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Process Based Agile Supply Chain Model According to BPR and IDEF 3.0 Concepts

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Abstract

Nowadays, growth and survival of organizations is due to applying an effective method for systematic planning and executing that plan through the organization. During earlier years, different concepts for organizational change have been propounded and business processes has considered as a conceptual framework for designing the structure of an organization. Appropriate identification, definition and mapping of key processes (Process Map) would coordinate organizational component in order to achieve its objectives. Process approach and process orientation are important issues that pioneer

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organizations should take care about. Acceptance of change with applying different known approaches like: Reengineering, Kaisen (Japanese continual improvement) and TQM are based on a primary assumption that organizations should focus on their main mission i.e. satisfying customer needs. Success in applying processes as organization constituents in this survey persuade researchers to develop a process based model to achieve agile supply chain. This model emphasize on current models in supply chain agility on one hand and on the basis and logic of IDEF model on other hand. Suggested model applied in AeroSpace industry organization after confirmation of industry and academy experts. However, it has to be cited that founds of this survey should be mentioned as a foresight idea for designing an organization based on processes and as an attempt for receiving a practical and theoretical feedback that take care practicability of suggested model.

Keywords: BPR, IDEF, SCM, Agility, Agile SCM

1 Introduction

In today's ever-changing world, the only thing that doesn't change is 'change' itself. In a world increasingly driven by the three Cs: Customer, Competition and Change, companies are on the lookout for new solutions for their business problems (Hammer, Champy.J., 1993) Organizations typically compete along several competitive dimensions, such as cost, quality, delivery, flexibility, etc. (Wheelwright, 1984). However, today's hyper-competitive environment is characterized by constant change and market unpredictability (Brown and Eisenhardt, 1998). Complex technological advances, shortened product life cycles, diverse customer requirements, and increased demand for product variety in fragmented global markets have drastically shortened market visibility and increased uncertainty. Given these pervasive changes, successful organizations have to remain competitive while adapting to changing marketplace conditions (Brown and Eisenhardt, 1998). Since, "agility is all about customer responsiveness and mastering market turbulence" (van Hoek et al., 2001), agility is regarded as a necessary ingredient for improving competitiveness (Yusef et al., 1999). agility has received far less attention in the literature. However, some studies have attempted to provide a conceptual definition of organizational agility. Sharifi and Zhang (1999) define it as, "the ability to cope with unexpected challenges, to survive unprecedented threats of business environment, and to take advantage of changes as opportunities", whereas Goldman et al. (1994) describe an agile organization as, "dynamic and having the potential to achieve a competitive advantage. To be dynamic, an organization's competitive strategy focuses on knowledge development and flexible processes that enable it to respond to these changing circumstances ". A more recent and comprehensive definition of organizational agility is provided by Kidd (2000): "An agile enterprise is a fast moving, adaptable and robust business. It is capable of rapid adaptation in response

to unexpected and unpredicted changes and events, market opportunities, and customer requirements". Such a business is founded on processes and structures that facilitate speed, adaptation and robustness and that deliver a coordinated enterprise that is capable of achieving competitive performance in a highly dynamic and unpredictable business environment that is unsuited to current enterprise practices. These definitions and interpretations clearly indicate that organizational agility is a very broad and multi-dimensional concept, and involves several diverse aspects of an organization. For example, Goldman et al. (1994) lists nine elements of organizational agility, such as customer dialogue and support, continuous improvement and change, people support, and flexible and rapidly responding operations. Since organizational agility involves many diverse issues, this paper focuses on identifying the determinants of agility in an organization's supply chain. Clearly, possessing agility in the supply chain enables a manufacturing firm to achieve higher levels of overall organizational agility. Supply chain agility enables an organization to react quickly and more effectively to marketplace volatility and other uncertainties, thereby allowing the firm to establish a superior competitive position. In addition, firms with agile supply chain processes are more market sensitive, better capable of synchronizing supply with demand, and able to achieve shorter cycle times. Given that an organization's supply chain agility directly impacts its ability to produce innovative products and deliver them to their customers, we believe an organization's supply chain agility is a critical factor affecting its overall global competitiveness. While the benefits of supply chain agility are generally acknowledged, little research exists which addresses how an organization can achieve supply chain agility during process approach. This research addresses this gap by undertaking an exploratory driven study to identify and develop critical factors that determine and influence an organization's supply chain agility. To achieve this goal, we develop a process based framework of an organization's supply chain agility. This framework on one hand, establishes key factors that determine agility attributes of four critical processes of the supply chain in a firm-new product development, sourcing, manufacturing, and delivery-as well as factors that constitute the supply chain agility and the other hand, determine a comprehensive approach to process based agile supply chain model.

2 Literature review

The importance and benefits of adopting process oriented perspectives of business value are well recognized within the academic literature (Crowston and Treacy 1986; Bakos 1987; Gordon 1989; Kauffman and Weill 1989; Wilson 1993) and its perceived significance by practitioners is indicated by the recent interest in process innovation and reengineering (Davenport 1993; Hammer and Champy 1993). Some of the recent headlines in the popular press read, "Wal-Mart reduces restocking time from six weeks to thirty-six hours."" Hewlett Packard's assembly time for server computers touches new low- four minutes." "Taco Bell's sales soars from $500 million to 3$ billion

(Grover,Varun., Malhotra, Manoj.1995)." The reason behind these success stories is business process reengineering.

2.1 Definition of business processes

Pall (1987) believed that a business process involves the combination of people, material, energy, equipment, and so on to achieve a certain goal. Murray (1991) placed greater emphasis on effectiveness and proposed that business process involves a combination of functions or tasks, which can be integrated to create products and services. Moreover, Murray also noted that business processes can be improved and redesigned to maximize process efficiency and effectiveness. After all the organization is only as effective as its processes (Hunt, 1996. Hammer and Champy, 1993) "A business process is a series of steps designed to produce a product or a service. It includes all the activities that deliver particular results for a given customer (external or internal) (Mayer, Richard, Dewitte, Paula, 1998),." Processes are currently invisible and unnamed because people think about the individual departments more often than the process with which all of them are involved. So companies that are currently used to talking in terms of departments such as marketing and manufacturing must switch to giving names to the processes that they do such that they express the beginning and end states. These names should imply all the work that gets done between the start and finish. For example, order fulfillment can be called order to payment process(Hammer and Champy, 1993). Davenport and Short (1990) define business process as "a set of logically related tasks intended to achieve a defined business outcome". A process is "a structured, measured set of activities designed to achieve a specified output for a particular customer or market". A process thus implies a strong emphasis on how work is done within an organization (Davenport 1993, Mooney et al, 1996). Davenport and Short consider that processes have two important characteristics: o Customer (internal or external) involvement, and o Crossing organizational boundaries, i.e., they occur across or between organizational subunits. One technique for identifying business processes in an organization is the value chain method proposed by Porter and Millar (1985). Take purchasing from suppliers for example: this process often involves employees in the production, purchasing, inventory control, and accounting units. From the procurement process demonstrates that successful business processes depend on inter-unit cooperation. In summary, using the scholarly definition of a business process, this study concludes that a business process can achieve certain goals, including various activities required by tangible production and intangible services and support. Additionally, each activity within the business process must know the information required to support the operation. Organization operational model is limited by organization technology adoption. The introduction of new technologies challenges old operational models and rules. Moreover, the advance of information technology revises old theories and business operation regulations step by step (Hammer and Champy, 1993). Talking

about the importance of processes just as companies have organization charts, they should also have what are called process maps to give a picture of how work flows through the company. Process mapping provides tools and a proven methodology for identifying current As-Is business processes and can be used to provide a To-Be roadmap for reengineering the product and service business enterprise functions. It is the critical link that reengineering team can apply to better understand and significantly improve business processes and bottom-line performance (Hunt, 1996. Hammer and Champy, 1993). Having identified and mapped the processes, deciding which ones need to be reengineered and in what order is the million-dollar question. No company can take up the unenviable task of reengineering all the processes simultaneously. Generally they make their choices based on three criteria: dysfunction: which processes are functioning the worst?; importance: which are the most critical and influential in terms of customer satisfaction; feasibility: which are the processes that are most likely to be successfully reengineered(Hammer and Champy, 1993).

2.2 Business Process Reengineering (BPR)

The IS professional literature increasingly suggests that achievement of significant business value is attainable only in combination with business process re-engineering prior to the application of IT. Hammer and Champy (1993) describe business reengineering as the "fundamental rethinking and radical redesign of an entire business system ....., to achieve dramatic improvements in critical measures of performance." Davenport (1993) uses the term "process innovation" to include any "radical change" initiative as distinct from incremental process improvements. The most common rationale for process innovation is improved financial performance, typically through cost reduction. Other process-based objectives, including time reduction, improved quality, improved customer service, are assumed to result in higher levels of sales or reduced cost of production. The continuing demand for business process improvements has resulted in a proliferation of consultants, methodologies, techniques, and tools for conducting BPR projects (Kettinger, Teng, and Guha 1997). A report by Prosci (2003) states that good reengineering projects design and implement solutions that are customer focused, capitalize on best practices and learning from others, are designed for the future, and produce significant bottom-line improvements for the business. A study done by Kettinger et al. (1997) places these methodologies, techniques and tools (MTTs) into a classification framework that permits project planners to assess the "fit" between their unique organizational problems and available MTTs. Kettinger et al. (1997) use eleven categories of BPR techniques. These categories can be used as a "primary index" for understanding and learning reengineering techniques. Muthu, Whitman, and Cheraghi (1999) during an Investigation of business process reengineering methodologies summarized fifth methodologies which listed as shown in table 1. The methodologies were cited by 1: Underdown (1997), 2: Harrison and Pratt (1993), 3: Furey (1993), 4: Mayer and

Dewitte (1998), 5: Manganelli and Klein (1994).

Activity	Methodology 1	Methodology 2
1	Develop vision, strategy	Determine customer requirements, goals for the process
2	Create desired culture	Map and measure the existing process
3	Integrate, improve enterprise	Analyze and modify existing process
4	Develop technology solution	Design the reengineered process
5		Implement the reengineered process

Activity	Methodology 3	Methodology 4	Methodology 5
1	Set direction	Motivating reengineered	Preparation
2	Baseline and benchmark	Justifying reengineered	Identification
3	Create the vision	Planning reengineered	Vision
4	Launch problem solving projects	Setting up for reengineered	Technical, social design
5	Design improvements	As Is description, analysis	Transformation
6	Implement change	To- Be design and validation	
7	Embed continuous improvement	Implementation	

Table 1: An Investigation of the Methodologies of Business Process Reengineering (Muthu, Whitman, and Cheraghi(1999))

Firstly to implement process approach, organization needs to prepare process map. IDEF model can help mapping the process.

2.3 IDEF0 CONCEPTS

The desire of the U.S. Air Force to reduce costs and lead times by assisting the aerospace industry in its modernization efforts is evidenced in its many "Tech Mod" (Technology Modernization) programs. A similar goal, but using an industry-wide target rather than individual companies, was established under the ICAM (Integrated Computer Aided Manufacturing) Program. In ICAM, the goal was to develop "generic subsystems" which could be used by a large number of companies to provide a significant upgrade to the industry as a whole. These "subsystems" provide support for common functions such as management of information, shop floor scheduling and materials handling. This ambitious goal needed a common "baseline" communication vehicle around which to plan, develop and implement the subsystems in the individual aerospace companies. The baseline was called the "Architecture of Manufacturing", since it was to provide an industry-wide "architecture" showing how industry works today and around which generic subsystems could be planned, developed and implemented. To develop the architecture, a "language" was needed in which to express and document current aerospace industry operations. At the outset of ICAM, the Air Force issued a Request for Proposal to build the architecture. An activity modeling technique was specified as the expressive language (where an activity was defined as a manufacturing cell or operational unit)(FIPS PUBS, 1993).

2.3.1 Activity Modeling Graphics

IDEF's roots began to form when the Air Force, in response to the identification of the need to improve manufacturing operations, established the Integrated Computer-Aided Manufacturing (ICAM) program in the mid-1970s. The requirement to model functions (processes), data, and dynamic (behavioral) elements of the manufacturing operations resulted in the initial selection of the Structured Analysis and Design Technique (SADT) method (SADT is a registered trademark of SofTech). SADT was developed by SofTech's Doug Ross in the early 1970s. A subset of SADT was the basis for the Air Force's ICAM language notation. A major development from the ICAM program was the Integrated Definition methodology or IDEF as it is now called (Wisnosky, Dennis, Batteau, 1990). This methodology was to be used as a regimented approach to analyzing an enterprise, capturing "as-is" process models, and for modeling activities (organizational units) within an enterprise. Thus, an enterprise could develop a basis for process improvement planning and have a foundation to define information requirements.

2.3.2 The IDEF Family of Methods

The IDEF0 method is used to specify function models, which are "what do I do" models. These are descriptive models that show the high-level activities of a process. As shown in Figure 1, the model indicates major activities and the input, control, output, and mechanisms associated with each major activity. IDEF0 models let the modeler portray a view of the process, the inputs (I), controls (C) over the process, outputs (O), and the mechanisms (M) acting on the process (these are collectively referred to as ICOMs, pronounced "eye coms"). The processes can be further decomposed to show lower-level activities and ICOMs, but at some point the required view may require another notation be used to portray such things as branch control. Figure 1 is an abstract view of IDEF0 notation.

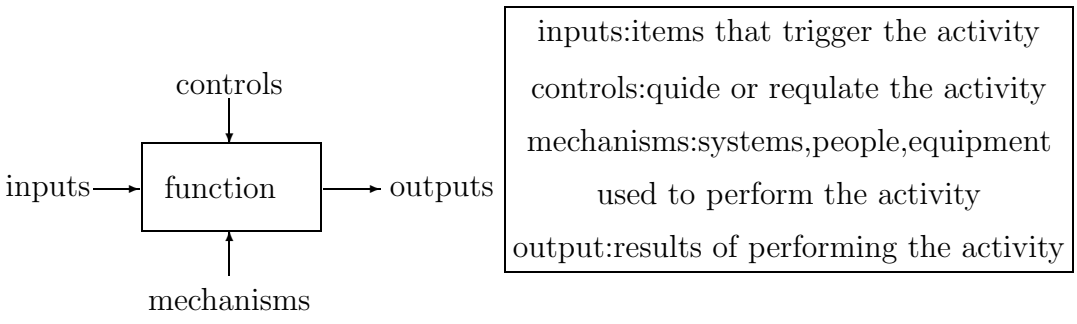

Fig 1: ICOM concept in IDEF modeling (Hanrahan, 1995)

IDEF1 is used for information modeling, which captures conceptual views of the enterprise's information. It is an analysis method to capture, communicate, ana-

lyze, and understand the information needs of the enterprise. The models simply identify the enterprise's concepts of information such as department and employee and the concept that there is a relationship between the two, such as employee works in a department. IDEF1 is not a method for designing the database, but is a tool for the enterprise to understand the information it deals with, so information resource management can be supported. IDEF1X is used for data modeling, which captures the logical view of the enterprise's data and is based on an entity relationship model. It is a design method for logical database design once the information system requirements are known. The focus is on the actual data elements of the information system to be developed. IDEF2 Simulation Model Design method is used to represent time varying behavior of resources in a manufacturing system. It has been replaced by various commercial products and notations. The IDEF3 Process Description Capture method is used to capture behavioral aspects of a system (Mayer, et al. 1992) From domain experts, descriptions are captured in which the precedence and causality relationships between activities and events of the process are shown. Thus, IDEF3 is a structured method used to express how a system or an organization works and show different user views of the system. IDEF3 consists of two modeling modes: the Process Flow Description (PFD), which describes how things actually work in the organization, and the Object State Transition Description (OSTD), which summarizes an object's allowable transitions in a particular process. The PFD provides a process- centric view, and the OSTD view provides, among other elements, entry and exit criteria. These two complementary views more than adequately describe a process. The IDEF4 object-oriented design method was developed to support the object-oriented paradigm. IDEF4 supports the object-oriented design method. It currently supports design to implement C language applications. IDEF 5 through IDEF14 has not been pursued in depth at this time. Some academic work has been done in several areas, and the future of these methods is uncertain. IDEF 5 through 14 exists today in various stages and is intended to provide the capability to describe additional views listed in Table 2.

IDEF Type	Description
IDEF0	Function Modeling
IDEF1	Information Modeling
IDEF1X	Data Modeling
IDEF2	Simulation Model Design
IDEF3	Process Description Capture
IDEF4	Object- Oriented Design
IDEF5	Ontology Description Capture
IDEF6	Design Rationale Capture
IDEF8	User Interface Modeling
IDEF9	Scenario- Driven IS Design
IDEF10	Implementation Architecture Modeling
IDEF11	Information Artifact Modeling
IDEF12	Organization Modeling
IDEF13	Three Schema Mapping Design
IDEF14	Network Design

Table 2: Suite of IDEF Methods (Current and in Development) (Mayer, et al.)

2.4 Value chain

Porter advocates using value chain analysis rather than analysis of value added as a better approach to the study of the economic and institutional outcomes of technology use. Venkatraman (1991) adopts the value chain framework in his discussion of "IT-induced business reconfiguration." Rockhart and Short (1991) also employ a value-chain perspective to consider the role of IT at the behavioral level in supporting the networked organization and the management of interdependence. Davenport (1993) in his discussion of the role of IT in supporting process innovation provides what is probably the most comprehensive analysis of the interaction of IT and organizations from a process perspective.

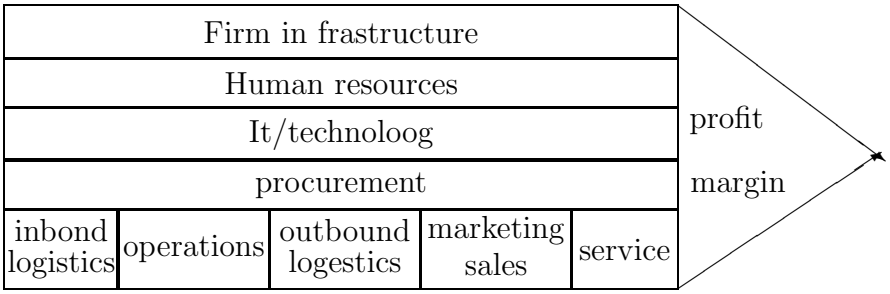

Fig 2: Porter's value chain

The idea of the value chain is based on the process view of organizations, the idea of seeing a manufacturing (or service) organization as a system, made up of subsystems each with inputs, transformation processes and outputs. Inputs, transformation processes, and outputs involve the acquisition and consumption of resources - money, labor, materials, equipment, buildings, land, administration and

management. How value chain activities are carried out determines costs and affects profits. Most organizations engage in hundreds, even thousands, of activities in the process of converting inputs to outputs. These activities can be classified generally as either primary or support activities that all businesses must undertake in some form. According to Porter (1985), the primary activities are: " Inbound Logistics - involve relationships with suppliers and include all the activities required to receive, store, and disseminate inputs. " Operations - are all the activities required to transform inputs into outputs (products and services). " Outbound Logistics - include all the activities required to collect, store, and distribute the output. " Marketing and Sales - activities inform buyers about products and services, induce buyers to purchase them, and facilitate their purchase. " Service - includes all the activities required to keep the product or service working effectively for the buyer after it is sold and delivered. Secondary activities are: " Procurement - is the acquisition of inputs, or resources, for the firm. " Human Resource management - consists of all activities involved in recruiting, hiring, training, developing, compensating and (if necessary) dismissing or laying off personnel. " Technological Development - pertains to the equipment, hardware, software, procedures and technical knowledge brought to bear in the firm's transformation of inputs into outputs. " Infrastructure - serves the company's needs and ties its various parts together, it consists of functions or departments such as accounting, legal, finance, planning, public affairs, government relations, quality assurance and general management.

2.5 SCOR model

Conceptual framework was designed based on porter's value chain and SCOR model. According to Bovet Martha (2000), a supply chain includes activities such as material sourcing, production scheduling, and the physical distribution system, backed up by the necessary information flows. Procurement, manufacturing, inventory management, warehousing, and transportation are typically considered part of the supply chain organization. Marketing, sales, finance, and strategic planning are not. Product development, demand forecasting, order entry, channel management, customer service, and accounts payable and receivable lie in a grey area; in theory, they are part of the supply chain process, but they are seldom included within the supply chain organization. Importantly, it also embodies the information systems so necessary to monitor all of those activities (Bovet Martha, 2000). Today, many companies have recognized the Supply-Chain Operations Reference model (SCOR) as a powerful and robust tool to describe, analyze, and improve the supply chain (Fig.3).

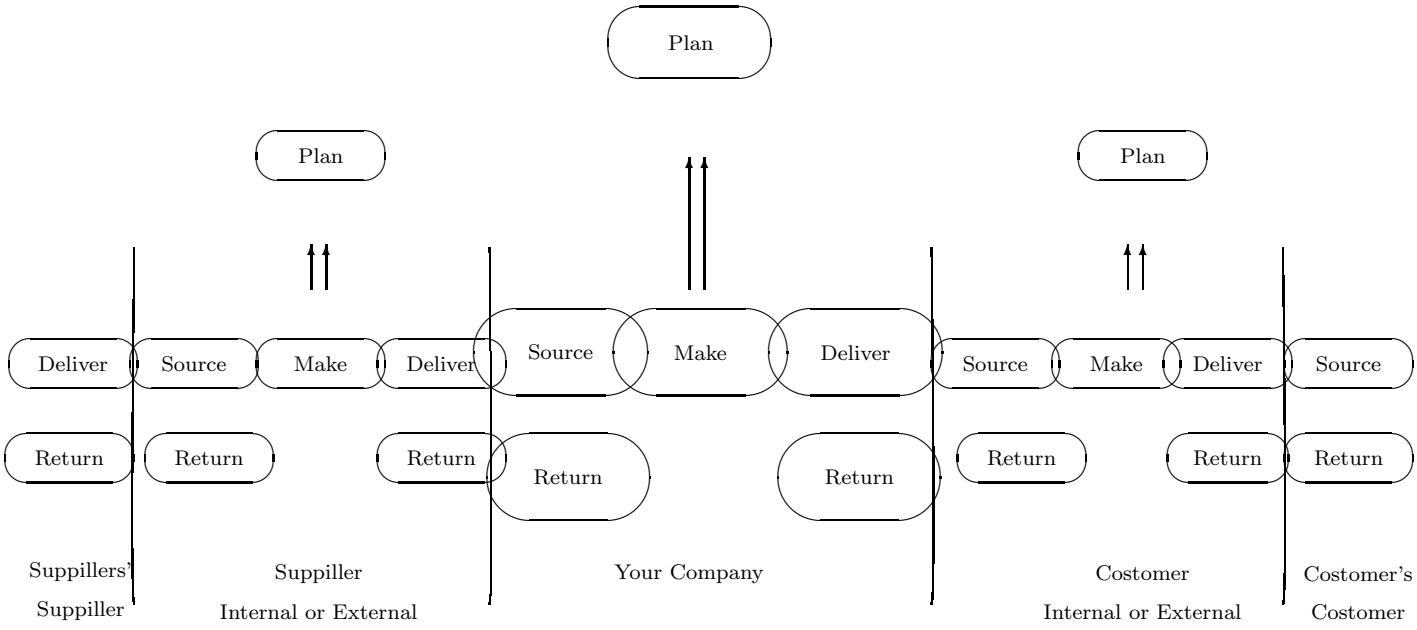

Fig 3: SCOR- Supply chain operation reference model (Supply Chain Council 2005)

Based on the SCOR approach, the Supply Chain Council (2005) defined a supply chain as follows: "The supply chain encompasses every effort involved in producing and delivering a final product, from the supplier's supplier to the customer's customer. Five basic processes - plan, source, make, deliver and return - broadly define these efforts, which include managing supply and demand, sourcing raw materials and parts, manufacturing and assembly, warehousing and inventory tracking, order entry and order management, distribution across all channels, and delivery to the customer." The supply chain involves five distinct basic processes, as the Supply Chain Council has defined. These processes are (Supply Chain Council 2005): plan (processes that balance aggregate demand and supply to develop a course of action which best meets sourcing, production and delivery requirements), source (processes that procure goods and services to meet planned or actual demand), make (processes that transform product to a finished state to meet planned or actual demand), deliver (processes that provide finished goods and services to meet planned or actual demand, typically including order management, transportation management, and distribution management, and return (processes associated with returning or receiving returned products or their parts, such as pallets, for any reason). The SCOR model is actually a process reference model that has been developed and endorsed by the Supply Chain Council as the cross-industry standard diagnostic tool for SCM. It is the only supply chain framework found that links performance measures, best practices, and software requirements to a detailed business process model (Supply Chain Council 2005).

3 Theoretical development

Unfortunately, there are little published studies in the literature, to the best of our knowledge, which render a model of agile supply chain according to process approach provide a formal definition of supply chain agility. This paper develops a process oriented conceptual framework of the business value chain and agile supply chain, and the subsequent effects on firm performance. The benefits of such a process oriented perspective are as above. First, a process focus should enhance the validity of the business value assessment. Second, the approach offers considerable insight into the processes by which value is created. An important benefit of process oriented studies is the ability to move beyond correlation evidence to explanation of the technological features, process characteristics, organizational settings, and competitive environments conducive to producing business values. The supply chain and its performance are one of the most important subjects for high level managers. Organizations are faces the variety of criteria and dimension which managers really can't clarify the barrier between them. The process approach alignment is not identified by organizational strategies and organizational approach to change. The drivers of agility in process approach are not indentifying. Which external factors move supply chain to supply chain agility is an important question. Is there any director factor to control the agility activities and decisions? Which mechanisms and enablers help the supply chain to be agile? Or to make a supply chain more agile which tools, techniques and resources are exactly required? All of these question are not identify and clarifying in standalone process approach. As we described, the importance and benefits of adopting process approach perspectives of business value are well recognized within the academic literature. With developing a theoretical model which contains the process approach strengths and cover the weakness of this model (which mention above) we will make a good chance to managers and leaders to lead the organization supply chain agility. Based on this developed model managers can design a useful roadmap to achieving supply chain agility. So in this article we proposed a Process based agile supply chain which integrated with IDEF3.0 model. As we discuss in literature review, the IDEF model deliver 4 dimensions though ICOM concept (input/Drivers. Control/Strategies, mechanism/agility characteristics and enablers, output/performance indicator). Via this integrated model we can cover process approach.

3.1 Conceptual framework of process based agile supply chain (PBASC)

Parallel developments in the areas of agility and SCM led to the introduction of an agile supply chain (e.g. Harrison et al. 1999, Christopher 2000). While agility is accepted widely as a winning strategy for growth, even a basis for survival in certain business environments, the idea of creating agile supply chains has become a logical

step for companies (Ismail Sharifi 2005). Agility in a supply chain, according to Ismail Sharifi (2005), is the ability of the supply chain as a whole and its members to rapidly align the network and its operations to dynamic and turbulent requirements of the customers. The main focus is on running businesses in network structures with an adequate level of agility to respond to changes as well as proactively anticipate changes and seek new emerging opportunities. Compared with the general definitions as agility, agility in a supply chain context might be defined simply as (Sharp et al. 1999): "Agility is the ability of a supply chain to rapidly respond to changes in market and customer demands". In the 1990s, the research interest was focused on finding systematic ways for manufacturers to approach agility in their supply chains. Van Hoek (2005) observes that three characteristics of supply chain operations can be earmarked as directly related to becoming agile: 1) mastering and benefiting from variance, 2) rapid responsiveness, and 3) unique or small volume responsiveness. In addition, many researchers provide conceptual overviews, different reference and mature models of agility (e.g. Kidd 1994, Dove 1994, Preiss et al. 1996, 1997, and 2005 .Goldman et al. 1995, Gunasekaran 1998, Gunasekaran 1999, Sharp et al. 1999, Christopher 1998, Christopher 2000, Christopher Towill 20002001, Sharifi Zhang 2001, Yusuf et al. 2001, and Weber 2002). In this study based on different models of process approach and ICOM concept in IDEF model, the basic model and conceptual framework designed. Figure 4 is conceptual framework.

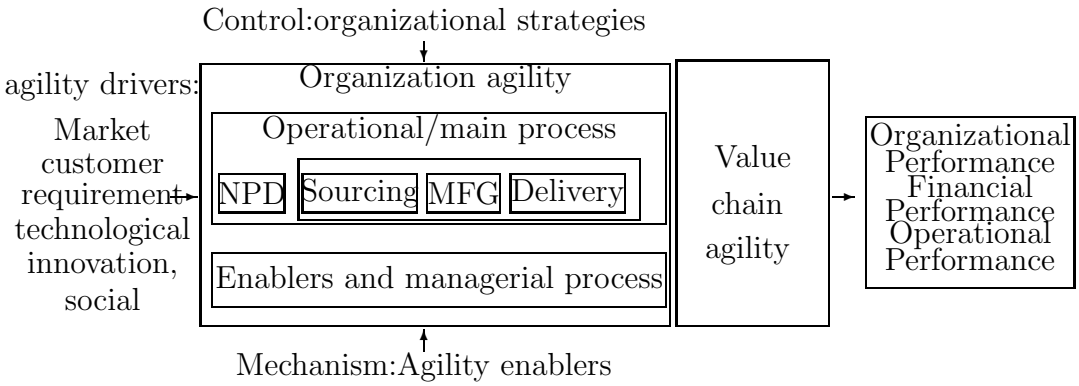

Fig 4: PBASC as a part of value chain agility (comprehensive model)

Based on comprehensive model (as shown in fig.4) we deep to the supply chain process as operational or main organizational processes and as a part of organization's value chain (fig 5). The following subsections offer a more detailed explanation of the key constructs in the theoretical framework. In fig 5 the organizational strategies in agility and supply chain strategy are aligned with organizational strategy, supply chain performance is aligned with business performance.

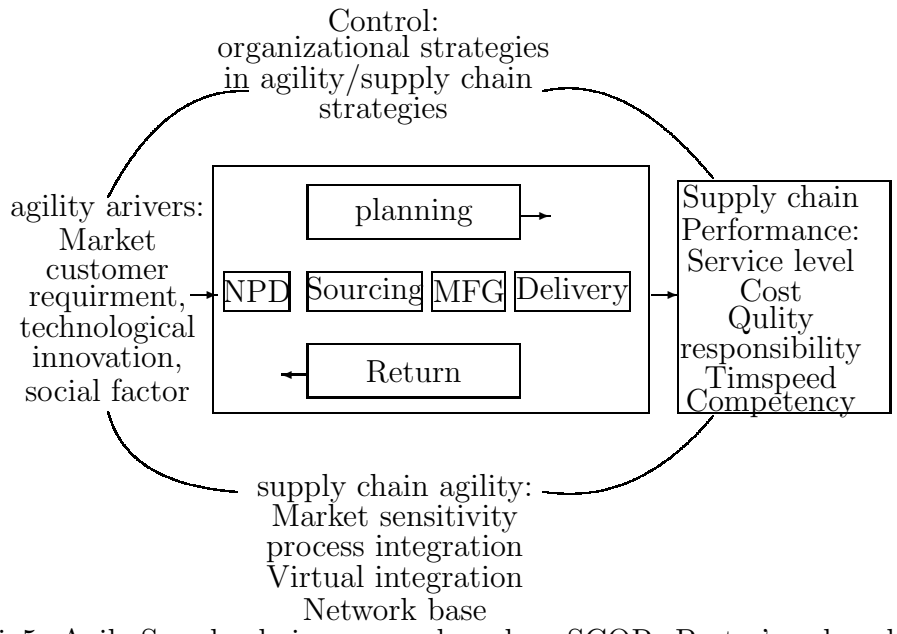

Fig5: Agile Supply chain process based on SCOR Porter's value chain (PBASC second level)

3.2 Framework for supply chain agility

The proposed framework adopts the process-based view of an organization's supply chain, consisting of four key processes: new product development, sourcing, manufacturing, and delivery (Cohen and Mallik, 1997; Zhang et al., 2002; Rayport and Sviokla, 1995; Porter, 1998). These components correspond to the source, make, and deliver processes adopted in the well established and well practiced SCOR model and porter's value chain. In the model shown in Fig. 7 we hypothesize that the key antecedents of a firm's supply chain agility are the inherent performance agility dimensions within each of the four supply chain processes. Together, the combined effect of these supply chain process impacts an organization's supply chain agility, i.e., the supply chain's capability to adapt or respond in a speedy manner to a changing marketplace environment. Each process agility, in turn, is determined by key dimensions of agility.

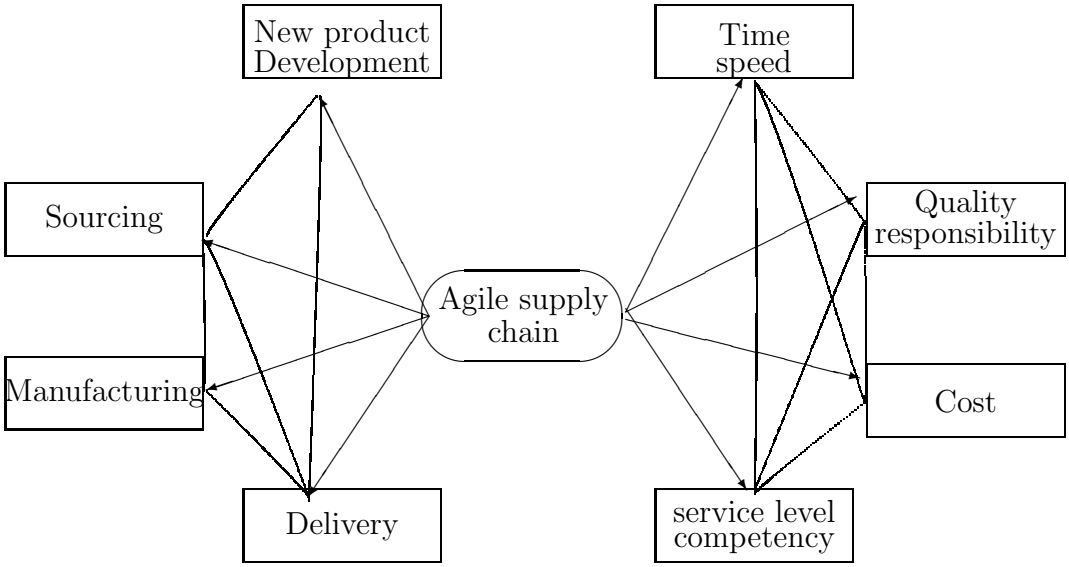

Fig6: Agile supply chain theoretical model based on process approach

The following subsections offer a more detailed explanation of the key constructs in the process based supply chain agility.

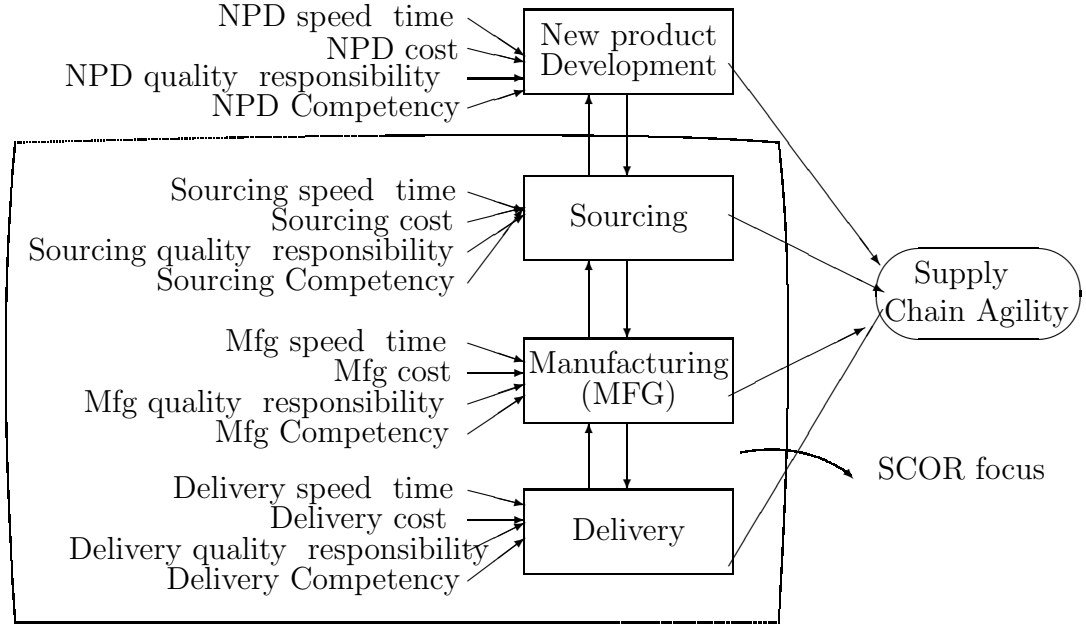

Fig7: Framework of international supply chain agility

We choose to address an organization's internal supply chain, rather than its extended supply chain, which includes the firm's suppliers' and customers' supply chain

processes (Lee et al., 1997; Lin et al., 2000). While possessing agility over a firm's extended supply chain is desirable, a firm has less control over its external processes compared to its own. Also, from a practical viewpoint, it would be difficult, if not impossible; to investigate the agility of every process in an organization's extended supply chain. By focusing on the key processes in a firm's internal supply chain, we have sought to keep this study more tractable, while gaining an understanding of a firm's supply chain agility that are within the firm's domain of control.

4 Research steps

Following Quivy and Campenhoudt (1988) survey methodology, to develop the model we do three steps as shown in fig8. Theoretical development and conceptual framework were done according to literature review, theory development and expert comment.

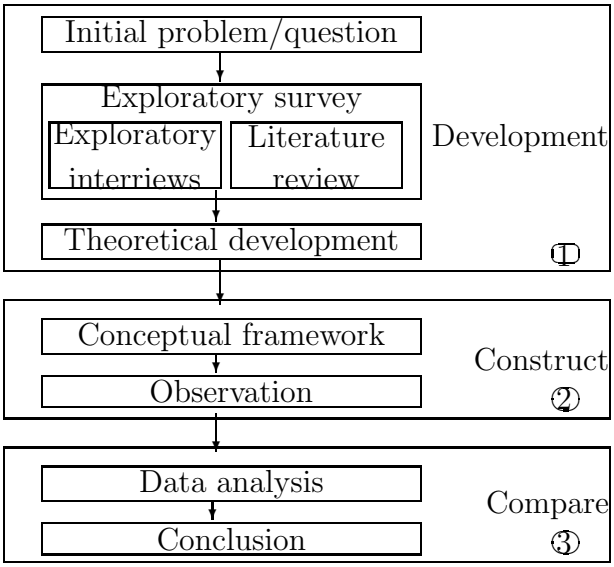

Fig 8: survey Methodology

This study sought to choose respondents who can be expected to have the best knowledge about the operation and management of the supply chain. Based on literature and recommendations from practitioners, it was decided to choose clear-sighted in university and managers who are at higher managerial levels as respondents for the current study. The final version of the questionnaire, measuring all the items on a five point scale, was administrated to 22 target respondents. A significant problem with organizational-level research is that senior and executive-level managers receive many requests to participate and have very limited time. Because this interdisciplinary research collects information from several functional areas, the

size and scope of the research instruments must be large and time consuming to complete. This further contributes to the low response rate. While the response rate was less than desired, the makeup of respondent pool was considered excellent. About half of the respondents are managers, some identified them as supply chain manager, plant manager, logistics manager or IT manager in the questionnaire. And half are professors who are deep in supply chain management and more than five articles in this context.

5 Research implications and limitations

The present study validates the SCM practice construct that has generally been poorly defined and about whose meaning there has been a high degree of variability in people understands (Monczka, Morgan, 1997). Although some organizations have realized the importance of implementing SCM, they often do not know exactly what to implement, due to a lack of understanding of what constitutes a comprehensive set of SCM practices. By proposing, developing, and validating a multi-dimensional, operational measure of the construct of PBASC, and by demonstrating its efficacy in enhancing organizational performance and competitive advantage, the present study provides SCM managers with a useful tool for evaluating the comprehensiveness of their current SCM practices. We have shown that agile supply chain composed of the agility drivers and business strategies, as external factor and market sensitivity, virtual integration, process integration and network base on supply chain main process(new product development, sourcing, manufacturing and delivery)- the five major components of process based agile Supply chain. Through the analysis, it was demonstrated that PBASC dimension may directly impact business performance. The findings of this research thus point to the importance of PBASC dimension and practices to the organization. The proposed model designed as integrated approach. To develop we must test the model for several industries and service enterprise. As today's competition is moving from "among organizations" to "between supply chains", more and more organizations are increasingly adopting SCM with customer requirements and expectations.

6 Conclusion

Based on the literature review, theory development, and expert comments, this research provides insights for discrete part manufacturing firms that design, implement, and participate in supply chains. It defines the dimension of process based supply chain agility, and it provides a framework for understanding process based agile supply chains (PBASC). Agile supply chains impact the business performance and affect by business strategy. PBASC employ a comprehensive dimension and factor which is impact on value chain agility and focus on process steps to meet cus-

tomer requirement and expectations as a competitive advantage. PBASC respond to rapidly changing, continually fragmenting global markets by being dynamic, context-specific, growth-oriented, and customer focused.

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