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**Achieving Supply Chain Performance through Business Process Orientation**

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***Abstract:*** The attention to the process view of organizational operation has attracted the attention of many scholars and practitioners in the past few years. Few studies have previously explored the role of process orientation in various aspects of organizational outputs; however, less attention has been paid to the role of process orientation in supply chain management. This study begins with describing the shift of attention in supply chain management studies from one, which emphasizes the network view, to one, which is focused on the process view of operations. After that, the process view of operations in the context of supply chain management studies is described. Finally, a research model is proposed to illustrate the role of process orientation on various aspects of organizational supply chain performance.

## **1. Background: From Networks Perspective to Process Perspective**

Supply chain management has evolved significantly during the past few decades. Some of these developments can be observed in the alteration of supply chain definition. Heiber (2002) conducted a review of supply chain management studies based on the definitions from 1985 to 1997, and identifies four schools of thoughts, which are: functional chain awareness, linkage, information, and integration. The integration view is seen by Heiber (2002) as the most recent view of supply chain management studies. A review of recent supply chain management from 1995 to 2009 was conducted to analyze the most recent developments in the past few years. Table 1 displays a list of some of the well cited definitions for supply chain during this period.

Following Heiber (2002) study, the period of 1995 to 2009 is categorized within the integration school of thought. However, major shift of focus is observed during this period with regards to the mechanism of integration. As it has been illustrated in Table 1, a network view of supply chain was mostly dominant during the 1980s and the 1990s. However, in the past decade the scholarly literature views supply chain mostly as a process. A network as a “collection of nodes and links” (Stanford-Smith and Chiozza, 2001:1101) is mostly concerned with “connecting companies, individuals and authorities” (Stanford-Smith and Chiozza, 2001:1033). In contrast, a process goes beyond connecting entities. A process illustrates a series of actions or activities from beginning to end for (directly or indirectly) achieving a well-defined organizational goal (Davenport and Short, 1993). Recent studies have enriched this perspective by adding the notion that, since sequences of functions are ordered with respect to time, therefore, business process view of supply chain, by definition is a dynamic view (Smith, 2003; Frye and Gullledge, 2007).

**Table 1**  
**Supply Chain Definitions**

View	Author/s	Definition
Supply Chain as a Network 1980s – 1990s  Supply Chain as a Process 2000s+	<b>Lee and Billington (1995)</b>	A <u>network</u> of facilities that procure raw materials, transform them into intermediate goods and then final products, and deliver the products to customers through a distribution system”.
	<b>Ganeshan and Harrison (1995)</b>	A <u>network</u> of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers.
	<b>Swaminathan, Smith and Sadeh (1996)</b>	A <u>network</u> of autonomous or semi-autonomous business entities collectively responsible for procurement, manufacturing, and distribution activities associated with one or more families of related products.
	<b>Beamon (1998)</b>	An <u>integrated process</u> wherein a number of various business entities (i.e., suppliers, manufacturers, distributors, and retailers) work together in an effort to: (1) acquire raw materials, (2) convert these raw materials into specified final products, and (3) deliver these final products to retailers
	<b>Stock and Lambert (2001)</b>	The <u>integration of key business processes</u> from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders.
	<b>Robinson and Malhotra (2005)</b>	<u>Integrated processes</u> of plan, source, make and deliver that span the value chain from the supplier’s supplier upstream to the customer’s customer downstream.
	<b>Si et al. (2007)</b>	A <u>process</u> that transforms materials into products and delivers them to customers through specific activities”.
	<b>Wong and Wong (2007, 2008)</b>	Combinatorial system consisting of four <u>processes</u> namely plan, source, make and deliver.
	<b>Sherrard et al. (2009)</b>	Supply chain refers to organized and effective <u>processes</u> that manage how products are selected and purchased.

The evidence of process view of supply chain is evident not only in the recent scholarly publications (as described above; see also Cooper, Lambert and Pagh, 1997 and Lambert, Cooper and Pagh, 1998) but also in practitioners’ publications. SCC in their most recent guideline (version 9.0) describes its process view of the supply chain. SCC defines its SCOR

model based on five core processes within the organizational supply chain, as mentioned before.

The definition of these core processes are displayed in Table 2.

**Table 2**

**Core Processes in Supply Chain Operating Reference model**

<b>Process</b>	<b>Definitions</b>
<b>Plan</b>	Processes that balance aggregate demand and supply to develop a course of action which best meets sourcing, production and delivery requirements.
<b>Source</b>	Processes that procure goods and services to meet planned or actual demand.
<b>Make</b>	Processes that transform product to a finished state to meet planned or actual demand.
<b>Deliver</b>	Processes that provide finished goods and services to meet planned or actual demand, typically including order management, transportation management, and distribution management.
<b>Return</b>	Processes associated with returning or receiving returned products for any reason. These processes extend into post-delivery customer support

Adopted from SCC version 9.0 (released April 2008)

The SCC model is extensively used in the scholarly research on supply chain management and specifically in the process view of supply chain management.

## **2. Process Paradigm**

The process view of the organizational supply chain emphasizes the integration of processes across the supply chain (Beamon, 1998; Stock and Lambert, 2001; Heiber 2002; Robinson and Malhotra, 2005). Process view, promotes the exploration of supply chain management from a perspective that views organizational operations as processes. While the

process view has attracted significant attention during the past few years, it is not a new perspective. Bakken and Hernes (2006) credit theorist before Greek philosophers for the identification of process view in organizations. Furthermore, they provide evidence of this view, in the works of relatively more recent philosophers such as Weber<sup>1</sup> and Marx<sup>2</sup>. Weick (1979, 1995), “Pettigrew (1987, 1997), Chia (1999), Langley (1999), Tsoukas and Chia (2002), Styhre (2004), Van de Ven and Poole (2005), Carlsen (2006)” (Bakken and Hernes, 2006), Hernes and Weik (2007) and Starbuck, (2009) are some of the leading contemporary organization theory researchers who contributed to this area.

Lavassani, Movahedi and Kumar (2010) proposed a framework of integration mechanisms from networking, and coordination to cooperation and collaboration based on the works of Himmelman (2001), Robinson and Malhotra (2005), McNichols and Brennan (2006) and Romero, Galeano and Molina (2008). This framework explores integration at three levels: strategy, process, and technology –following the work of Gullede (2008). Lavassani et al. (2010) is expanded in this study with more attention to the process dimension of the integration mechanism.

Having the process view of organization studies in mind, Hernes and Weik (2007) proposed a classification of process views. In their classification, there are four views toward the organizational processes: process as flows, process as programs, process as recursive reproduction, and process as connectivity. In the first two views, there exists an assumption that “processes take place within relatively stable contexts” (Hernes and Weik, 2007). These two views stem from a close system view of the organization, which Hernes and Weik (2007) name exogenous views. The exogenous views are built based “on the assumption that the processes

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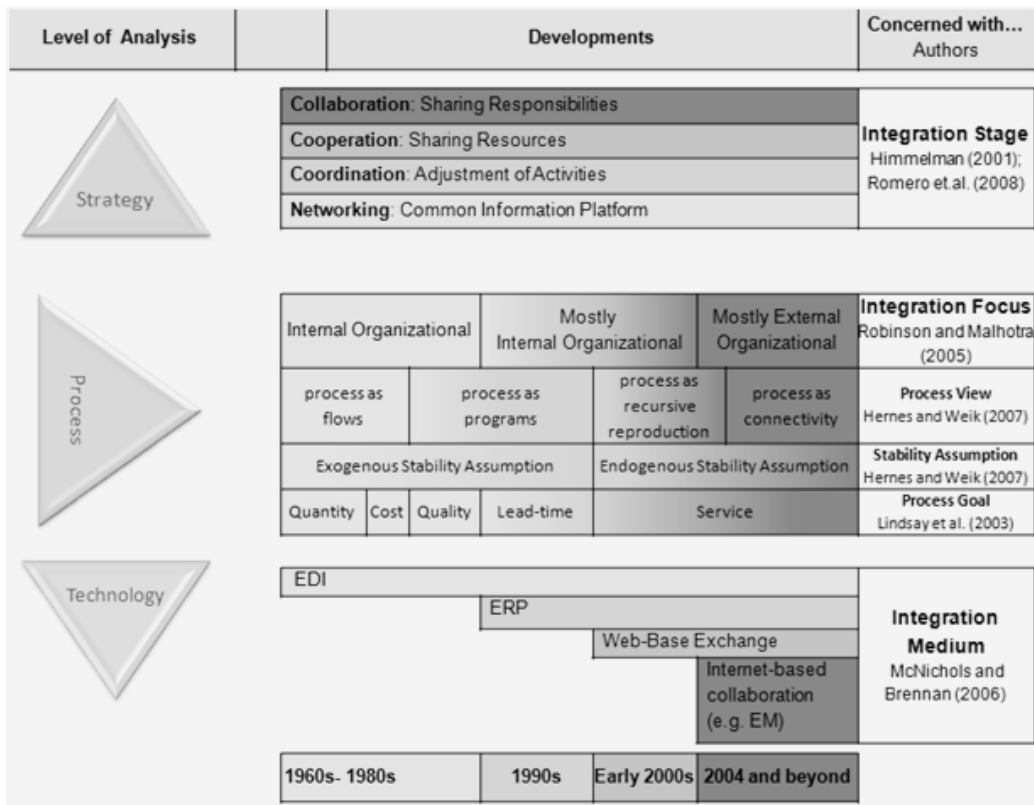
<sup>1</sup> “Weber developed his theory of bureaucratic structure precisely around the processes of decision making” (Bakken and Hernes, 2006)

<sup>2</sup> “Marx, in a different vein, focused on labour process as the unfolding logic of productive forces” (Bakken and Hernes, 2006)

take place within relatively stable contexts, such as the organization or the institutional environment”. In contrast, in the second two views –endogenous view– there exist an assumption that “process stability of entities resides in the process itself rather than outside it” (Hernes and Weik, 2007). Hernes and Weik (2007) conclude in their research that endogenous and exogenous views of processes are “analytically irreconcilable approaches”.

For expanding the Lavassani et al. (2010) integration framework, the Lindsay, Downs and Lunn (2003) classification of the processes has also been added to the integration framework. According to the well-cited Lindsay et al. (2003) classification, processes can be classified based on the departmental or organization goal that they pursue. This classification describes that previously, organizations –and hence the business processes– were concerned with quantity (1960s), cost (1970s), and quality (1980s). During the 1990s organizations started to pay more attention to the lead-time, and in the 20<sup>th</sup> century there exist a shift in attention toward the service aspect of the products and services that organizations provide. The proposed expanded integration model is displayed in Figure 1.

**Figure 1:**  
**Integration Mechanism**



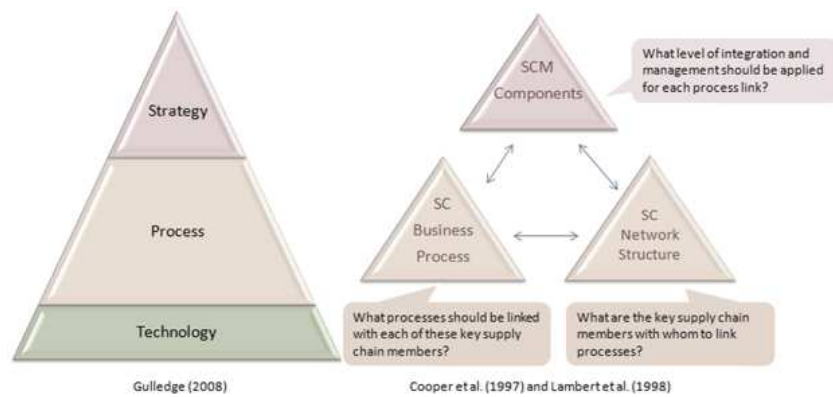
Adopted from Lavassani et al. (2010), expanded by the authors of this study

Based in this framework, business processes can be studied at three levels (Gulledge, 2008): strategy, process, and technology. Gulledge (2008) framework is designed based on the organizational architect. Interestingly, Gulledge, (2008) and Lavassani et al. (2010) frameworks are compatible –although not the equal– with/to frameworks provided for studying the organizational supply chain management. This compatibility is described as follow.

Cooper et al. (1997) and Lambert et al. (1998) have described the elements and key decisions associated with the organizational supply chain management. Figure 2 displays this framework in the context of supply chain management studies, beside the business process framework.

**Figure 2:**

**Business Process Framework and Supply Chain Framework**



Cooper et al. (1997) and Lambert et al. (1998) emphasize on the “process approach” toward the supply chain management, which is different from ‘functional approach’ –or what they refer to as “silo mentality”. The first component of Cooper et al. (1997) and Lambert et al. (1998) is supply chain component. The key decision at this point is the choice of “level of integration” (Lambert et al. 1998). Lavassani et al. (2010) acknowledges this component; and furthermore provide more detail guideline for the stages of integration. The second and third components in Cooper et al. (1997) and Lambert et al. (1998) are supply chain network structure and supply chain business process. These two components are compatible with the process level of Gulledge, (2008) framework. While ‘supply chain network structure’ focuses on identifying the key supply chain members (stakeholders), the ‘supply chain business process’ deals with identifying the processes associated with key members of the supply chain. The extended Lavassani et al. (2010) model (Figure 2) provides guidelines in regards with the focus of integration mechanisms associates with the ‘supply chain management components’ and identifies the various types of process views and process goals.

The Gulledge (2008) model however includes a technology level, which has not been considered in the Cooper et al. (1997), and Lambert et al. (1998) frameworks. Cooper et al. (1997) and Lambert et al. (1998) framework focuses on the “structural dimensions of the network” and hence overlooks the underlying information platform required to execute the processes.

This study considers Gulledge, (2008) view a complementary view on the supply chain processes. The focus of this study is on the process view of the operations; however as it was illustrated in this section, the process view is compatible with the supply chain activities of the firm. The advancements in the business strategies and processes have had significant affect on each other. Moreover, the development of process integration strategies would not be foreseeable without the technological advancements in the organizational information platforms. In the following sections, when the concept of process orientation and its measurement are described, it will be evident that while the focus of this study is on business processes, it cannot be taken apart from the process strategy and the underlying organizational information systems.

## **2.1 Business Process**

A business process generally represents a sequence of tasks – or what Keen and Knapp (1996) describe as actions or activities– that proceed in a sequential fashion from one to the next. A business process, if well defined, has distinct boundaries with a connection to its backward (object in) and forward (object out) linkages (Ljungberg, 2002; Portugal and Sundaram, 2005), as well as instruction on how to perform the work. A business process can be in the form of a management process, an operational process, and/or a support process (Hammer and Champy, 1993). The goal of every business process management is enhancing the value creation in the business process (Palmberg, 2009). This value creation can be through enhanced quality, cost reduction, and/or increased flexibility (McCormack and Johnson, 2002).

In traditional organizations where management of operations is mostly based on the functional structures “illogical” management relations may be formed (Ljungberg, 2002). In these circumstances, the goals assigned to the managers, their resource management scope and assigned managerial domain may become divergence –or what Ljungberg (2002) calls illogical. The limitations of the traditional functional view of processes has paved the way toward the development of process oriented approach is management of organizational processes.

## **2.2 Process Orientation**

Process orientation has attracted significant attention during the past few years as a management philosophy to enhance the operation of activities in the organization (Kumar, Lavassani, Movahedi and Kumar, 2010; Kohlbacher, 2010). For example, AUDI AG has funded a three-year research specifically on process orientation in automotive industry starting 2009 (Muenchen University, 2009). Another example is the Lund University research group – including twenty four organizations, e.g. Volvo and Sony-Ericsson– which works on various project on process management including “cross company process orientation” and the role of process orientation in logistics innovation (Flint, Larsson, Gammelgaard and Mentzer, 2005; Flint, Larsson and Gammelgaard, 2008; NGIL<sup>3</sup>, 2009).

The concept of process orientation promotes dominant role of process view in the execution of operations. In contrast, the traditional view of operations management promotes the role of functional silos in performing the tasks. This concept is extensively described in the works of Ljungberg (2002), McCormack, and Johnson (2002), Lockamy and McCormack (2004), Reijers (2006), McCormack, Ladeira and Valadares de Oliveira (2008), McCormack, Willaert,

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<sup>3</sup> Next Generation Innovative Logistics organization; associated with Lunds University and 24 large organization based in Sweden.

Stemberger, Skrinjar, Trkman, Ladeira, Valadares de Oliveira, Vuksic and Vlahovic (2009) and Chen, Tian and Daugherty (2009).

Based on the review of the studies on process orientation, Kumar et al. (2010) define process orientation “as the philosophy of process center design of organizational activities which requires a transformation from one based on a functional paradigm to one based on a process paradigm”. In other word, process orientation is defined in opposition to the functional paradigm of operation management, which is characterized with the formation of functional silos (McCormack, et al., 2009; Chen et al. 2009).

It is important to note that all of the organizations have some degree of functional orientation as well as process orientation in their execution of the processes. This means there exist a process orientation “continuum” ranging from low process orientation to high process orientation (Davenport, 2005, p: 65). This continuum is displayed in Figure 3. As the role of processes in execution of tasks increases, the organizations tend to have higher level of process orientation.

**Figure 3:**

**Functional-Process Paradigm**



Adopted from Kumar et al. (2010)

### **3. Process Orientation and Supply Chain Performance**

Several studies have been conducted to identify the benefits of process orientation in various aspects of organizations. For example, Lockamy and McCormack (2004) studied the role of process orientation in process maturity. Davenport (2005) describes the role of process orientation in the value creation of knowledge workers. Flint et al. (2005) study the impact of process orientation in logistics innovation. Vera and Kuntz (2007) provide empirical evidence for the role of process orientation in the German health care, while Vos, van Oostenbrugge, Limburg van Merode and Groothuis (2009) provide guidelines to implement process oriented care in a Dutch hospital. In another study Flint et al. (2008) provide empirical evidence for the contribution of process orientation in “supply chain learning and innovation”. Skrinjar, Bosilj-Vuksic and Indihar-Stemberger (2008) identified financial and non-financial benefits of process orientation. McCormack et al. (2009) have conducted a multinational study on the process maturity. In a more recent study, Kumar et al. (2010) studied the role of process orientation in various aspects of enterprise system implementation.

These studies have provided evidences that process orientation has been beneficial for various aspects of organizations. A few of the above-mentioned studies have explored the role of process orientation in the context of the supply chain management. The importance of studying the process orientation in supply chain management has been echoed by various authors (Lockamy and McCormack, 2004; Stadtler, 2004; Robinson and Malhotra, 2005). Robinson and Malhotra (2005) in their well cited study on supply chain quality management, highlight the importance of “transition of traditional activities ... from a product to a process orientation”. However, to the best of knowledge of the authors of this study, there is not a comprehensive study to date to confirm the role of process orientation in various aspects of organizational supply chain performance.

### **3.1 Measurement of Supply Chain Performance and Process Orientation**

This section proposes measurement models for assessing the level of process orientation and supply chain performance in organizations. For developing each of the measurement models, initially, a literature review of the current studies on measurement practices is conducted. Following that, the proposed comprehensive model is presented, which addresses various aspects of measurement as suggested by the literature review.

#### **3.1.1 Measurement of Supply Chain Performance**

Performance measurement is about quantifying the actions that lead to performance (Neely, Gregory and Platts, 2005). Performance measurement has been used in various contexts, and there have been rare occasions where consensus in measurement and definition is achieved (Neely et al. 2005; Aramyan, Oude Lansink, van der Vorst, van Kooten, 2007). However, there exists a consensus that the performance of an organization can be measured in terms of 'efficiency' and 'effectiveness' (Neely et al. 2005).

Based on an extensive review of the literature, a measurement system for assessing the supply chain performance is proposed. The proposed model is based on the review of the literature, which measure performance mainly in the context of organizational supply chain. It is important to mention that performance measurement systems have three levels (Neely et al. 2005). The first level includes the "individual performance measures" that are referred to as performance 'indicators' in this study. The second level include "the set of performance measures" which are called performance 'factors' in this study. The third level is the "model", which includes all performance indicators and performance factors and the relationship among them. The third level is the final structural model, which is proposed research model of this paper.

To construct the proposed measurement system, in the first step, the measures used in previous studies were categorized based on their similarities. In several cases, various authors had used different terminologies to address a certain concept. In the second step, the performance indicators were identified. Table 3 displays the proposed measurement model.

**Table 3:**  
**Proposed supply chain performance measurement model**

	Factor	Indicator
I	<b>Cost</b>	Inventory cost management Profit margin Service cost Asset Utilization
II	<b>Time</b>	Manufacturing lead time Delivery lead time Supplier lead time New product development cycle
III	<b>Responsiveness</b>	Ability to handle small disruptions (Flexibility) Ability to handle large disruptions (Resilience) Ability to recover from short-term changes (Agility) Ability to adapt to long-term changes (adaptability)
IV	<b>Operations quality</b>	Perceived quality of products and services (by customers) Accuracy in delivering Information accuracy Forecasting accuracy Real-time information Backlog
V	<b>Innovations</b>	Product innovation Product development Process innovation Technology acquisition

### **3.1.2 Measurement of Process Orientation**

There have been relatively few studies, which provide depth into our understanding of process orientation measurement. Based on the review of the literature eight measurement models for assessing the level of process orientation in organizations are identified. For each model –pending the availability of information– the scope of the study, factors of the measurement model and the related indicators were displayed. Not all of the information about every proposed measurement models is presented in the published papers. For example, in some cases, the indicators are not mentioned. While in some other cases, the indicators and factors have only been mentioned after completion of factor analysis.

Two important points are considered in developing the proposed measurement model. The first point is that the approach of this study toward developing of the measurement model is grounded on grouping the indicators and developing factors based their similarities. In some cases, different terminologies were used while the items used by various authors, were referring to the same concept. Second, it was identified that some of the measurement models are conceptual models which are developed based on the review of the literature, while others also conducted empirical studies and validated their models using factor analysis. In developing the proposed model, the decision was made to pay more attention to the empirically validated models. For example, one of the factors which is consistently rejected in the empirical studies is the ‘process structure’. Hence, the conclusion was made that process orientation is more concerned with the process view, process jobs, process measurement, and process culture. The proposed model is displayed in the Table 4.

**Table 4:**

**Proposed Indicators and Factors of Measuring Process Orientation**

	Factors	Indicators
I	<b>Process View</b>	<p>Clear definition of processes (holistic view of inputs and outputs)</p> <p>Well documentation of processes</p> <p>Well communication and education of employees about processes</p> <p>Utilization of process documentations</p> <p>Top management support in line with process definition</p> <p>Resource allocation based on the processes (not functions)</p>
II	<b>Process Jobs</b>	<p>Organization designating process managers</p> <p>Capability of handling multidimensional tasks</p> <p>Capability of handling simultaneous tasks</p> <p>Carrying out majority of processes without human discretion</p> <p>Process design toward customer satisfaction</p> <p>Alignment of organizational information system with processes</p>
III	<b>Process Measures</b>	<p>Measuring process effectiveness toward satisfying customer needs</p> <p>Measuring process efficiency through defined performance indicators</p> <p>Using performance measure to enhance processes</p>
IV	<b>Process Culture</b>	<p>Design of processes toward satisfying customer needs</p> <p>Promoting Teamwork in execution of processes</p> <p>Continuous and training and learning</p>

There exists similarities among the proposed models in the literature, which indicates that the measurement of process orientation is becoming more developed in recent years. This is the indication of further developments in the past few years. Some of the important points in regards with the proposed models are described as follow.

Some of the studies (such as Willaert et al. 2007; McCormck et al. 2009; Kumar et al. 2010) mentioned the role of organizational information system as one of the factors in their measurement model. This could be due to the focus of those studies on the role of information systems in process orientation measurement. However, others (such as Reijers 2006 and Skrinjar et al. 2008) considered the role of organizational information system as indicators associated with measurement factors. The proposed model follows the practice of the studies that explore mostly the role of process orientation in operational aspects of the organization.

It is important to mention that the proposed measurement model in this study will be validated through empirical studies and employing factor analysis techniques. The measures and factors therefore are subject to change based on the result of data collection and data analysis. Moreover, this measurement will take place toward four supply chain key processes: sourcing, planning, making and delivering.

### **3.2 Proposed Research Model**

The indicators and factors of process orientation and supply chain performance are developed based on the review of the literature. These proposed variables are presented in Table 3 and Table 4. The proposed research model is displayed in figure . The model suggests the overall effect of supply chain process orientation on various aspects of supply chain performance.

**Figure 4:**  
**Proposed Research Model**



Five hypotheses are developed based on the proposed overall research model as follow:

H1: Higher level of process orientation will lead to gain of better cost related performances in organizational supply chain.

H2: Higher level of process orientation will lead to better time related performances in organizational supply chain.

H3: Higher level of process orientation will lead to better responsiveness of supply chain to changes in supply and demand

H4: Higher level of process orientation will lead to higher operations quality in organizational supply.

H5: Higher level of process orientation will lead to more innovation related performance in organizational supply chain.

This study suggests the use of the proposed research model in an empirical study for measuring the effect of process orientation on organizational supply chain performance.

#### **4. Synthesis**

The present study provides evidence from the scholarly literature indicating the shift toward a process view of organizational supply chain management. Building on the process view of the operations the study described the concept of business process orientation in organizations and discusses its role in supply chain performance. Based on the review of the measurement models on supply chain performance and process orientations two measurement models are proposed. Finally a comprehensive research model is developed for future empirical studies.

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