ROEI) and inventory turnover (ITO), were used (Table V). This data were collected from the market observation post system of the Taiwan stock exchange web site (MOPST, 2007) and showed that the operational costs were lower because both ROEI and the ITO have gradually decreased in recent years (Table VI). So ROEI had positive performance and ITO had negative performance. To discover more about this negative performance, the author interviewed the project leader and found that the main reason for the ITO decrease centered on a recent product strategy change to sofa fabric from checker fabric that CH had implemented. Checker fabrics

<table>
<thead>
<tr>
<th>Items</th>
<th>Before</th>
<th>After</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material shortage costs (millions)</td>
<td>TW$87</td>
<td>TW$33</td>
<td>TW$54</td>
</tr>
<tr>
<td>Inventory costs (millions)</td>
<td>TW$87.75</td>
<td>TW$52.50</td>
<td>TW$35.25</td>
</tr>
<tr>
<td>Administration costs (millions)</td>
<td>TW$5</td>
<td>TW$2</td>
<td>TW$3</td>
</tr>
<tr>
<td>Inspection costs (millions)</td>
<td>TW$3</td>
<td>0</td>
<td>TW$3</td>
</tr>
<tr>
<td>Fulfilment time (days)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ITT to CH</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>CH manufacturing</td>
<td>21</td>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>CH to IH</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>IH manufacturing</td>
<td>8</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>IH delivery</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td>25</td>
<td>10</td>
</tr>
</tbody>
</table>

Table IV. eFashion performance  
always have a longer lifecycle and greater diversification, so average stock rose while ITO decreased.

Moreover, the project leader also indicated that the assistance of the committee IDB appointment was the most lauded and recognizable factor regarding project implementation, revealing that the IDB committee professionals contributed useful information and counselling during the execution process of enterprise IS introductions.

5. Discussion
Aside from the tangible benefits mentioned above, some managerial implications and successful factors emerged after the author interviewed the project leader and project committee members. These are discussed in the next sections.

5.1 Managerial implications
Information systems can be successfully implemented in a company regardless of its size, as long as the company leader has the determination to make changes for perpetual operation. The case revealed that a traditional textile industry lacking skilled employees such as those employed in the IT industry can still hold great potential in terms of successfully implementing B2BIS. Based on this case, several managerial implications are discussed:

• Vertical integration to quickly exchange data. The project involved CH, IH, and ITT collectively implementing a collaborative information system according to a vertically integrated supply chain perspective so that data specific to each enterprise could be quickly exchanged. This supply chain covered all upstream, midstream, and downstream businesses in the textile industry – from suppliers to weavers to manufacturers to retailers – following a purchase amount of around TW$8.4 billion and the inclusion of 150 businesses. In this way, it incorporated more than 60 per cent of Taiwan’s total production capacity of checkered fabric. Not only did the project lead to access to a wide range of

<table>
<thead>
<tr>
<th>KPI</th>
<th>Formula</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio of OE vs OI (ROEI)</td>
<td>[\frac{OE}{OI}]</td>
<td>The lower the ratio of ROEI the better, since this indicates that an enterprise enjoys lower operation costs</td>
</tr>
<tr>
<td>Inventory turnover (ITO)</td>
<td>[\frac{365}{ADGS}]</td>
<td>The higher the ITO the better, since this indicates that the average number of days in which goods are sold is lower</td>
</tr>
</tbody>
</table>

Notes: OE – Operation expenditure; OI – operation income; ADGS – average number of days in which goods are sold

<table>
<thead>
<tr>
<th>Item</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROEI (per cent)</td>
<td>10.54</td>
<td>10.27</td>
<td>9.52</td>
<td>9.97</td>
<td>10.6</td>
</tr>
<tr>
<td>ITO</td>
<td>2.90</td>
<td>2.83</td>
<td>3.07</td>
<td>2.76</td>
<td>2.83</td>
</tr>
</tbody>
</table>

Table VI. The value of ROEI and ITO in recent years
companies and resources, but it also acts as a leading demonstration model for other textile businesses interested in establishing inter-enterprise collaborative information systems in the future.

- **Platform to share information.** This case study conducted interface integration and operation information sharing between supply chain partners as a part of a RosettaNet-like installation to create a virtual integrated enterprise that strengthened supply and response speed, as well as radically improved supply chain competitiveness, and attracted bigger re-orders for upstream businesses.

- **Establishing VMI capability to lower costs.** Within the project, the focal businesses proved the competitiveness of upstream-downstream cooperation. In particular, ITT’s service to customers now successfully operates in a VMI model with lower costs.

- **Cross-organization to effectively operate.** In the past, each company’s internal system was handled by their information department, while purchasing and sales were also handled by those respective departments. For the eFashion system, a common platform was created following B2B process integration. An information collaborative operation centre was also set up, with members elected from information, purchasing, and sales staff based in the three companies. This improved information transparency and collaborative ability between organizations made the entire structure more flexible and competitive.

5.2 **Successful factors**

To understand the key factors introduced by businesses to the completed project, the author interviewed the project leader and two committee members and summarized some key successful factors as follows:

- **People understanding.** This project involved a significant amount of teamwork, and involved members from all relevant units, suppliers, and customers. This aided in reducing resistance to change and cooperation with the project implementation, as everyone knew what was happening and had a common view.

- **Simple inter-process redesign.** The inter-enterprise process was redesigned to be as simple as possible within the eFashion platform to replace the existing complicated processes and be easy to implement.

- **Process standard development.** To facilitate speedy information delivery and transfer, the data were automatically exchanged and transferred on the eFashion platform through a RosettaNet-like process standard development and integration, thereby decreasing time and error costs involved in manual transfers.

- **The strategy of government support.** By relying on the government committee, who possessed great experience in terms of reviewing many previous cases related to IT implementation, to provide valuable recommendations regarding the EC strategy and operation collaboration model, the risk of failure was significantly reduced.

- **Distinctive operation collaboration.** The three companies put in a lot of effort to build eFashion – a distinctive and not easily imitated collaborative model – to enhance their competitiveness.
• **Support from top management.** Top management was very determined to implement this project. Because the implementation of a collaborative information system concerned all departments from all three companies, this project received full support from the steering committee, which included the CH general manager and the relevant department heads from all the three companies.

• **Experienced teams.** The promotion team included members from the CH team, who had an average of nine years experience in implementing IT systems, and an ITT team who also had some experience in integrating IT systems with their international customers. The IH team had just changed their system from DOS to Informix, and were also very experienced. Further, the consultancy firm also had a great deal of experience related to information system implementation.

• **Operation collaboration centre.** One of the key factors of success was to partially restructure the organization and set up an operation centre, which enabled staff from the three companies to work together and to communicate with each other if any problems arose. This helped the eFashion system to run effectively.

6. **Proposed model**

From the aforementioned literature review, some researchers proposed the creation of a model for reference. Therefore, this study proposed a reference model for B2BIS based on the case study and the interviews with the project leader and two committee members regarding nine specific procedures: organizing the promotion team and project management; strategy planning and analysis; designing the key performance indexes (KPI); the As-Is model and process analysis; the To-Be model and process re-design; validating the To-Be model and process; access apprehension and communication; system implementation; and operations and maintenance. The nine procedures are described in more detail as follows.

6.1 **Organizing the promotion team and project management**

To facilitate the execution of the project, it was necessary to establish a promotional organization, such as steering committee (top management), a promotion team (senior staff), and a consultant team for software and process designs. Also, their responsibility and power needed to be clarified. Moreover, project management mechanisms needing establishment included: developing a project plan, which included defining project goals and objectives; specifying tasks or how goals will be achieved; what resources are needed; and associating budgets and timelines for completion. It also included implementing the project plan, along with careful controls to stay on the “critical path”; that is, to ensure everything was proceeding according to plan.

6.2 **Strategy planning and analysis**

Within an internet environment, each business needed to carefully consider how best to take into account the e-business transformation strategy, or risk losing its advantages. Therefore, foresight in conducting a strategy analysis, which requires emphasis from top management, also played an essential role in promoting IT success.
6.3 Designing the key performance indexes (KPI)
In implementing a suitable information system, an enterprise must know the objectives that are to be achieved if relevant operations are to be improved. As all business activities are geared toward improving a company’s competitive strategies, and supposing that the KPI is best suited to supporting the development strategy, it becomes more likely that top management will express enthusiasm by supporting and participating in such a project. Hence, it is prudent that the KPI be drafted to support the prescribed strategic goals, to better secure top management support and participation, which together lead to smoother project execution.

6.4 As-Is model and process analysis
Model construction and process analysis are crucial tasks within the information system implementation process that can help businesses to understand the problems associated with the existing model and process. In this way, businesses can understand the difference between the existing status and the KPI goals, and also understand the amount of resources that should be allocated to the project, as well as the degree of effort. The more accurate the understanding of the existing status, the more likely the key problems get solved.

6.5 To-Be model and process re-design
As varied strategies may lead to different business models and processes, it was essential to rethink and redesign a new business model and a set of processes that could help to achieve the new strategic goals.

After discovering the key problems related to the existing model and processes, cash flow, information flow, material flow, human flow and commerce flow needed additional thought, or redesigned a distinctive business model which is not easily to imitate. Therefore, based on internal and external business processes, they were redesigned according to the distinctive business model. It was necessary to realize that business processes on the internet involve several departments, and that discussions across departments are often required. In addition, customer needs, enterprise internal resources, and support from vendors (or suppliers) also needed to be taken into account from the perspective of management (not that of IT).

6.6 Validating the To-Be model and process
Once the new business process was designed, verification was executed to improve understanding of whether the new process fit in the actual needs of business development. Consequently, incorporating system simulations that helped to analyse new business processes remained a vital pre-implementation task in determining whether the predefined KPI could be satisfied. If business processes are repeatedly revised and simulated, an effective “To-Be” model that achieves KPIs can be developed. This model can then be used to design the information system in accordance with strategic objectives.

6.7 Access apprehension and communication
In general, an information system project always involves members from all relevant units, including suppliers and customers. A mechanism of reducing resistance to change should thus be proposed as follows.
Cross-departmental communication and consensus helped the company to greatly reduce resistance during implementation. Therefore, senior managers had to build up common understanding among company employees and partners. Also, solidifying company consensus, together with packaged measures to address departments and personnel most prone to being affected by the conflict under the To-Be model was imperative. This warranted the presence of cross-departmental communication and consensus to help the company greatly reduce resistance to the new process implementation.

6.8 System implementation
An incremental implementation strategy needed to be incorporated from simple to complex and from point to plane, coupled with sufficient incentives, to encourage the employees to support the effort. Reliance on experience building and teamwork promotion, and establishment of a comprehensive operation mechanism that served to ensure that the implemented system could run normally led to top management participation which, together with an adoption of aggressive work, led to success.

6.9 Operation and maintenance
After the project was completed, the organization needed to partially restructure, so a system operation model was set up to enable the staff elected from the relevant departments to work together and to effectively communicate with each other and while solving problems.

In terms of system maintenance, the system needed to be able to provide support through an experienced operations team and offsite back-ups with no loss of momentum in the event of platform shutdown. Also, the operation team kept up with upgrades, patches and bug fixes by scheduling testing, staging and launch during off-hours, to avoid impacting the day-to-day business activities. Moreover, the system possessed functions to archive, search, retrieve and report on individual transactions.

7. Conclusions and recommendations
The purpose of this paper was to discover some implemented strategies and successful factors pertaining to providing an attractive model for other firms to follow based in a case study of a B2B collaborative information system – the first textile company in Taiwan to implement a RosettaNet-like for B2B process integration. After detailed study, this case led us to some strategic implications and reasons for success. The completion of this project placed the business group two years ahead of foreign competitors, and thus ensured their positional status. The complete information structure provided in this case, its distinctive collaborative operation model including the procedures related to the As-Is and To-Be model analysis and inter-enterprise process integration, and the whole implementation process, serve to provide an attractive model for other firms to follow.

Although this collaborative model case had a significant performance and demonstrated a successful inter-enterprise process integration project, there were some limitations. For example, as this study only focused on the textile industry, it is unknown whether the proposed model can be extended to other industries. Also, the performance analysis might not only have resulted from this project, but also as too many factors impacted the performance. Therefore, researchers interested this field may pursue the following topic in the future:
Can a better analysis tool (aside from a case study) be used to analyse such case, such as the computer-aided software engineering (CASE) tool? It may lead to different results.

The proposed model can be applied to other industries to see whether it has faults. If so, then modification of this model may be undertaken to make it more complete.

References


Further reading

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