



LINCS: Leveraging, Integrating, Networking, Coordinating Supplies

COMMON LEARNING BLOCKS

SUPPORT DOCUMENTS TO ALL CERTIFICATION TRACKS

for Entry- to Mid-Level Professionals in Supply Chain Management

Developed by the LINCS in Supply Chain Management Consortium, comprised of the following educational institutions:

<i>Broward College (Lead Institution)</i>	<i>Long Beach City College</i>
<i>Columbus State Community College</i>	<i>Northwestern University</i>
<i>Essex County College</i>	<i>Rutgers, the State University of New Jersey</i>
<i>Florida State College at Jacksonville</i>	<i>San Jacinto College</i>
<i>Georgia Institute of Technology</i>	<i>St. Petersburg College</i>
<i>Harper College</i>	<i>Union County College</i>

In partnership with the Council of Supply Chain Management Professionals.



This material was funded in whole by a \$24.5M TAACCCT grant awarded by the U.S. Department of Labor's Employment and Training Administration to the LINCS Consortium.



Title Page

LINCS in Supply Chain Management Consortium
Broward College, Lead Institution
1930 S.W. 145th Avenue, Suite 224
Miramar, FL 33027
(954) 201-8440

Author: LINCS in Supply Chain Management Consortium

Title: Common Learning Blocks, Support Document to all Certification Tracks

Release Date: 06/03/2016

Version: v2.16

Website: www.LINCSeducation.org

To learn more about LINCS, visit www.LINCSeducation.org.

Content was developed and produced by LINCS in Supply Chain Management Consortium and is licensed under a Creative Commons Attribution 4.0 International License. Under this license, any user of this content herein must provide proper attribution as follows:

Use of this document as a bibliographic reference should employ the following citation: *Common Learning Blocks, Support Document to Certification Track Documents*. LINCS in Supply Chain Management Consortium. June 2016. Version: v2.16. www.LINCSeducation.org.

Disclaimer: The photos used within this document may only be used with this content. The license does not include copying photos for use with any other content.



Unless otherwise noted, this work is licensed under the Creative Commons Attribution 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/>.



Preface

The information in this Preface is an overview of LINCS in Supply Chain Management

Supply chain management (SCM) as a paradigm is nothing new to business and industry. However, academia and employers have recently seen SCM become a major focus. There are currently several industry-recognized certifications in SCM, largely focused on individuals with experience in management through the executive level. The curriculum in the certification tracks listed below is directed at those who have entry- to mid-level experience.

The curriculum for these certification tracks includes eight topics in SCM:

1. SCM Principles
2. Customer Service Operations
3. Transportation Operations
4. Warehousing Operations
5. Supply Management and Procurement
6. Inventory Management
7. Demand Planning
8. Manufacturing and Service Operations

Each certification track can be taken on its own to earn one certification; multiple certifications can be earned in any order. Each certification track covers the basic elements of the primary certification track, which allows the learner to obtain a foundational understanding of the **best practices** and processes associated with each topic.

This standalone document is to accompany each certification track and provides basic information on SCM. It is highly recommended that both the standalone document **and** the certification track document be thoroughly reviewed **prior** to taking the certification examination.

The content provided within this document relates specifically to **Common Learning Blocks**, which is intended to be a basic overview of SCM. The national certification examination will include questions from this **Common Learning Blocks** content.*

*NOTE: Materials listed under *Optional Supplemental Resources* sections (in some certification track documents only) are not included on the national certification examination.



Common Learning Blocks Table of Contents

Title Page.....	2
Preface.....	3
Common Learning Blocks Table of Contents	4
Abstract.....	6
Common Learning Block 1: Supply Chain Management Principles.....	7
Common Learning Block 1 Description.....	7
Common Learning Block 1 Learning Objectives	7
Unit 1: Supply Chain Basics	7
What is a Supply Chain?	7
Supply Chain Management	10
Unit 2: Supply Chain Strategy	11
Unit 3: Modern Supply Chains	12
The Global Economy	12
Supply Chain Management Principles	13
Common Learning Block 1 Practice Questions	14
Common Learning Block 2: Demand Planning.....	16
Common Learning Block 2 Description.....	16
Common Learning Block 2 Learning Objectives	16
Common Learning Block 2 Overview	16
Common Learning Block 2 Practice Questions	17
Common Learning Block 3: Supply Management and Procurement	18
Common Learning Block 3 Description.....	18
Common Learning Block 3 Learning Objectives	18
Common Learning Block 3 Overview	18
Common Learning Block 3 Practice Questions	19
Common Learning Block 4: Warehousing Operations	20
Common Learning Block 4 Description.....	20
Common Learning Block 4 Learning Objectives	20
Common Learning Block 4 Overview	20
Common Learning Block 4 Practice Questions	21
Common Learning Block 5: Inventory Management	23
Common Learning Block 5 Description.....	23



Common Learning Block 5 Learning Objectives	23
Common Learning Block 5 Overview	23
Common Learning Block 5 Practice Questions	24
Common Learning Block 6: Manufacturing and Service Operations.....	25
Common Learning Block 6 Description.....	25
Common Learning Block 6 Learning Objectives	25
Common Learning Block 6 Overview	25
Common Learning Block 6 Practice Questions	26
Common Learning Block 7: Transportation Operations.....	27
Common Learning Block 7 Description.....	27
Common Learning Block 7 Learning Objectives	27
Common Learning Block 7 Overview	27
Common Learning Block 7 Practice Questions	28
Common Learning Block 8: Customer Service Operations	29
Common Learning Block 8 Description.....	29
Common Learning Block 8 Learning Objectives	29
.....	29
Common Learning Block 8 Overview	29
Common Learning Block 8 Practice Questions	30
Common Learning Blocks Summary	31
Common Learning Blocks Optional Supplemental Resources	31
References	31
Common Learning Blocks Practice Questions Answer Key	32
Common Learning Blocks Glossary	33
Notes Page	36



Abstract

This document, Common Learning Blocks (CLBs), prefaces each of the eight LINCS track certifications and is intended to provide an overview of SCM and the relationship of each of the functions, or tracks, in a supply chain.

Supply chains are formed from various activities and functions that are integrated with other business activities, starting with strategic planning and ending with product delivery to customers. The supply chain functions included herein are demand planning, **supply management and procurement**, warehousing operations, inventory management, manufacturing and service operations, transportation operations, and customer service.

An additional certification track called Supply Chain Management Principles is also available to provide a more in-depth presentation of the supply chain functions and management of the supply chain. These CLBs, along with the supply chain management principles certification track, provide an excellent starting point for learners who have little or no background in SCM.

The goal of the content in this Common Learning Blocks document is to prepare students to understand the principles of SCM and the sequence of those principles. The content in the CLBs was developed by the LINCS in Supply Chain Management Consortium. **SCPro™ Fundamentals Certification** examinations are owned and administered by the Council of Supply Chain Management Professionals (CSCMP).





Common Learning Block 1: Supply Chain Management Principles

Common Learning Block 1 Description

This learning block defines the major functions that are necessary for an operational **supply chain** in most organizations. It also defines the linkage of the functions that form the chain and how that chain is linked with other business processes to form the basis for the management of the supply chain, or SCM.

Supply chain functions cannot operate independently. Each function is dependent on the others, and these interdependencies combine with the **integration** of other business processes like planning, sales, finance, and business development to formulate the overall SCM strategy in a given organization.

Common Learning Block 1 Learning Objectives

Upon completing this learning block, the learner will be able to:

- Discuss the functions in a supply chain
- Define SCM
- Explain how supply chains must be integral to an organization's strategic goals

Unit 1: Supply Chain Basics

A supply chain is a network of people, processes, resources, and technologies in an organization that work collectively to produce products and services for an end user, or customer. Supply chains have existed since people began trading goods and services. They have evolved from exchange trading on the Silk Trade road in the 1400s through supplying the troops in World War I and World War II to the complex networks of today's global supply chains.

Supply chains now consist of multi-national, global networks of companies working together to build products and provide services. Modern supply chains will be discussed in depth in Unit 3.

What is a Supply Chain?

A supply chain is a network of individual functions within an organization that begins with the development of a strategic plan and ends with the delivery of a product or service. Those functions are listed below; each is explored in subsequent learning blocks:

- Demand Planning
- Supply Management and Procurement



- Inventory Management
- Warehousing Operations
- Manufacturing and Service Operations
- Transportation Operations
- Customer Service Operations

It is immensely dangerous to business health to manufacture a product without first planning *what inventory* will be required and *when* it will be needed. It is equally risky to attempt to obtain goods and materials from suppliers without a demand plan that feeds *procurement* purchase requisitions in order of priority based on need dates and supplier lead times. Without linkages in the entire supply chain, chaos would occur and the company would soon have to close its doors. Now it is easier to see that the demand plan drives and signals procurement for the orderly acquisition of goods and materials, which in turn enables an organization to receive and stock inventory in a warehouse, etc.

For example, before tomato sauce can be made available to consumers, it goes through many steps from farmers to retailers. Farmers buy seeds and fertilizers to grow tomatoes, which are sold as raw material to food processors that employ their factories to convert the tomatoes into tomato sauce, juice, canned tomatoes, and ketchup. To convert the fresh tomatoes, processors need to purchase other raw materials, such as vinegar, salt, spices, cans, and labels; therefore, food processors must work with many different suppliers. The finished products are then combined into larger packages, transported to warehouses, and subsequently distributed to grocery stores.

There are often levels of suppliers within a supply chain called *tiers*. Suppliers that sell directly to factories or main operators are referred to as tier one suppliers; suppliers that sell to tier one suppliers are referred to as tier two suppliers. This cycle continues into tier three suppliers, tier four suppliers, etc. The final customers who purchases and consumes products and services are called consumers or *end customers*. End customers' needs and wants are the driving force behind the entire supply chain. They are the ones who create demand and ultimately pay for all the product and service functions in supply chains. Without end customers, supply chains would collapse due to a lack of demand for products and services.

Therefore, at any point in the supply chain, focus on the needs and wants of end customers must be maintained. For that to occur, careful attention must be placed on the values and expectations of each element of the supply chain leading to end customers; this approach, which keeps the end customer in mind even several steps away from the point of sale, is referred to as the voice of customers.

Examples of Supply Chains in Use

All companies are part of at least one supply chain, whether they sell directly to the end customers, provide services, manufacture products, or extract raw materials from the earth (see *Figure 1*).

For example, a customer may go to a Walmart store to buy laundry detergent. In this case, the supply chain begins by planning to satisfy customer needs through a sales forecast for laundry detergent. Proctor & Gamble, as a manufacturer of detergents, develops a forecast for sales; from that forecast, a demand plan is developed that enables its procurement department to procure the raw materials used to make the detergent along with plastic containers, labels, and other necessities. These procured items are received, stored, and then used in the manufacturing process. The individual completed containers of detergent are then packaged in boxes for shipment, transported to distribution centers, and ultimately delivered to retailers like Walmart.

Another supply chain example is based on a customer who needs to purchase laptop computers online. The supply chain includes:



- Defining how many laptops might be sold in a given period (like an annual sales forecast)
- Creating the demand plan to procure the necessary components (inventory) from suppliers to assemble the laptops
- Designing the value-added facility where final laptop assembly will occur
- Ensuring a system exists to control and issue the inventory
- Implementing a team of customer service representatives to take orders and interface with end customers, including Internet live chat to answer questions and provide recommendations
- Ensuring assembled laptops are adequately packaged for transportation and reliable carriers are used to deliver the final laptop and associated peripherals

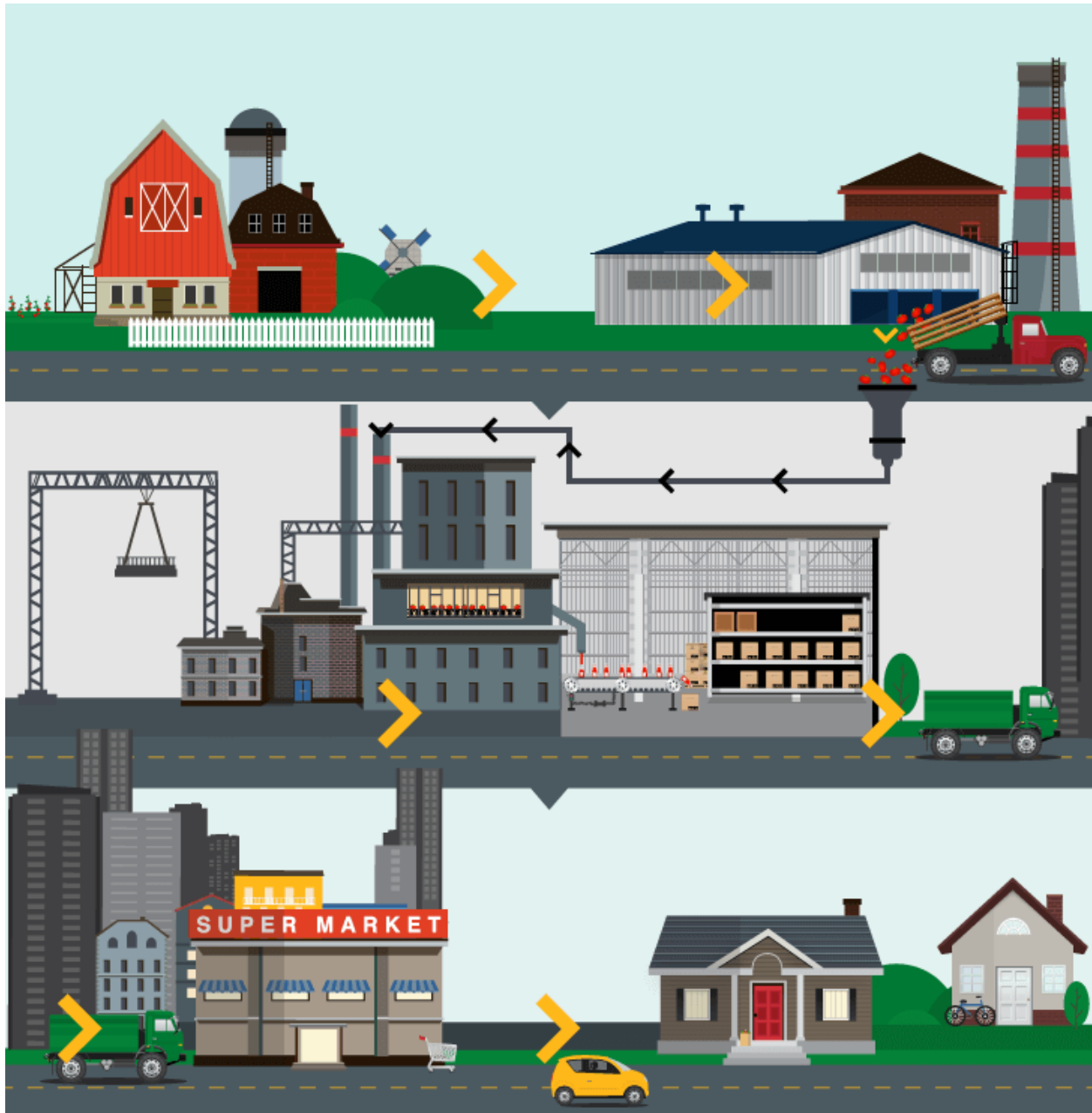


Figure 1. A supply chain from the farm to the customer's home. Developed by LINC'S Consortium.

Sometimes **reverse logistics** might occur, which require that products (in this case, the laptop) returned by the customers travel in the opposite direction through the supply chain. Reverse logistics is



a necessary process for product returns resulting from products that are defective, products that require an upgrade or refurbishment, preventive maintenance, or even product recalls stemming from safety or environmental concerns.

Typically, customers will interact with the customer service department to determine the nature of a problem, and customer service personnel will issue a return material authorization along with shipping instructions and other details.

Supply Chain Management

SCM is a comprehensive approach to the management of the entire flow of data, information, materials, and services of the individual supply chain functions previously mentioned. The ability to link these functions and integrate them with other elements in the business process is dictated by the overall management strategy. Therefore, the management of the supply chain cannot be viewed as an independent, standalone organization and must be arranged to work in concert with other business processes, functions, and departments.

The **Council of Supply Chain Management Professionals (CSCMP)** is a professional organization that supports the professional development of its worldwide membership. As defined by CSCMP,



*Supply Chain Management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all **logistics** management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies. Supply Chain Management is an integrating function with primary responsibility for linking major business functions and business processes within and across companies into a cohesive and high-performing business model. It includes all of the logistics management activities noted above, as well as manufacturing operations, and it drives coordination of processes and activities with and across marketing, sales, product design, and finance and information technology. (CSCMP, 2014)*

As the CSCMP's comprehensive definition above makes clear, supply chains have evolved into complex entities (see *Figure 2*).



Figure 2. Council of Supply Chain Management Professionals (CSCMP) logo. Acquired from CSCMP.org.

SCM takes into consideration activities involved in confirming that products from the raw material stage are turned into finished products and delivered to customers. These activities include:

- Sourcing of raw material and parts
- Manufacturing and assembling
- Warehousing and controlling inventory
- Entering and managing orders
- Finishing, customizing, and packaging



- Distributing across all channels
- Delivering to final customers
- Managing relationships with suppliers
- Managing relationships with customers
- Maintaining the information systems necessary to monitor the above activities

SCM thus coordinates and integrates these activities into a continuous process, linking the entities together to ensure supply chains are competitive and satisfy customers with the right products at the right prices.

Unit 2: Supply Chain Strategy

In today's environment, Supply Chain Management must be an integral element in developing a corporate strategy. Corporate strategies determine the target markets for companies to pursue, and companies then decide if they want to compete on price, service, quality, innovation, flexibility, or a combination thereof. For example, Walmart pursues a low-cost strategy on everyday goods. Many items offered to consumers at Walmart can be purchased in other retail stores, but they might not be sold at prices as low as those at Walmart.

In fact, the supply chains of two different retail stores, even selling the same items, can be quite different. Walmart owns their distribution centers and has their own fleet of trucks to serve their immense number of retail stores and control the flow and availability of products.



Figure 3: By Walmart from Bentonville, USA (Walmart's Grease Fuel Truck) CC BY 2.0 <http://www.creativecommons.org/licenses/by/2.0>), via Wikimedia Commons.

Meanwhile, smaller retail stores such as boutiques and other specialty shops do not have as many retail outlets, and the products they offer are not guaranteed to have the lowest prices; additionally, they do not have their own trucks or warehouses, so they must depend on other supply networks for product availability. The competitive strategies companies choose influence product price, delivery time, variety, and quality.

Walmart customers shop at that store primarily because of the low price, but consumers may shop at boutique retail stores because of unique product offerings and additional services offered, like gift wrapping and engraving.

Supply chains are designed to fit strategically with defined corporate strategies; the numerous organizations and activities in supply chains work together to contribute to the overall goals and objectives associated with those strategies. Understanding



Figure 4: Supply chain strategy could contribute to the overall competitive goal. Developed by LINCS Consortium.



customers and supply chain capabilities is important when determining if certain supply chains will be able to support corporate strategies.

The business plan, which includes the competitive strategy, should support consumer demand and the ability to provide products and services, which in turn drives the supply chain as it seeks to fill customer orders. Several functions within organizations—research and development, procurement, finance, manufacturing, etc.—work together to support their specific supply chains. If the strategic goal for a company is low costs, these functions need to contribute to that goal, such as designing a transportation network that minimizes expenses and procurement’s seeking of low-cost suppliers.

Unit 3: Modern Supply Chains

The Global Economy

In the late 1980s, the U.S. experienced an increased in foreign competition, and China’s economic strategy became more aggressive as the country opened its borders to begin trading globally.

This era was characterized by:

- 1 Intense competition among industries
- 2 Growing companies were capturing more international market share using different strategies
- 3 Rapid increases in technology and products with shorter product life cycles like personal computers, mobile devices, and global positioning systems

The ability to coordinate worldwide supply chain activities by using international data networks and the Internet became critical in the 1990s. If companies wanted to stay in business, they had to take coordinated steps to manage the flow of goods, services, funds, and information from suppliers around the world to end customers around the world (see *Figure 5*).





Figure 5. Professionals managing the flow of goods, services, funds, and information between suppliers and customers. © CanStockPhoto.com.

From 2000 to the Present

From the year 2000 to the present day, companies have needed to develop strong relationships with suppliers to remain competitive. Cooperation with suppliers became critical, replacing the sometimes adversarial nature of those relationships.

This recent cooperative supply chain approach of integrating suppliers as teammates has brought about strategies such as improved **supplier development**, **supplier design involvement**, the use of full service suppliers, evaluating suppliers on total value, **long-term supplier relationships**, and **strategic cost management**. As the supply chain is integrated with the overall business strategy, the impact of ecommerce will continue to reshape business strategies and the supply chains needed to conduct business globally. In response to the challenges presented by worldwide competition and trade, business strategies and processes will continue to evolve to meet the needs of rapidly changing technology and, of course, to continue meeting customers' expectations.

Supply Chain Management Principles

SCM is estimated to influence as much as 80% of the costs associated with the total costs of delivering the final product or service. For this reason, optimizing inventory expenses, choosing efficient transportation carriers, working closely with suppliers, and making sure forecasts are synchronized with the demand plan are examples of functions that have become critical within organizations in recent years. From global sourcing to global customers and from brick-and-mortar stores to ecommerce, the coordination and integration of the processes to plan, procure, produce, and deliver products to customers is essential.



To meet the needs of customers and achieve the goals of the organization, it is imperative all the functions of the supply chain are integrated and employees understand their impact on others within this broader function. Companies have invested in comprehensive **Enterprise Resource Planning (ERP)** systems, and today SCM is an integral part of the broader business; it is woven into the fabric of a business, not a standalone element operating in a vacuum.

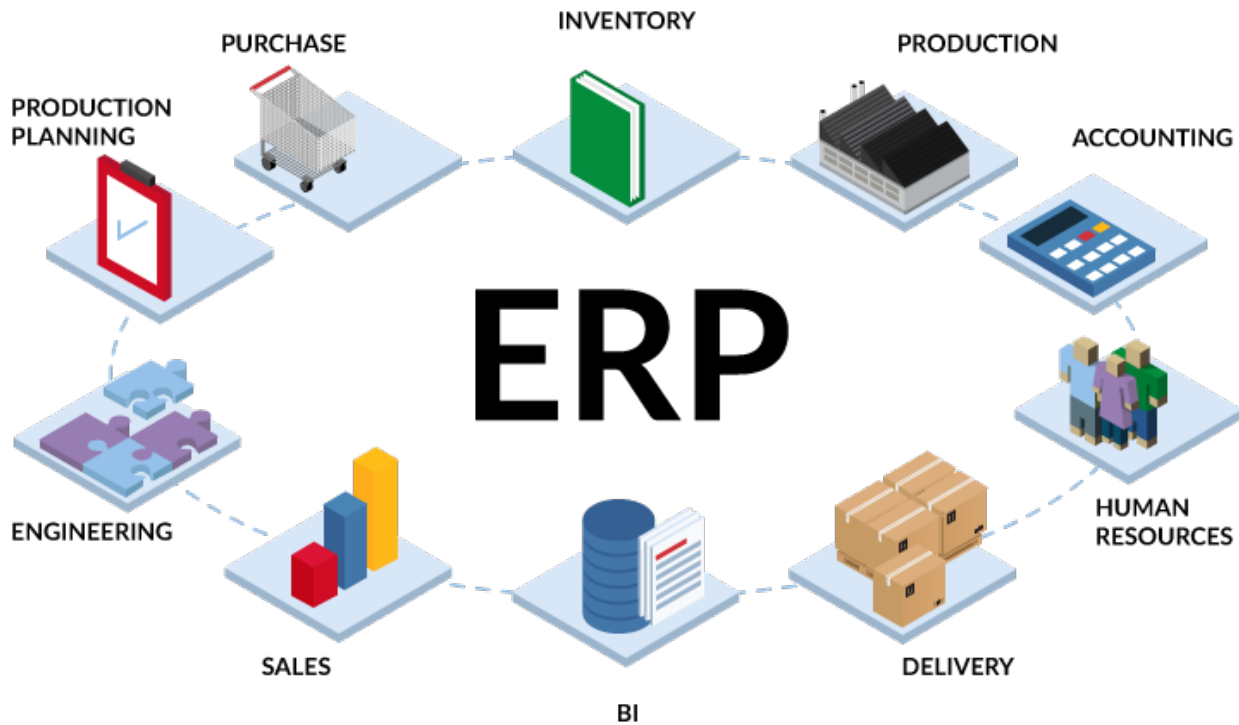


Figure 6: Visual representation of Enterprise Resource Planning. Developed by LINC Consortium.

SCM should be viewed as the integration of the major functions listed in learning blocks 2 through 8, beginning with Demand Planning. Students should focus on the fact that the functions have interdependencies that enable them to work within the broader supply chain.

Common Learning Block 1 Practice Questions

1. The levels of suppliers within a supply chain are called:
 - a. Ranks
 - b. Supports
 - c. Tiers
 - d. Services

2. For companies to be competitive, suppliers should be considered:
 - a. Teammates
 - b. Adversaries
 - c. Unreliable
 - d. Unnecessary



3. **A supply chain can best be described as:**
 - a. A network of many individual functions
 - b. One or two functions working together
 - c. Negotiating with suppliers
 - d. Choosing the best warehouse strategy
4. **Supply Chain Management can be described as a(n):**
 - a. Comprehensive approach to the management of the entire flow of individual functions
 - b. Method to increase sales and market share
 - c. Process to create adversarial relationships with suppliers
 - d. Innovative process for choosing carrier modes
5. **The process for customers to return defective products is called:**
 - a. Backwards logistics
 - b. Reverse logistics
 - c. Forward logistics
 - d. Domestic logistics





Common Learning Block 2: Demand Planning

Common Learning Block 2 Description

Demand planning is the engine that drives the supply chain. Personnel in the demand planning organization work closely with marketing, sales, finance, and other key personnel to develop a realistic forecast for sales; this forecast forms the basis for a demand plan which provides purchase requisitions to procurement and work orders to manufacturing.

Common Learning Block 2 Learning Objectives

Upon completing this learning block, the learner will be able to:

- Describe demand planning
- Define inputs to the demand plan
- Explain the outputs from the demand plan

Common Learning Block 2 Overview



Demand forecasting is an estimate of a company's future needs and forms the basis for a credible demand plan. Typically, sales forecasting defines what customers will buy over a defined period, usually one year. In turn, the demand planning function defines what inventory and resources are needed to support the sales forecast.

As an example, a commercial baker sells cakes, cookies, and breads. The company forecasts, or predicts, how many cakes and cookies its customers might purchase categorized by size and type. These quantities and variations translate into raw material requirements and other resources needed to manufacture finished products. The **forecasting** part in this example is the finished products of cakes, cookies, and breads, and the demand plan defines the ingredients, ovens, mixers, and equipment used, as well as the number of people preparing the baked goods.

Demand planning is the process of planning goods, materials, and resources required for procurement and manufacturing to support the sales forecast. The process starts with the general requirements defined by the sales department for finished or semi-finished products (which require additional manufacturing steps to become finished products; they are also called work in process). The plan further enables the generation of procurement requisitions for raw materials and other goods and materials. The demand planning function also defines other resources needed for manufacturing like mixing and baking equipment along with personnel staffing to perform the necessary **operations**.



The demand plan attempts to achieve a balance that defines the necessary supply elements with anticipated customer demand. This balance is critical to ensuring stock levels are optimized to satisfy manufacturing process requirements, while simultaneously making sure stock levels are not excessive. Having too much inventory is expensive and has inherent risks of obsolescence and shelf-life expiration.

Common Learning Block 2 Practice Questions

1. An estimate of a company's future needs is called:
 - a. Financial planning
 - b. Balance sheet
 - c. Demand forecasting
 - d. Targeting
2. The basis for a credible demand plan is derived from the:
 - a. Chief executive officer or company owner
 - b. Demand forecast
 - c. Shipping department
 - d. Warehouse size and location
3. To support the sales forecast, the demand plan defines the needed:
 - a. Inventory and resources
 - b. Customers
 - c. Suppliers
 - d. Transportation routes
4. The demand planning function initiates requisitions for:
 - a. Sales
 - b. Suppliers
 - c. Warehousing
 - d. Procurement
5. The demand plan attempts to achieve a balance between supply elements and:
 - a. Prior forecasts
 - b. Anticipated consumer demand
 - c. Warehouse square footage
 - d. Receiving docks





Common Learning Block 3: Supply Management and Procurement

Common Learning Block 3 Description

This learning block defines the role of the procurement organization and describes the processes of converting purchase requisitions into purchase orders (POs). Procurement is also responsible for researching and approving suppliers as qualified bidders to provide materials and products used in manufacturing and for resale to customers.

Common Learning Block 3 Learning Objectives

Upon completing this learning block, the learner will be able to:

- Discuss the procurement process
- Define purchase requisitions and POs
- Explain procurement's role after a PO is placed

Common Learning Block 3 Overview



The procurement organization is dependent on procurement requisitions that are fed from the demand planning organization. The demand plan tells or signals the procurement organization to initiate procurement of what is needed by transmitting the requirements in an ERP system. Without linkage to the demand plan, procurement would not know what to buy and when to buy it. The demand plan considers when items are needed in inventory against the supplier's lead time (the time it takes for a supplier to deliver goods after a PO is placed).

Procurement personnel receive requirements on purchase requisitions, solicit suppliers for pricing and delivery, evaluate supplier responses using an evaluation process, negotiate to achieve best value, and make awards by issuing POs. POs are a company's authorizing documents and financial commitments to buy products and services. The procurement organization makes sure products are accurately described by working with engineering and other internal organizations to avoid confusion about exactly what is needed.

Procurement is a function that interacts with suppliers globally to achieve the best value for an organization. Procurement personnel must consider the benefits and risks of working with suppliers in different countries. The specific issues must be managed across different time zones and cultures, and different approaches must be used to mitigate supplier disruptions like natural disasters, embargos, strikes, currency fluctuations, and military conflicts.



Procurement personnel must also manage suppliers after awarding a PO to ensure products and services are delivered on time, at the value stated on the PO, and at the correct quality level. If suppliers are not managed and open POs are not tracked, late deliveries could cause manufacturing disruptions and even delivery delays, resulting in lost sales.

Common Learning Block 3 Practice Questions

1. Purchase requisitions define items that need to be purchased and are initiated by:
 - a. Finance
 - b. Sales
 - c. Demand planning
 - d. Customers
2. Purchase orders are placed with suppliers by:
 - a. Warehousing
 - b. Customers
 - c. Procurement
 - d. Inventory management
3. The time it takes for a supplier to deliver an item after the purchase order is placed is known as:
 - a. Lead time
 - b. Queue time
 - c. Picking time
 - d. Wait time
4. To ensure items are delivered on schedule, procurement must:
 - a. Rely on suppliers for on-time shipments
 - b. Threaten not to pay invoices
 - c. Hope for the best
 - d. Manage suppliers after a purchase order is placed
5. One example of a challenge in dealing with international suppliers is:
 - a. Non-responsive personnel
 - b. Different times zones and cultures
 - c. Poor response time
 - d. Products that are too expensive





Common Learning Block 4: Warehousing Operations

Common Learning Block 4 Description

After POs are placed, suppliers ship materials that are generally received at a warehouse location for further processing. Warehouses are physical buildings or structures with equipment and systems in place to process and store inventory in the form of purchased materials, work in process, and finished goods. Warehousing operations are the processes that enable the control and management of inventory.

Common Learning Block 4 Learning Objectives

Upon completing this learning block, the learner will be able to:

- Explain the purpose of a warehouse
- Define the functions that occur in a warehouse
- Understand value-added operations in a warehouse

Common Learning Block 4 Overview



Warehousing personnel perform the receipt, storage, retrieval, and distribution of procured goods and materials. Initially, goods and materials are received from suppliers into a warehouse by warehousing personnel who unload trucks, inspect items to ensure there is no product or shipping damage, and process the items (now formally part of inventory) to a storage location until they are needed. Once there is a demand for the stored inventory, warehousing personnel retrieve or pick the inventory and deliver it to the intended destination, such as manufacturing for assembly.

As manufacturing personnel complete their assembly operations, they process raw materials and semi-finished goods, sending finished products back to the warehouse. At this point, products could be stored for further assembly operations or might be packaged and prepared for immediate delivery to a customer.

Warehouses are not always standalone facilities. In some cases, the storage of raw materials, work in process, and finished goods use dedicated portions of the manufacturing facility to expedite the movement of inventory through the various manufacturing processes. In other cases, warehouses and distribution centers may have roles that are entirely distinct from manufacturing operations and focus on storage and order fulfillment.

Warehousing operations can be simple floor storage or can include various types of racking for high storage. Many facilities feature sophisticated, automated **material handling systems** to increase speed



and accuracy while reducing costs. Functions performed within warehouses or distribution centers have increased significantly, so this function now plays a greater role in the overall supply chain. From picking items to repacking them into multipacks and shipping individual orders or full truckloads, the complexity of warehousing has resulted in a greater focus on the efficiency of these operations and how they impact the deliveries of customer orders.

Warehouses designed to function as distribution centers can provide additional (value-added) services for customers. These could include services like cross-docking and kit assembly. Cross-docking generally moves incoming products directly to outgoing trucks, thus eliminating the need for storage entirely. Kit assembly is performed to pick multiple items and place them into one kit or container for processing to be sent to manufacturing; this enables the manufacturing assembly operation to assemble the final product easily.

Warehousing is supported by a **warehouse management system (WMS)** that is linked to a company's ERP system. The WMS is integrated with the material handling systems, which includes equipment to move, stock, pick, and route goods in and out of warehouses and distribution centers. These material handling systems feature specialized software that enhances the flow of information and communication to optimize the efficiency of warehouse processes.

Common Learning Block 4 Practice Questions

1. Which task is normally not performed by warehousing personnel?
 - a. Unloading incoming items from trucks
 - b. Processing inventory within the warehouse
 - c. Paying suppliers
 - d. Inspecting incoming items
2. Identify the function that is performed by warehousing personnel when manufacturing has a demand for stored inventory.
 - a. Packaging for shipment
 - b. Paying an invoice
 - c. Retrieving or picking
 - d. Calling customer service
3. Automated material handling systems are designed to:
 - a. Completely eliminate jobs
 - b. Increase speed and accuracy
 - c. Decrease reliability
 - d. Increase costs
4. An example of a value-added function in a warehouse is:
 - a. Picking
 - b. Receiving
 - c. Storing
 - d. Cross-docking



5. Inventory is managed and controlled with the aid of:

- a. Warehouse management systems
- b. Receiving docks
- c. Conveyors
- d. Truck ramps





Common Learning Block 5: Inventory Management

Common Learning Block 5 Description

Inventory management is a combination of the personnel, processes, and systems that enable the efficient flow and control of physical assets, referred to as inventory. Inventory is often an organization's largest expense; beyond control and safeguarding, it needs to be turned or routinely used by an organization to ensure profitability. Inventory personnel work closely with warehousing, manufacturing, and transportation personnel to control the flow and availability of materials when and where they are needed.

Common Learning Block 5 Learning Objectives

Upon completing this learning block, the learner will be able to:

- Describe inventory
- Define inventory management
- Explain inventory management interfaces

Common Learning Block 5 Overview



Inventory management is an important function to control assets in the supply chain. Individuals working in the supply chain should have an understanding of the roles, costs, and benefits of inventories. Inventory is often obtained from suppliers in the form of raw materials and other goods and materials as a result of POs placed by the procurement department. Inventory also comes in the form of work in process and finished products from manufacturing operations.

It may seem obvious that inventory is controlled and managed in a warehouse because this is where the majority of inventory is physically stored. However, the management of inventory, or inventory management, is a function that actually involves the entire supply chain. Inventory management starts with close integration with demand planning and continues until products are successfully delivered to customers.

Inventory management is the process of controlling and managing goods, materials, and products to maximize efficiency and profitability. It controls how efficiently resources are utilized in producing products and services for customers. Inventory management systems and personnel interact with warehousing, transportation, demand planning, procurement, and other personnel throughout the company.



Companies continually strive to reduce their inventory levels as one approach to reducing operating costs and increasing competitiveness. Inventory costs are often one of the largest cost elements in an organization. Inventory management systems are generally part of a broader company-wide ERP system that monitors inventory availability at all levels from raw materials to finished goods.

Common Learning Block 5 Practice Questions

1. The combination of personnel, processes, and systems to control inventory is called:
 - a. Demand planning
 - b. Inventory management
 - c. Systems management
 - d. Engineering
2. Most inventory is initially obtained from:
 - a. Customers
 - b. Salvage dealers
 - c. Suppliers
 - d. Manufacturing
3. Inventory management is most obvious in which of the following areas:
 - a. Warehouse
 - b. Customer sites
 - c. Forecasting
 - d. Sales
4. Reduction of inventory is necessary to:
 - a. Decrease risks of stock-outs
 - b. Decrease competitiveness
 - c. Reduce operating costs
 - d. Justify additional suppliers
5. Inventory management takes place:
 - a. Only in warehouses
 - b. After customers receive shipments
 - c. Only on expensive items
 - d. Throughout the supply chain





Common Learning Block 6: Manufacturing and Service Operations

Common Learning Block 6 Description

Manufacturing and service operations are the supply chain functions in which products are manufactured or services are performed. Manufactured products may take the form of semi-finished goods, finished goods, components, parts, and materials. The manufacturing process includes the work that needs to be performed to convert materials into finished products. Service operations are performed on demand for customers and can involve product repair, refurbishment, or other warranty actions.

Common Learning Block 6 Learning Objectives

Upon completing this learning block, the learner will be able to:

- Discuss manufacturing operations
- Define manufacturing dependencies
- Explain the distinction between manufacturing and service operations

Common Learning Block 6 Overview



Manufacturing organizations convert raw materials and other procured items into final products that can be delivered to a customer. In order to fabricate products in a manufacturing organization, there must be an accurate sales forecast that is converted into a demand plan; those requirements are sent to procurement to obtain raw materials, equipment, space, and other resources. To aid in this process, the company-wide ERP system includes modules for forecasting, **requirements planning**, work order scheduling, and links to other business systems.

Products cannot be manufactured and services cannot be delivered unless tools are available. This means demand planning must accurately determine what is needed and when it will be required. If procurement does not purchase the materials or if transportation does not deliver them when needed, then the conversion, or manufacturing process, will fail. It is also critical conversions are done with high quality to avoid customer service issues and to avoid costly defects that are often returned through the reverse logistics process. Manufacturing is dependent on demand planning to schedule the assembly work, on procurement to buy needed items, on the warehouse to deliver items for assembly, and on inventory management to ensure the right items are available at the right time.

Manufacturing organizations are generally part of a company's operations that also includes service operations. Service operations personnel are responsible for products that require routine



maintenance, repairs, and warranty work. For example, if an automobile is recalled or needs repair or periodic maintenance, it is not sent back to the factory where it was assembled; instead, there is a separate dealer network of authorized service operations centers.

Common Learning Block 6 Practice Questions

1. Routine maintenance, repairs, and warranty work are performed by:
 - a. Sales
 - b. Service operations
 - c. Engineering
 - d. Finance
2. Manufacturing can be defined as:
 - a. Converting raw materials and other items into finished products
 - b. Promoting and selling new products
 - c. Interfacing with suppliers
 - d. Planning shipments to customers
3. Manufacturing and other functions systems are generally hosted on the company-wide:
 - a. Procurement systems
 - b. Enterprise resource planning (ERP) system
 - c. Customer feedback system
 - d. Transportation system
4. One focus of the manufacturing process is to ensure that:
 - a. Delivery trucks are properly routed
 - b. Suppliers ship materials on time
 - c. Product quality is achieved
 - d. Annual forecasts are completed on time
5. Reverse logistics could be a result of:
 - a. Manufacturing products with defects
 - b. Choosing an expensive shipper
 - c. Poor forecasting
 - d. Inadequate staffing





Common Learning Block 7: Transportation Operations

Common Learning Block 7 Description

Transportation operations provide a vital link in the overall supply chain to deliver incoming goods to an organization for resale or to manufacturing operations and provide an equally important link in the overall supply chain to deliver finished products to customers. Organizations must consider multiple modes of transportation to satisfy customer demand and remain competitive in the marketplace.

Common Learning Block 7 Learning Objectives

Upon completing this learning block, the learner will be able to:

- Define the various modes of transportation options
- Define the three transportation operations elements
- Understand the cost impact of selecting modal options

Common Learning Block 7 Overview



An appropriate way to understand the field of transportation operations is to consider the economic perspective: transportation involves the physical movement of people and goods between origin and destination points. From a business standpoint, transportation links partners and facilities that are separated geographically in a company's supply chain, such as customers, suppliers, distributors, plants, warehouses, and retail outlets. Transportation also provides the links between diverse entities spread across the global supply chain and connects the supply chain by moving inventory with trucks, trains, planes, ships, and pipelines. Any combination of two or more of these modes

to achieve a delivery requirement is called intermodal transportation.

Transportation operations involve ensuring the flow of inventory from points of origin in the supply chain to points of use and consumption. The three primary components in transportation operations are inbound, outbound, and reverse logistics. Inbound logistics supports the procurement of materials and goods from supplier locations, outbound logistics supports the distribution of materials and goods to customer locations, and reverse logistics supports product returns, recycling, reuse of materials, and waste disposal.

Transportation focuses on the timely movement of materials and products within and between organizations. In order to control costs, goods must move at the right time from the right place to the right place, while ensuring the correct product, quantity, and quality are ensured. When this is



achieved, inventory is reduced, which reduces expenses. Transportation operations have grown in complexity because the options for multiple (intermodal) modes of transportation—air, rail, truck, sea—and their combination can vary daily depending on a number of factors: cost, values, dimensions, weights, time-definite delivery requirements, and other factors like hazardous or refrigerated cargo.

For today's supply chain professional, it is essential to understand the roles of the different modes of commercial surface transportation (railways, road, water, pipeline), commercial modes of air transportation, and the selection criteria for operating carriers to move products in a cost- and time-efficient manner.

Common Learning Block 7 Practice Questions

1. The business of transportation is best defined by which of the following:
 - a. Choice of the least expensive mode
 - b. Selection of the fastest mode, regardless of cost
 - c. Partners and facilities separated geographically in a supply chain
 - d. The use of planes as the preferred mode
2. Intermodal transportation is best defined as:
 - a. Choosing the least expensive carrier
 - b. Interstate trucking
 - c. Using two or more modes to fulfill a delivery requirement
 - d. Container shipping
3. What does inbound logistics support?
 - a. Items within a regional boundary
 - b. The procurement of materials and goods from supplier locations
 - c. Delivery to a customer
 - d. Courier services
4. Which of the following is not recognized as a common mode of commercial transportation?
 - a. Ocean
 - b. Air
 - c. Road
 - d. Uber
5. Which of the following is not recognized as one of the three transportation operations components?
 - a. Emergency
 - b. Inbound
 - c. Outbound
 - d. Reverse





Common Learning Block 8: Customer Service Operations

Common Learning Block 8 Description

Organizations exist to satisfy customer demand and create value for customers; this must be at the center of all decision-making to enable a company to create jobs and ultimately generate profits. Companies focus on meeting customers' needs through disciplined customer service and by positioning themselves to outperform their competitors.

Common Learning Block 8 Learning Objectives

Upon completing this learning block, the learner will be able to:

- Understand customer service functions in a supply chain
- Define good customer service
- Explain how customer service can lead to customer satisfaction

Common Learning Block 8 Overview



While customer service is presented last in this learning blocks series, it actually threads its way throughout the supply chain. Customer service is essentially the delivery of customer satisfaction and covers all aspects of the supply chain. Customer service focuses on identifying and meeting customers' needs, wants, and expectations before, during, and after they buy products. It constantly interfaces with logistics and transportation to ensure products get to where they belong, on time.

Customer service also interfaces with operations, warehousing, and inventory, which assist in ensuring customers receive products when they need or want them while simultaneously managing inventory to control costs. The function of customer service is essential to any organization, whether in the private sector (e.g., manufacturers, wholesalers, retailers, carriers, and third-party logistics providers) or the public sector (e.g., government agencies, airports, ports, and terminals).

The demands have increased significantly, so it is crucial for anyone employed in supply chains to understand the key elements of customer service like distribution channels, e-commerce, brick and mortar stores, and reverse logistics. This function also requires individuals to understand the skills needed to handle customer complains effectively, address customer concerns, and communicate



consistently within organizations to satisfy customers. Within the modules of an ERP system or in standalone systems, customer service is supported by:

- Inventory stock status
- Customer contact management
- Sales force management
- Customer relationship management (CRM) systems

Customer service can be a discriminator for a company to maintain excellent customer satisfaction based on the processes for taking orders, resolving problems, and ensuring timely delivery.

Common Learning Block 8 Practice Questions

1. Customer service can be defined as:
 - a. Order takers and order entry
 - b. The delivery of customer satisfaction
 - c. Reverse logistics
 - d. Warranty extensions
2. When does customer service focus on customers?
 - a. When there is a problem
 - b. During annual forecasting meetings
 - c. Before, during, and after the sale
 - d. After the warranty period ends
3. Define the role of customer service with logistics and transportation.
 - a. Always demand the quickest mode without regard for cost
 - b. Customer service does not have a role in logistics and transportation
 - c. Use intermodal transportation for most shipments
 - d. To get products where they belong, on time
4. Customer service shares which goal with inventory management?
 - a. Maintain inventory to control costs
 - b. Customer service does not share a goal with inventory management
 - c. Ensure that all inventory in the warehouse is labeled
 - d. Measure picking accuracy
5. Customer service personnel do not typically require the skills to:
 - a. Address customer concerns
 - b. Effectively handle customer complaints
 - c. Communicate consistently
 - d. Prepare a detailed annual forecast



Common Learning Blocks Summary

Supply Chain Management needs to function to meet the needs of customers and achieve the goals of the organization; it is imperative the functions in the supply chain are integrated and employees understand their impact on others within this broader network. Companies have invested in comprehensive ERP systems, and today SCM is an integral part of the broader business; it is woven into the fabric of a business, not a standalone element operating in a vacuum.

SCM should be viewed as the integration of the major functions listed in Learning Blocks 2 through 8, beginning with Demand Planning. Careful study of each learning block will make clear that each of the functions has interdependencies and relationships that enable them to work within the end-to-end supply chain.

Common Learning Blocks Optional Supplemental Resources

The optional supplemental resources listed below may be used to reinforce the content covered within this learning block.

Cohen, S., & Roussel, J. (2013). *Strategic supply chain management: The five core disciplines for top performance* (2nd ed.). McGraw-Hill.

Dittmann, J. P. (2012). *Supply chain transformation: Building and executing an integrated supply chain strategy*. McGraw-Hill.

Simchi-Levi, D., Kaminsky, P., & Simchi-Levi, E. (2007). *Designing and managing the supply chain* (3rd ed.). McGraw-Hill.

References

Council of Supply Chain Management Professionals. CSCMP, (2014). Retrieved from <http://www.cscmp.org>



Practice Questions Answer Key

Common Learning Block # 1

1. C
2. A
3. A
4. A
5. B

Common Learning Block # 2

1. C
2. B
3. A
4. D
5. B

Common Learning Block # 3

1. C
2. C
3. A
4. D
5. B

Common Learning Block # 4

1. C
2. C
3. B
4. D
5. A

Common Learning Block # 5

1. B
2. C
3. A
4. C
5. D

Common Learning Block # 6

1. B
2. A
3. B
4. C
5. A

Common Learning Block # 7

1. C
2. C
3. B
4. D
5. A

Common Learning Block # 8

1. B
2. C
3. D
4. A
5. D



Common Learning Blocks Glossary

*: indicates terms coming, in part or in whole, from the Supply Chain Management Terms and Glossary from August 2013.

B

Best Practice*: A specific process or group of processes recognized as the best method(s) for conducting an action. Best practices may vary by industry or geography, depending on the environment being used. Best practices methodology may be applied with respect to resources, activities, cost objects, or processes.

C

Council of Supply Chain Management Professionals (CSCMP)*: A professional organization that supports the professional development of its worldwide membership.

CRM*: See *Customer Relationship Management*.

CSCMP*: See *Council of Supply Chain Management Professionals*.

Customer Contact Management: A system for managing a company's interactions with current and future customers.

Customer Relationship Management (CRM)*: Information systems that help sales and marketing functions, as opposed to Enterprise Resource Planning (ERP), which is for back-end integration.

Customer Service Operations: The delivery of satisfaction; it covers all aspects of the supply chain but is most often assigned to either logistics or sales.

D

Demand Planning*: The process of identifying, aggregating, and prioritizing sources of demand for the integrated supply chain of a product or service at the appropriate level, horizon, and interval.

E

End Customer: The final consumer who purchases a product or service.

Enterprise Resource Planning (ERP)*: A system that integrates financial, planning, and control systems into a single architecture that disseminates real-time information throughout an organization. Examples include Secure Access and Oracle.

ERP*: See *Enterprise Resource Planning*.

F

Forecasting*: Predictions of how much of a product will be purchased by customers; forecasting relies on both quantitative and qualitative methods.



I

Integration: Communication, coordination, and visibility within a company and with suppliers, customers, and service providers.

Inventory*: Components, raw materials, work in process, finished goods, and supplies required for the creation of goods and services. Inventory can also refer to the number of units or the value of a stock of goods held by a company.

Inventory Management*: The process of ensuring the availability of products through inventory administration.

Inventory Stock Status: The status of inventory at any given point.

L

Logistics*: The process of planning, implementing, and controlling procedures for the efficient and effective transportation and storage of goods, including services and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements.

Long-Term Supplier Relationships: Relations with suppliers that last for several years at a minimum.

M

Manufacturing and Service Operations: Controls the conversion of materials into products and services. In order to meet the needs of manufacturing as well as service delivery, there needs to be an accurate demand forecast.

Material Handling Systems: Short-distance movement of goods or materials within a storage area, such as loading, unloading, palletizing, etc.

O

Operations: The processes of manufacturing (converting) goods.

P

Procurement*: The activities associated with acquiring products or services.

R

Requirements Planning: A production planning, scheduling, and inventory control system used to manage manufacturing processes.

Reverse Logistics*: A specialized segment of logistics focusing on the movement and management of products and resources after delivery to the customer, typically for repair, warranty, or re-use purposes.

S

Sales Force Management: Information systems used in marketing and management that help automate sales and salesforce management functions.



SCM*: See *Supply Chain Management*.

Strategic Cost Management: Managing costs from a strategic or long-term rather than a tactical perspective.

Supplier Design Involvement: The process of involving the supplier in the product design process.

Supplier Development: Any activity undertaken by buyers to improve suppliers' performance or capabilities to meet the buyers' short- and long-term supply needs.

Supply Chain*: Starting with unprocessed raw materials and ending with the final customer using the finished goods, the supply chain links many companies together through material and informational interchanges in the logistical process that stretches from acquisition of raw materials to delivery of finished products to the end user. All vendors, service providers, and customers are links in the supply chain.

Supply Chain Management (SCM)*: The design and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Crucially, it also includes coordination and collaboration with channel partners, which can mean suppliers, intermediaries, third-party service providers, and customers.

Supply Management and Procurement: Global sourcing by finding materials from around the world in a timely and cost-efficient manner.

T

Tiers: The levels of the supply chain. For example, Ford makes and distributes automobiles to consumers. Firestone supplies tires to Ford's manufacturing plant. Ford is tier one, and Firestone is tier two; there can be as many tiers as needed.

Transportation Operations: Focus on the timely movement of materials and products within an organization and between organizations.

W

Warehouse Management System (WMS)*: The central brain of managing a warehouse and distribution center.

Warehousing Operations: Another function of logistics, warehousing controls the receiving, storing, retrieving, and distributing of inventory.

WMS*: See *Warehouse Management System*.



