

# A new approach to supply chain management based on pooling ITIL and APICS Principles and Practices

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## Abstract

APICS (Advanced Productivity, Innovation and Competitive Success - The Association for Operations Management) is known as the repository providing a set of best practices in Supply Chain Management. The ITIL (Information Technology Infrastructure Library) also provides best practices for IT service management. Noting the existence of a similarity between these two standards, this paper identifies the ITIL concepts used in the supply chain context and describe their contributions.

Keywords: *Best Practices, ITIL, Availability, Service Level, Incident, Problem, APICS, Process, Supply Chain, MRP, MPS, Forecasting, Planning, Manufacturing*

## 1. Introduction

Faced with the competition experienced by today's industrial companies, the need to master the management of the supply chain is becoming a crucial strategic factor.

The APICS repository, considered as a world reference in Supply Chain Management, offers a set of best practices, drawn primarily from the return of the experience of major practitioners.

The ITIL framework also provides good practices for IT service management that have contributed to improving the services provided by computer companies to their clients.

According to our experience in the implementation of ERP-based supply chain management and information systems, we have noted that there is a similarity between the ITIL framework and the APICS repository. Indeed ITIL can provide more precise answers to questions of monitoring supply chain processes and measuring their performance.

The purpose of this paper is to identify ITIL concepts and processes that can be applied to the supply chain context, by insisting on their possible contribution.

## 2. Supply Chain Management Process according to APICS reference

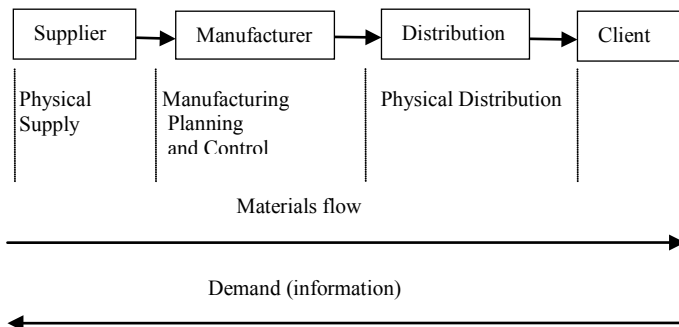
### 2.1 Introduction

Manufacturing is basically the process of converting raw materials into finished products. This process consists of a set of operations each of which consumes resources (labour, machinery and materials).

To manage the process means the planning and control of resources: setting goals and deciding on the use of resources to achieve these goals.

The materials flow controls process performance, it can be classified as:

- ⤴ Planning and Production Control:
  - Production Planning
  - Implementation and Control
  - Inventory Management
- ⤴ Physical Supply et Distribution :
  - Transportation
  - Stock distribution
  - Warehousing
  - Shipping
  - Handling
  - Demand Entry



It is recommended to have a department responsible for the materials flow: planning and control of flow.

The objective of this entity is to maximize resources utilization and provide the required level of customer service.

## 2.2 Production Planning System

Manufacturing Planning and Control System is an information system that includes:

- ⤴ Planning functions (SOP, MPS, MRP).
- ⤴ Executive functions (control of load flow, scheduling, launching).

Priority, established by the Marketing and Manufacturing, is responsible to combine plans to meet it.

Capacity is the ability of a production facility to produce finished products; it depends on the resources provided by the company and the materials availability.

Capacity Management is the process that calculates the capacity required to accomplish the priority and finding methods for making the capacity available for producing finished products.

## 2.3 Master Scheduling

The four functions required to execute an MPS (Master Production Schedule) in any Production Planning System are:

- ⤴ Establishing the link between the production plan and what is actually being manufactured;
- ⤴ Forming the basis for calculating the capacity and the necessary resources
- ⤴ Piloting MRP by MPS;
- ⤴ Keeping the priorities valid.

The functions carried out through MPS between Sales and Production are:

- ⤴ MPS informs Production and Sales when goods will be available for delivery
- ⤴ MPS is a contract between Marketing and Production

The Production Plan relates to families of products whilst MPS is concerned with finished products (The Production Plan controls the MPS).

To develop an MPS, the information required is:

- ⤴ A production plan;
- ⤴ A forecast of finished products;
- ⤴ A record of received sales orders;
- ⤴ An inventory levels of finished products;

There are three steps to preparing an MPS:

- ⤴ Develop a preliminary MPS;
- ⤴ Test the Preliminary MPS with the available capacity;
- ⤴ Resolve any differences between them.

## 2.4 Material Planning Requirements

MRP establishes a Priority Plan showing the components required for each level of assembly and calculates the time that these components will be needed.

The MPS controls the MRP. The inputs to the MRP are:

- ⤴ MPS;
- ⤴ Stock records:
  - Planning factors (order quantity, lead-times, stock safety, scrap);
  - Status of each article (available, reserved, available for future demand);
- ⤴ Bill of materials.

## 2.5 Production Activity Control (PAC)

PAC is responsible for implementing MPS and MRP through initiating and controlling the work orders.

The activities of the PAC can be classified as following functions:

- ⤴ Planning:
  - Plan the workflow at each work centre (to ensure that adequate material and labour are available);

- Plan the start and end date for each order by developing the load profile for each work centre.
- ⤴ Implementation: PAC collects information necessary for the workshop to manufacture the product and then issues work orders to the workshop, as authorised by MRP;
- ⤴ Control: once the orders have been started, the process must be controlled to compare the actual progress with the planned.

## 2.6 Inventory

The stock can be classified:

- ⤴ According to the flow of:
  - Raw materials;
  - Work in process;
  - Finished goods.
- ⤴ According to the function:
  - Anticipation inventory: to anticipate future demand, it reduces the cost of changing the rate of production;
  - Fluctuation inventory : to cover the random fluctuations in supply and demand, to avoid disruptions in production or delivery;
  - Lot-size inventory: to take advantage of volume discounts and reduce administrative costs and set-up;

Inventory Management must establish decisions and rules about stock items in order to permit the staff responsible for controlling stock to do their job effectively. These rules are:

- ⤴ What are the most important items;
- ⤴ How are items controlled;
- ⤴ How to order each time;
- ⤴ When to place an order.

Inventory Management is designed to achieve the required service level and reduce total cost, which provides the answers to two questions:

- ⤴ How should we order at all times:
  - Lot for lot (MPS and MRP);
  - Fixed-order quantity;
  - Min-max system;
  - Economic order quantity;
- ⤴ When an order should be placed:
  - Independent demand;
    - Order point system;
    - Periodic replacement model;
  - Dependent demand :
    - MRP.

## 3. Information System Management Process according to ITIL reference

### 3.1 Introduction

To define ITIL, one must position oneself in a context of continuous IT service improvement, and referrals to internal and external customer needs. IT is the concentration of efforts on the customer value that will contribute to a strategic alignment of IT services within business enterprises.

ITIL is defined as a set of best practices structured as multiple processes communicating with each other. Each of these processes fulfils its dual role; to meet and care about the continuous improvement and customer satisfaction.

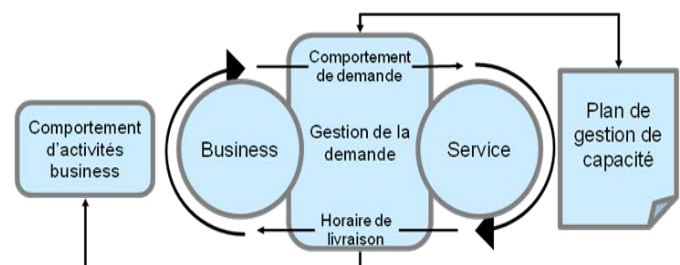
Best practice organizations provide a structure, approved by years of experience in large global companies, recognized for their professionalism and thoroughness, to formalize their processes and optimize IT service management.

### 3.2 ITIL principles that are closer to the Supply Chain context

#### 3.2.1 Management demand

##### • Purpose

The management demand is a critical aspect of service management. A poorly managed application is a source of risk to service providers because of the demand uncertainty. Excess capacity generates costs without creating value that provides a basis for cost recovery.



##### • Concepts

- ▶ Demand Management Activity (activity-based demand management)

This means predicting demand for services by analyzing and following the habits and behaviors of the client's business processes.

► **Diagram of business activity (PBA - Pattern of Business Activity)**

This is the workload profile of one or more business activities.

Business activity patterns help the service provider to understand and plan for changes in activities relating to the job.

• **Objectives**

- Balance supply and demand;
- Avoid costs associated with excess capacity that do not add value;
- Prevent the impact of insufficient capacity on the quality of services.

• **Application to supply chain**

Service management faces the additional problem of the synchronization of production and consumption. Service production cannot occur without the presence of the application that consumes the output. This is a 'pull-system' in which the consumption cycle stimulates the production cycle.

Consumer demand products and production answers their demands in a highly synchronized pattern.

Demand and capacity are a much more closely coupled service system, even when compared with 'just in time' manufacturing.

The productive capacity of available resources of a product is adjusted according to demand forecasts.

According to APICS, Demand Management is the coordination of production plans between Sales and Production Services. It is regarded as a function, identifying and managing all requests for products (local and foreign clients, other stores, warehouse, spare parts, promotion, stock distribution, stock records etc).

Note that the forecast is inevitable in the development plans to meet future demand and is involved in:

- Strategic planning facilities;
- The planning of aggregate demand;
- Individual planning applications.

The customer expectation determines the competitive characteristic of the product that can be described either as an order qualifier or an order winner.

To control the production strategy, the company must understand the difference between the product order winner and order qualifier and couple the market.

Note that the order qualifier and the order winner are based on the product's life cycle (introduction, growth, maturity and decline).

### 3.2.2 Supplier Management

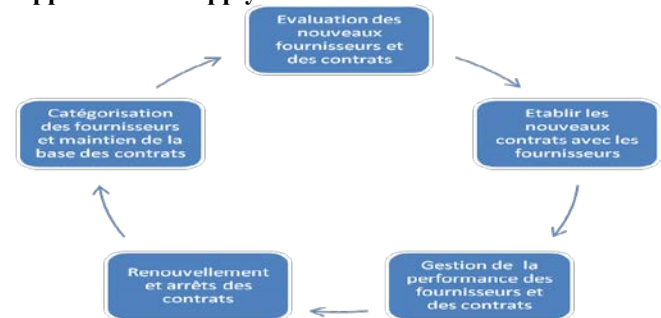
• **Purpose**

Managing subcontractors and suppliers, and the services they provide, can ensure the flawless quality of business services as well as optimizing resources.

• **Objectives**

- Documentation and identification of the scope of support services, as well as the interfaces and dependencies between suppliers;
- Documenting the roles and responsibilities of key suppliers and subcontractors;
- Updating contracts through a process of change management;
- Monitoring, reporting and reviewing suppliers' performance and track improvements;
- Contract auditing;
- Reviewing and analyzing risks for all vendors and contracts;
- Analyzing the profitability and value of suppliers and contracts;
- Maintaining the suppliers and subcontractors' database.

• **Application to supply chain**



Supply Chain considers the supplier as a strategic partner within the company. The supplier is required to work closely together with the company, to enable them to execute their plans in order to produce the most effective solution. This special relationship is generally supported by an information system to ensure high availability of useful data.

This process allows, amongst other things, the ability to track purchase requests, respond to suppliers, orders, receipts, payments providers and the extent of suppliers' performance through their ratings on the basis of respect for their commitments.

### 3.2.3 Capacity Management

• **Purpose**

Provide ongoing capacity profitably in all areas, tailored to the needs of current and future agreed business.

This process is broken down into three processes:

- Business capacity management.
  - Services capacity management.
  - Component capacity management.
- **Objectives**
    - Produce and maintain the capacity plan;
    - Implementing proactive measures to improve service performance;
    - Studying the impact of changes on the Capacity Plan in terms of services and resources;
    - Ensure meeting or exceeding performance targets.

- **Application to supply chain**

Capacity management can identify the operational resources needed in terms of storage capacity, logistical, human and financial resources to meet the client's needs whilst respecting the agreements reached with the latter.

According to APICS, capacity is defined as the ability of a charge centre, to achieve a given output per period.

There are two types of capacity:

- Available Capacity: Ability of a charge centre to achieve a production in a given period;
- Required Capacity: Ability of a charge centre, required to achieve a desired output in a given period.

Capacity Management is also responsible for determining the Required Capacity, and piloting and the controlling the Production Plan honor commitments.

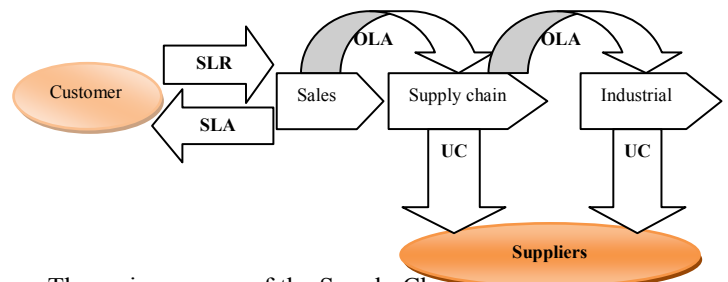
### 3.2.4 Service Level Management

- **Purpose**  
 Ensure that the level of service agreed with the client to all current services provided.
- **Objectives**
  - To define, document, agree, monitor, measure, report writing and reviewing all service levels;
  - To ensure and improve customer relations;
  - To set targets for service levels;
  - To monitor and improve customer satisfaction;
  - To manage customer expectations;
  - To improve service levels proactively.
- **Concepts**
  - SLR (Service Level Requirement):

It is a set of requirements expressed by the client as to the level of service required.

- **SLA (Service Level Agreement):**  
 It is a formal agreement between a service provider and client, defining the key service level targets and responsibilities of each party.
- **OLA (Operational Level Agreement):**  
 It is an agreement between a service provider and another part of the same organisation that contributes to the provision of service.
- **UC (Underpinning contract):**  
 A binding legal agreement for the management of agreements with external suppliers.

- **Application to supply chain**



The main concern of the Supply Chain is to anticipate customer demand in order to have the right amount at the right time. The service level is measured in terms of delivery, the quantity delivered and the quality of the product.

Good demand management and a good command of both the ability and sources of supply can lead to the development of production plans that are realistic and effective: in such conditions the level of service can be very high.

It is obviously clear that the objectives of the various services in the company will not go in the same direction. APICS attaches great importance in order to minimize the total cost and maximize the customer service level compatible with the company's strategy. By adopting this vision, the supplier is considered as a partner and not an external actor. When these goals are formalized through SLR, SLA, OLA and UC, the level of service may be more accurate and easy to pilot.

### 3.2.5 Availability Management Purpose

The purpose of this process is to ensure that the availability of service level agreements, match or exceed the agreed needs, present and future of the business and is cost effective.

- **Concepts**

**Availability** is the ability of a service or component provider to perform their function as agreed and when required.

**Reliability** is the measure of the duration of a service or component provider to function in accordance with their agreement and without interruption.

**The plan** must reflect **the availability** of current and future business objectives of service availability. It must ensure that these needs are supported by service management and performance-related resources availability.

**Availability management** is a balancing act of being able to provide the service whilst at the same time ensuring maximum economy.

**Availability management** should ensure the agreed level of availability of supplies and resources.

**Availability management** must continually optimize, and proactively improve the availability of the infrastructure, services and support organization, so as to provide improved cost effective availability that can provide business benefits to customers.

- **Objectives**

- To improve service availability;
- To achieve the agreed availability;
- To develop and maintain an appropriate level of availability.

- **Application to supply chain**

The availability of finished products or raw material is a crucial factor for the successful supply and delivery to the customer.

The corresponding information systems are very flexible and are critical to the management of material availability. To meet customer demand, the system must be able to provide all information related to the availability of materials in order to know the quantity in stock or forecasted, taking into account the quantities reserved or blocked and outstanding suppliers etc.

The identification, derived from careful management of stocks, of the status of finished products or the raw materials is so crucial to develop efficient production plans. Indeed, the availability definition may vary if we consider reservation of finished products or raw materials.

To meet customer demand, the process must be able to provide all information related to the availability of the raw materials like the actual or forecasting quantities.

### 3.2.6 Catalogue Management

- **Purpose**

The purpose of catalogue management services is to provide a single source of consistent information on all the agreed services, and to ensure that it is widely available to those authorized to access it.

The objective of catalogue management is to ensure that a service record is produced and maintained; containing detailed information on all operational services and which of them is ready for execution at the operational level.

- **Objectives**

- Ensure that a service catalogue is produced and maintained;
- Manage the information contained in the catalogue of services: states, interfaces and dependencies of current services operating;
- Ensure the accuracy of catalogue information services for all production services;
- Facilitate access for all authorized persons.

- **Application to supply chain**

For the supply chain, all services provided to clients must be documented and detailed in the catalogue service. It is also highly recommended to state the commitment of suppliers and customers and display conditions for access to these services.

**Example:** Requirements for supply to client and/or whether they have a display.

Currently, the corresponding information systems can not operate without a predefined catalogue. Recorded sales orders must necessarily rely on Management Advanced Pricing that takes into account the tariffs and trade agreements products.

Addition to the technical or operational characteristics of an item that constitutes the master record, a catalogue of items is also important in the relationship with the client. An item clearly identified and documented may liquefy any type of transaction relating to the item.

Orders expressed by customers being recorded should be based necessarily on information provided by the service catalog.

### 3.2.7 Continuity Management

- **Purpose**

Support the whole process of business continuity management by ensuring that the components and technical services can be restored within the time required and the business agreement.

- **Objectives**

- Impact analysis for business' continuity plans are aligned with the business;

- Proactively improve the availability and cost of services;
  - Maintaining continuity plans and support the business continuity plan;
  - Analysis of the risk of service outages;
  - Negotiate and enter into contracts necessary provider.
- **Application to supply chain**  
Continuity of service delivery occurs after a major event that affects the smooth running of an operation. Examples of strikes (carriers, employee etc.), natural disasters (flood, earthquakes, etc.) or voluntary acts of vandalism.  
It is recommended to have a supply chain continuity plan, according to the customer agreement and honored commitments.  
Currently, most companies have an information system supported by an ERP or a WMS that stores all information related to the supply chain. These ERPs or WMSs typically rely on databases, whose backup procedures and recovery should be well defined to ensure continuity of service.

### 3.2.8 Security Information Management

- **Purpose**  
Align information security on the Safety of Business and ensure that information security is managed in all operations management services.
- **Concepts**
  - **Availability** ensures that access to information is guaranteed at the time agreed and to the people who are qualified to access it;
  - **Integrity** is the property that information is kept as possible, to its reliability and exactitude.
  - **Confidentiality** is the principle that does not permit access to or dissemination of any information or service, relating to the client, to any authorized persons.
- **Objectives**
  - Develop and maintain policies, processes and procedures for information security;
  - Education and awareness on the process of information security;
  - Contribute to the analysis of business impact of failure of information security;
  - Check the permissions for access to information;
  - Risk Management Information Security.
- **Application to supply chain**

Information is crucial to the supply chain management. Without it, no decision can be taken. Thus, it must be protected against unauthorized access, non-availability and alteration.

It is recommended to establish clear and realistic procedures to ensure the three critical pillars of security:

- Confidentiality,;
- Integrity and
- Availability.

### 3.2.9 Assets and Configuration Management

- **Purpose**  
Asset & configuration management process manage all the information concerning the services and components that are used or required by the customer.
- **Objectives**
  - To identify, monitor, record, report, audit and check the configuration of services and infrastructure, including their attributes and relationships;
  - To maintain accurate configuration information in the historical state of planned and existing services and infrastructure;
  - To protect the integrity of assets and services configuration elements in ensuring that only authorized components are deployed.

- **Application to supply chain**

Supply chain management can use this process to build information based on the logistics structure (storage, transport, distance between two repositories, etc) and the elements that contribute to customer satisfaction whether internally or externally.

Indeed the ERP oriented logistics have advanced functions for managing the physical structure of the company. It's possible to model the concepts like logistical organization, stores and locations. The static or dynamic location concept is also supported.

### 3.2.10 Change Management

- **Purpose**  
Change Management is dedicated to applying the methods, procedures and best practices for implementing changes in the services and / or infrastructure provided.
- **Objectives**
  - To use standardized methods and procedures for efficient management and enable rapid changes to be made with minimal disruption;

- To save all changes in management configuration;
- To record, assess, allow, prioritise preferences, plans, tests, implement, research and review any changes in a controlled manner.

- **Application to supply chain**

Strategical changes require modifications to be implemented to reach specific targets whilst minimizing expenses and risks. There are few plans that don't involve expenses, strategic risks or new initiatives. There are always expenses and risks linked to decisions such as the introduction of new services, the access to the areas of new markets, and to serve new customers.

Examples of strategic changes: Juridical - the modification of regulation, organizational changes and policies and norms. Having analyzed the changes of the business, the customers and users activity models, the addition of a new service in the market place, updating the customer's budget or revaluing contracts, the changes of model supply, technological innovation.

### 3.2.11 Production Management

- **Purpose**

To create, test and produce the skills and abilities to provide the services specified by the design of the services and which will perform to the requirements of stakeholders to achieve their objectives.

- **Objectives**

- To create, install, test and unfold the package of bet in production successfully and in allowed time;
- To ensure that any new or changed service answer the agreed service requirements;
- To reduce unforeseen impacts on services, operations and support of production;
- To elaboration and definite the complete plans of deployment and put into production;
- To ensure the contentment of the customers, users and the personnel of the Management of services.

- **Application to supply chain**

Product design determines the process to produce it. This process will be used to control the finished product, its testing and marketing.

The start of production relates to the logistics namely: the release of a vehicle, operating a deposit or when assigning a task to a staff.

This process is coincident with the concept of product life cycle:

- Introduction: we have to design the new product before its introduction to the market;

- Growth: The product begins to gain market share which encourages competition to react;
- Maturity: The market becomes increasingly saturated;
- Decline: Customers buy upgraded versions from other competitors.

### 3.2.12 Incident Management

- **Purpose**

To restore service as quickly as possible, to guarantee the best quality levels possible and ensure the availability of the service.

Incident management covers any event which interrupts or could interrupt a service, from a power-cut to a fire.

- **Objectives**

- To identify all possible risks to the system and propose safety measures;
- To reduced downtime of the service resulting in greater availability of service in a business and a small number of negative impacts;
- To increased the ability to align activities and allocate resources dynamically to business priorities;
- To increased the ability to identify potential improvements to services;
- To increased the ability to identify service requirements or additional training.

- **Application to supply chain**

This process can bring significant added value to the supply chain management, it can record and track any adverse event causing or likely to cause interruption or degradation of the service offered to the customer.

It is responsible for the restoration of any service to increase customer satisfaction.

Incidents concerning the supply chain can affect the logistics, traffic accidents, stock outs, etc.

### 3.2.13 Problem Management

- **Purpose**

Prevent problems and incidents that may result, to eliminate recurring incidents and to limit the impact of incidents that cannot be avoided.

- **Objectives**

- To diagnose the cause of incidents to address the merits of the anomaly;
- To ensure that the implementation of the resolution is the appropriate process in accordance with (Change, etc);
- Build and maintain information about the problem, its cause and ways of working around it;



- Solving problems by bringing the solution amicable agreement.

- **Application to supply chain**

The contribution of this process in the supply chain management can reduce the impact of recurring incidents and minimize the number of incidents, which alter the functioning of services and reduce their quality.

This process also helps to monitor and understand the impact of any change.

It also allows intervening proactively to ensure the smooth operation of the service depending on the level of service agreed with the client.

#### 4. Conclusion

ITIL provided a repository of good practices structured as interrelated processes to improve business performance and meet customer requirements on one hand and to clarify the strategic direction of the company on another.

In this paper we have emphasized the similarity between the two concepts of ITIL and APICS, it is possible to design a new version APICS based on the philosophy of ITIL to get more performance and formalism.

Indeed, the process:

- Demand management ;
- Supply management ;
- Catalogue management;
- Service level management ;
- Continuity management ;
- Availability management ;
- Security management ;
- Asset and configuration management ;
- Change management ;
- Release management ;
- Incident management ;
- Problem management ;

All of these could bring greater value to the process of supply chain management both in terms of provision of service support service.

This new approach, proposed by this article - the pooling of two standards - could be a reference to the deepening of participant research, including licenses:

- a new version / expansion ITIL offering innovative concepts in the service of supply chain management;
- Redevelopment of functions offered by the APICS vision with ITIL.

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