

# Exploration & Optimizing of Internal Supply Chain Management for Manufacturing Industry: using SAP-LAP

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**Abstract:** Supply chain management has become probably the most talked about factor in modern business. Prices, delivery, quality of products variety and innovation and services are the established aspects on which rivalry among the enterprises is being raised time by time and to confront the competition integrated supply chain is much needed tool. The purpose of this paper is to present the rapport between firm integration and supply chain orientation and supporting technology as moderating that relationship. The objectives of this paper are to explore the element of Internal Supply Chain management in Manufacturing Industry, to go through the effects of Supply Chain drivers on synchronization of inter departmental activity, to build up the framework to establish the relationship between Supply Chain Integration & business performance and to assign the relationship among the drivers in SAP-LAP perspective using self interaction & cross interaction matrix. To get a start towards this paper work, a questionnaire was prepared by visiting XYZ manufacturing industry & interacting with its employees. The data obtained by interaction were explored on SAP-LAP which stands for Situation Actor Process & Learning Action Performance. This paper addresses integration issues in supply chain, and tries to investigate how different aspects of integration are linked with some product features. Integration in this study is interpreted as "internal", "upstream" (supply), and "downstream" (demand). The research leads company to proper handling and thorough knowledge of SCM implementation. Since the company chosen for this research work is in learning stage, this paper allows the relevant, correct and timely information.

**Keywords :** SAP-LAP, SCM.

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## 1. INTRODUCTION

The supply chain is defined as an association of customers and suppliers who, working together yet in their own best interests, buy, convert, distribute, and sell goods and services among themselves resulting in the creation of a specific end product. A supply chain includes all of the capabilities and functions required to design, fabricate, distribute, sell, support, use, and recycle or dispose of a product.

A supply chain is "process of integrating the suppliers, manufacturers, distributors, and retailers" in various business entities and 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." (Beamon 1998).

The supply chain starts with firms extracting raw materials from the ground –such as iron, oil, wood, and food- and then selling them to raw material manufactures. These companies, acting on purchase orders and specifications they have received from component manufacturers, turn the raw materials into materials that are usable by these customers. Now what is supply chain management? SCM is management of material and information flow in a supply chain to provide the highest degree of customer satisfaction at the lowest possible cost.

A smooth running supply chain management system can help organizations to acquire a sustainable competitive advantage. It can help organization to improve product quality and service while reducing the cost at same time. Supply chain management is closely related with the concept of best practices. Adopting supply chain management initiatives first and the most importantly requires that companies should have a long-term view. They must have an extensive focus on all the mediums that are deployed in the transformation process of the raw materials to end-user consumable. Top management commitment is also essential at this point. Organizations should redesign how business is done at every level in and outside the organization.

### The major supply chain drivers

Companies in any supply chain must make decisions individually and collectively regarding their actions in five areas. These are the five major supply chain drivers.

- Production (what, how, and when to produce)
- Inventory (how much to make and how much to store)
- Location (where best to do what activity)
- Transportation (how and when to move product)
- Information (the basis for making these decisions)
- Personnel (how many employee)
- Medium of Communication

## 2. OBJECTIVE

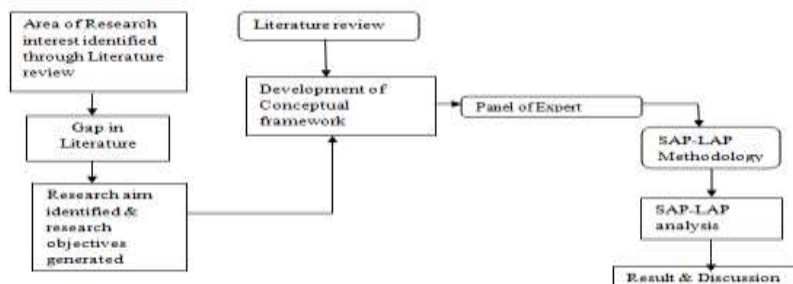
The main objective of this paper is to:

1. To explore the element of Internal Supply Chain management in Manufacturing Industry.
2. To study the Effects of Supply Chain drivers on synchronization of inter departmental activity.
3. To develop the framework to establish the relationship between Supply Chain Integration & business performance.
4. To establish the relationship among the drivers in SAP-LAP perspective using self interaction & cross interaction matrix.

## 3. RESEARCH METHODOLOGY

The study has been developed by collecting data from primary and secondary sources. Primary data and information have been collected, mainly through semi-structured interviews of the concerned managers in each organization. Secondary information has been collected through published sources and web sites. In the development of these studies, the published material mainly consists of business dailies, business weekly, corporate magazines, and the material available on the web site of the company. As requested by the companies, to maintain the confidentiality of information, the names of companies are not revealed in this paper. The discussed case is of company A1 from manufacturing industry. Sushil (2000) has recommended the use of SAP-LAP methodology for critically examining a case organization. This methodology consists of two steps. In the first step, the SAP analysis, the dynamic parameters of a case are highlighted through the three dynamic interface of any business system. These interfaces are situations (S), actors (A), and processes (P). The next step is LAP synthesis. LAP has three components. These are learning issues (L), actions recommended (A), and anticipated improvement in performance (P).

A SAP-LAP model should be developed by framing critical questions about the situation, actor, process, learning, action, and performance. The SAP-LAP model enquires about what is happening in the situation, what are the relevant characteristics of the actor that relate it with the situation as well as process, and what is to be questioned about the process. Further, it enquires into the major areas of learning, key fronts of suggested actions, and their implications on the performance (Sushil, 2000). The situation is treated like a journey and examines the past, present, and the expected trends in future. For the various actors under consideration, it inquires about their worldviews, roles and capabilities, and their respective freedom of choice. The process is examined in terms of three seminal questions, i.e. what, why, and how? The basic purpose of the process is questioned and then the questions are asked to generate the alternatives (Sushil, 2000). The LAP is carried out for situation, actor, and process independently leading to a synthesis. The key learning issues about the SAP are to be identified synthesizing into overall learning issues. This will lead to key suggested actions to improve the situation, actor and process respectively. Finally, the impacts of these actions on the performance of the situation, actor, and process are explored (Sushil, 2000, 2001).



Algorithm of Research Methodology

#### 4. SAP-LAP

SAP-LAP is a holistic framework that blends hard systems and soft systems paradigms. There is a pressing need to evolve a management approach which is holistic and flexible in the light of dramatic change in various external factors of the business environment and the corresponding change in the internal factors of the organizations.

The SAP-LAP framework consists of three entities in any context, viz. a situation to be dealt with, an 'actor' or group of actors who deal with it and a 'process' or processes that recreate the situation. In this framework, freedom of choice lies with the actor. A synthesis of SAP leads to LAP which deals with learning, action and performance.

SAP-LAP framework can be used to generate generic as well as specific models for managerial inquiry and problem solving. We often encounter situations in managing organizations and conducting management research to carry out an in-depth inquiry of the problem/case at hand for effective action. The effectiveness of the outcome of inquiry/problem solving/case development will depend a great deal on the deep rooted and creative group learning about the key facets of the problem. Such a holistic inquiry requires some systemic aids to channelize the creative process adapting to the problem at hand. A flexible modeling framework can facilitate this action learning process to aid knowledge management. SAP-LAP framework is generic and flexible and can be used to develop generic as well as specific models for managerial inquiry and problem solving.

The purpose of a SAP-LAP model is to aid the process of analysis and idea generation about the 'situation', 'actors' and 'processes' and their interfaces. The model also guides the process of synthesis in terms of key learning areas, action points and performance impacts. Thus, the SAP-LAP model prepares the group for effective action in the changing situation. The model can be applied iteratively, as with each action the situation is changed and a fresh inquiry can be made.

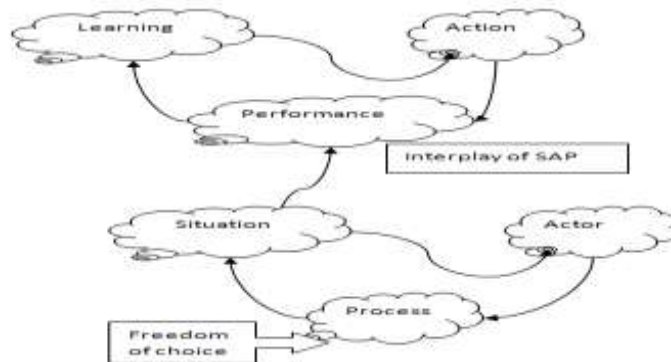
##### 4.1 SAP-LAP Model of Internal Supply Chain Management

The SAP analysis brings out key learning issues, which act as a base to take actions leading to performance. Largely, SAP-LAP models that are developed are naïve or atomic models treating the basic components of SAP-AP framework independently without explicitly considering their interdependence or interrelationships.

Interaction of various elements or components can be represented by using concepts and tools of structural modeling, such as self-interaction and cross-interaction matrices (Harary et. al. 1965, Warfield 1973, 2003). These matrices are used as a base in developing Program Planning

Linkages (Hill and Warfield 1972, Sage 1977, Saxena et. al. 1989, 1990, 2006) which is used as a guiding framework to develop SAP-LAP linkages, as proposed in this paper. However, the presentation in the proposed framework is enriched using interpretive matrices (Sushil 2005). SAP-LAP is an integrative framework comprising of six basic components:

- The '**situation**' to be dealt with, which can be external or internal to the organization.
- The '**actor(s)**' dealing with the situation, which can be 'internal' or 'external' with reference to the organization under study.
- The '**process (es)**' dealing with the situation, which can again be 'internal' or 'external' to the organization.
- The key '**learning**' issues, in terms of the achievement of objectives or problem areas.
- The '**action(s)**' to be taken based on learning, affecting the performance areas or objectives.
- The '**performance**' areas in terms of 'objectives' to be achieved or key result areas (KRAs).



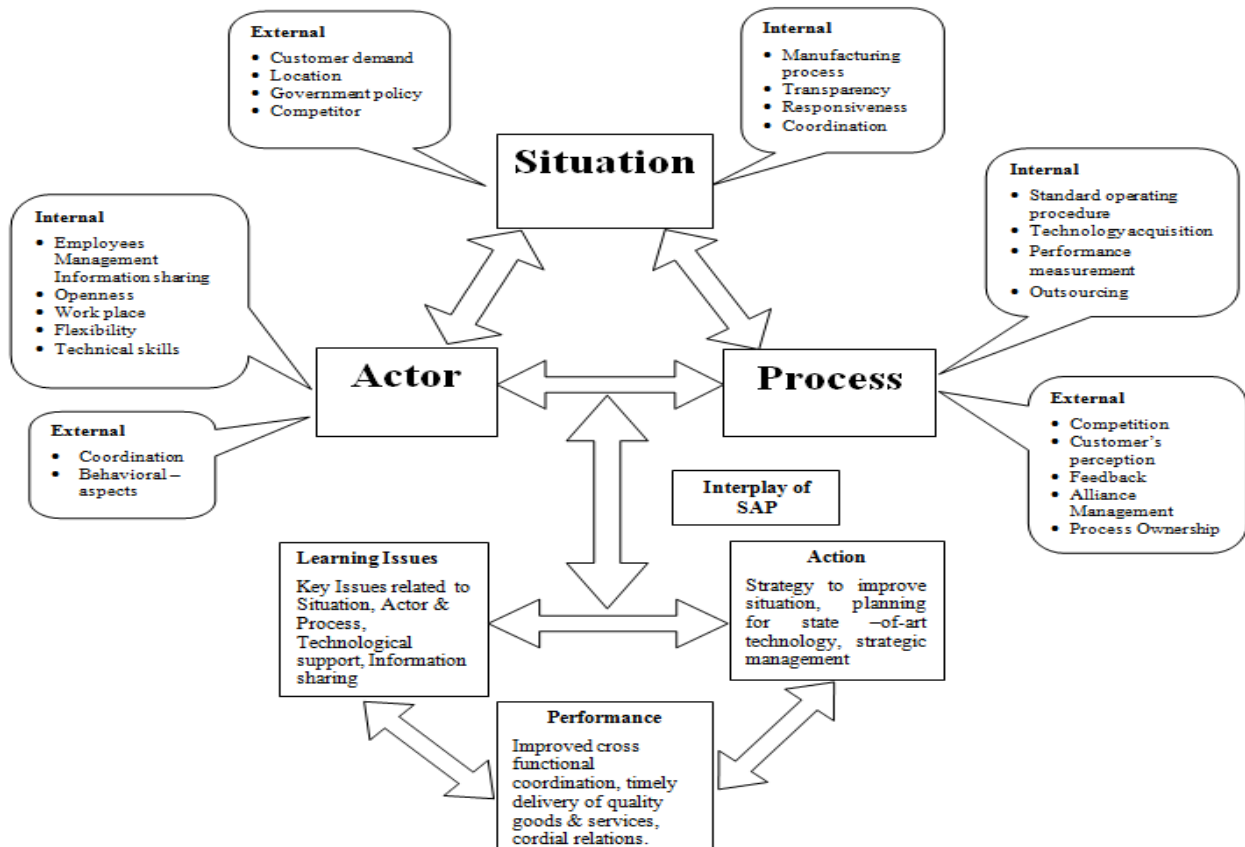
SAP-LAP Model

An illustration of external and internal elements under situation, actor and process is shown in SAP-LAP is a generic framework which can be used in a variety of contexts, such as problem solving, change management, strategy formulation, supply chain management, marketing management, technology management, human resource management, and so on.

The first step in any problem context would be identification of SAP elements, both external and internal. Care should be taken to identify only key elements. Similarly, key elements are to be identified for learning, action and performance, as is done in LAP synthesis in general.

## 5. ANALYSIS OF DATA

The simplest form to depict interrelationship of elements can be used in the form of a matrix, having two dimensions. The basic matrices in SAP-LAP linkages taken are self-interaction and cross-interaction matrices.



SAP-LAP framework for Supply Chain Management

Though there is one-to-one correspondence between matrices and structural models, the structural graphics is advantageous to read and interpret as compared to large matrices. However, the graphical structural model, in the context of cross-interaction of two different sets of elements becomes at times complicated to be read by the user. Since there is one-to-one correspondence between matrices and structural models, the graphical models can easily be portrayed by using the data in matrices. As the paper is the first attempt to include interrelationships of SAP-LAP elements, it is preferred to use matrices rather than graphical representations.

### 5.1 Self-interaction Matrices

The relationships among the elements of a particular component can be represented by a self-interaction matrix. For example, the interdependence of actors in a given context can be represented in the form of information support, team work and so on. A pair wise comparison is made and a binary relationship (1, 0) is represented in the matrix as shown in Table 5.2. An entry of '1' in a cell means that the two elements (in these case actors) have some interaction, and '0' means no interaction. Further, the nature of interaction is qualified in an 'interpretive self-interaction matrix' as shown in Table 5.3 so as to understand the inter-actions more meaningfully.

External and Internal Drivers for Situation

**Table 5.1 : Drivers for the situation**

Key	SITUATION
S1	Customer demand
S2	Manufacturing process
S3	Location
S4	Government policy
S5	Competitor
S6	Transparency
S7	Responsiveness
S8	Coordination

**Table 5.2: Simple Interaction (Binary Matrix) Matrix for Situation**

Situation	S8	S7	S6	S5	S4	S3	S2	S1
S1	1	1	1	1	0	1	1	1
S2	1	0	0	1	0	0	1	
S3	0	0	0	1	1	1		
S4	0	0	0	0	1			
S5	0	1	0	1				
S6	1	1	1					
S7	1	1						
S8	1							

**Table 5.3: Interpretive Matrix for Situation**

Situation	S8	S7	S6	S5	S4	S3	S2	S1
S1	High productivity	Higher reliability	Long term relationship	Policy making	0	Logistics System	New Technologies	1
S2	Business development	0	0	Sustainability	0	0	1	
S3	0	0	0	Sustainability	Indifferent regulatory law	1		
S4	0	0	0	0	1			
S5	0	Customer satisfaction	0	1				
S6	High productivity	Support	1					
S7	Adaptation	1						
S8	1							

External and Internal Drivers for Actor

**Table 5.4 : Drivers for the Actor**

Key	Actors
A1	Employees
A2	Management
A3	Information sharing
A4	Openness
A5	Work place
A6	Flexibility
A7	Coordination
A8	Behavioral –aspects
A9	Technical skills

**Table 5.5 : Simple Interaction(Binary Matrix) Matrix for Actor**

Actors	A9	A8	A7	A6	A5	A4	A3	A2	A1
A1	1	1	1	0	1	0	1	1	1
A2	1	1	1	1	0	1	1	1	
A3	1	0	1	0	0	1	1		
A4	0	1	1	0	0	1			
A5	1	0	0	0	1				
A6	1	0	1	1					
A7	1	1	1						
A8	1	1							
A9	1								

**Table 5.6 : Interpretive Matrix for Actor**

Actors	A9	A8	A7	A6	A5	A4	A3	A2	A1
A1	Quality	Long term relation ship	Timeliness	0	Physical comfort	0	Timeliness	Motivation	1
A2	Quality	Long term relation ship	Support	Policy making	0	Productivity	Policy making	1	
A3	Satisfaction	0	Business development	0	0	Customer satisfaction	1		
A4	0	Adaptation	Sustainability	0	0	1			
A5	High productivity	0	0	0	1				
A6	Support	0	Policy making	1					
A7	Productivity	Business development	1						
A8	Long term relation ship	1							
A9	1								

### External and Internal Drivers for Process

**Table 5.7 : Drivers for the Process**

Key	Process
P1	Self assessed measurement
P2	Standardization
P3	Learning organization
P4	Innovation and change
P5	Motivation
P6	Feedback
P7	Regulation(laws)
P8	New technologies
P9	Labor and raw material
P10	Business development

**Table 5.8 : Simple Interaction Matrix for Process**

Process	P10	P9	P8	P7	P6	P5	P4	P3	P2	P1
P1	0	1	0	0	1	1	1	1	1	1
P2	1	1	1	0	1	0	1	1	1	
P3	1	0	1	0	1	0	1	1		
P4	1	0	1	1	0	0	1			
P5	0	0	0	0	1	1				
P6	1	0	1	0	1					
P7	1	1	1	1						
P8	0	0	1							
P9	0	1								
P10	1									

**Table 5.9: Interpretive Matrix for Process**

Process	P10	P9	P8	P7	P6	P5	P4	P3	P2	P1
P1	0	Good human resource	0	0	Satisfactory performance	0	Reliability	Adaptability	Perfection	1
P2	Customer attraction	Higher quality	High productivity	0	Customer satisfaction	0	0	Flexible system	1	
P3	Existence in competitive	0	Adaptability	0	Adaptability	0	Adaptability	1		
P4	Profitability	0	Modernization	Political and social issues	0	0	1			
P5	0	0	0	0	Organization growth	1				
P6	Organization growth	0	Customer attraction	0	1					
P7	Political and social issues	Good resources	Political and social issues	1						
P8	0	0	1							
P9	0	1								
P10	1									

### 5.2 Cross-interaction Matrices

The relationship/deployment among the elements of two different components, such as ‘actors’ and ‘processes’ or ‘actors’ and ‘performance’ can be represented by a cross interaction matrix, as shown in Table 5.10.

**Table 5.10:- Cross interaction matrix for Situation (S) X Actor (A)**

	A1	A2	A3	A4	A5	A6	A7	A8	A9
S1	1	1	0	0	1	0	1	0	1
S2	0	1	0	1	1	1	1	0	1
S3	0	0	1	1	1	0	0	1	0
S4	1	1	0	0	0	1	1	0	1
S5	1	1	0	0	0	0	1	1	1
S6	1	0	1	1	1	0	1	1	1
S7	0	1	1	1	0	1	1	0	1
S8	0	0	1	0	0	0	0	0	1

**Table 5.11 Cross interpretive matrix for Situation (S) X Actor (A)**

	A1	A2	A3	A4	A5	A6	A7	A8	A9
S1	Standardization	Customer focus	0	0	Reputation	0	Acceptability	0	Demand
S2	0	Objective achievement	0	Product variety	Stability	Rules and regulation	Acceptability	0	Customer satisfaction
S3	0	0	Customer satisfaction	Better services	Satisfaction	0	0	Motivation	0
S4	Belief in the organization	Faith	0	0	0	Support	Support	Civilization	Customer satisfaction
S5	Knowledge sharing	Knowledge sharing	0	0	0	0	Support	Team work	Customer retention
S6	Satisfaction	0	Satisfaction	Policy making	Organization value	0	Living standard	Civilization	More customer
S7	0	Vision and mission	Knowledge sharing	Better services	0	Rules and regulation	Culture	0	Customer focus
S8	0	0	Better services	0	0	0	0	0	Assets and income

**Table 5.12:- Cross interaction matrix for Actor (A) X Process (P)**

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
A1	1	1	1	1	1	1	1	1	1	1
A2	1	1	1	1	1	1	1	1	1	1
A3	1	1	1	1	0	1	1	1	1	1
A4	0	0	1	1	0	1	0	1	0	1
A5	0	1	0	0	0	0	1	0	0	1
A6	0	0	0	1	0	0	1	1	1	1
A7	0	1	0	1	0	0	1	0	0	0
A8	0	0	1	1	1	1	0	0	1	1
A9	0	1	1	1	1	1	0	0	0	1

**Table 5.14:- Cross interaction matrix for Process (P) X Situation(S)**

	S1	S2	S3	S4	S5	S6	S7	S8
P1	1	1	1	1	0	0	1	0
P2	1	1	0	0	0	1	1	0
P3	1	1	1	1	1	1	1	1
P4	1	1	1	0	0	1	1	0
P5	1	0	1	0	1	1	1	0
P6	1	1	1	1	1	1	1	0
P7	0	1	0	1	0	0	1	0
P8	1	1	1	0	0	1	1	1
P9	1	1	1	0	0	0	1	0
P10	0	1	1	0	1	1	1	1

**Table 5.13 Cross interpretive matrix for Actor (A) X Process (P)**

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
A1	Organizational relationship	Customer focus	Adaptability	Adaptability	Organization growth	Corrective action	Job security	Organization growth	Better quality	Organization growth
A2	New policies and plan	Customer attraction	Sustainability	Organization existence	Employee commitment	Process improvement	Govt. And social context	Re-planning	Quality resources	Organization growth
A3	Customer need	Satisfaction	Effective services	Customer attraction	0	New policies	Govt. And social context	Organization growth	Customer focus	Organization growth
A4	0	0	Identification of Customer Need	Adaptability	0	Identification of Customer Need	0	Organization Growth	0	Organization Growth
A5	0	Objective Achievement	0	0	0	0	Vision And Mission	0	0	Better Quality
A6	0	0	0	Regulatory Laws	0	0	Decision Making	Regulatory Laws	Govt Policies	Regulatory Laws
A7	0	Social Support	0	Product Planning	0	0	Policies And Planning Making	0	0	0
A8	0	0	Adaptability	Adaptability	Satisfaction	Corrective Action	0	0	Better Quality	Organization Growth
A9	0	Customer Attraction	Customer Attraction	Organization Growth	Value	Corrective Action	0	0	0	Profitability

Using the normal group techniques (NGT), including various experts from field, academicians, and stakeholders the feedback is taken to formulate the cluster of drivers as tabulated in table:

Cluster No.	Cluster	Drivers
1	Service Cape	Office layout, Occupiers, Environment, Behavioral aspects, Interaction, Comfort, Accessibility/ease of access, Ergonomics, Eco performance.
2	Quality Of Service	Product quality, Manufacturing Process quality, Perfection, Better Quality, Quality Resources.
3	Human Recourse & Empowerment	Human resource management, Learning and growth Perspective, Manpower, Skilled Worker, Job Security, Transparency, Long Term relationship, Motivation, Outsourcing.
4	Relationship with Stakeholder	Satisfactory Performance, Adoptability.
5	Tactical Strategies & R&D	Information technology, Innovation and learning Perspective, Innovation & Change, Corrective Action, Innovativeness, Employment Management Information system, Standard Operating Procedure,
6	Oragniasation Commitments	Government Policy, Indifferent regulatory Law, Sustainability, Business Development, Self Assessed Measurement, Objective Achievement, Vision & Mission, Internal Business Process Perspective, Environmental performance, Political & Social Issues, Organization Growth,
7	Customer Based approach	Responsiveness, Flexibility, Customer perspective, Customer satisfaction Improvement, Organization Innovation Capability, Reliability, Flexibility, Feedback, Identification of Customer Need, Openness, Timeliness, Transparency
8	Logistics	Good Resources, Inbound logistics, Outbound logistics, Marketing and sales, System dynamics, Operations research, Service level, Operations dimension, Performance, Sales and marketing, Transportation, Inventory
9	Financial Perspective	Budget, Enterprise profit increasing, Purchasing, High Productivity,

### CONCLUSION

The comprehensive effort put into the work can be conventionally categorized into the literature survey and its analysis in formal and non formal context which include definition, classification and to examine the managerial concern about the internal Supply Chain Management. The proposed inclusive framework of SAP-LAP model is presented to capture the whole Scenario of coordination to exploring the performance level of internal supply chain in the manufacturing industry. It is based on the three key entities, viz. situation, actor and process and takes the learning centered synthesis in terms of learning, action and performance. The framework helps in identifying different coordination issues based on the relative importance of using internal supply chain in the manufacturing industry. The actors of XYZ may demand more freedom of choice to change the present concept of coordination in a more flexible way. The XYZ actors may share values, knowledge, information and willingness with other actors at intra-departmental (between various business processes of XYZ) and inter-departmental (amongst different members of the chain) level. The changing dynamic situation demands changes in the processes of XYZ. The processes of designing, procuring components, manufacturing and distributing, may change when actors adopt different coordination mechanisms (like information sharing, joint decision-making, meetings, information technologies, and supply chain contracts). In the proposed SAP-LAP framework the different issues discussed are coordination with supplier, coordination with buyer, information sharing, information system, coordination initiatives, and flexibility required to coordinate with members to the managerial concern about the internal Supply Chain Management. SAP-LAP framework has helped in understanding various coordination issues related to the downstream and upstream of



the internal supply chain of XYZ manufacturing company.

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