

# Fashion ERP Systems and Supply Chain Coordination

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## Abstract

The Enterprise Resource Planning (ERP) system is an enterprise information system designed to integrate and optimize the business processes and transactions in a corporation. An ERP system enables an organization to integrate all the primary business processes in order to enhance efficiency and achieve a competitive edge. It also facilitates the smooth flow of functional information and practices across the supply chain. TAL Apparel Limited is chosen to be the case study target and its cooperation with J.C. Penney under Vendor-Managed inventory (VMI) scheme is also being investigated. We also investigate the two latest recently implemented modules in TAL called Fashion Planning Workbench (FPW) and Supply Chain Order (SCO), which relate closely to the company's production planning and order arrangement. Based on the case study results, and the literature review, we identify the critical successful factors in coordinating supply chains with ERP systems which include: (i) assessing the fitness between organization and the target ERP system, (ii) managing the cost and time of ERP implementation (iii) arranging extensive education, training and rewards to employees, (iv) ensuring the internal processes are working properly and fully integrated before it is implemented in managing the supply chain, (v) building up a trusting and collaborative relationship and (vi) ensuring information visibility. Finally, future research opportunities are explored.

**Keywords** ERP Systems, Coordination, Fashion Planning Workbench, Supply Chain Order, Fashion Industry

## 1 Introduction

In fashion industry, requirements to reduce the product cost while meeting quality requirements and improving the time-to-market lead to many operational challenges and magnify competition among companies. Fashion companies are hence encouraged to use advanced technologies to improve operational efficiency. The Enterprise Resource Planning (ERP) system is an enterprise information system designed to integrate and optimize the business processes and transactions in a corporation. An ERP system enables an organization to integrate all the primary business processes in order to enhance efficiency and maintain a competitive position. It also facilitates the smooth flow of functional information and practices across the supply chain (SC). ERP platform is specifically necessary in the fashion industry. This is because the fashion industry and its supply chains face a demand-driven market and it becomes utmost important to obtain the latest

market information and share the information among the channel members in order to facilitate the operation [1]. There is a considerable amount of literature reviewing the ERP system implementation [2-21]. In this paper, we will focus on ERP system implementation and its modular functionalities in a manufacturing company and how it can help achieve supply chain coordination. Owing to data availability, TAL Apparel Limited is chosen to be the case study target. The company has recently adopted two modules, namely: Fashion Planning Workbench (FPW) and Supply Chain Order (SCO). These two latest applied modules concern about production planning and order arrangement, which are critical for fashion manufacturers to schedule their production, even the production cycle, and to be responsive to customer orders. With the case study and literature, we aim at investigating the following four research perspectives:

1. How do ERP systems benefit fashion supply chain coordination and internal operations?
2. What are the possible issues that fashion companies may encounter in supply chain coordination and ERP system implementation?
3. What are the critical successful factors for achieving supply chain coordination with ERP system implementation?
4. What are the trends of ERP system implementation and coordination?

The organization of the rest of the paper is as follows. We conduct in Section 2 a comprehensive review of the literature on the apparel supply chain characteristics, supply chain coordination, ERP system in fashion industry and the challenges and successful factors in ERP system implementation. Then, we introduce the case study research methodology, review and discuss the system implementation project of TAL in Section 3. Afterwards, we explore the above perspectives and discuss the finding from the literature and the case in Section 4. Finally, we have a conclusion and further research direction in Section 5.

## 2 Literature Review

### *2.1 Apparel Supply Chain Characteristic*

In apparel supply chain, there are several characteristics. (i) As it is market-oriented, the brand-owners are usually the controller and have the power to influence other units in the supply chain [22]. (ii) It is a subcontracting supply chain in which the apparel retailers are usually big companies that place orders with manufacturers whereas those manufacturers make the product under a make-to-order production structure in order to lower the risk of building up obsolete inventories [23]. (iii) Demand is uncertain and unpredictable. Most products of the apparel industry are seasonal with short product life cycle while the demands are driven by ever-changing market trends, so it requires quick response and shorter lead-time [24] (iv) Information flow is complicated as a buyer may connect

to a number of manufacturers or the other way round [25], as work process in fashion industries are often highly interdependent and time sensitive. Accordingly, the business value is co-created by all partners who provide different services [26].

### *2.2 Supply Chain Coordination*

There is a vast amount of literature about supply chain coordination. According to [27], coordination is a central lever of supply chain management. And it plays a key role in focusing on the innovation, flexibility, and speed that serve as the sources of competitive advantage necessary for survival in global competition [24,28].

Simatupang and Sridharan (2004)[29] state that two or more independent companies work jointly to plan to execute SC operations is with greater success than when acting in isolation. But in reality, the objectives and interests of different members along a supply chain are usually diversified and conflicting. Therefore supply chain coordination becomes vitally important to achieve the all-level consensus, through which different members along a supply chain can react to market requirements in highly congruous ways [30]. Under the coordination scenario in a two-echelon supply chain, achieving a win-win improvement situation can provide improved business success for both parties [31] and becomes a strategic response to the challenges that arise in the market [32].

The inter-firm coordination processes are characterized by effective communication, information exchange, partnering and performance monitoring [33]. And structures of coordination are related to the levels of information sharing and integration of physical flow from the perspective of operations management [34]. Supply chain partners are working for joint planning, joint product development, mutual information exchange and integrated information systems, cross coordination on several levels in the companies on the network, long-term cooperation and fair sharing of risks and benefits [35].

Lack of coordination occurs when decision makers have incomplete information or have incentives that are not compatible with system-wide objectives [36]; and it may result in poor performance of SC. The consequences of lack of coordination are: inaccurate forecasts, low capacity utilization, excessive inventory, inadequate customer service, low inventory turns, high inventory costs, slow time to market, as well as poor performance in order fulfillment response, quality, customer focus and customer satisfaction [37].

### *2.3 ERP Systems in Fashion Industry*

In fashion industry, the product life-cycle is relatively short whilst the demand is uncertain. The emergence of fast fashion further leads to a more dynamic market with more frequently changing merchandising and purchasing decisions, and hence ERP systems can play a crucial role [38]. Many textiles and clothing

companies have employed the company-wide centralized ERP system to improve information sharing and operations [39]. In the literature, the importance of ERP system for fashion companies has been explored. Au and Ho (2002)[40] conduct a review study on how ERP system enhances supply chain management and comment that ERP system can support the fashion supply chains by allowing the implementation of e-commerce business models. ERP system can also provide companies with flexibility and help solve many operational problems such as achieving more coordinated decisions on material resource planning (MRP) and capacity scheduling [41]. It allows effective planning of all resources in an organization. Fin (2006)[42] investigates the relationship between electronic data interchange (EDI) in apparel industry and the three performance levels: operational, financial and strategic, and finds that EDI can help in reduction of lead time from several weeks to 3days.

According to Hodge (2002)[43], an ERP system can be defined as an information system for identifying and planning the enterprise-wide resources needed to take, make, ship, and account for customer order. In general, ERP systems used in textile and clothing industries are modular in structure and they can be tailored to the needs of individual companies, both large and small, with variable numbers and features of the modules. Functionalities commonly covered in an ERP system include finance, sales and distribution, production planning and scheduling, manufacturing and quality management, inventory management, global enterprise management, and customer relationship management[44]. For example, Choi et al.(2012) [45] examine the implementation of the order-to-cash module in Levi Strauss & Co. in China- Hong Kong, showing that a modular design allows ERP implementation in different processes to fit the companys requirement with flexibility.

### **3 Case Study - TAL Apparel Ltd & J.C. Penney**

#### *3.1 Methodology*

In this paper, we follow the relevant literature and employ a case study methodology, supplemented by literature review, to investigate four perspectives and propose future research directions. This research focuses on a single, in-depth case study, based on the publicly available data from the company's website, and several published articles on the target company. According to Benbasat et al. (1987)[46], case study methodology examines a phenomenon in its natural setting, employing multiple methods of data collection to gather information. It provides a systematic way of looking at events, collecting data, analyzing information, and reporting the results. As a result, a sharpened understanding of why the instance happened as it did and what might become important to look at more extensively in future research is investigated and discussed [47]. This approach is deemed as

appropriate for this piece of research because the topic is exploratory in nature and a number of insights and critical issues can be identified by examining the target case.

### *3.2 Overview of Target Company*

Founded in 1947 with headquarter in Hong Kong, TAL Apparel Ltd (TAL) is one of the world leaders in production of innovative clothes that combine style, comfort and functionality. It specializes in the manufacture of quality men's and women's garment for the world's leading brands and creates one in every six dress shirts sold in the United States. (TAL official website)[48]

J. C. Penney Co.Ltd. was founded in 1902 in Kemmerer, Wyoming by James Cash Penney and William Henry McManus. Today J.C. Penney offers a range of family apparel, jewelry, shoes, accessories, and home furnishing products through a chain of department stores and its company website. Headquartered in Plano, TX, the company operates in the United States and Puerto Rico, with a total of 1102 department stores in 49 states. It receives merchandise from over 2,500 suppliers, both domestic and foreign. The company also operates buying and quality assurance inspection offices in 15 countries. (J.C. Penney annual report 2011)[49].

### *3.3 ERP Implementation in TAL*

In 1990s, TAL was one of those first companies that use a shop-floor system to manage apparel bundles on the factory floor. Each bundle has a barcode and whenever a sewer finishes an operation, she scans the bundle and it's tracked with the shop-floor systems. The system, named the Apparel Manufacturing Management Information Systems (AMMIS), is still in use, though its database has been upgraded [50]. TAL is known for using information technology to improve shop floor efficiency and process flow to differentiate itself from the competitors.

#### *Lawson M3 Enterprise Management Systems Implementation*

In early 2002, TAL implemented Lawson M3 Enterprise Management Systems (M3 stands for Make, Move and Maintain) to manage its internal business process. TAL invested US\$ 12 to 15 million to develop and perfect the system in around 5 years starting from 2000 [51]. This system is provided by Lawson Software which is a global provider of enterprise software, services and support to customers primarily in three sectors: services, trade and manufacturing/distribution. Lawson's solutions include Enterprise Performance Management, Human Capital Management, Supply Chain Management, Enterprise Resource Planning, Customer Relationship Management, Manufacturing Resource Planning, Enterprise Asset Management and industry-tailored application [52]. TAL implemented M3 Enterprise Management Systems with the following five modules: Customer Sales & Service, Enterprise Asset Management, Supply Chain Management, Manufacturing Operation and Finance Management. Table 1 summarizes their corre-

sponding functions and benefits (adapted from the Infor official website).

TAL has been using the Lawson M3 enterprise software for supply chain management, order management, capacity planning, production planning, inventory management, procurement, vendor-managed inventory, material requirements planning, and finance. Then TAL spent two years with Lawson's research and development team to co-develop two more modules in 2006, which are: Fashion Planning Workbench (FPW) and Supply Chain Order (SCO).

#### *Fashion Planning Workbench (FPW)*

In the past, TAL used Excel spreadsheets to plan the medium- and long-term capacity for individual factories, which took hours to download data from the ERP system and is susceptible to human error. Now the workbench tool allows executives in the company to see order capacity across the Group and handle multi site planning in a more efficient manner. It takes only 30 minutes and that's with 200,000 manufacturing orders in the system. The company has 10 factories located in seven countries, and it can swap short orders from one factory to another one according to individual factory loads. With the workbench tool, TAL can arrange six-month production planning [53].

#### *Supply Chain Order (SCO)*

In traditional material requirements planning (MRP), demands from multiple customer orders were satisfied at an aggregate level. It did not tell which order was specifying the demand, and it lacked visibility. When TAL needed to make changes in a customer order like size breakdown, it had to go through three more steps to make sure the changes were done. However in TAL's business where most things are made-to-order, materials are highly specific to particular orders, and often need to be uniquely linked, rather than grouped together as a whole, so tracking and having visibility to customers level is crucial. The SCO module improves the way TAL plans and manages order chains by linking orders to supply chain data. Specifically, if TAL changes the quantity of a customer's order, all other related material requirement orders are taken care of. TAL implemented SCO at 10 of TAL's production sites, which help to save 80 percent of the time spent for revising related orders already in the system, while reducing inventory levels by approximately 30 percent.

In short, FPW and SCO help TAL to smooth the production workflow and even out the production cycle, and a flat production cycle results in \$3 millions saving a year. [54-55].

**Table 1** M3 Enterprise Management Systems (adapted from infor official website)[56]

Modules	Functions and Benefits
Customer sales & Service	<ul style="list-style-type: none"> <li>• Provides support for market development, sales and after-sales service processes</li> <li>• Integrates web, mobile and traditional order management tools</li> <li>• Supports sales channels using the same availability, pricing, and fulfillment controls</li> </ul>
Enterprise Asset Management	<ul style="list-style-type: none"> <li>• Integrates with other operational, planning and execution applications</li> <li>• Synchronizes maintenance with production plan</li> <li>• Increases asset reliability and improves operational capacity and output</li> <li>• Enhances scheduling</li> <li>• Reduces the need for emergency repair and maintenance cost</li> </ul>
Supply Chain Management	<ul style="list-style-type: none"> <li>• Controls and optimizes information, material and financial flows</li> <li>• Drives efficiencies from planning to procurement, from warehouse to work-in-progress</li> <li>• Provides functionality based on open standards</li> <li>• Helps to capitalize on new mobile and data collection</li> </ul>
Manufacturing Operations	<ul style="list-style-type: none"> <li>• Simplifies complex challenges with the capability to manage traceability, change control, and enhance manufacturing environments</li> <li>• Provides a single source of product data and improves information availability</li> <li>• Brings control and transparency to the manufacturing processes</li> </ul>
Finance Management	<ul style="list-style-type: none"> <li>• Records operational transactions from other modules</li> <li>• Handles accounting, budgeting, and helps consolidate all required reports and documents</li> <li>• Coordinates multiple units in terms of the financial requirements</li> <li>• Detects critical trends effectively and in a timely manner</li> </ul>

### *Continuous Upgrade of the ERP System in TAL*

Afterwards, TAL continued to launch its system upgrade in Hong Kong, mainland China, Thailand, Malaysia, Indonesia and Vietnam in 2009 and the upgrade project was complete in January 2010, on time and on budget. The upgraded system helps TAL improve productivity across its global operations, by helping users personalize their information workspace and bring together enterprise applications, business intelligence, desktop tools, and group collaboration. Thus it helps TAL to work in a more productive and dynamic manner [52].

### *3.4 VMI Scheme Implementation between TAL and J.C. Penney*

Traditionally, information systems are designed such that they are not accessible to exterior companies. There are organizational boundaries isolated a company's system from the vendors and customers. Useful information like sales data, inventory level and order status cannot reach it partners along the supply chain effectively. This would result in longer lead time and lower flexibility.

Under VMI scheme with TAL, J.C. Penney uses EDI over a third-party network. There is both centralized and non-centralized ordering, the stores place orders directly to supplier, and many items are handled through automated replenishment system. EDI can also be used to transmit POS-data. TAL collects point-of-sales data of J.C. Penney's 1,102 stores. The data is fed into TAL's demand forecasting model yielding model stock of stock keeping units (SKUs) for individual stores. TAL then decides how many shirts to be made in which color and size[57]. This entire program is designed and operated by TAL. The model stock and SKU information is now dynamically linked to TAL's factory floor, so the factories promptly know the detailed orders and then deliver the shirts directly to individual stores, using the technology of X-docking. Although forecasts are never completely accurate, TAL's collaborative information and fast manufacturing capabilities enable the company to react quickly to changes. If necessary, TAL can yield shirts ready for shipment in just four hours.

According to [58], J.C. Jenney is doing something beyond VMI called Supplier Managed Availability (SMA), which is an extension of VMI. There are no minimum or maximum inventory level requirements placed on the supplier whereas the supplier evaluates solely on product availability in the store when the product is needed. Depending on the urgency of the need at a particular store, the supplier may choose to ship the product much more rapidly by air (express).TAL's coordinated power makes the chain operating in a more efficient mode.

Under VMI scheme, both the manufacturer and the retailer are benefited. J.C. Penney can respond more quickly to consumer demand and it has shown sales increases by 20-25% and improvement in inventory turnover by 30% [59]. This form of collaboration completely eliminates warehouse inventory thus bypassing warehouse handling, improved fill rates, and increased customer satisfaction. The direct-ship processes have helped J.C. Penney save roughly \$30 million of the average monthly inventory expenses [60].

On the other hand, the main advantage of the VMI scheme for the manufacturer is the mitigation of demand uncertainty; it monitors the POS data and determines the most cost-effective way to meet the projected availability requirements, enhancing TAL's scheduling and planning, allowing a specified service level to be maintained at minimal inventory and production cost. TAL claims that the VMI program can result in costs savings of up to 15% through reduced



inventory and operational costs. (TAL official website)[48].

Close collaboration with J.C. Jenney allows TAL to design products for it. When TAL's design teams in New York and Dallas come up with a new style, within a month its factories can churn out 100,000 new shirts and offer for sale in 50 Penney stores [36]. As TAL participates in the whole process including design, production, marketing and distribution, it can be more flexible and accurate to response to the consumer market, resulting in greater sales and fewer closeouts.

## 4 Discussions

### 4.1 How Do ERP Systems Benefit Fashion Supply Chain Coordination and Internal Operation?

#### *Allowing Information Accessibility among Supply Chain Partners*

ERP system allows integration and coordination, supports information flow and activities both within a company and along supply chain, provides reliable services to make information flow smoothly amongst all partners and ensures that any partner can get information timely and accurately when in need [25]. Under the vendor managed inventory scheme between TAL and J.C. Jenney, TAL (the manufacturer) can access to J.C. Penney (the retailer)'s system to obtain point-of-sale data so that TAL can have a clearer picture about the real market demand. This successfully reduces the Forrester's bullwhip effect and results in just-in-time inventory and delivery, quick response, collaborative planning and forecasting in their supply chain. Also the two members maintain the updated single forecasting process in the system by sharing information related to future demand, resulting in substantial cost reduction.

#### *Developing a Successful Synchronization Strategy*

In the case of TAL and J.C. Penney, sophisticated skills in the deployment and use of technologies such as EDI, advanced planning and scheduling (APS), forecasting software, and enterprise resource planning (ERP) help the manufacturer in synchronizing with its retailers for information sharing, inventory and logistics management. Information sharing helps supply chain partners build up trust and responsibility interdependence. The stronger the responsibility interdependence between supply chain partners, the more they need to become involved in sharing private information, learning how to open another's viewpoint, as well as resolving shared problems [29]. Thus, it develops a differential compatible advantage and creates higher switching costs for retailers and substantial entry barriers for competitors. In addition, most commodity manufacturers do not have the sophistication in a complex partnership between supplier and customer [61].

#### *Identifying Medium- to Long-term Production Planning*

TAL has been using the Lawson M3 Enterprise Management System in its factories in seven countries to help minimize production peaks and valleys. To achieve

that, it needs to match production capacities across all factories with orders that it expects six to nine months in advance. TAL balances production load across its multiple sites and assists with planning at the style/color level. This gives TAL the ability to better plan capacity across the company's various production sites and simulate load based on possible operational and business changes [53]. Thus, TAL is better positioned to manage seasonal peaks and valleys for production.

#### *Achieving a Higher Visibility in Material Requirements Planning*

ERP system helps TAL plan and manage order chains by linking orders with supply chain data. This helps the company managing issues related to changes along the supply chain as demand and supply information are all in one single view. This allows improvement of delivery accuracy, reduction in inventories, and manual work elimination. With more immediate access to comprehensive integrated business information, TAL has cut its reporting time by 50 percent. Besides, improved demand management with relevant information consolidated to a single database also allows the company for better customer service using real-time information, and increase customer responsiveness [50].

#### *4.2 What are the Possible Issues that Fashion Companies may Encounter in Supply Chain Coordination and ERP System Implementation?*

##### *A Trade-off between Autonomy and Control*

Collaboration implies visibility of internal activities and metrics by external parties. The adoption of an integrated approach throughout the supply chain requires a trade-off between autonomy and control between each supply partner relationship [62]. In the case of TAL and J.C. Penney, J.C. Penney shares packing, shipping, inventory and product movement with TAL and let TAL control its inventory level. It is actually giving an important function to supply chain partners when outsourcing the inventory management. Many companies in virtual integration may not be willing to allow partners to view their systems and processes as their ability to perform will become more transparent, which may create pressure on themselves, especially for small companies. Therefore, this becomes an organizational challenge to reach an acceptable balance among autonomy and control between supply chain partners.

##### *Conflict in Inter-organization Relationships*

With effective coordination, partners should work together to reach a mutual goal. However, such approach will be difficult for many firms to take on board as they have focused on squeezing margins with their suppliers rather than cooperating with them [63]. Conflict in inter-organization relationships refers to the disagreements that occur in cooperation relationship or the incompatibility of activities, shared resources and goals between partners [64]. And this is impediment to effective inter-organization information sharing. If the supply chain partners do not cooperate with each others, this would affect the accuracy of

information being shared, for example, the required lead time provided by the manufacturers and the expected due date by the retailers.

#### *Power Asymmetry*

According to Hingley (2005)[65], inter-organizational relationships emphasize the necessity for symmetry and mutuality and that symmetric dependence structures foster longer-term relationships while asymmetric relationships are associated with less stability and more conflict. Under VMI, we can observe a significant shift in power from the retailer to the manufacturer since it is now the manufacturer who manages the inventory. In the case of TAL and J.C. Penney, they are giant manufacturer and retailer respectively with high bargaining power; this leads them to become inter-dependant and work together under fair terms. TAL is willing to design and operate entire program for VMI and J.C. Penney is willing to share POS data and design work with TAL. But for other manufacturers in the apparel industry that are small or medium in scale and lack resources and bargaining power in the supply chain, the cost involved in implementing new IT systems is high. Those small manufacturers will be worried about an unequal distribution of costs and benefits between the various members of the supply chain [26]. These will obviously hinder smaller firms to share their information.

#### *Operation Reengineering Shifts the Management Power*

Implementing an ERP system may force the reengineering of key business processes or developing new business processes to support the organizations goals [66]. And redesigned processes require corresponding realignment in organizational control to sustain the effectiveness of the reengineering efforts. And this kind of alignment may change the functional areas and many social systems within the organization. The resulting changes may significantly affect organizational structures, policies, processes, and employees. According to Burca (2005)[63], implementation of ERP system changes the career prospects and aspirations of many people in the company. Power was perceived to move strongly in the direction of people who had embraced the IT agenda. As a result, management may feel that there is a change, and want to resist it. This would definitely affect ERP implementation.

### *4.3 What are the Critical Successful Factors for Achieving Supply Chain Coordination with ERP System Implementation?*

#### *Assessing the Fit between Organization and the Target ERP System*

According to Swan et al. (1999)[67], organizational misfits of ERP exist due to the conflicting interests of the user organization and the ERP vendor. In order to have successful ERP implementation, ERP implementation managers as well as top management of the organization should be able to assess the fit between their organization and the target ERP system before its adoption, identify gaps between the ERP generic functionality and the specific organizational require-

ment, and then decide how these gaps will be handled [68]. After ERP system implementation, the impact of ERP and process adaptations should be well measured and managed so as to minimize the potential business disruptions and user resistance. In the case of TAL's ERP implementation, TAL spent two years with Lawson's research and development team co-developing new ERP modules (the Fashion Planning Workbench and Supply Chain Order systems) to ensure the modules fit TAL and work efficiently.

#### *Managing the Cost and Time of ERP Implementation*

ERP systems come in modular fashion and do not have to be implemented entirely at once as the length and cost of implementation is affected to a great extent by the number of modules being implemented and the scope of the implementation [69]. The adopting company is suggested to follow a phase-in approach in which few modules are implemented at a time. Besides, the implementation costs increase with the degree of customization. Therefore, the company should have a thoughtful plan in order to balance customization and cost, keep the project plan aggressive, but achievable and flexible. In the case of TAL's ERP system implementation, TAL first adopted 5 modules in 2002; after the system had been run smoothly for few years, it added two more new modules in 2006 and eventually upgraded the ERP systems in 2009 on time and on budget. Gradual implementation and modification of ERP system can also lower user resistance and the risk that may encounter.

#### *Arranging Extensive Education, Training and Rewards to Employees*

Education and training is probably the most widely recognized critical success factor for ERP system implementation, because user understanding is essential. ERP implementation requires a critical mass of knowledge to enable people to solve problems within the framework of the system. If employees do not understand how the system works, they will invent their own processes using those parts of the system they are able to manipulate [70]. Top management must allocate adequate expense on education and end-user training and incorporate such expense as part of the ERP budget. According to Volwer (1999)[71], it is suggested that reserving 10-15% of the total ERP implementation budget for training will give an organization an 80% chance of implementation success. Once the selected employees are trained after investing a huge sum of money, it is a challenge to retain them; especially the market is seeking for skilled ERP system consultants. Employees could double or triple their salaries by accepting other positions [69]. It is recommended the company should provide attractive retention strategies such as bonus programs, company perks, salary increases, continual training and education, and appeals to company loyalty.

#### *Ensuring Internal Processes Work Properly*

Under VMI, the manufacturer receives sales data from the retailer via EDI and

the information will be transmitted to the manufacturer's ERP system for inventory planning, scheduling and production. The manufacturer should ensure its internal processes integrated properly so that the orders can link up with other supply chain data. Norris et al. (2001)[72] have stressed that before an organization can participate in e-supply chain management (e-SCM) it needs to ensure that its internal processes are fully integrated. The assertion is that processes that span the supply chain cannot work if the internal processes do not work correctly in the first place.

#### *Building Up Trusting and Collaborative Relationships*

All parties involved must view collaboration as a strategic asset and an operational priority in order to foster trust among trading partners. Organizations wishing to extend their processes will have to develop more trusting and collaborative relationships with their business partners. All parties need to recognize that success for one part of the supply chain means success for all and all improvements made to the operation of the supply chain will ultimately benefit all member firms [73].

Smooth communication is the foundation for supply chain management. Frequent communication contributes to faster problem resolution, trust, and relationship building as well as quicker decision-making and those are resulted from having access to up-to-date information. Moreover, willingness to share information enhances the quality and relevance of the information that is shared. For example, sharing actual sales data combined with rolling forecasts helps improving mutual supply chain decision making. In addition, willingness to share future product strategies and technology plans rather than simply sharing forecasting data allows more cooperation and integration.

#### *Ensuring Information Visibility*

Good supply chain management is essential for a successful company. Supply chain management aims at going beyond the boundary of a single company. This also applies the corresponding use of information. In order to have efficient and effective supply chain operations, information visibility, such as those on inventory level and transportation schedule, is critical. Regarding information visibility across the supply chain, it should be managed with strict policies, disciplines and monitoring [72]. Allowing all partners in the supply chain to view and dynamically manage both demand and capacity data raises opportunities for the simultaneous improvement in customer service levels and reduction in overall inventory levels and associated costs [74]. Partners in virtual integration need to be willing to share information with each other in order for the end-to-end process to work correctly and organizations also need to understand the implications of integration across the entire supply chain [75]. According to Kelle and Akbulut (2005)[76], if one of the supply chain partners forces its optimal policy on the

other partner, the total operating cost of the system can be much higher than the case with a coordinated ordering/setup and shipment policy. So the potential for cost reduction in policy coordination motivates sharing of information, too.

#### *4.4 What are the Trends of ERP System Implementation and Coordination?*

##### *Intensive Cooperation between the Organization and its ERP Vendor*

Competing in a dynamic environment and meeting global challenges requires agility. Successful companies must be able to respond quickly and cost-effectively to change. The change could be of any type, for example shifting in customer demands and supply chain partners, modifications of a business model, business process or business expansion [77]. Organizations need to convert their business into responsive, demand-driven, profit-making enterprises by optimizing their operations, so a company with ERP system would be more active in cooperating with its ERP vendor to create new modules that can increase operational effectiveness and market responsiveness. This phenomenon also appears in the case of TAL, where TAL actually teams up with its ERP vendor to co-create ERP modules for effective operation and coordination.

##### *The Need of Extended Information System Applications and Technology*

From the case of TAL we can see the ERP system should be monitored and upgraded continually to enhance its functions and efficiency, so as to increase the company's competitiveness. According to Sleeper (2004)[78], only 35% of the organizations are satisfied with the ERP they use at the moment, and the main reason for dissatisfaction is that the software does not map well with the business goals. A major problem with existing ERPs is the "misfit" between delivered functionality and needed functionality, described as a gap between the processes the ERP supports and the processes the organizations work by. Thus, there is an increasing interest among vendors to improve future ERP-systems [77], and further look into how to identify and present business requirements for the future ERP. This creates the need for extended information system applications and technology (e.g. ERP II, SOA, WEB 2.0 or Software as a Service - SaaS, etc.). Staff (2006)[79] describes mySAP as the next generation of ERPs, and says that this software is fast, flexible, and an efficient foundation offering organizations new functions, greater productivity, and integrated analytical insights into business processes which increase the flexibility to design the software so that it meets customer requirements. This is described as role-specific development aiming at increasing employee productivity by supporting them with a tool tailored to their specific work tasks.

Amongst companies that are relatively satisfied with their existing ERP operations, many of them are now considering extension of the functionalities provided by the original ERP systems (i.e. ERP II) toward e-business, supply chain management (SCM), customer relationship management, supplier relationship

management, business intelligence, and manufacturing execution systems, etc. According to Tenkorang et al. (2011)[80], ERP II aggregates and manages the data surrounding all the transactions of an enterprise as accurately as possible in real time. It also facilitates opening up of the system to make information available to trading partners in the supply chain.

## 5 Conclusion and Future Research Opportunities

Through the study of the TAL- J.C. Penney case and the reviewed literature, we have demonstrated how the ERP system can improve business performance and organization in TAL and how the system helps coordination between the retailer and the manufacturer. ERP allows useful information to be integrated and flowed effectively within the organization and across the supply chain, which is important to uncertain and demand-driven fashion industry. The latest implemented modules – Fashion Planning Workbench (FPW) and Supply Chain Order (SCO) – help TAL to smooth the production workflow and even out the production cycle. Besides, information sharing between TAL and J.C. Penney benefit in (i) maintaining optimal stock level, (ii) reducing inventory and operational cost, (iii) enhancing manufacturers' scheduling and planning and (iv) building up close relationship between manufacturer and retailer. Combining the findings from the case study and the literature review, below is the summary of what we have discussed in this paper.

### *5.1 The Benefit of ERP Systems in Fashion Supply Chain Coordination and Internal Operations*

Four major benefits in fashion supply chain coordination and internal operation are identified: (i) It allows information accessible among supply chain partners, providing reliable services to make information flow smoothly between all partners and get information from partners timely and accurately when partner needs. (ii) It develops a successful synchronization strategy, creating a differential compatible advantage and creates higher switching costs for supply chain partners. (iii) It helps the manufacturers to identify medium- to long-term production planning. (iv) It helps achieving a higher visibility in material requirements planning by linking orders with supply chain data.

### *5.2 The Possible Issues that Fashion Companies may Encounter in Supply Chain Coordination and ERP System Implementation*

From the case of TAL and J.C. Penney, we reveal the possible issues in supply chain coordination and ERP system implementation, namely: (i) the trade-off between autonomy and control, (ii) conflict in inter-organization relationships, (iii) power asymmetry between the supply chain partners, and (iv) the management power shifted through operation reengineering.

### *5.3 The Critical Successful Factors for Achieving Supply Chain Coordination with ERP System Implementation*

In order to have a successful ERP systems implementation and make sure it can work effectively in supply chain coordination, the following six factors should be considered: the company should (i) assess the fitness between organization and the target ERP system, (ii) manage the cost and time of ERP implementation, (iii) arrange extensive education, training and rewards to employees, (iv) ensure the internal processes are working properly and fully integrated before it spans the supply chain. (v) The supply chain partners should build up a trusting and collaborative relationship and have better communication. (vi) Supply chain participants should ensure information visibility, allowing all partners in the supply chain to view and dynamically manage both demand and capacity data.

### *5.4 The Trends of ERP System Implementation and Coordination*

According to the case study and the literature review, we have observed two trends of ERP system implementation and coordination. (i) Intense cooperation between organization and its ERP vendors: Companies with ERP system installed would be more active in cooperating with their ERP vendors to create new modules that can increase operational effectiveness and market responsiveness. (ii) The need for extended information system applications and technology: There are many companies which have implemented ERP systems and are relatively satisfied with their operations are now considering the extension of the functionalities provided by the original ERP systems.

### *5.5 The Challenges and Further Research Opportunity in ERP System Implementation Mismatch between Existing and New ERP System*

As discussed in Section 4, there are some new versions of ERP systems developed in order to handle the problem of mis-fit between ERP system and organizational functionality. However according to Kumar and Van Hillegerberg (2000)[12], this creates new problems in the migration between different versions, and either it could be that the new version is not backward compatible or it could be that the customer organization has made modifications of the ERP, and these modifications do not automatically adjust to the new version of the ERP. Thus, there is a need to examine further how companies should extend their ERP systems and the factors that should be considered when extending ERP systems.

### *Small and Medium-sized Firms Hardly Develop a Costly ERP System*

Companies that invest in technology can improve overall efficiency and effectiveness and have a competitive advantage. But the implementation cost of those technology systems is high, only large companies are able to invest in these big projects to improve their performance whilst small and medium-sized firms hardly develop such a system on their own. Besides, not many small companies are taking a proactive approach to implementing ERP or even sharing information.



The usual reason is they tend to rely on the industrial giants to offer help (e.g. teaming up with big suppliers such as TAL can help enhance their own supply chains). Then it may come to another problem mentioned by Burca (2005)[63]: those small companies may have a distrust of passing confidential information to customers and suppliers as this may indicate how well they are performing. Further study in this area may indicate how small and medium-sized firms can put practices in place to ensure that collaboration takes place.

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