

SUPPLY CHAIN PERFORMANCE IMPROVEMENT

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ABSTRACT

This Paper deals with business renovation, effective utilization of Information technology and the role of business process modelling in supply Chain integration projects. The main idea is to show how the performance of the supply chain can be improved with the integration of various tiers in the Supply Chain. Integration is prerequisite for effective sharing and utilization of information between different companies in the chain. Simulation –based Methodology for measuring the benefits combine the simulation of business Processes with the simulation of supply and demand. The theoretical Findings are illustrated with the case study of procurement process in petrol Company. Old and renewed business process models are shown. The changes in lead-times, process execution costs, and quality of the process and Inventory costs are estimated.

Keywords : *Business renovation, Supply chain integration, Business process model, Information transfer in supply chain, Supply chain integration benefits.*

Introduction:

Today collaboration between different companies in the supply chain is vital for the success of each supply chain. Although the importance of the supply chain relations is widely acknowledged, seamless coordination is rarely achieved in practice. The paper tackles the different question of facilitating, enabling and measuring the effect of supply chain integration supported by information technology. The main idea is to show how the performance of the supply chain can be improved with the integration of various tiers in the chain as the renovation of the current business practice is usually necessary to fully realize the benefits of shared information, the prior realization of the current business process and the desired future state is vital. We show how the modeling of business processes can help in achieving successful business process changes. The prediction and measurement of results is crucial for planning and monitoring such projects-this can be achieved with the use of the simulations described in the last section.

We tried to reveal, how business process modeling can be used in order to develop such business process models that will lead to improvement in sharing the information and the integration of processes appropriate business processes are prerequisite for the strategic utilization of information (otherwise the sharing of information can only lead to an overload of information without much benefits for anyone involved) Business modeling techniques are of great help in becoming fully acquainted with the processes

in question and to improve them. The mere implementation of new technology without changes in a company's operation will realize only some of all possible benefits. Business renovation and changes in business processes that consequently improve the flow of information.

Review of Literature:

According to Monczka, R., Trent, R., & Handfield, R "The main objective of the supplier evaluation process is to reduce purchase risk and maximize the overall value of the purchaser. It typically involves evaluating, at a minimum, supplier quality, cost competitiveness, potential delivery performance and technological capability. Some of the other criteria used in the preliminary evaluation of suppliers include financial risk analysis, evaluation of previous performance, and evaluation of supplier provided information".

In the view of Christoph H. Loch, Yaozhong Wu "Supply chain contracting literature has traditionally focused on aligning incentives for economically rational players. Recent work has hypothesized that social preferences, as distinct from economic incentives, may influence behavior in supply chain transactions. Social preferences refer to intrinsic concerns for the other party's welfare, reciprocating a history of a positive relationship, and intrinsic desires for a higher relative payoff compared with the other party's when status is salient. And given experimental evidence that social preferences

systematically affect economic decision making in supply chain transactions. Specifically, supply chain parties deviate from the predictions provided by self-interested profit-maximization models, such that relationship preference promotes cooperation, individual performance, and high system efficiency, sustainable over time; whereas status preference induces tough actions and reduces both system efficiency and individual performance.

Rajat Bhagwat and Milind Kumar Sharma were developed a balanced scorecard for supply chain management (SCM) that measures and evaluates day-to-day business operations from following four perspectives: finance, customer, internal business process, and learning and growth. Balanced scorecard has been developed based on extensive review of literature on SCM performance measures, supported by three case studies, each illustrating ways in which BSC was developed and applied in small and medium sized enterprises (SMEs) in India. They suggested that a balanced SCM scorecard can be the foundation for a strategic SCM system provided that certain development guidelines are properly followed, appropriate metrics are evaluated, and key implementation obstacles are overcome. The balanced scorecard provides a useful guidance for the practical managers in evaluation and measuring of SCM in a balanced way and proposes a balanced performance measurement system to map and analyze supply chains. While suggesting balanced scorecard, different SCM performance metrics have been reviewed and distributed into four perspectives. This helps managers to evaluate SCM performance in a much-balanced way from all angles of business”.

Michael Tracey, Jeen-Su Lim, Mark A. Vonderembse were tried to empirically test the impact of supply-chain management (SCM) capabilities on business performance so as to determine to what degree customer-oriented SCM issues influence competitive position and organizational performance. For this study, they used a rigorous methodology is employed to generate a reliable and valid measurement instrument. Responses from 474 manufacturing managers are then utilized to test a causal model using LISREL. The results indicate significant positive relationships exist among three types of SCM capabilities (outside-in, inside-out, and spanning) and business performance (perceived customer value, customer loyalty, market performance, and financial performance).

Thoo Ai-Chin, Huam Hon-Tat, Rosman Md Yusoff & Amran Rasli conducted a study on Electronic manufacturing services (EMS) provide electronics manufacturing services for other companies. This industry is one of the industries that require supply chain management (SCM) to optimize the operations. EMS focuses on printed circuit board fabrication, electronic design, assembly and testing. The authors proposed a conceptual model by linking the relationships with customer and supplier, information and communication technology, material flows management, corporate culture, performance measurement; and SCM performance in a single study. The findings would provide important

implications for the management in the manufacturing companies to understand determinants that contribute to the SCM success. More importantly, based of the obtained results, these companies can enhance the SCM performance by improving the current practices/strategies through focusing on the determinants that significantly influence SCM performance.

According to Elena Katok, Diana Yan Wu “The coordination of supply chains by means of contracting mechanisms has been extensively explored theoretically but not tested empirically. The authors investigated the performance of three commonly studied supply chain contracting mechanisms: the wholesale price contract, the buyback contract, and the revenue-sharing contract. The simplified setting we consider utilizes a two-echelon supply chain in which the retailer faces the newsvendor problem, the supplier has no capacity constraints, and delivery occurs instantaneously. Compared the three mechanisms in a laboratory setting using a novel design that fully controls for strategic interactions between the retailer and the supplier. Results indicate that although the buyback and revenue-sharing contracts improve supply chain efficiency relative to the wholesale price contract, the improvement is smaller than the theory predicts. And also find that although the buyback and revenue-sharing contracts are mathematically equivalent, they do not generally result in equivalent supply chain performance.

Kristen Etheredge and Damon Beyer viewed that, Successful standard processes require implementation strategies that build emotional commitment as well as rational compliance, which is accomplished by combining bottom-up change management with the top-down rollout of well designed standard processes. And Robert Monczka, John Blascovich, Leslie Parker, and Tom Slaight opined that, Value Focuses Supply (VFS) strategies will provide the next breakthrough opportunity for companies to create and capture value from their most strategic purchases. Senior executives who lead their companies to apply VFS across the supply network will have opportunities to protect and create significant competitive advantages”.

Supply Chain Management:

The supply chain (SC) is a linked set of resources and processes that begins with the sourcing of raw materials and extends through the delivery of end items to the final customer. While the separation of SC activities among different companies enables specialization and economies of scale, many important issues and problems need to be resolved for a successful SC operation.

According to the Global supply chain forum, SCM is ‘the integration of key business processes from end user through original suppliers that provide products, services, and information that add value for customer and other stakeholder’ We can only talk about SCM if there is a proactive relationship between a buyer and supplier and the integration is across the whole SC, not just first-tier suppliers, most SCM related-problems stem either from uncertainties or an inability to co-ordinate several activities

and partners, one of the most common problems in SC is the so-called bullwhip effect. Even some fluctuations in demand or inventory levels of the final company in the chain are propagated and enlarged throughout the chain. Because each company in the chain has incomplete information about the needs of others, it has to respond with a disproportional increase in inventory levels and consequently an even larger fluctuation in its demand relative to others down the chain. Production peak can be significantly reduced by transmitting the information directly from the customer to the manufacturer.

Information Transfer in a Supply Chain:

In recent years numerous studies have emphasized the importance of information sharing within the SC, how different changes in ordering costs as a result of using e-business can affect the optimal ordering intervals and quantity, average stock level and consequently total inventory-related costs. While there is no doubt about the fact that IT can greatly reduce the costs, business model, formation and utilization of information is crucial. Information should be readily available to all, companies in the supply chain and the business processes should be structured in a way to allow full use of this information. It should be noted that the mere use of IT applications is insufficient to realize the benefits. It has been found that adoption of the internet by itself demonstrates no benefits in terms of reduced transaction costs or improved SC efficiency in Scottish small-and medium-sized enterprises, the internet reduces much of the costs of information sharing, but it does not solve information receivers reading and interpretation limitations. A possible approach to these problems as information market problems with solutions consisting of information market service process models, strategic utilization of the information is of the importance and business process modelling and renovation can be of great help in achieving this desired coordination. This substantiates our thesis that business models have to be changed so as to facilitate the better use of transferred information. Although the exact possibilities vary from industry to industry, the main business process integration concepts presented below can be applied with minor modifications irrespective of the industry in question. The paper presents a novel combination of methodological approaches for measurement of the supply chain integration benefits.

Business Renovation into E-business:

Business renovation (BR) or business process renovation and normalization efforts integrate radical strategic methods of business process reengineering (BPR) and more progressive methods, of continuous process improvement (CPI) with adequate IT infrastructure strategies. Process renovation is a reengineering strategy the critically examines current business policies, practices and procedures, rethinks them through and then redesign

the mission critically-critical products process and services.

Business renovation argues for a balanced approach in which we attempt to manage realistic changes rather than always seeking radical change. For a thorough and effective renovation, organization should combine radical shift (BPR) with those that permanently increase business efficiency and effectiveness. As the internet becomes very important component of company's information systems, it plays a significant role, the internet enables companies of all sizes to develop new online business models, which means improving and altering the ways in which companies operate and interact with business partners, customers and suppliers. Companies are now pursuing more intensive and interactive relationships with their suppliers, collaborating in new product development, integrating key business process and cross-functional information sharing on a range of issues.

The internet enables complete integration of inter-organizational processes in BR projects and extends the strengths of BR to the new strategic options (e.g. electronic distribution) the new possibilities for process (e.g. order entry, distribution, on-line payment)

E-business represents a shift in business doctrine that is changing traditional organizational models, business processes, relationships and operational models that have been dominant for the past 20 years. The new doctrine of e-business requires an enterprise to integrate and synchronize the strategic vision and tactical delivery of products to its customers with the IT and service infrastructure needed to meet that vision and process execution.

Measuring Supply Chain Integration Benefits:

Only in that way, an improvement of quality, lower cost, and shorter performance times of renovated business procedures and activities could be expected which would lead to increase in customer satisfaction. At first sight the answer seems very simple. Customer satisfaction would grow if we managed to reduce costs, shorten execution times and increase service quality. But after a closer look it becomes clear that we have three excluding goals.

Business Process Modelling:

The main purpose of developing and analysing business process models is to find revenue and Value generators within a reversible VALUE CHAIN or a business model's value network. There have been a number of attempts to formally describe and classify a business process model. Venkatraman and Henderson (1998) defined a business process model as a co-ordinated plan to Design strategy along three vectors: customer interaction, asset configuration and knowledge Leverage (Venkatraman, 2000). Some authors relate the high capitalisation of Internet companies to new business process models. A business process model is an abstraction of a business that shows how business components are related to each other

and how they operate. Its ultimate purpose is to provide a clear picture of the enterprise's current state and to determine its vision for the future. There are several reasons

Producing business process models (Eriksson, & Penker, 2000):

A business process model helps us understand the business: one of the primary goals of business process modelling is to increase understanding of the business and to facilitate communication about the business.

A business process model is a basis for creating suitable information systems: descriptions of the business processes are very useful in identifying the information systems needed to support the business. Business process models also act as a basis for engineering requirements when a particular information system is being designed.

A business process model is a basis for improving the current business structure and operation: as it shows a clear picture of the business current state, a business process model can be used to identify the changes required to improve the business.

A business process model provides a polygon for experiments: a business process model can be used to experiment with new business concepts and to study the implications of changes for the business structure or operation.

A business process model acts as a basis for identifying outsourcing opportunities: by using a business process model the core parts of a business system can be identified. Other parts considered less important can be delegated to external suppliers. Modelling a complex business requires the application of multiple views. Each view is a simplified description (an abstraction) of a business from a particular perspective or vantage point, covering particular concerns and omitting entities not relevant to this perspective. To describe a specific business view, several diagrams are usually used and complemented with textual descriptions. The process modelling methodology with the usage of process maps is shown in more detail in (Popovic, Indihar Stemberger, & Jaklic, in press). In the next section a detailed case study of Petrol Company is presented.

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The developed business model helps to understand the current problems and also makes them more visible to all

decision-makers in both companies. The main problems identified on the tactical level are:

- The stock level cannot be measured accurately with a measuring stick since the tank always contains some water, the exact quantity of water is unknown;
- The transport company's trucks are not fully utilized, even bigger problems are found on a more strategic level.
- The flow of information in the process is slow and costly also the process is not being executed efficiently.
- The communication between the various departments and companies is costly using telephones, fax machines etc.
- Full information is not available when making a decision.
- The prediction of future demand is approximate, based on human tacit knowledge.
- Human limitations prevent the decision-maker from using all available information.
- Each member in the chain is trying to attain its local optimum instead of the global chain's optimization.
- Consequently both the stock levels and transportation costs are higher than necessary.
- Business modelling plays the role of a facilitator of changes; it helps to identify some of the above mentioned problems. In connection with business process simulation it also helps measure the benefits of the changes.

Petrol Supply Chain And Transfer of Information:

Special attention in renovation efforts is paid to changes in transfer of information IT would enable an efficient and cheap transfer even in the AS-IS model as the use of e-mail or extranet can facilitate instant access to all available information to both the petrol and transport companies.

- IT certainly plays as important role in both acquiring information and utilizing it.
- Certain advantages could be realized from the exact information about stock levels with the automated system. However, the main advantages lie in the possible organizational changes.

The main effects of the enhanced flow of information are twofold:

- An earlier start and better flow of the business process: as needs are identified at the supplier the fulfillment process can start immediately, without any unnecessary delays and the main decision about transport if made with full information about both the needs petrol stations, the prediction of future demands and the available truck fleet and their associated costs.
- Previously, the decision about order quantities was made by the purchasing department, while the decision about transport was taken by the transport company based on given orders
- The transferred information in the AS-IS model would only help make the search for local optimization.

- The TO-BE model, however, enables both improvements at a single company and at the global, SC level.

Business Renovation Effects:

The business process is structured in such a way that it can also be utilized in decision making.

- The effect of the changes can be estimated with a simulation of business processes and simulations of supply and demand. With the first simulations the changes can be estimated in process execution costs, lead times and employee workloads.
- The methodology used does not enable the direct measurement of the quality of the process and its outputs.
- Therefore second simulation was used to estimate changes in the quality and level and costs of stocks, both simulations are especially important as they enable us to estimate the consequences of possible experiments.

Conclusion:

In the paper we analysed the main aspects needed for the successful renovation, integration and Operation of Supply Chain. The core idea is that the successful implementation of Supply Chain integration projects is not as much a technological problem and that a thorough study of the current and desired states of Business processes in all companies involved is required. The case study showed a two-phased approach to estimating the different benefits of business Process renovation with the use of simulations. The transfer of information brings important Advantages in process costs and lead-times, while the resulting possibility of smaller and more frequent orders means reduced inventory costs.

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