Global Value Chain

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Contents

Introduction 1

Acknowledgements 3

Part I. Chapter 1: Introduction to Global Value Chain

1.1 Introduction 11

1.2 Components of Global Value Chain 14

1.3 Value Chain and International/Global Trade 23

1.4 Global Value Chain and Global Supply Chain 31

1.5 Summary 37

1.6 Key Terms, References, and Accessibility Descriptions 38

Part II. Chapter 2: Distribution Logistics

2.1 Introduction 51

2.2 Distribution Logistics 53

2.3 Inbound and Outbound Logistics 57

2.4 Logistics Cycle 67

2.5 Summary 72

2.6 Key Terms, References, and Accessibility Descriptions 73

Part III. Chapter 3: International Procurement

3.1 Introduction 87

3.2 Concept of Procurement and its Value in the Global Value Chain 89

3.3 Sourcing and Outsourcing of Goods, Manufacturing and Services 94

3.4 Suppliers 103

3.5 Supplier Relationships and The Global Value Chain 107

3.6 Summary 110
3.7 Key Terms, References, and Accessibility Descriptions 111

Part IV. Chapter 4: Transportation

4.1 Introduction 127
4.2 Modes of Transportation 130
4.3 Importance of Containers in International Transportation 137
4.4 International Transport Network 142
4.5 Transportation and the Global Value Chain 146
4.6 Summary 152
4.7 Key Terms, References, and Accessibility Descriptions 153

Part V. Chapter 5: Inbound and Outbound Storage Facilities

5.1 Introduction 169
5.2 Inbound and Outbound Storage 172
5.3 Warehousing 177
5.4 Demand Planning, Inventory Management & Control 184
5.5 Summary 198
5.6 Key Terms, References, and Accessibility Descriptions 199

Part VI. Chapter 6: Facilitating International Freight Flows

6.1 Introduction 213
6.2 Incoterms Rules 215
6.3 Trade Facilitation and Promotion 219
6.4 Trade Harmonization 228
6.6 Key Terms, References, and Accessibility Descriptions 233
6.5 Summary 242

Part VII. Chapter 7: Value Chain Vulnerability

7.1 Introduction 245
7.2 Value Chain Vulnerability and Current Challenges 247
7.3 Types of Risks and Disruptions 251
7.4 Risk Management Strategies to Mitigate the Supply Chain Vulnerability 259
7.5 Summary 266
7.6 Key Terms, References, and Accessibility Descriptions 267

Part VIII. Chapter 8: Sustainable Value Chains

8.1 Introduction 279
8.2 Defining Sustainable Value Chain 283
8.3 Circular Economy 289
8.4 Initiatives to Make Sustainable Supply Chains 295
8.5 Main Dimensions of Sustainability in the Global Value Chain 300
8.6 Key Sustainability Challenges in Value Chains 302
8.7 Summary 308
8.8 Key Terms, References, and Accessibility Descriptions 309

Part IX. Chapter 9: Emerging Value Chain Concepts

9.1 Introduction 329
9.2 Reverse Logistics 331
9.3 ICT and the Global Value Chain 341
9.4 Value Stream Mapping 347
9.5 Humanitarian Logistics 352
9.6 Summary 359
9.7 Key Terms, References, and Accessibility Descriptions 360

Introduction

Welcome

Welcome to Global Value Chain Digital Text Open Educational Resource (OER). This resource is intended for learners preparing for positions in International Business and Supply Chain Management settings. The global value chain connects two extremes of the international trade world – Suppliers with Customers; and identifies how value can be added in the steps involved throughout the supply chain process. This book discusses the logistics cycle in detail and cover topics such as Distribution Logistics, Procurement, Sourcing and Outsourcing, Transportation, Inventory Management, Material Handling, Warehousing, Incoterm Rules, Trade Facilitation and Promotion, Vulnerability in global value chains, Sustainable value chains, Reverse Logistics, Role of ICT in value chain and Humanitarian Logistics. This is just a comprehensive list, there are other relevant and recent concepts included in the book to enhance readers knowledge about International Business, International Trade, Logistics and Supply Chain Management and Global Value Chain.

Accessibility Statement

Please review Conestoga College's Accessibility Statement for OER Projects.

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Kiranjot Kaur, MBA, Ph.D. is a professor of the Business – International Business program at Conestoga College. She is a doctorate in Business Administration with International Economics and Trade as a major research area. She was offered a fellowship to pursue and complete her doctorate for her excellence in research. She completed her Master in Business Administration (MBA) degree with Distinction as well. Kiranjot Kaur has always been recognized for her participation and paper presentations in International Conferences. She has authored a book titled 'Competitiveness and Complementarities in

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~ Iuliia Kau

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Disclaimer

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PART I

CHAPTER 1: INTRODUCTION TO GLOBAL VALUE CHAIN

1.1 Introduction

Learning Objectives

After reading this chapter, you should be able to understand and answer the following questions:

1. Define the term value chain, global value chain and outline its components.
2. Highlight the importance of international trade process, stakeholders and documents in understanding the concept of global value chain.
3. Examine the relationship between global value chain and global supply chain management.

Introduction

It is easy to think that trade is just about business interests of different countries. But in real, global trade is much more. There is a convergence and, at times, a conflict of the interests of different **stakeholders** — from businesses to governments to local citizens. In recent years, advancements in technology, a renewed enthusiasm for **entrepreneurship**, and a global sentiment that favors free trade have further connected people, businesses, and markets—all flatteners that are helping expand global trade and investment. An essential part of international business is understanding the history of international trade and what motivates countries to encourage or discourage trade within their borders. In this chapter, we will look at the concept of international trade, its process, stakeholders and documents. This chapter will also provide an introduction to the concept and role of global value chains and their relation with supply chain management.

Assessing What you Already Know

Read through the following case which will help in building a framework for our discussion in further sections.

Opening Case: Q-Cells

Q-Cells exemplifies the successes and challenges of global importing and exporting. Founded in Germany in 1999, by 2010, it was experiencing losses due, in part, to mistiming some of the entry strategies.

Figure 1.1

Q-Cells



Note. Q-CELLS. From Wikimedia Commons, 2019. CC BY-SA 4.0.

First, it's important to know that Germany is a high-cost manufacturing country compared to China or Southeast Asia. On the other hand, Germany is known for its engineering prowess. Q-Cells gambled that customers would be willing to pay a premium for German-made solar panels. The trouble was that solar cells aren't that sophisticated or complex to manufacture, and Asian competitors were able to provide reliable products at 30 percent less cost than Q-Cells.

The Cost Advantage

Q-Cells recognized the Asian cost advantage—not only are labor and utility costs lower in Asia, but so are the selling, general, and administrative (SG&A) costs. What's more, governments like China provide significant tax breaks to attract solar companies to their countries. So, Q-Cells opened a manufacturing plant in Malaysia. Once the Malaysian plant is fully ramped up, the costs to manufacture solar cells there will be 30 percent less than at the Q-Cells plant in Germany.

Then, Q-Cells entered into a joint venture with China-based LDK, in which Q-Cells used LDK silicon wafers to make its solar cells. The two companies also used each other's respective expertise to market their

products in China and Europe (Kessler,2009). Although the joint venture gave Q-Cells local knowledge of the Chinese market, it also locked Q-Cells into buying wafers from LDK. These wafers were priced higher than those Q-Cells could source on the spot market. As a result, Q-Cells was paying about 20 cents more for its wafers than competitors were paying. Thus, in the short term, the joint venture hurt Q-Cells. However, the company was able to renegotiate the price it would pay for LDK wafers.

To stay cost competitive, Q-Cells has decided to **outsource** its solar-panel production to contract manufacturer Flextronics International. Q-Cells' competitors, SunPower Corp. and BP's solar unit, also have outsourced production to contract manufacturers. The outsourcing has not only saved manufacturing costs but also brought the products physically closer to the Asian market where the greatest demand is currently. This has reduced the costs of shipping, breakage, and inventory carrying (Walet, 2012).

Media Attributions and References

Q CELLS. (2019, March 2). *Solar module manufacturing plant in Dalton, Georgia, USA* [Photograph]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Hanwha_Q_CELLS_Dalton_J_023.jpg. CC BY-SA 4.0 International.

World101. (2019, June 18). *International trade explained | World101* [Video]. YouTube. https://www.youtube.com/watch?v=HfN8BnRJryQ

1.2 Components of Global Value Chain

Learning Objective

1. Define the term value chain, global value chain and outline its components.

Global Value Chain

In 1985, Michael E. Porter introduced the term 'Value Chain' in his book "Competitive Advantage: Creating and Sustaining Superior Performance". Since then, this concept has been used extensively by organizations to improve their functionality and operations. The concept of 'Value Chain' stressed on the importance of 'Competitive Advantage' or being different and superior from competitors. Thus, value chain identifies how value is added throughout the creation of the final good or service produced and how operational activities costs represent a proportion of the final sale price of the good or service (Business Faculty from Ontario Colleges and eCampus Ontario Program Managers, 2018).

Global Value Chain is when an organization does the full range of activities including supply, production, marketing, sales, distribution, and support to the end consumer, across geographical locations to gain competitive advantage.

In simple words, when a company involves into international trade and divide it's operations across countries, they participate in global value chain.

Video:
Cocoa: a Sweet Value Chain (8:53)

Let's look at this example of Cocoa production that explains how global value chain works to successfully convert cocoa beans (raw material) into chocolate (final product). It will also introduce you to some of the safety measures taken to keep food products safe, which will be discussed in detail in further chapters.

Media 1.2. Cocoa: A Sweet Value Chain [Video]. STDF. (URL: https://youtu.be/5UAnYcqQTR4)

We live in a global marketplace. The food on your table might include fresh fruit from Chile, cheese from France, and bottled water from Scotland. The clothes you wear might be designed in Italy and manufactured in China. The toys you give to a child might have come from India (Greenlaw and Shapiro, 2017). Have you ever wondered how is it possible that the products manufactured around the world are available in your nearby supermarket? The answer to such questions is International Trade. Global Trade allows countries to expand their markets and access the products which are not available domestically.

Just Whose iPhone is This?

The iPhone is a global product. Apple does not manufacture iPhone components, nor does it assemble them. The assembly is done by Foxconn Corporation, a Taiwanese company, at its factory in Sengzhen, China. But, Samsung, the electronics firm and competitor to Apple, actually supplies many of the parts that make up an iPhone—representing about 26% of the costs of production. That means, that Samsung is both the biggest supplier and biggest competitor for Apple. Why do these two firms work together to produce the iPhone? To understand the economic logic behind international trade, you have to accept, as these firms do, that trade is about mutually beneficial exchange. Samsung is one of the world's largest electronics parts suppliers. Apple lets Samsung focus on making the best parts, which allows Apple to concentrate on its strength — designing elegant products that are easy to use. If each company (and by extension each country) focuses on what it does best, there will be gains for all through trade (Greenlaw and Shapiro, 2017).

Global value chains (GVCs) have brought about revolutionary changes in international trade, industrialization, and economic development. The GVC story is still rapidly

unfolding, as vividly demonstrated by the supply chain crisis, particularly for semiconductors and other components, that broke out during the COVID-19 pandemic, causing further anxiety (Global Value Chain Development Report, 2021).

Positioning Economies in Global Value Chains

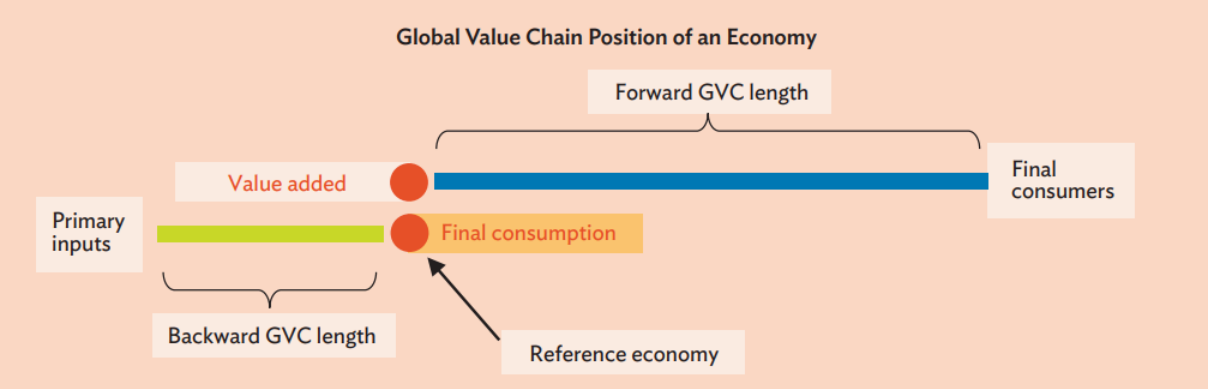
With the rise of global value chains (GVCs), patterns of specialization have expanded to cover not only products but also tasks. Indeed, gross trade statistics may lead to the conclusion that an economy has a **product specialization** when in fact it has a **functional specialization**.

A case in point is developing countries with major electronics exports, such as the Philippines. These **economies** do not specialize in electronics per se, but in a particular segment in the electronics value chain (Timmer, Miroudot, and de Vries 2019).

Figure 1.2 shows since the forward GVC length is noticeably longer than the backward GVC length, this economy is said to be positioned relatively upstream in GVCs.

Figure 1.2

Global Value Chain Position of an Economy



Note. From Alvarezet al., 2021, p. 11. CC BY-NC 3.0 IGO [Image description].

Components of Value Chain

The concept of Value Chain is used as an **internal assessment tool** to help a firm determine where it might be able to achieve a competitive advantage and answering questions as:

- In which areas of the primary and secondary activities is the firm particularly strong?
- Can that activity be leveraged to provide a competitive advantage over its rivals?

Figure 1.3 below describes the value chain framework given by Michael Porter.

Figure 1.3

The Value Chain by Porter



Note. From Kennedy, 2020, Section 4.5. CC BY-NC-SA 4.0. [Image description].

The Value Chain includes both Primary and Secondary Activities. **Primary activities**are actions that are directly involved in creation and distribution of goods and services. There are five primary activities in Porter's Value Chain namely Inbound Logistics,

Operations, Outbound Logistics, Marketing & Sales and Services. **Secondary activities**are not directly involved in the **evolution** of a product, but instead provide important underlying support for primary activities. Four activities are attributed as Secondary in Porter's Value Chain namely Infrastructure, Human Resource Management, Technological Development and Procurement. These primary and secondary activities work together to produce a profit margin for the firm.

Video:
Porter's Value Chain: How to Create Value in your Organization (3:23)

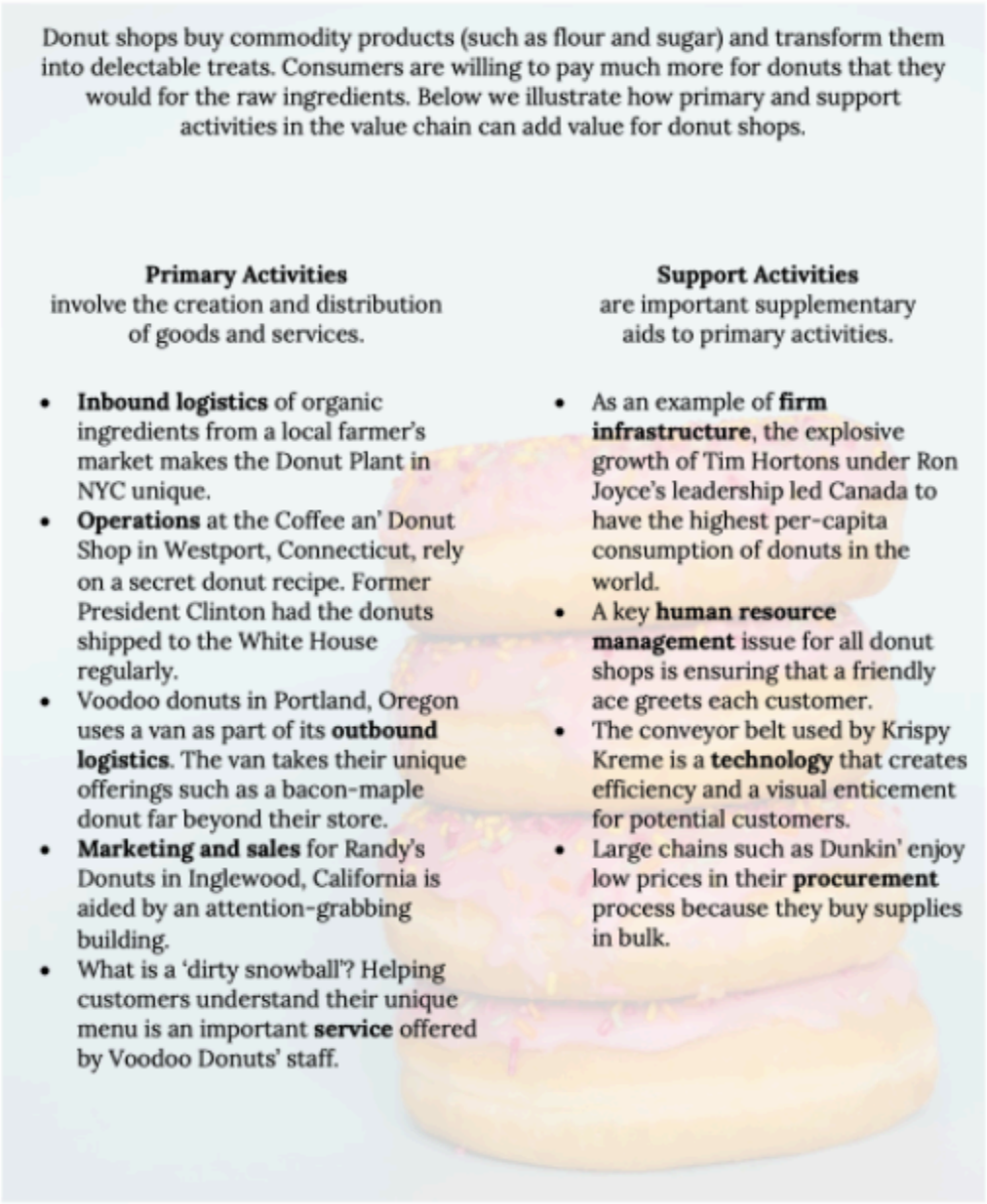
Let's watch this video to learn about Primary and Support activities and sub-activities, and how they affect each other. Also, how costs of creating value can be reduced, so that profit margin can grow.

Media 1.3. Porter's Value Chain: How to Create Value in Your Organization [Video]. MindToolsVideos. (URL: https://youtu.be/aeshYi6lj2Y)

Let's try to understand these activities from a very simple example of doughnut shops. Doughnut shops transform basic commodity products such as flour, sugar, butter, and grease into delectable treats. Value is added through this process because consumers are willing to pay much more for doughnuts than they would be willing to pay for the **underlying ingredients**. Figure 1.4 explains in detail how value is added while making donuts.

Figure 1.4

Adding Value Within a Donut Value Chain



Note. Kennedy, R., 2020, Section 4.5. CC BY-NC-SA 4.0.[Image description].

Primary Activities

Primary Activities are essential for creating value and Competitive Advantage. There are five components of primary activities:

1. **Inbound Logistics:** Inbound logistics refers to the arrival of raw materials. Although

doughnuts are seen by most consumers as notoriously unhealthy, the Doughnut Plant in New York City has carved out a unique **niche** for itself by obtaining organic ingredients from a local farmer's market.

2. **Operations:** Operations refers to the actual production process. Operations at the Tim Horton's or other such restaurants are **trade secrets**. It's nearly impossible to make a coffee that tastes like Tim Horton's French Vanilla at home unless you have coffee powder from Tim Horton's.
3. **Outbound Logistics:** Outbound logistics tracks the movement of finished products to customers. For instance, one of Southwest Airlines' **unique capabilities** is moving passengers more quickly than its rivals. This advantage in operations is based in part on Southwest's reliance on one type of airplane (which speeds maintenance) and its avoidance of advance seat assignments (which accelerates the passenger boarding process).
4. **Marketing and Sales:** Attracting potential customers and convincing them to make purchases is the domain of marketing and sales. For example, people cannot help but notice Randy's Donuts in Inglewood, California, because the building has a giant doughnut on top of it.
5. **Services:** Service refers to the extent to which a firm provides assistance to their customers. Voodoo Donuts in Portland, Oregon, has developed a clever website (voodoodoughnut.com) that helps customers understand their uniquely named products, such as the Voodoo Doll, the Texas Challenge, the Memphis Mafia, and the Dirty Snowball.

Secondary Activities:

Secondary/ Support Activities helps primary activities to work efficiently. There are four components of secondary activities.

1. **Firm Infrastructure:** Firm infrastructure refers to how the firm is organized and led by **executives**. The effects of this organizing and leadership can be profound. For example, Ron Joyce's leadership of Canadian doughnut shop chain Tim Hortons was so successful that Canadians consume more doughnuts per person than all other countries. In terms of resource-based theory, Joyce's leadership was clearly a valuable and rare resource that helped his firm prosper.
2. **Human Resource Management:** Human resource management is also important.

Human resource management involves the recruitment, training, and compensation of employees. A recent research used data from more than twelve thousand organizations to demonstrate that the knowledge, skills, and abilities of a firm's employees can act as a strategic resource and strongly influence the firm's performance (Crook et al., 2011). Certainly, the unique level of dedication demonstrated by employees at Southwest Airlines has contributed to that firm's excellent performance over several decades.

3. **Technology:** Technology refers to the use of computerization and telecommunications to support primary activities. Although doughnut making is not a high-tech business, technology plays a variety of roles for doughnut shops, such as allowing customers to pay using credit cards.
4. **Procurement:** Procurement is the process of negotiating for and purchasing raw materials. Large doughnut chains such as Dunkin' and Krispy Kreme can gain cost advantages over their smaller rivals by purchasing flour, sugar, and other ingredients in bulk. Meanwhile, Southwest Airlines has gained an advantage over its rivals by using futures contracts within its procurement process to minimize the effects of rising fuel prices.

More Value Chain Examples

Would you like to know about value chain of Canadian Pacific Railways and Apple. Review these resources:

- How to perform a Value Chain Analysis (explained with Example)?
- A Simple Guide to Value Chain Analysis: How to build more Efficient Sales Processes.

Check Your Understanding

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Check your Understanding: Global Value Chain

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 1.7.

Media Attributions and References

Alvarez, J. B., Baris, K. V., Crisostomo, Ma. C. R., de Vera, J. P., Gao, Y., Garay, K. V., Gonzales, P. B., Jabagat, C. J., Juani, A. S., Lumba, A. B., Mariasingham, M. J., Meng, B., Rahnema, L. C., Reyes, K. S., San Pedro, M. P., & Yang, C. (2021, November). Recent trends in global value chains. In *Global Value Chain Development Report 2021: Beyond Production*. World Trade Organization. https://www.wto.org/english/res_e/booksp_e/00_gvc_dev_report_2021_e.pdf

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STDF. (2016, May 27). *Cocoa: A sweet value chain* [Video]. YouTube. https://youtu.be/5UAnYcqQTR4

1.3 Value Chain and International/ Global Trade

Learning Objective

2. Highlight the importance of international trade process, stakeholders, and documents in understanding the concept of global value chain.

Process of International Trade

Let's assume there is an **importer** in Canada who wants to purchase finished goods from outside world to take advantages of International trade and their search ends with an **exporter** in India who sells exactly the kind of product they want. So, they communicate with one another and agree on buying and selling.

Once they agree on terms and conditions and sign sales contract, **exporter** will start product manufacturing so they can deliver products to the **importer** on agreed time. The **exporter** uses local transportation to deliver products to the port of origin where exporter's products encounter export customs. Export Customs check the goods on complete documentation and clear the goods to the port authorities. Then the goods are loaded onto the main transportation vehicle which could be ship, airplane, truck or rail that will take exporter's product to the port of destination. At the port of destination, goods will encounter import customs. Import customs will again check the goods on complete documentation and clear them depending upon documentation status. These goods will travel to importer's warehouse using local transportation and at last **importer** will have access to the requested goods which he can sell and make profits.

Please note that the actual import-export process includes many other steps and considerations. Here, the process is explained in simplified terms for educational purposes.

Video: Process of International Trade (1:44)

Watch the video to understand international trade process.

Media 1.4. *Process of International Trade* [Video]. Kiranjot Kaur Walia. (URL: https://youtu.be/gsbDZ3EYQ6E)

On the basis of information shared in the video, we can say that there are five main steps in International Trade:

1. Exporters
2. Export Customs
3. Transportation
4. Import Customs
5. Importers

For the rest of the book, we will keep these five steps in our mind to understand different concepts in Global Value Chain.

Stakeholders/ Parties in International Trade

Just as it takes many parts to make an international business run smoothly, there are many people, organizations, and entities that have a "stake" in the success of a business. In this section we'll take a look at who these stakeholders are and how they affect business. The impact of a business on its stakeholders is a bit like the effect of dropping a stone into a pond. The decisions and actions of the business have a ripple effect that can extend beyond the pond and even reach those who are standing far away on the

shore. The size of exports in the world grew from less than $100 million after World War II to well over $11 trillion today. Export and import is big business, but it isn't just for big businesses. Most of the participants are small and midsize businesses, making this an exciting opportunity for entrepreneurs.

The main parties involved in export and import transactions are the exporter, the importer, and the carrier. The **exporter** is the person or entity sending or transporting the goods out of the country. The **importer** is the person or entity buying or transporting goods from another country into the importer's home country. The **carrier/ transportation provider** is the entity handling the physical transportation of the goods. Well-known carriers across the world are United Parcel Service (UPS), FedEx, and DHL.

Customs administration offices in both the home country and the country to which the item is being exported are involved in the transaction. In the United States, the US Customs Service became the US Bureau of Customs and Border Protection (CBP) after the terrorist attacks on September 11, 2001. The mandate now isn't simply to move goods through customs quickly and efficiently to facilitate international trade; it also ensures that the items coming into the United States are validated and safe as well. Canada's Custom administration department is called Custom and Border Security agency (CBSA).

Video: What is the Canada Border Services Agency? (1:04)

Watch the media clip and visit the website Canada Border Services Agency to know more about what Canadian Custom and Border Security Agency does. Scroll down on the website and review all components of Services and Information: Trade tab components.

Media 1.5. What is the Canada Border Services Agency [Video]. canadameetings. (URL: https://youtu.be/jKrxBUjoTcI)

Cooperation for Security

The World Customs Organization (WCO) created a framework that calls for cooperation between the customs administrations of different countries. Under the WCO Framework of Standards to Secure and Facilitate Global Trade, if a customs administration in one country identifies problems in cargo from another country, that customs administration could ask the exporting country to do an inspection before goods are shipped. Businesses across the world benefit (in terms of speed and cost) if there is one common set of security standards globally, and the WCO is working toward that goal.

Other Intermediaries in International Trade

In addition to the main players described above, intermediaries can get involved at the discretion of the importer or exporter. Entrepreneurs and small and midsize businesses, in particular, make use of these intermediaries, rather than expending their resources to build these capabilities in-house.

A **freight forwarder** typically prepares the **documentation**, suggests shipping methods, navigates trade regulations, and assists with details like packing and labeling. At the foreign port, the freight forwarder arranges to have the exported goods clear customs and be shipped to the buyer. The process ends with the freight forwarder sending the **documentation** to the seller, buyer, or intermediary, such as a bank.

An **export management company** (EMC), an independent company performs the duties a firm's export department and handles the necessary **documentation**, finds buyers for the export, and takes title of the goods for direct export. In return, the EMC charges a fee or a commission for its services.

Banks perform the vital role of finance transactions. Along with providing finance to primary parties in international trade, they also help in mitigating risks.

Did You Know?

Standard Chartered Bank Mitigated Risk by Duplicating Operations in Chennai and Kuala Lumpur. As you can imagine, banks are very concerned about security because of the highly confidential customer information . As a result, some banks try to mitigate the risks by setting up mirror sites. Standard Chartered Bank, for instance, chose Chennai in South India as the hub for its Scope International operations. Still some of the tasks are also done in Kuala Lumpur in Malaysia: "Because we run the operations of 52 countries, we have to satisfy information security and business continuity issues in all locations," says Sreeram Iyer, Group Head, Global Shared Services Centers, Standard Chartered Scope International at the time of the decision. "Kuala Lumpur backs up the Chennai center and vice versa".

Trade Documentation

Importing and exporting require much **documentation** (i.e., filing official forms) to satisfy the regulations of countries invoved. The value of the **documentation** is that it enables trade between entities who don't know each other. The parties are able to trust each other because the documentation provides a common framework and process to ensure that each party will do what they say in the import/export transaction. Various forms of **documentation** are required for import and export transactions.

The **bill of lading** is the contract between the exporter and the carrier (e.g., UPS or FedEx), authorizing the carrier to transport the goods to the buyer's destination. The **bill of lading** acts as proof that the shipment was made and that the goods have been received.

A **commercial or customs invoice** is bill for the goods shipped from exporter to importer/buyer. **Exporters** send invoices to receive payment, and governments use these invoices to determine the value of the goods for customs-valuation purposes.

Did You Know?

IBM does business with 160 countries. Daily, it sends 2,500 customs declarations and ships 5.5 million pounds of products worth $68 million.

The **export declaration** is given to customs and port authorities. The declaration provides the contact information for both the **exporter** and the **importer** (i.e., buyer) as well as a description of the items being shipped, which the custom department uses to verify and control the exports. The government also uses the information to compile statistics about exports from the country.

Humorous Anecdote

Customs regulations in some countries—particularly emerging-market countries—may impede or complicate international trade. A study of the speed and efficiency of items getting through customs in different countries found that it can take anywhere from three to twenty-one days to clear incoming goods. This variation causes problems because companies can't plan on a steady flow of goods across the border. Some countries have customs idiosyncrasies. In Brazil, for example, no goods move within the country on soccer game days and documents that are not signed in blue ink will incur delays for their accompanying goods.

The **certificate of origin**, as its name implies, declares the country from which the product originates. These certificates are required for import duties. These import duties are lower for countries that are designated as a "most favored nation."

Certificate of Origin as Marketing Tool

Not all governments or industries require certificates of origin to be produced, but some companies are seeing that a certificate of origin can be used for **competitive advantage**. For example, Eosta, an importer of organic fruit, puts a three-digit number on each piece of fruit. Nature & More customers can type in that

number and get a profile of the farmer who grew the fruit, getting a glimpse into that farmer's operations. For example, Fazenda Tamanduá, a farm in Brazil, grows mangoes using a variety that needs less water to grow and a drip-irrigation system that optimizes water use. This database gives customers a way to learn about growers and provides a way for growers and others to share what they learn. Providing this type of certification to customers differentiates Eosta products and makes them more attractive to sustainability-minded consumers.

Although not required, **insurance certificates** show the amount of coverage on the goods and identify the **merchandise**. Some contracts or invoices may require proof of insurance in order to receive payment.

Some governments require the purchase of a **license** (i.e., permission to export) for goods due to national security or product scarcity. Interestingly, licenses for import and export date back to the 1500s at least, when Japan required a system of licenses to combat the smuggling of goods taking place (Manresa, 2010).

Impact of Trade Agreements

Trade agreements impact the particulars of doing business. For example, the former North American Free Trade Agreement (NAFTA) (now USMCA – US- Mexico- Canada Agreement) makes Mexico different from other Latin American countries due to the ease of movement of goods between that country and the United States. Changes in agreements can affect the competitiveness of different countries. When China joined the World Trade Organization (WTO), the rapid elimination of tariffs and quotas on textiles harmed US makers.

The **letter of credit** is a legal document issued by a bank at the importer's (or buyer's) request. The **importer** promises to pay a specified amount of money when the bank receives documents about the shipment. Simply put, the letter of credit is like a loan against collateral (in this case, the goods being shipped) in which the funds are placed in an **escrow** account held by the bank. Letters of credit are trusted forms of payment in international trade because the bank promises to make the payment on behalf of the **importer** (i.e., buyer) and the bank is a trusted entity. Given that the letter of credit is like

a loan, getting one issued from the bank requires proof of the importer's (or buyer's) ability to pay the amount of the loan.

Video: Required Documents for International Shipping (2:08)

Watch this video that summarizes different documents required while shipping internationally.

Media 1.6. *Required Documents for International Shipping* [Video]. Exfreight. (URL: https://youtu.be/FewozrREymU)

1.4 Global Value Chain and Global Supply Chain

Learning Objective

3. Examine the relationship between global value chain and global supply chain management.

From the Value Chain to Best Value Supply Chain

"Time is money!" warns a famous saying. This simple yet profound statement suggests that organizations that quickly complete their work will enjoy greater profits, while slower-moving firms will suffer. The belief that time is money has encouraged the modern emphasis on supply chain management. A **supply chain** is a system of people, activities, information, and resources involved in creating a product and moving it to the customer.

Supply chain is a broader concept than value chain; the latter refers to activities within one firm, while the former captures the entire process of creating and distributing a product, often across several firms.

Supply-chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and logistics. 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.

Activities in the supply chain include:

- demand management (e.g., forecasting, pricing, and customer segmentation),
- procurement (e.g., purchasing, supplier selection, and supplier-base rationalization),

- inventory management (e.g., raw materials and finished goods),
- warehousing and material handling,
- production planning and control (e.g., aggregate planning, workforce scheduling, and factory operations),
- packaging (i.e., industrial and consumer),
- transportation management,
- order management,
- distribution network design (e.g., facility location and distribution strategy), and
- product-return management.

Spotlight on International Strategy and Entrepreneurship: Entrepreneurial Innovation at P&G

In 2002, Procter & Gamble (P&G) created a test factory, called the Garage, in Vietnam to experiment with low-cost diaper manufacturing for emerging markets. This factory was different from P&G's US-based factories because it didn't use high-tech, automation-intensive manufacturing processes. Rather, P&G wanted a low-cost, low-tech solution. The factory helped P&G devise a new, low-cost approach to manufacturing in emerging-market countries. The strategy required finding local suppliers, some of whom wouldn't have been acceptable for other P&G products but were suitable for this one. P&G formed a network of 150 low-cost machine builders who could supply manufacturing equipment to P&G's Vietnam factory. This manufacturing equipment was appropriate for emerging-market sites and emerging-market prices. The equipment was not on par to P&G's US-based manufacturing equipment, but P&G could use it in other countries and in other product lines. For example, P&G took the lessons and machine-building know-how it had learned from making low-cost diapers in Asia and applied it to reducing the costs of making feminine pads in Mexico. In transferring this know-how from one country to the next, P&G reduced the costs of its feminine pads in Mexico by 20 percent.

P&G has gone a step further and brought its results back home to the United States in two ways. First, thanks to the North American Free Trade Agreement (NAFTA), P&G can import its low-cost feminine pads from Mexico back into the United States. Second, P&G now sees an opportunity to give a second life to obsolete plants in the United States. The experience P&G has gained in emerging markets has taught the company that not every product in every market needs the latest and greatest approaches to manufacturing in order to be successful. P&G's experience with its Vietnamese factory has given it a scalable approach, which has enabled P&G to make diapers and other similar personal-care products in many different emerging-market countries using widely available, low-cost manufacturing equipment.

Competition in the 21st century requires an approach that considers the supply chain

concept in tandem with the value-creation process within a firm: **best value supply chains**. These chains do not fixate on speed or on any other single metric. Instead, relative to their peers, best value supply chains focus on the total value added to the customer.

Creating best value supply chains requires four components. The first is **strategic supply chain management** — the use of supply chains as a means to create **competitive advantages** and enhance firm's performance. Such an approach contradicts the popular wisdom centered on the need to maximize speed. Instead, there is recognition that the fastest chain may not satisfy customers' needs. Best value supply chains strive to excel along four measures:

- **Speed (or "cycle time")** is the time duration from initiation to completion of the production and distribution process.
- **Quality** refers to the relative reliability of supply chain activities.
- Supply chains' efforts at managing **cost** involve enhancing value by either reducing expenses or increasing customer benefits for the same cost level.
- **Flexibility** refers to a supply chain's responsiveness to changes in customers' needs. Through balancing these four metrics, best value supply chains attempt to provide the highest level of total value added.

Did You Know?

The value of Strategic supply chain management is reflected in how firms such as Walmart have used their supply chains as competitive weapons to gain advantages over peers. Walmart excels in terms of speed and cost by locating all domestic stores within one day's drive of a warehouse while owning a trucking fleet. This creates distribution speed and economies of scale that competitors simply cannot match. When Kmart's executives decided in the late 1990s to compete head-to-head with Walmart on price, Walmart's sophisticated logistics system enabled it to easily withstand the price war. Unable to match its rival's speed and costs, Kmart soon plunged into bankruptcy. Walmart's supply chains also possess strong quality and flexibility. When Hurricane Katrina devastated the Gulf Coast in 2005, Walmart used not only its warehouses and trucks but also its satellite technology, radio frequency identification (RFID), and global positioning systems to quickly divert assets to affected areas. The result was that Walmart emerged as the first responder in many towns and provided essentials such as drinking water faster than local and federal governments could.

Meanwhile, failing to manage a supply chain effectively causes serious harm. For example, in 2003 Motorola

was unable to meet demand for its new camera phones because it did not have enough lenses available. Also, firms whose supply chains were centered in the Port of Los Angeles collectively lost more than $2 billion a day during a 2002 workers' strike. In terms of stock price, firms' market value erodes by an average of 10 percent following the announcement of a major supply chain problem.

The second component is **agility**, the supply chain's relative capacity to act rapidly in response to dramatic changes in supply and demand (Lee, 2004). Agility can be achieved using buffers. Excess capacity, inventory, and management information systems all provide buffers that better enable a best value supply chain to service and to be more responsive to its customers. Rapid improvements and decreased costs in deploying information systems have enabled supply chains in recent years to reduce inventory as a buffer. Much popular thinking depicts inventory reduction as a goal in and of itself. However, this cannot occur without corresponding increases in buffer capacity elsewhere in the chain, or performance will suffer. A best value supply chain seeks to optimize the total costs of all buffers used. The costs of deploying each buffer differs across industries; therefore, no solution that works for one company can be directly applied to another in a different industry without adaptation.

Agility in a supply chain can also be improved and achieved by collocating with the customer. This arrangement creates an information flow that cannot be duplicated through other methods. Daily face-to-face contact for supply chain personnel enables quicker response times to customer demands due to the speed at which information can travel back and forth between the parties. Again, this buffer of increased and improved information flows comes at an expense, so executives seeking to build a best value supply chain will investigate the opportunity and determine whether this action optimizes total costs.

Adaptability refers to a willingness and capacity to reshape supply chains when necessary. Generally, creating one supply chain for a customer is desired because this helps minimize costs. Adaptable firms realize that this is not always a best value solution, however. For example, in the defense industry, the U.S. Army requires one class of weapon simulators to be repaired within eight hours, while another class of items can be repaired and returned within one month. To service these varying requirements efficiently and effectively, Computer Science Corporation (the firm whose supply chains maintain the equipment) must devise adaptable supply chains. In this case, spare parts

inventory is positioned in proximity to the class of simulators requiring quick turnaround, while the less-time-sensitive devices are sent to a centralized repair facility. This supply chain configuration allows Computer Science Corporation to satisfy customer demands while avoiding the excess costs that would be involved in localizing all repair activities.

In situations in which the interests of one firm in the chain and the chain as a whole conflict, most executives will choose an option that benefits their firm. This creates a need for alignment among chain members. **Alignment** refers to creating consistency in the interests of all participants in a supply chain. In many situations, this can be accomplished through carefully writing incentives into contracts. Collaborative forecasting with suppliers and customers can also help build alignment. Taking the time to sit together with value chain stakeholders to agree on anticipated business plans by shared understanding and rapid information transfers between parties facilitate alignment. This is particularly valuable when customer demand is uncertain, such as in the retail industry (Ketchen et al., 2008).

Video: Comparing Value Chain and Supply Chain

Watch this video to know more about the differences between value chain and supply chain.

Media 1.7. *Comparing Value Chain and Supply Chain* [Video]. QStock Inventory. (URL: https://youtu.be/MC_hByD8nBY)

Check your Understanding

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Check your Understanding: Value Chain and Supply Chain

Interactive activity unavailable in this format

Text-based alternative. to interactive activity available in Chapter 1.7

Media Attributions and References

QStock Inventory. (n.d.). *Comparing value chain and supply chain* [Video]. YouTube. https://www.youtube.com/watch?v=MC_hByD8nBY

1.5 Summary

In this chapter, you were introduced to the terms Value Chain, Global Value Chain, International Trade Process, Stakeholders and Documentation. Relationship between Value Chain and Supply Chain was also discussed. The value chain provides a useful tool for managers to examine systematically where value may be added to their organizations. This tool is useful in that it examines key elements in the production of a good or service, as well as areas in which value may be added in support of those primary activities. The Primary participants in international trade are exporters and importers which take help of carriers, freight forwarders, banks, insurance companies etc. to function efficiently. Essential documents for importing and exporting include the bill of lading, which is the contract between the exporter and the carrier; the export declaration, which the customs office uses to verify and control the export; and the letter of credit, which is the legal document in which the importer promises to pay a specified amount of money to the exporter when the bank receives proper documentation about the shipment. In regard to relationship between value chain and supply chain, supply chain is a broader concept than value chain; the latter refers to activities within one firm, while the former captures the entire process of creating and distributing a product, often across several firms.

1.6 Key Terms, References, and Accessibility Descriptions

Key Terms

Adaptability: A willingness and capacity to reshape supply chains when necessary.

Agility: The supply chain's relative capacity to act rapidly in response to dramatic changes in supply and demand.

Alignment: Creating consistency in the interests of all participants in a supply chain.

Best Value Supply Chains: Supply chains that focus on the total value added to the customer as opposed to individual outcomes, such as speed or cost.

Bill of Lading: The contract between the exporter and the carrier, authorizing the carrier to transport the goods to the buyer's destination; acts as proof that the shipment was made and that the goods have been received.

Carrier/ Transportation Provider: The entity handling the physical transportation of the goods, such as UPS, FedEx, and DHL.

Certificate of Origin: Documentation that declares the country from which the product originates.

Commercial or Customs Invoice: The bill for the goods shipped from the exporter to the importer or buyer.

Competitive Advantage: Competitive Advantage defines how different and superior you are to your competitors. It is usually achieved in the form of Low Cost Leadership or Differentiation.

Competitors: Company's rivals in the market

Cost: The price paid for supply chain inputs.

Customs Administration: A governmental agency that monitors imports and collects import duties on goods coming into the country.

Documentation: The official forms that must be presented to satisfy the import and export regulations of countries and for payment to be processed.

Economies: Countries

Entrepreneurs: Businessmen

Entrepreneurship: Activity of Setting up a business

Escrow: Documents in custody of bank and taking effect only when specified conditions are met.

Evolution: Development

Executives: Top Management of the Company

Export Declaration: Documentation that provides the contact information of both the exporter and the importer (i.e., buyer) as well as a full description, declared value, and destination of the products being shipped.

Exporter: A person or organization that sells products and services in foreign countries that are sourced from the home country.

Flexibility: A supply chain's responsiveness to changes in customers' needs.

Functional Specialization: Company's expertise in different functions such as marketing and selling

Importer: A person or organization that sells products and services that are sourced from other countries.

Insurance Certificates: Documentation that shows the amount of insurance coverage on the goods and identifies the merchandise.

Internal Assessment Tool: Tools used to analyze company's strengths

Letter of Credit: A legal document issued by a bank at the importer's (or buyer's) request

in which the importer promises to pay a specified amount of money when the bank receives documents about the shipment.

License: Purchased permission to export goods from a country.

Merchandise: Products

Niche: Specialized segment of the market

Outsource: Purchasing from a foreign Supplier

Product Specialization: Company's specialization in manufacturing a single product or a single product category

Quality: The relative reliability of supply chain activities.

Speed or Cycle Time: The time duration from initiation to completion of the production and distribution process.

Stakeholder: All the parties who participate in International Trade

Strategic Supply Chain Management: The use of supply chains as a means to create competitive advantages and enhance firm performance.

Supply Chain: A system of people, activities, information, and resources involved in creating a product and moving it to the customer.

Trade Secrets: A secret technique used by company to manufacture its products

Unique Capabilities: Core Competencies

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Image Descriptions

Figure 1.1: A photograph representing building of QCells.

Figure 1.2: The figure shows global value chain position of an economy. It begins with primary inputs on the left and ends with final consumers on the right. There is a reference economy point in between where final consumption happens. The area between primary inputs and final consumption is referred to as Backward GVC length and area between final consumption and final consumers is called forward GVC length. In the figure, forward GVC length is noticeably longer than the backward GVC length, such economy is said to be positioned relatively upstream in Global Value Chains. [Return to image].

Figure 1.3: The figure outlines primary activities in the bottom part and support activities on the top part. The primary activities are inbound logistics, operation outbound logistics, marketing and sales, and service. Secondary activities or the support activities are firm infrastructure, human resources management, and procurement. Both activities contribute towards profit margin on the right. [Return to image].

Figure 1.4: The figure illustrates how primary and support activities in the value chain can add value for doughnut shops. Primary activities are outlined on the left and secondary activities on the right explaining how doughnut shops buy commodity products (such as flour and grease) and transform them into delectable treats as Consumers are willing to pay much more for doughnuts than they would for flour and grease. [Return to image].

Alternative Text-Based Activities

Check Your Understanding: Global Value Chain Activity (Text-Based)

Question 1:

Global Value Chain is when an organization does the full range of activities including supply, production, marketing, sales, distribution, and support to the end consumer, across geographical locations to gain competitive advantage.

- True
- False

Feedback: True!

Question 2:

Drag and Drop the activities (Inbound Logistics, Operations, Outbound Logistics, Marketing and Sales and Services, Infrastructure, Human Resource Management, Technological Development and Procurement) into correct category: Primary Activities or Secondary Activities.

[Return to activity].

Check Your Understanding: International/Global Trade Activity (Text-Based)

Question 1:

Who is an exporter?

- the person or entity sending or transporting the goods out of the country
- the person or entity buying or transporting goods from another country into the importer's home country
- the entity handling the physical transportation of the goods
- administration offices from both the home country and the foreign country

Feedback: The exporter, who is the person or entity sending or transporting the goods out of the country

Question 2:

Who is an importer?

- the person or entity sending or transporting the goods out of the country
- the person or entity buying or transporting goods from another country into the importer's home country
- the entity handling the physical transportation of the goods
- administration offices from both the home country and the foreign country

Feedback: The importer, who is the person or entity buying or transporting goods from another country into the importer's home country

Question 3:

Who is a carrier?

- the person or entity sending or transporting the goods out of the country
- the person or entity buying or transporting goods from another country into the importer's home country
- the entity handling the physical transportation of the goods
- administration offices from both the home country and the foreign country

Feedback: The carrier, which is the entity handling the physical transportation of the goods

Question 4:

Custom Offices are:

- the person or entity sending or transporting the goods out of the country
- the person or entity buying or transporting goods from another country into the importer's home country
- the entity handling the physical transportation of the goods
- administration offices from both the home country and the foreign country

Feedback: The customs-administration offices from both the home country and the foreign country

Question 5:

Intermediaries, such as freight forwarders and export management companies (EMC), provide companies with expert services so that the firms don't have to build those capabilities in-house.

- True

- False

Feedback: True! Freight forwarders specialize in identifying the best shipping methods, understanding trade regulations, and arranging to have exported goods clear customs. EMCs handle the necessary documentation, find buyers for the export, and take title of the goods for direct export.

Question 6:

Drop the documents (Bill of Lading, Export Declaration, Letter of Credit, Insurance Certificates, Certificate of Origin and Commercial/Customs Invoice) and their purpose/ definition:

1. The contract between the exporter and the carrier
2. The document used by customs office to verify and control the export
3. The legal document in which the importer promises to pay a specified amount of money to the exporter when the bank receives proper documentation about the shipment.
4. The document that shows amount of coverage on the goods and identify the merchandise.
5. The document that declares the country from which the product originates.
6. The bill for the goods shipped from the exporter to the importer or buyer.

Feedback: These are the correct combinations:

1. Bill of lading: the contract between the exporter and the carrier
2. Export Declaration: which the customs office uses to verify and control the export
3. Letter of credit: which is the legal document in which the importer promises to pay a specified amount of money to the exporter when the bank receives proper documentation about the shipment.
4. Insurance Certificates: show the amount of coverage on the goods and identify the merchandise.
5. Certificate of Origin: declares the country from which the product originates.
6. Commercial/ Custom invoice: the bill for the goods shipped from the exporter to the importer or buyer.

Overall Activity Feedback

Exporter is the seller whereas importer is the buyer. Carriers are the transportation parties which are responsible to carry goods from origin to destination. Whenever goods leave their originating country and reach destination country, they encounter custom officials which check and verify the goods and different documents and allow them entry into the country. [Return to activity].

Check Your Understanding: Supply Chain and Value Chain Activity (Text-based)

Question 1:

Value chain is broader concept than Supply Chain.

- True
- False

Feedback: A supply chain is a broader concept than a value chain; the latter refers to activities within one firm, while the former captures the entire process of creating and distributing a product, often across several firms.

Question 2:

From the following, which component is NOT required for creating best value supply chains.

- Strategic Supply Chain Management
- Agility
- Acceptability
- Alignment

Feedback: Creating best value supply chains requires four components: Strategic Supply Chain Management, Agility, Adaptability and Alignment.

Question 3:

The value chain provides a useful tool for managers to examine systematically where value may be added to their organizations.

- True
- False

Feedback: The value chain provides a useful tool for managers to examine systematically where value may be added to their organizations. This tool is useful in that it examines key elements in the production of a good or service, as well as areas in which value may be added in support of those primary activities.

Question 4:

Best value supply chains strive to excel along four measures. Which are those:

- Speed, Quality, Profit and Quantity
- Cost, Quality, Speed and Superiority
- Quality, Quantity, Customers and Profit
- Speed, Quality, Cost and Flexibility

Feedback: Best value supply chains strive to excel along four measures. These are: Speed, Quality, Cost and Flexibility. [Return to activity].

PART II

CHAPTER 2: DISTRIBUTION LOGISTICS

2.1 Introduction

Figure 2.1

Distribution Chain



Note. Distribution Chain. From EpicTop10.com, 2021. Flickr. CC BY 2.0.

Learning Objectives

After reading this chapter, you should be able to understand and answer the following questions:

1. Analyze the role of distribution logistics in value chain.
2. Explain the terms Inbound and Outbound Logistics and their components.
3. Outline the steps in the logistics cycle.
4. Assess the role of logistics service providers in this cycle.

Introduction

Managing distribution is one of the integral parts of global value chain. Be it the distribution of raw material or finished goods, organizations try to effectively perform these activities as the former ensures company's success in the market. Distribution further can be categorized as Inbound Logistics and Outbound Logistics. Inbound Logistics work closely to suppliers whereas Outbound Logistics work close to consumers. These together form a logistic cycle that connects suppliers to customers. With this in mind, let's try to look deeper into the concept of distribution logistics and understanding how different components of inbound and outbound logistics work. Also, we will try to build the logistic cycle and analyze the role of logistic service providers in it.

Assessing What You Already Know

As you answer the following questions, reflect upon what you already know about how company's work.

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 2.6.

Overall Activity Feedback

While answering the above questions, you got a chance to analyze what a company receives and sells to their consumers. The products a company receives are a part of 'Inbound Logistics' and the goods that a company sells directly to consumers or retail stores is a part of 'Outbound Logistics'. The process of managing Inbound and Outbound Logistics together is called 'Distribution Logistics'.

Media Attributions and References

EpicTop10.com. (2021, August 21). *Distribution chain* [Graphic]. Flickr. https://www.flickr.com/photos/182229932@N07/48592750752. CC BY 2.0.

2.2 Distribution Logistics

Learning Objective

1. Analyze the role of distribution logistics in value chain.

With increase in international trade over the years, Consumer expectations have changed. Now, they want goods of high quality, service, **responsiveness**, and flexibility. **Logistics** has gained attention here by providing organizations with increased efficiency and flexibility. "Companies now seek to create synergies with other organizations and begin to create value chains through horizontal and/or vertical collaboration with logistics partners (Moutaoukil. et al., 2012, p. 477). " It helps businesses in satisfying the changing demand pattern of their consumers. **Logistics** can be thought as a company's consumer-facing side that strives to add value to their consumers every day (Jejani et al., 2019).

The Council of Supply Chain Management Professionals (n.d.) define logistics as:

> The part of supply chain management that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements (para. 5).

Additionally, international selling require companies to focus more on their distribution strategies. For instance, a developing country's distribution strategies would require attention to loosely integrated networks, limited **logistics** and smaller retail markets to sell the product (Mariadoss, 2017). So, companies need to make their distribution plans different for different counties. Further, distribution becomes even more important because it makes sure that a company's customers are highly satisfied by making it necessary for companies to provide the desired quality and quantity of products to the value chain customers (Klumpp & Heragu, 2019).

Did You Know?

How Nokia Tackles Distribution Challenges? This example will help you understand how companies change their distribution strategies for different countries.

Nokia is a $26 billion company with over 92,000 employees (Nokia Corporation, 2020). It sells 150 different devices, of which 50 to 60 are newly introduced each year. Each device can be customized on many variants, including language and content. This variation adds greatly to the devices' complexity; three hundred to four hundred components need to arrive on time at factories in order for the devices to be built. Approximately one billion people use Nokia devices worldwide. Countries like China, India, and Nigeria, which ten years ago had almost zero penetration of mobile phones, now have twenty million to forty million users each. Emerging markets now account for over half of Nokia's annual sales.

Nokia has the challenge of selling a growing variety of mobile devices in hundreds of thousands of tiny retail outlets in the developing world. To tackle reaching its rural customers in developing countries, Nokia has 350,000 points of presence in rural areas, from small kiosks and corner shops to organized retail outlets. Nokia has 100,000 such point-of-sale (POS) outlets in India, 80,000 in China, and 120,000 in the Middle East and Africa.

To train salespeople in developing countries, Nokia created an internal university to educate the people who sell its phones in these POS locations—an average of five people per location. Nokia Academy teaches local salespeople about the features of the phones and how to sell them. As Nokia expands further into these emerging markets, it will penetrate deeper into the rural areas and will distribute through local providers.

Nokia's challenge is to maintain its strong brand name — the fifth most recognized brand in the world — across these POS locations. Meeting this challenge has taken years. One way that Nokia maintains control of its brand across these locations is by having managers visit the outlets on a regular basis and using their mobile phones to photograph the shelf layout at each location. This lets Nokia control quality and improve merchandising techniques at all locations.

One way to look at business logistics is "having the **right item** in the **right quantity** at the **right time** at the **right place** for the **right price** in the **right condition** to the **right customer**." To increase the visibility of value-added contribution of logistics, these seven R's were coined and announced (Swamidass, 2000).

Figure 2.2

The 7 R's of Logistic



Note. 7 R's in logistics. [Image description].

Achieving these R's is essential to match the market's demand and supply side. These elements can also help organizations in identifying different logistical aspects or key performance indicators to be considered to examine operational success or failure in international market (Rushton et al., 2014).

Video: What is Logistics? Logistics Definition and 7 Rights of Logistics Explained

Watch this video to understand the term logistics in more detail, its history and the 7 rights in logistics.

Media 2.1. *What is Logistics? Logistics Definition and 7 Rights of Logistics Explained* [Video]. Daily Logistics. (URL: https://youtu.be/FD2ShcUtLkE)

An operations manager who focuses on logistics will be concerned with issues such as

inventory management, purchasing, transportation, warehousing, and the planning and organization of these activities. Logistics may have either an internal focus (inbound logistics) or an external focus (outbound logistics).

Check Your Understanding

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Check Your Understanding: Distribution Logistics

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 2.6.

Overall Activity Feedback

Logistics help companies in increasing efficiency and flexibility and satisfying consumer demands. It is important for companies to have different distribution plans for different countries as they may have different dynamics of networks, logistics and market. The 7 R's in logistics are very important as they help organizations in making Value-added component visible to the top management. Logistics may have either an internal focus (Inbound Logistics) or an external focus (Outbound Logistics) which will be discussed in detail in next section.

Media Attributions and References

Daily Logistics. (2021, June 27). *What is logistics ? Logistics definition and 7 right of logistics explained!* [Video]. YouTube. https://www.youtube.com/watch?v=FD2ShcUtLkE.

2.3 Inbound and Outbound Logistics

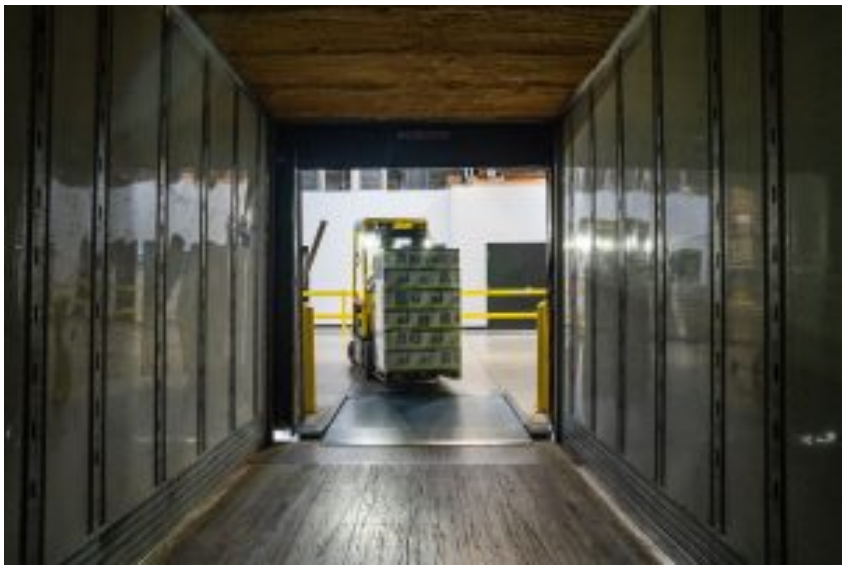
Learning Objective

2. Explain the terms Inbound and Outbound Logistics and their components.

Inbound and Outbound Logistics – Introduction

Figure 2.3

Inbound Logistics



Note. Inbound Logistics. From Elevate, 2018. Used under the Unsplash License.

Inbound Logistics refers to anything that is coming **inside** a company. For a furniture manufacturer, inbound logistics would mean managing the arrival of raw materials or semi-finished products such as wood, paint, nuts, screws, bolts etc. For an Amazon

Fulfillment centre, on the other hand, inbound logistics would mean managing receiving, quality check, storage etc. of finished goods.

"Inbound logistics is one of the primary processes of logistics concentrating on purchasing and arranging the inbound movement of materials, parts, or unfinished inventory from suppliers to manufacturing or assembly plants, warehouses, or retail stores (Wikipedia, 2019)".

According to Minner,

> Inbound Logistics comprises all activities that secure the supply for manufacturing and assembly or sales. These activities range from order placement and order allocation between suppliers to a chosen delivery and transportation concept for the receipt and storage or immediate use of the materials.

Video: Inbound Logistics Solutions – Machine Vision & Barcode Reading for Distribution & Fulfillment (4:20)

Watch this video to understand the role of technology in Inbound Logistics.

Media 2.2. *Inbound Logistics Solutions – Machine Vision & Barcode Reading for Distribution & Fulfillment* [Video]. CognexTV. (URL: https://youtu.be/Maz17CvqJa4)

A manager in charge of **inbound logistics** manages everything related to the incoming flow of resources that the company needs to produce its goods or services. These activities will include managing supplier relationships, accessing raw materials, negotiating materials pricing, and arranging quicker delivery.

Check Your Understanding

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Check Your Understanding: Inbound Logistics

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 2.6.

Outbound Logistics

Figure 2.4

Outbound Logistics



Note. Forklift in Warehouse. From Nebov, J. 2021. Used under the Unsplash License.

Outbound Logistics refers to anything that is going **outside** of a company. Outbound processes are vital for companies as they connect them directly with their customers in value chain (Klumpp and Heragu, 2019)." For instance, for a furniture manufacturer outbound logistics would mean managing delivery of finished furniture such as sofa sets, beds, chairs etc., to furniture retailers. For Furniture retailers, on the other hand, outbound logistics would comprise managing the distribution of finished goods to consumers on time and in good condition.

Council of Supply Chain Management Professionals defines Outbound Logistics as "the process related to the movement and storage of products from the end of the production line to the end consumer".

A manager working in **outbound logistics** will be focused on two issues: **storage** and **transportation**. They will use **warehousing** techniques to keep the finished goods safe and accessible. Since the products may need to be moved out to a customer at any moment, proper organization is crucial. Having as little product stored as possible can be advantageous since stored products are not making money, so the outbound logistics manager often has to balance company cost savings with consumer demand. The **transportation** function is by far the most complex part of outbound logistics. Without transport, there simply is no logistics. For that reason, it's critical to be able to move the product from one location to another in the fastest, most cost-effective, and efficient way possible. Since transportation involves fluctuations, factors such as delays and changes in fuel costs need to be taken into account to cover all possible scenarios that might jeopardize the efficient movement of goods.

Video: Discover the World of Outbound Logistics with Tata Steel (2:54)

Watch this video to understand how Tata Steel manages their Outbound Operations.

Media 2.3. *Discover the World of Outbound Logistics within Tata Steel* [Video]. Tata Steel Jobs. (URL: https://youtu.be/5RH9xMAANf8)

Check Your Understanding

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Check Your Understanding: Outbound Logistics

Interactive activity unavailable in this format

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 2.6.

Inbound and Outbound Logistics, taken together, links Suppliers in the upstream to consumers in the downstream. However, **Inbound logistics** focuses on the Supply-side whereas **Outbound Logistics** focuses on the demand side of the supply-demand equation. So, to ensure the operational success of any business, it is essential to focus equally on inbound and outbound operations. As per Jejani et al., 2019:

> Outbound and Inbound logistics, both activities, play complementary roles to the success of the logistics function of the company while one guarantees that your management has all the supplies it needs to keep the production line upend running, the other connects your products to the final buyer. Therefore, both parts should be carefully planned and executed so that your supply chain and logistic can be as effective as possible and you are able to meet your customers' expectations and requirements with ease.

Inbound and Outbound Logistics – Components

Before delving deeper into components of Inbound and Outbound Logistics, let's look at the term logistics and it's importance once again.

Video: Why is Logistics Management Important? (0:40)

Watch this video that provides an overview of the importance of Logistics Management.

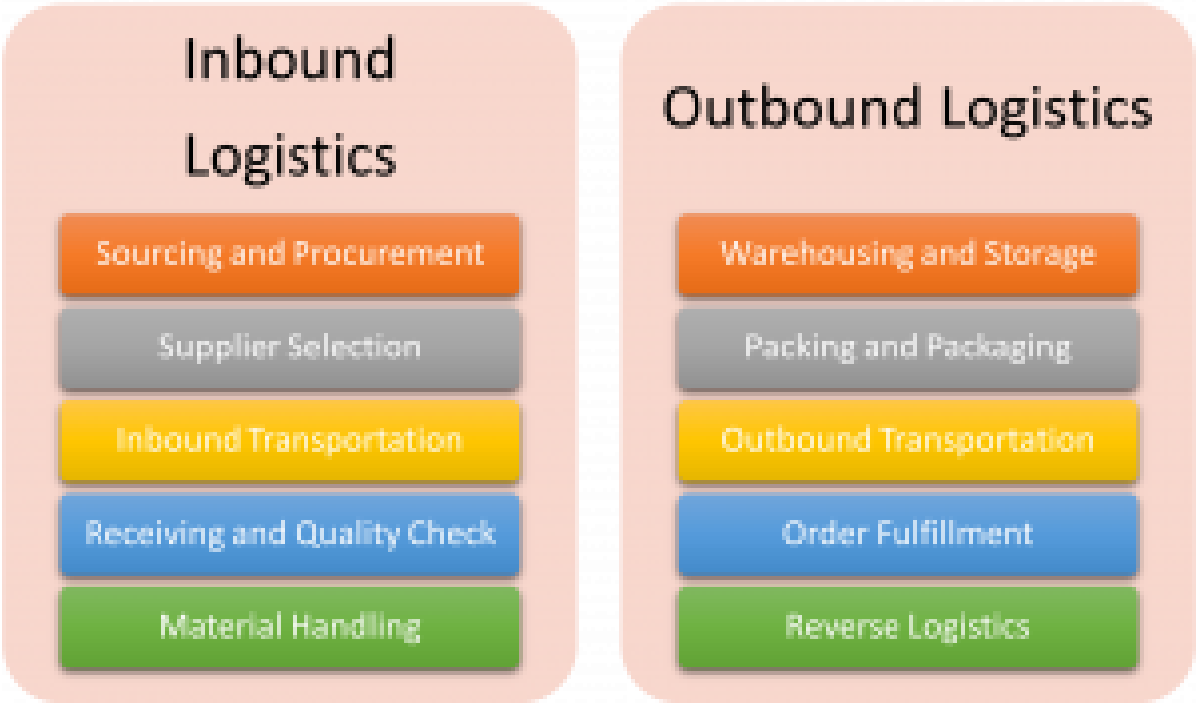
Media 2.4. Why is Logistics Management Important? [Video]. PLS Logistics Services. (URL: https://youtu.be/eF1aYwDmppM)

The Components of Inbound and Outbound Logistics vary from Industry to Industry. "How a company approaches inbound logistics varies depending on incoming goods, the industry and the buyer-seller relationship (Jenkins, 2020) ."

In this part of the chapter, we will focus on Inbound and Outbound Logistics activities. Figure 2.5 gives a quick view of these activities:

Figure 2.5

Components of Inbound and Outbound Logistics



Note. Components of Inbound and Outbound Logistics. [Image description].

Inbound Logistics Components:

As we know, Inbound Logistics works closely on the market's supply side. Therefore, it would include activities related to suppliers and receiving of materials coming **inside** a company. Let's discuss these activities in detail.

1. **Sourcing and Procurement:** This is the first activity a company does when it decides to trade globally. They start exploring suppliers in international markets who can provide them with required materials within desired time frame and agree to work on specified terms and conditions. In simple words, they decide to purchase the materials, which is called Sourcing or Procuring in Logistics terminology . "Procurement includes the activities involved in establishing fundamental requirements; sourcing activities, such as market research and vendor evaluation; and negotiation of contracts (Bhargove, 2018)."
2. **Supplier Selection:** This is another significant activity as it decides the quality of your outbound operations and success of your business in the long run. Suppliers are companies or individuals who provide you with the required material at the required time. In case a company ends up selecting a wrong supplier, it has financial implications and can impact the operational success of a business. Therefore, choosing suitable suppliers is crucial because it directly affects cost reduction, profitability, and company flexibility (Ting & Cho. 2008, p. 116-117). In some cases, it is also considered as a part of procurement.
3. **Inbound Transportation:** Inbound Transportation relates to material movement from suppliers to the manufacturing unit. It is one of a company's significant decisions as it consumes much of its cost. The success of other activities depends upon whether the material has been received on time and in good condition. Therefore, a highly responsive and economical transportation system can be considered a strong pillar for any business to fulfill consumer demands at a reduced cost. Conversely, its absence can lead to increased costs of goods and services (Ogar, 2017).
4. **Receiving and Quality Check:** After inbound transportation comes receiving and quality check of the received material. During receiving, goods are unpacked, checked for any damages or quality and quantity issues, entered into the inventory system and staged for movement to the storage area. The aim here is ensure that received products comply with ordering documentation and are not damaged during shipping

(LINCS, 2017, p.38).

5. **Material Handling:** Once company receives goods, it's vital to handle them properly. "Material Handling is the function of moving the right material to the right place, at the right time, in the right amount, in sequence, and in the right position or condition to minimize production cost (Stephens, 2019)." It includes other sub activities as well such as receiving, incoming quality check, warehousing and production scheduling.

Outbound Logistics Components

Outbound Logistics work closely on the demand side of the market. It would include order processing, Storage Management, Packing, Distribution and Reverse Logistics. Let's discuss these activities in detail.

1. **Warehousing and Storage:** Once a company receives goods, these are stored in the warehouses to fulfill consumer demand. A company needs to decide the number of goods to be stored as when goods stay in warehouses for a more extended period; additional costs are incurred. In warehouses, there is an overlap of inbound and outbound logistics. Where later specifically focus on sending goods directly to consumers or retail stores, the former works towards product acquisition (Jenkins, 2020).
2. **Picking and Packaging:** When a consumer places order, warehouse associates pick the products ordered and forward them to the packaging department. The packaging associates make sure that goods are appropriately packaged within the transportation requirements of labelling and kitting, ensuring the safety of goods while in transit. For instance, fragile goods are packed using bubble wrapping so that these are not damaged during transportation and are labelled effectively for proper handling.
3. **Outbound Transportation:** The modes of transportation and other requirements remain the same for inbound and outbound transportation. The only difference is that in inbound transportation goods arrive at a facility and in outbound transportation goods move out of a facility. As Dao et. al., 2018 states, "Inbound Logistics includes all aspects of material sourcing, material purchasing, transporting to factories. Meanwhile, outbound logistics handles the rest of the process such as transportation of the finished goods to warehouses or distribution centers, then from warehouses or distribution centers to customers."
4. **Order Fulfillment:** Delivering products at the right time and in proper condition to the consumer is all about order fulfillment. Companies can have their fleet of trucks

and drivers or get services from courier companies like UPS and FedEx to fulfill consumer orders. In some instances, order fulfillment is a process where inbound and outbound logistics intersect. A complete order fulfillment lifecycle starts with strategic sourcing and ends with shipping. Some businesses also consider inventory management, supply chain management, order processing, quality control and customer support as a part of order fulfillment (Schwarz, 2020).

5. **Reverse Logistics:** It often happens that the material you have received has some defects or problems. Such materials can be treated at the manufacturing unit, but sometimes it becomes essential to send them back to the suppliers. The process employed to deliver goods back to the upstream point is known as 'Reverse Logistics'. Many companies specifically operate in the area of Reverse Logistics. For instance, GLS Logistics and International Shipping is a courier company that directly picks up the products from consumers and returns them to the seller of any other location (Tirelli, 2021).

Check Your Understanding

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Check Your Understanding: Components of Inbound and Outbound Logistics

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 2.6.

Overall Activity Feedback

It is important to understand the activities in Inbound and Outbound Logistics. Procurement or sourcing is also known as purchasing of goods or services from international suppliers. Material Handling is the function of moving the right material to the right place, at the right time, in the right amount, in sequence, and in the right position or condition to minimize production cost. In Warehousing and Transportation activities, Inbound and Outbound Logistics overlap. Reverse Logistics moves the goods or problem inventories from downstream to upstream.

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2.4 Logistics Cycle

Learning Objectives

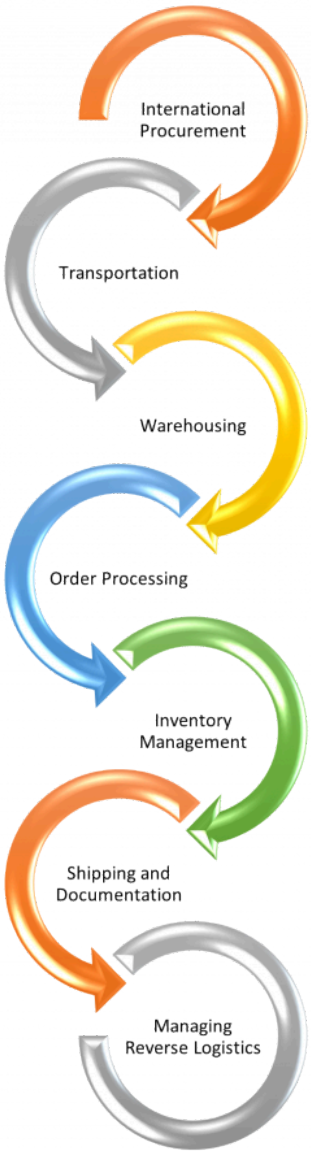
3. Outline the steps in logistics cycle.
4. Assess the role of logistics service providers in this cycle.

Logistics Cycle

Inbound and Outbound Logistics ensure smooth material movement from upstream to downstream, efficient manufacturing process and satisfied consumers. That is why, collaborative planning of inbound and outbound logistics becomes so essential. The logistics cycle includes all the steps involved in inbound and outbound logistics. Figure 2.6 provide its overview:

Figure 2.6:

Logistics Cycle



Note. Logistics Cycle [Image description].

All the activities listed in this cycle are interrelated. The rest of the book is based on this cycle and will explain every step in detail. For instance, **Procurement** is discussed in the next Chapter, different requirements and modes of **transportation** from origin to destination will be explained in Chapter 4, **Warehousing**, Order Processing and Inventory Management will be addressed in Chapter 5, Chapter 6 provides details on documentation, Incoterm Rules and other related concepts, and **Reverse Logistics** will be covered in Chapter 9. Other topics of relevance are also covered in the book like Value Chain Vulnerability, Sustainability, Circular Economy, Introduction to Value Stream Mapping, Humanitarian Logistics etc.

Logistics Service Providers

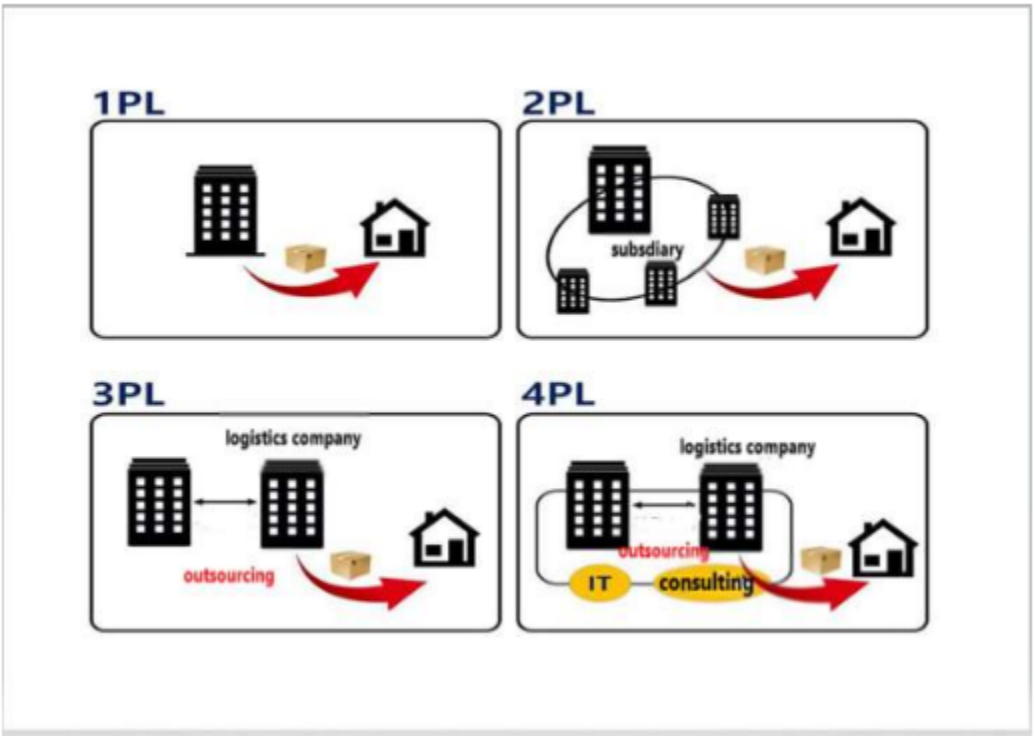
Logistics Service providers (LSPs) help organizations with the activities listed in the logistics cycle. To focus on their core businesses, companies take services from the logistics providers. Demands for different services have been continuously increasing in the current **logistics** market. For instance, FedEx responds to various consumer's needs and provides services such as same day, first overnight, priority overnight, standard overnight, 2 day, and express saver. In the case of UPS and RPS, rather than overly diverse services, they are using a service strategy that accurately meets the scheduled time. This is also called a money-back guarantee (Kim, 2021).

Categories of Logistics Service Providers

The following categories of LSPs differ based on services provided by different companies. Figure 2.7 provides an overview of these categories:

Figure 2.7

Development of Outsourcing



Note. Development of Outsourcing. From Kim, J. 2021. CC BY-NC 4.0. [Image description].

1. **1PL**: A logistics service with the concept of internally performing the logistics work generated by the company. Here, the company that manufactures the product handles the process from completion stage to final distribution.
2. **2PL**: Companies chose the 2PL method to provide logistics services by independently creating subsidiaries with specialized functions. In this case, it was common for a department in charge of logistics to become independent and become a subsidiary.
3. **3PL**: Third Party Logistics allows the shipper to designate all or part of the supply chain to improve customer service, reduce logistics-related costs, and improve operational efficiency for logistics activities. It refers to outsourcing logistics functions to a specialized company.
4. **4PL**: Fourth-party logistics (4PL) is a connection with management resources, capabilities and technologies of other companies that can make up for the shortcomings of logistics service providers to provide a comprehensive supply chain solution to shippers. Thus, it can be defined as a supply chain integrator that provides a more complete supply chain solution. Fourth-party logistics are also described as LLP (Lead Logistics Providers) and general contractors. It is a single contract point that aims to effectively connect various organizations and functions to plan and manage all activities in the supply chain (Saglietto,2013).

Video: Difference between 1PL, 2PL, 3PL, 4PL and 5PL Logistics Providers (4:02)

Watch this video that summarizes categories of Logistic Service Providers.

Media 2.5. *Difference between 1PL, 2PL, 3PL, 4PL and 5PL Logistics Providers* [Video]. IIPMR. (URL: https://youtu.be/2X6rD1nJx4M)

Check Your Understanding

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Check your Understanding: Logistics Cycle and Logistic Service Providers

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 2.6.

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2.5 Summary

In this chapter, you were introduced to different aspects of Distribution Logistics. Logistics provides organizations with increased efficiency and flexibility to meet consumer demands by focusing on 7 R's. Two categories of logistics were also explained – Inbound and Outbound Logistics. Where Inbound Logistics deals with anything coming inside a company, outbound logistics focuses on everything going outside. This concept was explained using relevant examples. Various components of inbound and outbound logistics were also discussed in detail. In the end, clarity was provided towards the logistics cycle and role of Logistics Service Providers in this cycle.

2.6 Key Terms, References, and Accessibility Descriptions

Key Terms

Logistics: The part of supply chain management that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements (CSCMP).

Inbound Logistics: Inbound logistics is one of the primary processes of logistics concentrating on purchasing and arranging the inbound movement of materials, parts, or unfinished inventory from suppliers to manufacturing or assembly plants, warehouses, or retail stores (Wikipedia, 2019).

Outbound Logistics: Outbound logistics is the process related to the storage and movement of the final product and the related information flows from the end of the production line to the end user (Wikipedia, 2019).

Procurement: Procurement is the process of finding and agreeing to terms, and acquiring goods, services, or works from an external source, often via a tendering or competitive bidding process (Wikipedia, 2022).

Reverse Logistics: Reverse logistics is a type of supply chain management that moves goods from customers back to the sellers or manufacturers (Jenkins, 2021).

Logistic Service Providers: Logistics Service Providers, or 3PL (third-party logistics) providers, are outsource entities shippers leverage to manage a company's warehousing, distribution and transportation of freight (Young, 2019).

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Image Descriptions

Figure 2.2: The figure presents 7 R's of logistic activities in circles, Each circle representing a each R such as right item, right quantity, right time, right place, right price, right condition and right customer. [Return to image].

Figure 2.3: The image shows a person using forklift to unload goods from a container, representing inbound logistics.

Figure 2.4: The image shows a person using forklift to move goods, representing outbound logistics.

Fig 2.5: The figure categorize inbound and outbound logistics in different columns each representing their own components. [Return to image].

Figure 2.6: This figure outlines the steps involved in logistics cycle starting with International Procurement to Reverse Logistics [Return to image].

Figure 2.7: The image presents different categories of Logistic Service Providers in four quadrants with 1PL on top left quadrant and 4PL on bottom right quadrant. [Return to image].

Alternative Text-Based Activities

Assessing What You Already Know Activity (Text-based)

Question 1

What raw materials furniture manufacturer receives and uses to manufacture finished goods? Check all that apply.

- Wood
- Paint
- Nuts and Bolts

Feedback: A furniture manufacturer uses all of these while manufacturing finished goods

Question 2

What goods a retail store like Walmart receives to sell to their consumers. Check all that apply.

- Finished goods
- Raw material
- Semi finished goods

Feedback: A retail store receives finished goods and in some cases semi finished goods to sell to their consumers.

Question 3

What finished goods does a furniture manufacturer sells? Check all that apply.

- Finished Sofa sets
- Finished Beds
- Nuts and Bolts

Feedback: A furniture store uses wood, paint and nuts and bolts that it received to manufacture finished goods such as sofa sets, beds, tables, chairs etc.

Question 4

What goods does a retail store like Walmart sells? Check all that apply.

- Books
- Grocery Items
- Fruits and Vegetables

Feedback: A retail store will basically sell whatever it will receive. It will not engage in manufacturing or producing goods like fruits and vegetables.

Question 5

On the basis of your previous experiences and knowledge, how would you define the term 'distribution logistics'?

- Distribution logistics help company's in managing whatever they receive and sell.
- Distribution logistics help company's in hiring workforce.
- Distribution logistics help company's in marketing and selling.

Feedback: Distribution Logistics is a process that help company's in managing whatever they receive (inbound logistics) and whatever they sell (outbound logistics).

Overall Activity Feedback

While answering the above questions, you got a chance to analyze what a company

receives and sells to their consumers. The products a company receives are a part of 'Inbound Logistics' and the goods that a company sells directly to consumers or retail stores is a part of 'Outbound Logistics'. The process of managing Inbound and Outbound Logistics together is called 'Distribution Logistics'. [Return to activity].

Check Your Understanding: Distribution Logistics (Text-based Activity)

Question 1

Logistics help companies to:

1. Increase efficiency and flexibility and satisfy consumer demands
2. Convert inputs (raw materials) into outputs (goods or services)
3. Reduce efficiency and flexibility

Feedback: Logistics help companies to Increase efficiency and flexibility and satisfy consumer demands whereas manufacturing converts inputs to outputs.

Question 2

It is important for companies to have different distribution plans for different countries because:

1. Different countries have different birth rate
2. Different countries have different dynamics of networks, logistics and market
3. Different countries have different political systems

Feedback: It is important for companies to have different distribution plans for different countries because different countries have different dynamics of networks, logistics and market.

Question 3

The 7 R's in logistics help organizations by making _____ visible to top management.

1. Costs in Logistics activities
2. Risks in Logistics activities
3. Value-added component of logistic activities

Feedback: The 7 R's in logistics help organizations by making Value-added component of logistic activities visible to top management.

Question 4

Logistics may have either an internal focus (_____) or an external focus (_____).

1. Outbound Logistics, Inbound Logistics
2. Inbound Logistics, Outbound Logistics
3. Downstream, Upstream

Feedback: Logistics may have either an internal focus (Inbound Logistics) or an external focus (Outbound Logistics).

Overall Activity Feedback

Logistics help companies in increasing efficiency and flexibility and satisfying consumer demands. It is important for companies to have different distribution plans for different countries as they may have different dynamics of networks, logistics and market. The 7 R's in logistics are very important as they help organizations in making Value-added component visible to the top management. Logistics may have either an internal focus (Inbound Logistics) or an external focus (Outbound Logistics) which will be discussed in detail in next section. [Return to activity].

Check Your Understanding: Inbound Logistics (Text-based Activity)

Inbound Logistics focus on incoming goods in the company's manufacturing unit , warehouse etc. Based on what has been explained above, Can you think of an example of Inbound Logistics ? If yes, write it in the box below. If not, read through the text again and try again. [Return to activity].

Check Your Understanding: Outbound Logistics (Text-based Activity)

Outbound Logistics focuses on goods moving out of the company's manufacturing unit, warehouse etc. Based on what has been explained above, Can you think of an example of Outbound Logistics? If yes, write it in the box below. If not, read through the text again and try again. [Return to activity].

Check Your Understanding: Components of Inbound and Outbound Logistics (Text-based Activity)

Question 1

Drag and Drop the components of Inbound and Outbound Logistics in correct Category. Students are given two columns titled Inbound and Outbound Logistics and six components to drop into the correct category.

Question 2

Purchasing of goods or services from international suppliers can be referred as:

1. Material Handling
2. Warehousing
3. Sourcing and Procurement

Feedback: Procurement is the first step a company does when it decides to trade globally. They start exploring suppliers in international markets who can provide them with required materials within desired time frame and agree to work on specified term and conditions. In simple words, they decide to purchase the materials which in Logistics terminology is called Sourcing or Procuring.

Question 3

Material Handling is the function of moving the right material to the right place, at the

right time, in the right amount, in sequence, and in the right position or condition to minimize production cost.

1. True
2. False

Feedback: Material Handling is the function of moving the right material to the right place, at the right time, in the right amount, in sequence, and in the right position or condition to minimize production cost.

Question 4

These are the components where Inbound and Outbound Logistics overlap.

1. Warehousing and Transportation
2. Material Handling and Order Processing
3. Procurement and Reverse Logistics

Feedback:

Inbound and Outbound activities overlap during warehousing and transportation components.

Question 5

Reverse Logistics deals with problem inventories only.

1. True
2. False

Feedback:

The process that is employed to deliver goods back to the upstream point is known as ‘Reverse Logistics’. Many companies specifically operate in the area Reverse Logistics. For instance, GLS Logistics and International Shipping is a courier company that pick up the products from consumers directly and return them to the seller of any other

location. It not only focus on problem inventories but deals with products such as empty bear bottles being returned to the store for further processing.

Overall Activity Feedback

It is important to understand the activities in Inbound and Outbound Logistics. Procurement or sourcing is also known as purchasing of goods or services from international suppliers. Material Handling is the function of moving the right material to the right place, at the right time, in the right amount, in sequence, and in the right position or condition to minimize production cost. In Warehousing and Transportation activities, Inbound and Outbound Logistics overlap. Reverse Logistics moves the goods or problem inventories from downstream to upstream. [Return to activity].

Check your Understanding: Logistics Cycle and Logistic Service Providers (Text-based Activity)

Question 1

Arrange the logistic cycle activities in correct order:

- International Procurement – 1
- Transportation – 2
- Warehousing – 3
- Order Processing – 4
- Inventory Management – 5
- Shipping and Documentation – 6
- Managing Reverse Logistics – 7

Question 2

Each category of Logistic Service Provider differ on the basis of:

1. Policies
2. Services Provided
3. Owners

Feedback:

Every Logistic Service provider differs based on services provided. For more details, watch the video describing different categories of LSPs. [Return to activity].

PART III

CHAPTER 3: INTERNATIONAL PROCUREMENT

3.1 Introduction

Watch or Listen to the Following Media Clip

Media 3.1 *Introduction in Procurement – Module 1: What is Procurement?* [Video]. Procurious HQ. (URL: https://www.youtube.com/watch?v=wPR_KoSSofA)

Learning Objectives

After reading this chapter, you should be able to understand and answer the following questions:

1. Explain the concept of procurement and how it adds value in the global value chain
2. Introduce the concepts of Sourcing and Outsourcing of Goods, Manufacturing and Services.
3. Show how Suppliers are selected and the role of different components in supplier relationship models.
4. Explain how supplier relationships adds value in global value chain

Introduction

All businesses have to be competitive and successful in markets. Companies' procurement of goods and services plays a vital role in improving profit, customer needs, uniting suppliers, identifying and organizing sources, managing the value chain, renewing contracts, specifying requirements, and evaluating available options. A process of the procurement of goods or services can be done across continents or countries where specific international and national requirements and trade regulations have to be met.

Assessing What You Already Know

As you answer the following questions, reflect upon what you already know about how companies work.

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 3.7.

Overall Activity Feedback

While answering the above questions, you got a chance to analyze what procurement is and how international procurement helps businesses. Also, globalization has significantly improved businesses by increasing the availability of labour globally and production flexibility. In addition, labour costs in many countries are cheap, which helps companies move their production process to third-party or external providers with whom the firm has a contract. Selecting the right supplier consists of identifying, evaluating, and negotiating steps.

Media Attributions and References

Procurious HQ. (2014, May 22). *Introduction to procurement – module 1: What is procurement? (Part 1)*. [Video]. YouTube. https://www.youtube.com/watch?v=wPR_KoSSofA

3.2 Concept of Procurement and its Value in the Global Value Chain

Learning Objective

1. Explain the concept of procurement and how it adds value in the global value chain.

What is Procurement?

Mangan and Lalwani (2016) describe procurement as:

- "Procurement includes sourcing and purchasing and covers all of the activities from identifying potential suppliers through top delivery from supplier to the customer" (p. 379).
- "Procurement is about specifying requirements, identifying sources, evaluating options, and acquiring resources that are fit for purpose, cost effective and sustainable" (p. 144).
- Managing risks and value on behalf of the company is the role of procurement (p. 148).

Globalization gives tremendous opportunities for companies to increase competitive advantages by using international sourcing or acquiring cutting-edge technologies. The process of purchasing services or goods worldwide to bid on contracts is called international procurement. The process is increasingly essential for organizations globally. It helps organizations enhance their competitive position, meet customer expectations, improve profits, and add value by finding suppliers who meet the organization's strategy.

According to authors from "*Production and Inventory Management Journal*", international

procurement helps improve worldwide logistics capabilities, the source for small companies, and extend international procurement activities (Scully & Fawcett, 1994). However, specific knowledge and special skills are required to succeed in international procurement.

Procurement Process and Steps

Before delving deeper into the procurement steps, let's look at the types of the procurement process.

Video: Types of Procurement Process (2:32)

This video gives an overview of the different types of procurement process used by Irish public bodies as well as information on how businesses can access these opportunities

Media 3.2 *Types of Procurement Process.* [Video]. Office of Government Procurement Ireland. (URL: https://www.youtube.com/watch?v=_490ZEaYdwA)

Consider This

Let us consider the procurement process in services such as Project Management. This is an example of a clear explanation of procuring goods and services. Some paragraphs adapted from *Procurement Management* by Adrianne Watt under Creative Commons Attribution Licence 4.0.

Procurement management follows a logical order. First, you plan what you need to contract; then you plan how you'll do it. Next, you send out your contract requirements to sellers. They bid for the chance to work with you. You pick the best one, and then you sign the contract with them. Once the work begins, you monitor it to make sure that the contract is being followed. When the work is done, you close out the contract and fill out all the paperwork.

You need to start with a plan for the whole project. Before doing anything else, you need to think about all of the work that you will contract out for your project. You will want to plan for any purchases and acquisitions. Here's where you take a close look at your needs to be sure that contracting is necessary. You figure out what kinds of contracts make sense for your project, and you try to define all of the parts of the project that will be contracted out.

Contract planning is where you plan out each individual contract for the project work. You work out how

you'll manage the contract, what metrics it will need to meet to be considered successful, how you'll pick a seller, and how you'll administer the contract once the work is happening.

(Watt, n.d.) CC-BY-4.0

The procurement process helps companies obtain and manage costs such as freight forwarders, human resources, capital assets, fuel, IT equipment, sales, utilities, marketing, legal and professional services, raw materials, facility management.

According to the book FITT "*Global Value Chain*" (2021), there are seven major steps in the procurement process: "Conduct an Internal Needs Analysis, Conduct an Assessment of the Suppliers' Market, Collect Supplier Information, Develop a Sourcing/Outsourcing Strategy, Implement the Sourcing/outsourcing Strategy, Negotiate with Suppliers and Select the Winning BID, Implement a Transition Plan or Contractual Supply Chain Improvements". These seven steps are visualized in the figure below. (FITT, 2021, p. 8).

Figure 3.1

Procurement Flow Chart



[KPIs][1] - Key Performance Indicators; [RFP][2] - Request for Proposal; [RFQ][3] - Request for Quote.

Note. From FITT, 2021, p.8. Click to enlarge. [Image description].

Check Your Understanding

Explain the concept of procurement and how it adds value in the global value chain.
Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 3.7.

Overall Activity Feedback

Globalization gives tremendous opportunities for companies to increase competitive advantages by using international sourcing or acquiring cutting-edge technologies. The process of purchasing services or goods worldwide to bid on contracts is called international procurement. The process is increasingly essential for organizations globally. It helps organizations enhance their competitive position, meet customer expectations, improve profits, and add value by finding suppliers who meet the organization's strategy.

According to authors from "Production and Inventory Management Journal", International procurement helps improve worldwide logistics capabilities, the source for small companies, and extend international procurement activities (Scully & Fawcett, 1994). There are seven major steps in the procurement process. The process of purchasing services or goods worldwide to bid on contracts is called international procurement. The process is increasingly essential for organizations globally. It helps organizations enhance their competitive position, meet customer expectations, improve profits, and add value by finding suppliers who meet the organization's strategy. Managing risks and value on behalf of the company is the role of procurement.

Media Attributions and References

FITT. (2021). *FITTskills: Global Value Chain* (7th Edition). Forum for International Trade Training (FITT). https://bookshelf.vitalsource.com/books/9781988782126

Office of Government Procurement Ireland. (2018, January 11). *Types of Procurement Process*. [Video]. YouTube. https://www.youtube.com/watch?v=_490ZEaYdwA

3.3 Sourcing and Outsourcing of Goods, Manufacturing and Services

Learning Objective

2. Introduce the concepts of sourcing and outsourcing of goods, manufacturing and services.

Modern businesses evolve simply from domestic supply of products to global sourcing and outsourcing goods, manufacturing, and services. It is clear that companies cannot manufacture and do all products and services for running a business and hold a competitive position in the market. That is why many organizations use sourcing and outsourcing strategies and become globally competitive. Other benefits accrued include cost reduction, increasing efficiency by meeting customer demands on time, taking advantage of different time zones, accessing cutting-edge technology, cheap cost of labour, increase innovation and share expertise, improve quality of products/services, access to talents and experts, and so forth. Actual examples of big companies outsourcing include Google, Apple, Skype, Alibaba, etc. Let's delve deeper into the definitions of sourcing and outsourcing of goods, manufacturing and services.

Sourcing

Figure 3.2
Sourcing



Consider This

The following material is adapted from *Global Sourcing and Distribution* by Babu John Mariadoss (n.d.). under a Creative Commons Attribution-NonCommercial-ShareAlike License 4.0.

Global sourcing refers to buying the raw materials or components that go into a company's products from around the world, not just from the headquarters' country. For example, Starbucks buys its coffee from locations like Colombia and Guatemala. The advantages of global sourcing are quality and lower cost. Global sourcing is possible to the extent that the world is flat—for example, buying the highest-quality cocoa beans for making chocolate or buying aluminum from Iceland, where it's cheaper because it's made using free geothermal energy.

When making global-sourcing decisions, firms face a choice of whether to sole-source (i.e., use one supplier exclusively) or to multisource (i.e., use multiple suppliers). The advantage of sole sourcing is that the company will often get a lower price by giving all of its volume to one supplier. If the company gives the supplier a lot of business, the company may have more influence over the supplier for preferential treatment. For example, during a time of shortage or strained capacity, the supplier may give higher quantities to that company rather than to a competitor as a way of rewarding the company's loyalty.

On the other hand, using multiple suppliers gives a company more flexibility. For instance, if there's a natural disaster or other disruption at one of their suppliers, the company can turn to its other suppliers to meet its needs. For example, when Hurricane Mitch hit Honduras with 180-mile-per-hour winds, 70 to 80

percent of Honduras's infrastructure was damaged and 80 percent of its banana crop was lost. Both Dole Food Company and Chiquita bought bananas from Honduras, but Dole relied more heavily on bananas from Honduras than from other countries. As a result, Dole lost 25 percent of its global banana supply, but Chiquita lost only 15 percent.

Sole-Sourcing Advantages

- Price discounts based on higher volume
- Rewards for loyalty during tough times
- Exclusivity brings differentiation
- Greater influence with a supplier

Sole-Sourcing Disadvantages

- Higher risk of disruption
- Supplier has more negotiating power on price

Multisourcing Advantages

- More flexibility in times of disruption
- Negotiating lower rates by pitting one supplier against another

Multisourcing Disadvantages

- Quality across suppliers may be less uniform
- Less influence with each supplier
- Higher coordination and management costs

Whichever sourcing strategy a company chooses, it can reduce risk by visiting its suppliers regularly to ensure the quality of products and processes, the financial health of each supplier, and the supplier's adherence to laws, safety regulations, and ethics.

(Mariadoss, n.d.) CC-BY-NC-SA-4.0

Outsourcing

Figure 3.3
Outsourcing

As defined by Cambridge Dictionary (2022):

Outsourcing is the process or a situation when the company employs a third-party



Note. From Gibson, n.d.

provider or organization to do some work instead of using its staff or resources. Sourcing is a process of gaining goods or services from a particular place.

Simply, organizations select suppliers worldwide to provide goods for running business so-called sourcing. The difference between sourcing and outsourcing is that sourcing supplies goods/ products for running a business; on the other hand, outsourcing transfers a firm's function to the third-party provider or external service provider. A lot of Canadian companies, as well as the Canadian government, use outsourcing technology. For example, according to Forrester Research (2020), the Canadian government and businesses spent 15 billion dollars on technology outsourcing in 2021 (Forrester Research, 2020). View this graph, Technology Outsourcing Industry Spending by Business and Government in Canada from 2016 to 2021 for a further breakdown.

Table 3.1

Advantages and Disadvantages of Outsourcing

Advantages	Disadvantages
Lower costs;	Expose confidential information and technology;
differentiate products;	hidden costs;
production capacity;	exchange rate fluctuations;
meet customer demands;	lack of customer focus;
efficient replenishment;	cost of transactions can be raised;
focus on the core competencies;	wrong partners;
build innovative products or services;	risk of cultural differences;
effective and efficient service;	risk of poor-quality finished products;
increase value by bringing capabilities and expertise;	delay in delivering goods or services.
reduce operational and production costs;	
being adaptable for changing market conditions and preferences;	
increase human resources;	
low cost of labour	

Video: Why Outsourcing is Bad for Business (3:37)

As countries like China and India become leaders in manufacturing the costs of their expertise rises diminishing their advantage against US counterparts. Adversely, convoluted and increasingly risky supply chains dependent on inexperienced vendors have turned once stable brands like Boeing, into the perfect "reshoring" case study.

Media 3.3 *Why Outsourcing is Bad for Business* [Video]. Minute MBA by OnlineMBA. (URL: https://www.youtube.com/watch?v=V7fsEIp2r_8)com.

Outsourcing of Manufacturing

Globalization has significantly improved businesses by increasing the availability of labour globally and production flexibility. In addition, labour costs in many countries are cheap, which helps companies move their production process to third-party or external providers with whom the firm has a contract. As a result, the firm has gotten a lot of advantages, such as access to specialized resources and reduced fixed costs. For example, an airplane can be split into thousands of parts and produced in many geographic locations.

Consider This

A real example of outsourcing manufacturing is described in the following section from the *Introduction to Business* reading: "Outsourcing" by Linda Williams and Lumen Learning under a Creative Commons Attribution-NonCommercial-ShareAlike License 4.0 .

PowerSki's Web site states that "PowerSki International has been founded to bring a new watercraft, the PowerSki Jetboard, and the engine technology behind it, to market."[1] That goal was reached in May 2003, when the firm emerged from a lengthy design period. Having already garnered praise for its innovative product, PowerSki was ready to begin mass-producing Jetboards. At this juncture, the management team made a strategic decision that's not uncommon in manufacturing today.

Rather than producing Jetboards in-house, they opted for outsourcing: having outside vendors manufacture the engines, fiberglass hulls, and associated parts. Assembly of the final product took place in a manufacturing facility owned by All American Power Sports in Moses Lake, Washington. This decision does not mean that the company relinquished control over quality; in fact, every component that goes into the PowerSki Jetboard is manufactured to exact specifications set by PowerSki.

One advantage of outsourcing its production function is that the management team can thereby devote its attention to refining its product design and designing future products. However, as processes or pieces of a process are outsourced companies have legitimate concerns about quality standards being met and maintained at the outsourced location. The decision whether or not to outsource often comes down to identifying organizations that can meet and maintain the standards set by the company and the customer.

Figure 3.4
Outsourcing in the Manufacturing Sector



Note. Outsourcing the production of its engines, hulls, and other components enables PowerSki to reduce the cost of producing each Jetboard through manufacturing efficiencies and lower labor costs. All components that go into the Jetboard are made to PowerSki's specifications and are inspected upon arrival to ensure that they meet the company's high-quality standards. From Williams, n.d. CC-BY-NC-SA-4.0. [*Image description*].

Understandably, outsourcing is becoming an increasingly popular option among manufacturers. For one thing, few companies have either the expertise or the inclination to produce everything needed to make a product. Today, more firms, like PowerSki, want to specialize in the processes that they perform best—and outsource the rest. Like PowerSki, they also want to take advantage of outsourcing by linking up with suppliers located in regions with lower labor costs.(Williams, n.d.). CC-BY-NC-SA-4.0

Outsourcing of Services

Outsourcing services are essential for companies, governments, countries, and the world. Globalization allows organizations to be competitive and move data cost-effectively and very fast. In addition, technological advances help continue to grow to outsource services significantly. For example, according to Statista (2019), IT outsourcing services continue to grow steadily, and revenue of these services in Canada in 2021

accounted for approximately 500.97 million U.S. Dollars while the significant part is 7,439.02 million U.S. Dollars for IT-infrastructure outsourcing (Statista, January 22, 2019). View graph IT-outsourcing services market revenue in Canada from 2016 to 2021, by segment (in million U.S. Dollars) [chart description].

There are a few outsourcing services such as administration, infrastructure, and knowledge. Infrastructure services include communications services, information security, media and content, data processing, developing applications, and data storage. Administration services consist of the following: business processes, public administration, security, procurement, accounting, finance and so forth. Finally, the knowledge segment includes product and service developments, research, analytics, inventory management, insurance processing, software design.

Check Your Understanding

Introduce the concepts of sourcing and outsourcing of goods, manufacturing and services.

Answer the questions below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 3.7.

Overall Activity Feedback

Modern businesses evolve simply from domestic supply of products to global sourcing and outsourcing goods, manufacturing, and services. It is clear that companies cannot manufacture and do all products and services for running a business and hold a competitive position in the market. That is why many organizations use sourcing and outsourcing strategies and become globally competitive. Other benefits accrued include cost reduction, increasing efficiency by meeting customer demands on time, taking advantage of different time zones, accessing cutting-edge technology, cheap cost of labour, increasing innovation and sharing expertise, improving quality of products/services, access to talents and experts, and so forth. Globalization has significantly improved businesses by increasing the availability of labour globally and production flexibility. In addition, labour costs in many countries are cheap, which helps companies move their production process to third-party or external providers with whom the firm has a contract. As a result, the firm has gotten a lot of advantages, such as access to specialized resources and reduced fixed costs.

Media Attributions and References

Gibson, J. (n.d.). [Outsource]. [Photograph]. Pixabay. https://pixabay.com/illustrations/outsource-freelance-contractor-1345109/

Minute MBA by OnlineMBA.com. (2013, May 28). *Why outsourcing is bad for business* [Video]. YouTube. https://www.youtube.com/watch?v=V7fsEIp2r_8

3.4 Suppliers

Learning Objectives

3. Show how suppliers are selected and the role of different components in supplier relationship models.

Suppliers are the central part of the company's success. To select suppliers for the firm, the organization needs to know various strategies. According to the chosen strategy, the company needs to choose the right supplier. A firm has to select the appropriate strategy for its supply chain. *According to the book* "Operations Management: Sustainability and Supply Chain Management" (2020), six methods exist nowadays (Heizer, Render, Munson, & Griffin, 2020, p. 428).

Six strategies exist for obtaining suppliers:

1. The first strategy is to collaborate with many suppliers. It is common for companies worldwide and suitable for obtaining commodities. In this case, one supplier plays against another supplier and creates an aggressively competitive environment. This strategy is not ideal for long-term relationships. The provider is responsible for maintaining technology, expertise, cost, quality of goods and delivery (Heizer et al., 2020, p. 428).
2. The second is negotiating with a few suppliers, which helps build lifelong partnerships. Dedicated providers help companies get economies of scale and lower transaction and production costs (Heizer et al., 2020, p. 428). Collaboration between buyer and supplier can produce a willingness to participate in the Just-in-time method, increasing inventory turnover and reducing holding costs.
3. The third one is to buy the supplier. According to the Cambridge Dictionary (2022), vertical integration is "a process in a business where a company buys another company that supplies it with goods or that buys goods from it in order to control all the processes of production" (Cambridge University Press, 2022). It is suitable for large companies with a significant market share (Heizer et al., 2020, p. 428).

4. The fourth strategy is the so-called joint venture, when firms collaborate with a few companies to produce the finished product. The power of this collaboration is to enhance new development and technical skills as well as reduce costs and secure supply (Heizer et al., 2020, p. 428).
5. The fifth one is a coalition strategy called a keiretsu. The name came from Japanese manufacturers, often suppliers' financial supporters. This strategy combines parts from vertical integration, collaboration, and purchase from a few suppliers. It's for long-term relationships, which provide technical expertise with stable, high-quality production (Heizer et al., 2020, p. 428).
6. The sixth strategy is to use suppliers when needed and called virtual companies. The virtual company specializes in flexibility, efficiency, speed, management expertise and low capital investments. This type of company provides services on-demand by relying on various suppliers (Heizer et al., 2020, p. 430).

Selecting the right supplier consists of identifying, evaluating, and negotiating steps. Selection of suppliers is a process where the main objectives are reducing the risk of purchasing and costs, maximizing the value of the purchaser, as well as developing long-term relationships between supplier and buyer (Taherdoost & Brard, 2019). It isn't elementary to choose the right supplier for the company because the decision can impact the performance and competitiveness of the company. For example, decrease customer satisfaction, increase the product's lead time, suffer loss, and weaken the competitiveness. First, they identify suppliers often based on a quantitative and qualitative decision criterion such as delivery, quality performance, capability, costs, vendor competence. It depends no longer on the price but the purchasing situation (Taherdoost & Brard, 2019). The main goal of the first step for buyers is to identify the right supplier with the right product' quality, who can provide the right price and the right quantities, at the right place and at the right time (Taherdoost & Brard, 2019). Second, evaluation vendors comprise major parts commonly used within many companies: price, quality, and delivery dimensions.

Vendors can be evaluated by the following key points: production flexibility, production capacity, financial situation, technical expertise, technical support, information systems, innovation capabilities, and communication systems (Taherdoost & Brard, 2019). External verification is the central part of the international quality certification of suppliers. Certifications for external verification are ISO 9000 and ISO 14000. The certificate means that the company follows standards and quality of management (Heizer et al., 2020, p.

436). Organizations can use these certificates to pre-qualify potential vendors (Heizer et al., 2020, p. 436). The third step appears after the supplier is selected and evaluated by the criteria and the weights. The next point is the negotiation process. The contract's critical elements, such as schedules, delivery, cost, payment, or quality requirements, can be discussed during the negotiation process.

Video: Sourcing Processes: Supplier Selection – Procurement Training – Purchasing Skills (1:54)

The eLearning topics, for buyers, covered in our procurement academy online training: tender, negotiation, finance, total cost of ownership — TCO, RFP, RFI, RFT, category management, contract writing, strategic sourcing, tender documents, supplier development, cost calculation, European procurement, cost estimation, legal terms, supplier performance management — KPI, contract management, value analysis, cost breakdown, incoterms, development of specifications, how to write an RFP, procurement assessment, procurement certificate.

Media 3.4 *Sourcing Processes: Supplier Selection-Procurement Training-Purchasing Skills.* [Video]. Skill Dynamics. (URL: https://www.youtube.com/watch?v=510AN2Tkuik)

According to the authors of the book *Operations Management: Sustainability and Supply Chain Management*"(2020), three types of strategies where different components play a different role in supplier relationship models such as cost-based price, competitive bidding, as well as market-based price models (Heizer et al., 2020, p. 436). According to the book "*Operations Management: Sustainability and Supply Chain Management*" (2020), "cost-based price model requires that the supplier open its books to the purchaser. The contract price is then based on time and materials or fixed cost with an escalation clause to accommodate changes in the vendor's labour and materials cost" (Heizer et al., 2020, p. 436). Market-based price model based on the product market prices. Companies consider competitors' prices and competitive market position. For example, the company shortly adjusted their price according to competitors' change. The last model is the competitive bidding model based on a bid to purchase products and the required bidding policy. Often, purchasing agents have many potential vendors (Heizer et al., 2020, p. 436).

Check Your Understanding

Show how suppliers are selected and the role of different components in supplier relationship models

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 3.7.

Overall Activity Feedback

Suppliers are the central part of the company's success. To select suppliers for the firm, the organization needs to know various strategies. According to the chosen strategy, the company needs to choose the right supplier. A firm has to select the appropriate strategy for its supply chain. According to the book "Operations Management: Sustainability and Supply Chain Management" (2020), 6 (six) methods exist nowadays (Heizer, Render, Munson, & Griffin, 2020, p. 428). It is important for companies to select suppliers for the firm. That is why the organization needs to know various strategies. Six methods exist nowadays.

Media Attributions and References

Skill Dynamics. (2012, September 14). *Sourcing processes: Supplier selection-procurement training-purchasing skills.* [Video]. YouTube.https://www.youtube.com/watch?v=510AN2Tkuik

3.5 Supplier Relationships and The Global Value Chain

Learning Objectives

3.4. Explain how supplier relationships adds value in global value chain.

Video: What Makes a Great Supplier Relationship? (10:03)

Many companies have adopted a haphazard approach to supplier relationship management. Dennis Snyder, general managing of lighting and decorative hardware with Kohler Co., tells what they need to do in order to correct that oversight.

Media 3.5 *What Makes a Great Supplier Relationship?* [Video]. Supply Chain Brain. (URL: https://www.youtube.com/watch?v=dv5-J0HOeLE)

Suppliers' relationships are vital for successful performing businesses. Supplier relationship management is increasingly essential for companies. Supplier relationship' value created by reducing costs, improving efficiency, and getting quality products for the same price. These benefits impact the financial results of any organization. Advantages are beneficial if the relationship with suppliers is long-term developed. To create advantages for the organization, companies and suppliers have to invest money, time, patience, resources, and willingness to communicate to find the best solution for all parties. All stakeholders involved in the process include employees, suppliers, and buyers. Increasing the complexity of changing product lines, service delivery, value, and customer satisfaction all points to becoming a function of the global value chain. Relationships between business, suppliers, and customers are increasingly important and robust, improving overall business and the global value chain. Ongoing valuable relationships can increase the popularity of quality products and the organization's

efficiency and effectiveness, determined by a business model, supply chain, customers, and suppliers.

Quality products have to be delivered on time to provide excellent service and delivery goods. By having solid and long-term relationships with suppliers, vendors will prioritize my orders and provide quality goods ahead of time. In addition, suppliers will ensure that the company will get the best products quickly without returning poor-quality goods. The next value is excellent support from suppliers with whom you have a solid relationship. For example, if the company gets damaged products or delayed shipments, suppliers will help you solve this issue as soon as possible.

Moreover, if the company delivers quality products without defects, customer satisfaction indicators will increase because customers will continue to enjoy doing business. More vital brand awareness comes from excellent customer satisfaction factors. In addition, the production or manufacturing industry depends on suppliers. If the raw material is delivered late, the company will face risks and losses. Losses such as stopping production or rejecting finished products.

Check Your Understanding

Explain how supplier relationships adds value in global value chain.

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Interactive activity unavailable in this format

Text-based alternative. to interactive activity available in Chapter 3.7

Overall Activity Feedback

It is important to know that supplier relationship management is increasingly essential for companies. Also, supplier relationship' value is created by reducing costs, improving efficiency, and getting quality products for the same price. These benefits impact the financial results of any organization. Advantages are beneficial if the relationship with suppliers is long-term developed. To create advantages for the organization, companies and suppliers have to invest money, time, patience, resources, and willingness to communicate

to find the best solution for all parties. If the company delivers quality products without defects, customer satisfaction indicators will increase because customers will continue to enjoy doing business.

Media Attributions and References

Supply Chain Brain. (2020, January 23). *What makes a great supplier relationship?* [Video]. YouTube. https://www.youtube.com/watch?v=dv5-J0HOeLE

3.6 Summary

Globalization gives tremendous opportunities for companies to increase competitive advantages by using international sourcing or acquiring cutting-edge technologies. Globalization has significantly improved businesses by increasing the availability of labour globally and production flexibility. In addition, labour costs in many countries are cheap, which helps companies move their production process to third-party or external providers with whom the firm has a contract. As a result, the firm has gotten a lot of advantages, such as access to specialized resources and reduced fixed costs. The process of purchasing services or goods worldwide to bid on contracts is called international procurement. The process is increasingly essential for organizations globally. It helps organizations enhance their competitive position, meet customer expectations, improve profits, and add value by finding suppliers who meet the organization's strategy.

3.7 Key Terms, References, and Accessibility Descriptions

Key Terms

[KPIs] - Key Performance Indicators – quantifiable metrics used for measuring the company's performance and success in many different areas and situations. KPIs help the organization to focus on the primary key points.

[RFP]- Request for Proposal – "An RFP accounts for price but focuses on meeting the project quality or schedule requirements. The process of developing a proposal in response to an RFP can be very expensive for the bidder, and the project team should not issue an RFP to a company that is not eligible to win the bid" (Accettura, Bergsma, Boszak, Callaway, Cote, N. Doepker, Harbidge, Her, Hlushko, Holmes, Knight, MacDowell, Marshall, McDougall, Prima & Story, 2021) CC-BY-NC-SA-4.0

[RFQ] - Request for Quote – "An RFQ focuses on price. The type of materials or service is well defined and can be obtained from several sources. The bidder that can meet the project quality and schedule requirements usually wins the contract by quoting the lowest price" (Accettura, et. al, 2021) CC-BY-NC-SA-4.0

Sourcing – is a process of gaining goods or services from a particular place (Cambridge University Press, 2022).

Outsourcing – is the process or a situation when the company employs a third-party provider or organization to do some work instead of using its staff or resources (Cambridge University Press, 2022).

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Image Descriptions

Fig 3.1: 1. Conduct an internal needs analysis (identify the firm's needs and targets benchmark the current company's performance). [Return to image].

2. Conduct an assessment of the suppliers' market (research and find the most cost-effective supply with the lowest risk).

3. Collect supplier information (determine supplier selection criteria, compare and evaluate suppliers).

4. Develop a sourcing/outsourcing strategy (strategy can be through acquisition or partnerships or purchase directly from suppliers).

5. implement the sourcing strategy (express interest. A firm can start preparing RFP (request for proposal) with explicit materials or RFQ (request for quote) and send it out to suppliers with a deadline for their response. Use e-procurement technology).

6. Negotiate with suppliers and select the winning bid (Evaluate suppliers' responses by applying evaluation criteria. Choose suppliers by using the selection criteria).

7. Implement a transaction plan or contractual supply chain improvements. (invite winner suppliers in implementing improvements. The buyer should use KPIs (Key performance indicators)).

Fig 3.4: One bar for every year from 2016-2021 showing spending in billion Canadian dollars. 2016 = 13, 2017 & 2018 = 14. 2019-2021 = 15. [Return to image].

Fig 3.6: Bar graph showing IT-outsourcing services market revenue in Canada from 2016-2021 by segment in million US dollars. Each bar is divided to show: IT-infrastructure outsourcing, IT-application outsourcing, IT-administration outsourcing, and professional payment services. Totals increase over time with IT-infrastructure outsourcing growing the most (6625.08 in 2016 to 7439.02 in 2021). [Return to image].

Alternative Text-Based Activities

Assessing What You Already Know Activity (Text-based)

Question 1:

Procurement is about specifying requirements, identifying sources, evaluating options, and acquiring resources that are fit for purpose, cost effective and sustainable.

- False (Incorrect)
- True (Correct)

Feedback: “Procurement is about specifying requirements, identifying sources, evaluating options, and acquiring resources that are fit for purpose, cost effective and sustainable” (p. 144).

Question 2:

Does the procurement process help organizations gain and manage costs such as professional services, IT equipment, capital assets and so forth?

- Yes (Correct)
- No (Incorrect)

Feedback: The procurement process helps companies obtain and manage costs such as freight forwarders, human resources, capital assets, fuel, IT equipment, sales, utilities, marketing, legal and professional services, raw materials, facility management.

Question 3:

Globalization has significantly deteriorated businesses by decreasing the availability of labour globally and production flexibility. True/ False

- True- (Incorrect)
- False (Correct)

Feedback: Globalization has significantly improved businesses by increasing the availability of labour globally and production flexibility. In addition, labour costs in many countries are cheap, which helps companies move their production process to third-party or external providers with whom the firm has a contract. As a result, the firm has gotten a lot of advantages, such as access to specialized resources and reduced fixed costs. For example, an airplane can be split into thousands of parts and produced in many geographic locations.

Question 4:

What are the three main steps of choosing a supplier? Check all that apply.

- Identifying (Correct)
- Preparing (Incorrect)
- Evaluating (Correct)
- Negotiating (Correct)

Feedback: Selecting the right supplier consists of identifying, evaluating, and negotiating steps. Selection of suppliers is a process where the main objectives are reducing the risk of purchasing and costs, maximizing the value of the purchaser, as well as developing long-term relationships between supplier and buyer (Taherdoost & Brard, 2019). [Return to activity].

Check Your Understanding: Concept of Procurement and its Value in the Global Value Chain

Question 1:

1. Conduct an Internal Needs Analysis	Identify the firm's needs and targets benchmark the current company's performance.
2. Conduct an Assessment of the Suppliers' Market	Research and find the most cost-effective supply with the lowest risk.
3. Collect Supplier Information	Determine supplier selection criteria, compare and evaluate suppliers.
4. Develop a Sourcing/Outsourcing Strategy	Strategy can be through acquisition or partnerships or purchase directly from suppliers.
5. Implement the Sourcing Strategy	Express interest. A firm can start preparing RFP[2] with explicit materials or RFQ[3] and send it out to suppliers with a deadline for their response. Use e-procurement technology.
6. Negotiate with Suppliers and Select the Winning Bid	Evaluate suppliers' responses by applying evaluation criteria. Choose suppliers by using the selection criteria.
7. Implement a Transaction Plan or Contractual Supply Chain Improvements	Invite winner suppliers in implementing improvements. The buyer should use KPIs.

Feedback: Great Job! (Correct)

Try Again! (Incorrect)

Question 2:

What is the role of procurement?

- Hiring workforce on behalf of the company (Incorrect)
- Marketing and selling on behalf of the company (Incorrect)
- Managing risk and value on behalf of the company (Correct)

Feedback: Managing risks and value on behalf of the company is the role of procurement (p. 148).

Question 3:

Contract planning is where you plan out each individual contract for the project work. True/False

- True (Correct)
- False (Incorrect)

Feedback: Contract planning is where you plan out each individual contract for the project work. You work out how you'll manage the contract, what metrics it will need to meet to be considered successful, how you'll pick a seller, and how you'll administer the contract once the work is happening (Watt, n.d.)

Question 4:

International procurement is the process which is increasingly essential for organizations globally. It helps organizations enhance their (_____), (_____), (_____), and (_____) by finding suppliers who meet the organization's strategy.

- competitive position, meet customer expectations, improve profits, add value (Correct)
- network, find new stream of revenue, connect them directly (Incorrect)
- Opportunities, improve profit, create freedom, buying an existing business (incorrect)

Feedback: The process of purchasing services or goods worldwide to bid on contracts is called international procurement. The process is increasingly essential for organizations globally. It helps organizations enhance their competitive position, meet customer expectations, improve profits, and add value by finding suppliers who meet the organization's strategy. [Return to activity].

Check Your Understanding: Sourcing and Outsourcing of Goods, Manufacturing and Services

Question 1:

Many organizations use (_____) and (_____) strategies and become globally competitive.

- Outsourcing and sourcing (Correct)
- Sourcing and procurement (Incorrect)
- Many suppliers and inbound transportation (Incorrect)

Feedback: Modern businesses evolve simply from domestic supply of products to global sourcing and outsourcing goods, manufacturing, and services. It is clear that companies cannot manufacture and do all products and services for running a business and hold a competitive position in the market. That is why many organizations use sourcing and outsourcing strategies and become globally competitive.

Question 2:

Benefits of outsourcing. Check all that apply.

- Lower costs; (Correct)
- differentiate products; (Correct)
- production capacity; (Correct)
- meet customer demands; (Correct)
- efficient replenishment; (Correct)
- focus on the core competencies; (Correct)
- build innovative products or services; (Correct)
- effective and efficient service; (Correct)
- increase value by bringing capabilities and expertise; (Correct)
- reduce operational and production costs; (Correct)
- being adaptable for changing market conditions and preferences; (Correct)
- increase human resources; (Correct)
- low cost of labour; (Correct)
- Value-added component of logistic activities (Incorrect)

Feedback:

Advantages	Disadvantages
• Lower costs; • differentiate products; • production capacity; • meet customer demands; • efficient replenishment; • focus on the core competencies; • build innovative products or services; • effective and efficient service; • increase value by bringing capabilities and expertise; • reduce operational and production costs; • being adaptable for changing market conditions and preferences; • increase human resources; • low cost of labour	• Expose confidential information and technology; • hidden costs; • exchange rate fluctuations; • lack of customer focus; • cost of transactions can be raised; • wrong partners; • risk of cultural differences; • risk of poor-quality finished products; • delay in delivering goods or services.

Question 3:

Benefits of sole-sourcing. Check all that apply.

- Price discounts based on higher volume (Correct)
- Rewards for loyalty during tough times (Correct)
- Exclusivity brings differentiation (Correct)
- Greater influence with a supplier (Correct)
- More flexibility in times of disruption (Incorrect)
- Negotiating lower rates by pitting one supplier against another (Incorrect)

Feedback: Sole-Sourcing Advantages

- Price discounts based on higher volume
- Rewards for loyalty during tough times
- Exclusivity brings differentiation
- Greater influence with a supplier

Sole-Sourcing Disadvantages

- Higher risk of disruption
- Supplier has more negotiating power on price (Mariadoss, n.d.). CC-BY-NC-SA-4.0

Question 4:

Today, more firms, like PowerSki, want to specialize in the processes that they perform best—and outsource the rest.

- True (Correct)
- False (Incorrect)

Feedback: Understandably, outsourcing is becoming an increasingly popular option among manufacturers. For one thing, few companies have either the expertise or the inclination to produce everything needed to make a product. Today, more firms, like PowerSki, want to specialize in the processes that they perform best—and outsource the rest. Like PowerSki, they also want to take advantage of outsourcing by linking up with suppliers located in regions with lower labour costs (Williams & Lumen Learning (Ed.), n.d.). CC-BY-NC-SA-4.0

[Return to activity].

Check Your Understanding: Show how suppliers are selected and the role of different components in supplier relationship models

Question 1:

Suppliers are the central part of the company's success.

- True (Correct)
- False (Incorrect)

Feedback: Suppliers are the central part of the company's success. To select suppliers for the firm, the organization needs to know various strategies. According to the chosen strategy, the company needs to choose the right supplier.

Question 2:

A firm has to select the appropriate strategy for its supply chain. According to the book "Operations Management: Sustainability and Supply Chain Management" (2020), (_____) methods exist nowadays (Heizer, Render, Munson, & Griffin, 2020, p. 428).

- 5 (Incorrect)
- 7 (Incorrect)
- 8 (Incorrect)
- 6 (Correct)
- 9 (Incorrect)

Feedback: A firm has to select the appropriate strategy for its supply chain. According to the book “Operations Management: Sustainability and Supply Chain Management” (2020), six methods exist nowadays (Heizer, Render, Munson, & Griffin, 2020, p. 428).

Question 3:

Arrange the logistic cycle activities in correct order:
Collaborate with many suppliers -1
negotiating with a few suppliers- 2
buy the supplier -3
joint venture -4
a coalition strategy called a keiretsu -5
use suppliers when needed and called virtual companies -6

Question 4:

Drag and Drop the steps in correct category

Collaborate with many suppliers	It is common for companies worldwide and suitable for obtaining commodities. In this case, one supplier plays against another supplier and creates an aggressively competitive environment. This strategy is not ideal for long-term relationships. The provider is responsible for maintaining technology, expertise, cost, quality of goods and delivery (Heizer et al., 2020, p. 428).
Negotiating with a few suppliers	Which helps build lifelong partnerships. Dedicated providers help companies get economies of scale and lower transaction and production costs (Heizer et al., 2020, p. 428). Collaboration between buyer and supplier can produce a willingness to participate in the Just-in-time method, increasing inventory turnover and reducing holding costs.
Buy the supplier	According to the Cambridge Dictionary (2022), vertical integration is "a process in a business where a company buys another company that supplies it with goods or that buys goods from it in order to control all the processes of production" (Cambridge University Press, 2022). It is suitable for large companies with a significant market share (Heizer et al., 2020, p. 428).
Joint venture	When firms collaborate with a few companies to produce the finished product. The power of this collaboration is to enhance new development and technical skills as well as reduce costs and secure supply (Heizer et al., 2020, p. 428).
A coalition strategy called a keiretsu	The name came from Japanese manufacturers, often suppliers' financial supporters. This strategy combines parts from vertical integration, collaboration, and purchase from a few suppliers. It's for long-term relationships, which provide technical expertise with stable, high-quality production (Heizer et al., 2020, p. 428).
Use suppliers when needed and called virtual companies	The virtual company specializes in flexibility, efficiency, speed, management expertise and low capital investments. This type of company provides services on-demand by relying on various suppliers (Heizer et al., 2020, p. 430).

Feedback: It is important for companies to select suppliers for the firm. That is why the organization needs to know various strategies. According to the chosen strategy, the company needs to choose the right supplier. A firm has to select the appropriate strategy

for its supply chain. According to the book "Operations Management: Sustainability and Supply Chain Management" (2020), six methods exist nowadays (Heizer, Render, Munson, & Griffin, 2020, p. 428). [Return to activity].

Check Your Understanding: Explain How Supplier Relationships Adds Value in The Global Value Chain

Question 1:

Supplier relationship' value created by (_____), (____) and getting quality products for the same price.

- reducing costs, improving efficiency (Correct)
- reducing order processing, deterioration in productivity (Incorrect)
- Improving management resources, reduce logistics-related costs (Incorrect)

Feedback: Supplier relationship management is increasingly essential for companies. Supplier relationship' value created by reducing costs, improving efficiency, and getting quality products for the same price. These benefits impact the financial results of any organization.

Question 2:

Advantages are beneficial if the relationship with suppliers is long-term developed.

- False (Incorrect)
- True (Correct)

Feedback: Advantages are beneficial if the relationship with suppliers is long-term developed. To create advantages for the organization, companies and suppliers have to invest money, time, patience, resources, and willingness to communicate to find the best solution for all parties. All stakeholders involved in the process include employees, suppliers, and buyers. Increasing the complexity of changing product lines, service delivery, value, and customer satisfaction all points to becoming a function of the global value chain.

Question 3:

Ongoing valuable relationships can increase the popularity of (_____)

- quality products (Correct)
- transportation (Incorrect)
- services (Incorrect)
- activities (Incorrect)

Feedback: Ongoing valuable relationships can increase the popularity of quality products and the organization's efficiency and effectiveness, determined by a business model, supply chain, customers, and suppliers.

Question 4:

If the company delivers quality products without defects, customer satisfaction indicators will (____).

- Increase (Correct)
- Decrease (Incorrect)

Feedback: If the company delivers quality products without defects, customer satisfaction indicators will increase because customers will continue to enjoy doing business. More vital brand awareness comes from excellent customer satisfaction factors. In addition, the production or manufacturing industry depends on suppliers. If the raw material is delivered late, the company will face risks and losses. Losses such as stopping production or rejecting finished products.

[Return to activity].

PART IV

CHAPTER 4: TRANSPORTATION

4.1 Introduction

Watch or Listen to the Following Media Clip

Media 4.1 *Module 4: Move it: Transportation and Logistics – ASU's W.P. Carey School* [Video]. W. (URL: https://www.youtube.com/watch?v=-ZpHiMTwOdM)P. Carey School of Business.

Learning Objectives

After reading this chapter, you should be able to understand and answer the following questions:

1. Identify different modes of transportation and their characteristics.
2. Assess infrastructure and equipment types used in different modes of transportation.
3. Describe International Transport Network.
4. Explain how transportation adds value to the global value chain.

Introduction

Transportation is an essential and integral part of the Global Value Chain. Transportation is beneficial for society and helps in globalization of the world economy. That is why it plays a vital role in human life, companies, suppliers and distributors. This service should be effective, efficient and appropriately managed by an enterprise. Demand for transportation depends on a party wishing to move goods or freight efficiently and effectively from one point to another. Five different modes of transportation exist to help people move freight between cities or countries, or continents.

Transportation adds value in international supply chain management by reducing transportation time and as a result supply chain costs and frees up time on other areas of the supply chain. Also, suppose delays happened in some areas of the supply chain. In

that case, transportation can help to speed up their performance and reduce time more efficiently by choosing the fastest way of delivering goods to the customer. In addition, transportation can help organizations to reduce cycle stock and increase customer satisfaction because of frequency deliveries. Supply chain cost minimized by dint of transportation' benefits such as reducing inventory cost, safety stocks, cycle stocks, inventory velocity, minimum dwell-times, increase shelf life % for customers, operational planning. Transportation plays a vital role in supply chains which offer reliability and consistency; flexibility in terms of location, delivery, time, quantity, goods, cost; Just-in-Time delivery; customization by integration of supply chain; standardization by making activities predictable, reduction of total cost (Morash & Clinton, 1997).

Assessing What You Already Know

As you answer the following questions, reflect upon what you already know about how company's work.

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 4.7.

Overall Activity Feedback

Transportation is an essential and integral part of the Global Value Chain. Transportation is beneficial for society and helps in globalization of the world economy. That is why it plays a vital role in human life, companies, suppliers and distributors. This service should be effective, efficient and appropriately managed by an enterprise. Demand for transportation depends on a party wishing to move goods or freight efficiently and effectively from one point to another. Transportation adds value in international supply chain management by reducing transportation time and as a result supply chain costs and frees up time on other areas of the supply chain. Also, suppose delays happened in some areas of the supply chain. In that case, transportation can help to speed up their performance and reduce time more efficiently by choosing the fastest way of delivering goods to the customer. Transportation plays a vital role in supply chains which offer reliability and consistency; flexibility in terms of location, delivery, time, quantity, goods, cost; Just-in-Time delivery; customization by integration of supply chain; standardization by making activities predictable, reduction of total cost (Morash & Clinton, 1997)

Media Attributions and References

W. P. Carey School of Business. (2010, April 15). *Module 4: Move it: Transportation and*

logistics – ASU's W. P. Carey School. [Video]. YouTube. https://www.youtube.com/watch?v=-ZpHiMTwOdM

4.2 Modes of Transportation

Learning Objective

1. Identify different modes of transportation and their characteristics

There are many criteria by which the mode of freight transportation will be chosen. It depends on the distance, value, availability of services, freight rates, characteristics of goods, budget, cost of transport, reliability, safety, urgency, carrier timing, etc. A critical decision for companies is to choose the suitable carrier to transport (Jung, Kim & Shin, 2019).

Modes of transportation are classified into the following types:

1. Road
2. Rail
3. Air
4. Water
5. Pipeline

Modes of Transportation

Some paragraphs came from Faramarzi & Drane (n.d.) *Introduction to Operations Management* under a Creative Commons Attribution-NonCommercial-ShareAlike License 4.0.

Trucking

The majority of goods are shipped by truck completely or at some point during the shipping. Trucking is the most flexible of all modes of transportation. It is categorized by "Full Truck Load" (TL) when the entire truck is hired and delivered directly, or "less-than-truckload" (LTL) which generally includes integrating

orders to increase utilization of the truck. Presently, Canada is facing a serious issue which is shortage of qualified drivers. Demand for drivers continues to increase every year, and the average age of drivers is increasing. The trucking industry will face challenges to make driving more attractive to entice new workers into trucking jobs (Faramarzi & Drane, n.d.).

The most used mode of transport which allows extended delivery services for other types of transportation. For improving efficiency, profitability, service level, and productivity; transportation companies cooperate with fellow transportation companies by creating efficient transport planning, extending portfolio and vehicle capacity, and strengthening market position in the region. This definition is called horizontal cooperation. As road transportation is most used globally by organizations, policymakers insist on shifting companies to more environmentally friendly modes of transportation such as inland waterways or rail carriage.

Railroads

Rail can be a very cost-effective means of transporting goods for long-distance travels. Goods in containers, or products that are bulky and heavy are ideal for train transport. Canada has a very old and well-established rail system. It ships products including cars, fertilizer, food and beverages, forest products, grain, metals and minerals and petroleum products. Often, large manufacturers locate themselves near rail lines for easy shipment of raw material into and finished goods out of their facilities. Compared to trucking, shipping by rail is very energy efficient, and removes many trucks from congested highways (Faramarzi & Drane, n.d.).

The essential and efficient mode of transport, among other types, links to other carriers by using containers. This mode increased over decades and continues to grow.

Airfreight

For goods that are expensive, small and light, and urgent air shipping may be a good choice. Air carriers charge by a combination of the weight and size of the shipment. This mode of transport is generally used when speed is more important than cost. Shipping by air is very reliable. Firms may want to consider the environmental impact of regular use of air shipping (Faramarzi & Drane, n.d.). The airfreight mode of transport is steadily growing. Also, the airfreight sector is changing direction to integration and cooperation with other modes of transportation such as water and inland carriages. This action will allow companies to provide services like Just-In-Time. Also, air transport is a part of the intermodal system.

Waterway

This is a very common way of shipping goods. The goods that travel by water include chemicals, stone, cement, sugar, coal and other heavy commodities (Faramarzi & Drane, n.d.) .

The Great Lakes St. Lawrence Seaway System is a 3,700 kilometer marine highway that runs between Canada and the United States. Since 1959, it is serving many industries to ship iron ore, coal, limestone, steel, grain and cement. The cost for shipping by waterways is economical. Most low-cost products are shipped by waterways (Faramarzi & Drane, n.d.)

For the international movement of freight, maritime transport performs a dominant role in the supply chain. Service quality such as real-time information or tracking systems is more important than delivery price for the logistics industry. The water industry has three types of operation: industry, liner, and tramp shipping. Industry shipping supplies raw materials like natural gas, which requires high-pressure containers. Liner shipping conveys standardized containers partially or comprising manufactured products from various shippers and different consignments (Lun & Marlow, 2011). Liner Shipping Companies (LSCs), which offer this type of operation, invest in ships, containers, and cutting-edge technology for improving customer satisfaction (Lun & Marlow, 2011). Manage capacity is a central key point in the liner shipping operation. Tramp shipping has irregular schedules, sporadic routes, and prices to maximize profit with long-term contracts (Laake & Zhang, 2016). Liner shipping is similar to bus services, while tramp shipping is the same as taxi services (Lun & Marlow, 2011)

Pipelines

Crude oil, natural gas and other petroleum products are shipped by pipelines. Once the pipelines are built, the cost per kilometer for shipping is very inexpensive. There is a lot of opposition and concern over new pipelines because of worry over spills and leaks that may contaminate land and waterways.

(Faramarzi & Drane, n.d.) CC-BY-NC-SA-4.0

Table 4.1

Characteristics of Mode of Transportation

Mode	Characteristics
Road	**Advantages:** direct access to consignee place and consignor; high accessibility, mobility, and availability level; cheapest investment funds; frequency, and dependability. **Disadvantages:** limited and low capacity for moving large quantities of freight; low safety and speed (Mangan & Lalwani, 2016, p.105) .
Rail	**Advantages:** Carrying capacity is high, energy consumption is low, and impact of weather conditions is low, good on speed, capability to transfer oversized freight. **Disadvantages:** time-consuming for organizing goods, complicated and high cost of maintenance, equipment requirements, and difficult flexibility to manage urgent demand (Mangan & Lalwani, 2016, p.105) .
Air	**Advantages**: High-speed delivery to far destinations; high security; risk of damage products is low; accessibility and flexibility; the great frequency for regular move products from one location to the next; connect national and international distance. **Disadvantages:** Delivery fee is high; capacity constraints; required other modes of transport for moving goods to the airport; lack of direct access to consignees and consignors; manage demand; impact weather factors that affect low schedule reliability; cost of delay can be significant; air traffic.
Water	**Advantage:** Cheap price and has a high capacity for bulky freights. **Disadvantage:** Products take a long time to arrive; weather conditions affect schedule (Mangan & Lalwani, 2016, p.105).
Pipeline	**Advantages:** high capacity; the impact of weather conditions is low; operation fee is cheap; conveyance is continuous; excellent dependability. **Disadvantages:** Supervision is hard; high cost of infrastructures and ongoing maintenance and inspection (Mangan & Lalwani, 2016, p.105).

This material is adapted from Faramarzi & Drane (n.d.) *Introduction to Operations Management* under a Creative Commons Attribution-NonCommercial-ShareAlike License 4.0.

Multimodal/Intermodal Shipping

This refers to the use of a combination of different types of transportation to move goods from origin to destination. A common example is a combination of truck/ship/train. The goal is to ship the goods as efficiently as possible. The goods are shipped under a single contract with a carrier, and can be easily

tracked. It also uses several modes of transportation but also uses a container so that freight does not have to be handled each time it changes modes. Each mode will have a carrier responsible for the shipment. The use of containers increases the security, reduces loss and damage and increases the speed of shipment (Faramarzi & Drane, n.d.).

Figure 4.1
Transportation Modes



TRUCKING

- Flexible (truck load vs. less-than-truckload)
- Drivers in demand
- Creates highway congestion



RAILROADS

- Ideal for bulkier products or containers
- Cost effective over distances
- Energy efficient



AIRFREIGHT

- Ideal for small & light products
- Prioritizes speed over cost
- Reliable
- Air pollutant



WATERWAY

- Ideal for low cost, heavy products
- Very common
- Inexpensive



PIPELINE

- Used for crude oil, gas, petroleum
- Once built, very cost effective
- Land and water pollutant



MULTIMODAL

- Uses a combination of modes through a carrier
- Products secured in containers
- Contractual with

(Click to enlarge).

Note. From Faramarzi & Drane, n.d. CC BY-NC-SA 4.0. [Image description].

Check Your Understanding

Identify different modes of transportation and their characteristics.

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Interactive activity unavailable in this format

Text-based alternatives to interactive activity available in Chapter 4.7.

Overall Activity Feedback

There are many criteria by which the mode of freight transportation will be chosen. It depends on the distance, value, availability of services, freight rates, characteristics of goods, budget, cost of transport, reliability, safety, urgency, carrier timing, etc. A critical decision for companies is to choose the suitable carrier to transport. Companies need to select the proper mode of transportation, which plays a vital role in supply chains. Urgent air shipping may be reasonable for expensive, small, and light goods. Air carriers charge by a combination of the weight and size of the shipment. This mode of transport is generally used when speed is more important than cost. Shipping by air is very reliable.

Media Attributions and References

Drane, M. and Faramazi, H. (n.d.). *Introduction to operations management*. Pressbooks Seneca College. https://pressbooks.senecacollege.ca/operationsmanagement/ CC BY-NC-SA 4.0.

4.3 Importance of Containers in International Transportation

Learning Objective

2. Assess infrastructure and equipment types used in different modes of transportation.

Often goods move intermodal by using several transport modes in a single container along the entire route. Intermodal transportation has excellent advantages, such as reducing the time and the chance of freight damage, flexibility, and secure goods flow. If the company needs to deliver cargo quickly to their destination and over a short distance, they prefer to choose intermodal transportation on the road. The freight will be delivered in the shortest time to their last destination. Regarding sea freight intermodal transport, it is the cheapest way to move cargo, allowing for the export and import of large-scale bulk, despite a long transportation time. The implementation time to organize shipment using rail transport will take several working days. On the other hand, the cost of transporting freight by rail will be decreasing significantly if the distance is increased; however, the short distance will be expensive (Mindur, 2021). For organizing and managing intermodal transportation of cargo, operators should have skills, knowledge, experience and access to advanced technologies which help to understand and meet customer needs.

Importance of Containers in International Transportation

Container transport is the most important and often used for moving different types and sizes of goods globally. Containerisation system improves productivity, reduces time and increases delivery time which meet

Figure 4.2
Container Ship

customer's expectation and satisfaction. For instance, freight can be moved by sea-road-rail or rail-sea-road or road-sea. According to the Statista Research Department, the seaborne containerized cargo was significantly increased from 0.1 billion tons in 1980 and reached 1.85 billion tons in 2020 (Statista, November 23, 2021). View graph International seaborne trade carried by container ships from 1980 to 2020. [Chart description].



Note. From Container Ship, n.d. Pixabay.

Also, as globalization continues growing, the largest shipping zone of cargo volume is the Trans-Pacific Ocean, which transported over 31.2 million twenty-foot equivalent units [TEUs] of freight in 2021 (UNCTAD, November 18, 2021). This mode of transport is environmentally friendly and the most cost-effective way to transfer freight internationally. View graph Estimated containerized cargo flows on major container trade routes in 2021, by trade route (in million TEUs). [Chart description].

There are many types and standardized sizes of intermodal transport unit (ITU)/containers; however, 90 % of all containers used worldwide are general-purpose containers.

Types of containers 20ft and 40ft:

Figure 4.3

Container



Note. From McKenna, 2017. Unsplash.

- Standard container- general purposes;
- Garmentainers containers – created specifically for garments on hanger shipments created with special system by using string or bar system; (OOCL, 2022).
- High Cube containers – suitable for voluminous or bulky cargo, and light; (OOCL, 2022).
- Open top – ideal particularly for machinery or bulky freight which loaded from the top; (OOCL, 2022).
- Super Rack- the most flexible container with adjustable height which is suitable for drilling machinery or helicopters; (OOCL, 2022).

- Refrigerated container created for products which should be moved with controlled temperature containers; (OOCL, 2022).
- Flat rack container is suitable for bulky machinery or pipes or heavy loads which should be loaded from the top or sides; (OOCL, 2022).
- Tank container for transferring heavy products with special attention which does not fit into the rest of containers;
- Dry ventilated containers are ideal for goods with high moisture components which should be naturally ventilated. These types of containers are so-called coffee containers. Suitable for organic goods or cocoa beans, coffee beans.

Table 4.2

Container Types

GENERAL PURPOSE	 20′ x 8′ x 8′6″	 40′ x 8′ x 8′6″	
FLATRACKS	 20′ x 8′ x 8′6″	 40′ x 8′ x 8′6″	 40′ x 8′ x 9′6″
GARMENTAINERS	 20′ x 8′ x 8′6″	 40′ x 8′ x 8′6″	
HIGH CUBE	 40′ x 8′ x 9′6″	 45′ x 8′ x 9′6″	
OPEN TOP	 20′ x 8′ x 8′6″	 40′ x 8′ x 8′6″	 40′ x 8′ x 9′6″
REFRIGERATED	 20′ x 8′ x 8′6″	 40′ x 8′ x 8′6″	
SUPER RACK	 40′ x 8′ x 13′6″		

(click to enlarge). Various types of shipping containers with dimensions and visuals. [Table description].

Check Your Understanding

Assess infrastructure and equipment types used in different modes of transportation.

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Interactive activity unavailable in this format

Text-based alternatives to interactive activity available in Chapter 4.7.

Overall Activity Feedback

It is essential to know intermodal transportation and modes of transport. Often goods move intermodal by using several transport modes in a single container along the entire route. Intermodal transportation has excellent advantages, such as reducing the time and the chance of freight damage, flexibility, and secure goods flow. If the company needs to deliver cargo quickly to their destination and over a short distance, they prefer to choose intermodal transportation on the road. The freight will be delivered in the shortest time to their last destination.

Regarding sea freight intermodal transport, it is the cheapest way to move cargo, allowing for the export and import of large-scale bulk, despite a long transportation time. If the company needs to deliver cargo quickly to their destination and over a short distance, they prefer to choose intermodal transportation on the road. The freight will be delivered in the shortest time to their last destination.

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[Container ship] [Photograph]. (n.d.). Pixabay. https://pixabay.com/photos/ship-container-ship-containers-sea-6560671/

McKenna, F. (2017). Containers. [Photograph]. Unsplash. https://unsplash.com/s/photos/containers

4.4 International Transport Network

Learning Objectives

3. Describe International Transport Network.

Now that you know the modes of transportation in detail, it would be beneficial to analyze international transport networks. The International Transport Networks consist of shipping routes worldwide and container ports connecting many countries and continents for moving freight.

Video: Marine Traffic – A Visualization of Global Shipping Data (1:49)

Unsigned created custom software to produce a film showcasing the data in a new visual format.

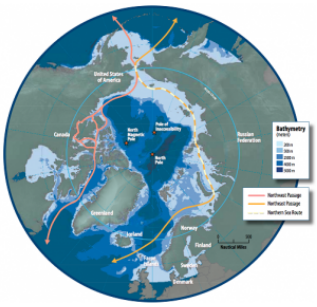
Media 4.2 *Marine Traffic – A Visualisation of Global Shipping Data* [Video]. Aurecon. (URL: https://www.youtube.com/watch?v=JLg1_dnWXR8)

Routes include the Trans Mongolian and Trans-Siberian railways as well as Northern Sea and Commercial Maritime routes and Air Freight Hub (Mangan & Lalwani, 2016, p.114).

Figure 4.4
Northern Sea Route

- The Northern Sea Route (NSR): NSR opened new doors for international trades in containerized goods and connected Asia with Europe, Russia, with Korea. According to a journal about the Northern Sea Route (2020), this channel reduces distance by up to 40% between Europe and Asia (Khazheeva & Bondarchuk, 2021).

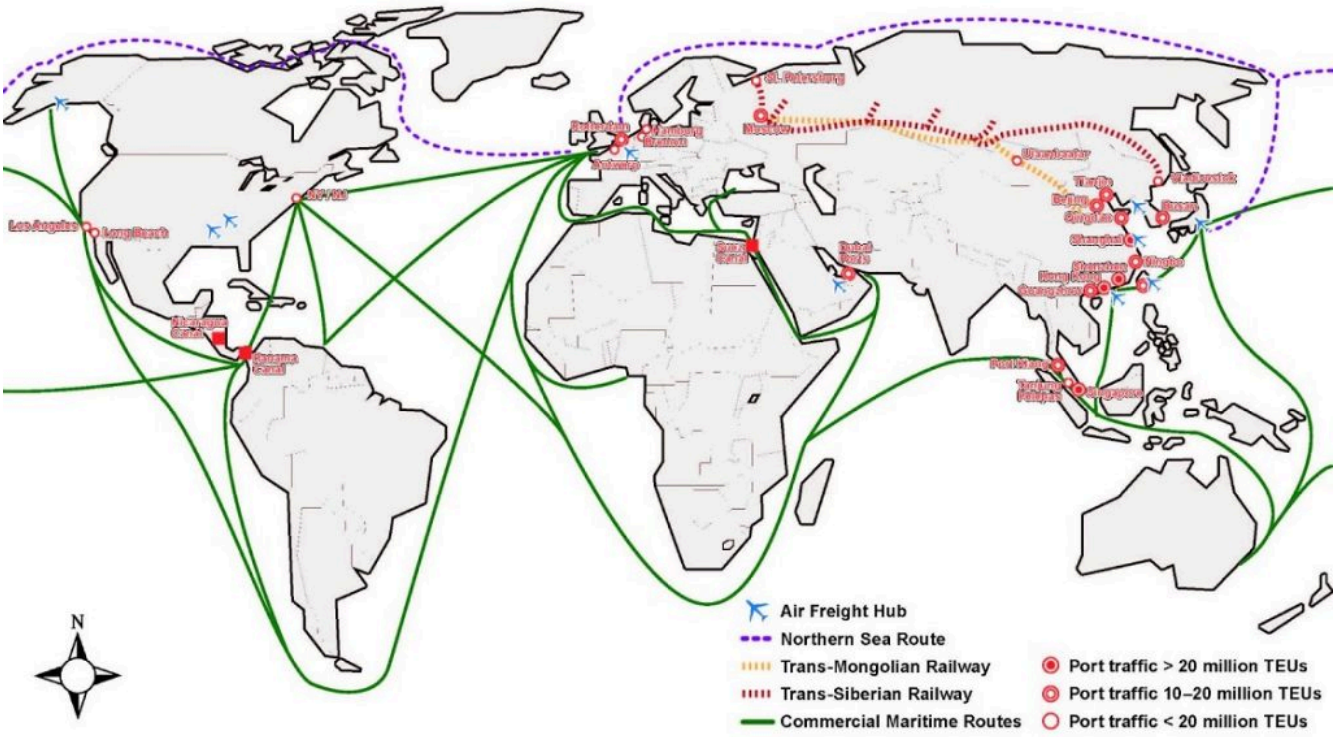
The Northern Sea Route (NSR) gradually creates opportunities for shipping companies and moves freight faster by using short distances between destinations. Because of global climate change and melting icebergs in the Arctic. The research found (2020) that climate change impacts the ship schedules and sizes of vessels, which should have particular metal for moving through ice. In addition, the lack of modern deep-water ports and shipping small cargoes is sophisticated for this route (Keltto & Su-Han, 2020).



(click to enlarge)
Note. From Harder, 2009). Arctic Council Public Domain. [Image description].

- Trans-Siberian railway is a part of international transport corridors (ITCs) and has the longest railway in Russia, which interconnects the Far East and the European Union ports. This channel generates economic cooperation between countries, world trade, the well-being of countries' population, infrastructure, and opens huge sales markets for domestic companies within countries (Khazheeva & Bondarchuk, 2021).
- The least expensive cost and volatile region shipping through the Suez Canal and between Europe and Asia. The Suez Canal/ Panama is the most changeable region in the world and has vessel canal restrictions. At the same time, Northern Sea Routes and Trans-Siberian Railway are the second options of shipping cargo and are more expensive (Mangan & Lalwani, 2016, p.114).
- Trans-Mongolian Route starts from Moscow and finishes in Beijing. Trans-Siberian Route – Vladivostok and St. Petersburg. Destinations in both routes take approximately six days (Richmond, Bloom, Duca, Haywood, Kohn, Low, Masters, McCrohan, St. Lous., & Vorhees, 2015).

Figure 4.5
International Transport Network



(click to enlarge)

Note. [Image description].

A consignor can choose any carrier organization because many global shipping companies move freight over broadly similar routes. The significant difference will be related to cost and time. The vital key role in deciding the freight shipment is the cost factor.

New routes are planned and emerge globally, such as the Nicaragua Canal and the Northern Sea Route (Mangan & Lalwani, 2016, p.114). Shipping channels can significantly impact global economic integration, export service, and world seaborne trade and help less economically developed regions stimulate foreign trade (Chen, Notteboom, Liu, Yu, Nikitakos, & Chen, 2019). The Nicaragua Canal will connect the Caribbean Sea with the Pacific Ocean to compete with the Panama Canal (Chen, Notteboom, Liu, Yu, Nikitakos, & Chen, 2019). Also, the Nicaragua Canal can accommodate much more enormous vessels than the Panama Canal because of the superior water depth, which is a minimum of 26.9-29.0 m (Chen, Notteboom, Liu, Yu, Nikitakos, & Chen, 2019). According to the article "The Nicaragua Canal: potential impact on international shipping and its attendant

challenges" (2019), the potential of the Nicaragua Canal is significant because it can impact developing port' systems in the Pacific and the Atlantic Oceans and create a cargo channel to Cuba, Venezuela, Colombia and other regions (Chen, Notteboom, Liu, Yu, Nikitakos, & Chen, 2019).

Check Your Understanding

Describe the international transport network.

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 4.7.

Overall Activity Feedback

Now that you know the modes of transportation in detail, it would be beneficial to analyze international transport networks. The international Transport Networks consist of shipping routes worldwide and container ports connecting many countries and continents for moving freight. A consignor can choose any carrier organization because many global shipping companies move freight over broadly similar routes. The significant difference will be related to cost and time. The vital key role in deciding the freight shipment is the cost factor.

Media Attributions and References

Aurecon. (2018, March 5). *Marine traffic – A visualisation of global shipping data.* [Video]. YouTube. https://www.youtube.com/watch?v=JLg1_dnWXR8

Harder, S. (2009). *Arctic marine shipping assessment* [Image]. Arctic Council. https://commons.wikimedia.org/w/index.php?curid=36253405. Public Domain.

4.5 Transportation and the Global Value Chain

Learning Objectives

4. Explain how transportation adds value to the global value chain.

Transportation adds value to the global value chain for many aspects such as reducing time delivery, efficiency, reliability, flexibility, increasing visibility, transparency, and enhancing customer satisfaction and service. Moreover, transport logistics can use data for analyzing costs and expenses for optimizing future transport planning for being more effective and adding value to the global value chain. In addition, various transportation networks can significantly impact global economic integration, export service, the connection between countries and continents, and help less economically developed regions stimulate foreign trade (Chen, Notteboom, Liu, Yu, Nikitakos, & Chen, 2019).

The global chain relies on efficiency and flexibility of transport; that is why many companies use intermodal modes. Internodal transportations and containers increase security, reduce loss and damage, and increase shipment speed and efficiency. Different organizations choose different transportation methods suitable for the firm's objectives. Companies need to select the proper transport for moving their goods. Without transportation, businesses cannot exist. For example, raw materials should be moved to production and manufacturing destinations to create finished goods that should be delivered on time to customers. The global value chain adds a competitive advantage to businesses, organizations, and industries. Maximizing inbound and outbound logistics and operations are keys to success for the competitive world's business field (Tarver, 2021). It's self-evident that technical improvements help intermodal transportation be more efficient for connecting between modes of transport and the value chain.

The Role of Transportation Networks in Moving Canadian Trade

The following is from *The Role of Transportation Networks in Moving Canadian Trade* by Stephen Tapp (2016) under the Creative Commons/No Derivatives Licence 4.0:

The efficiency and reliability of a country's transportation networks are key drivers of international competitiveness, and can help expand global trade and attract foreign investment. This is particularly true with the emergence of a "supply chain mindset" as production processes become more international. Jacques Roy (HEC Montréal, Professor of Logistics and Operations Management), examines the role of Canada's transportation infrastructure in moving goods in and out of the country by four key transportation modes: road, rail, sea and air.

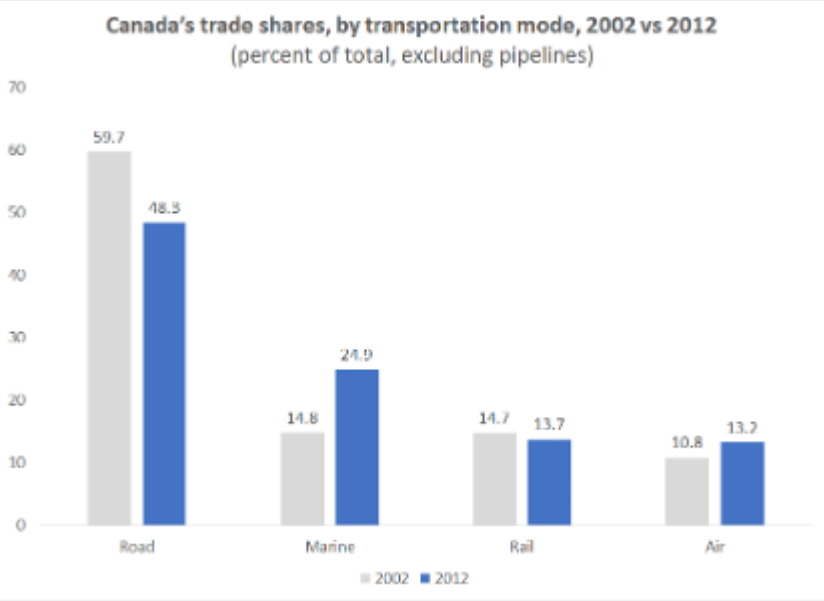
Overall, he finds that Canada's transportation and logistics networks perform reasonably well compared with other countries. But he identifies several areas for improvement, namely for:

- roads: domestic congestion;
- rail: capacity constraints;
- sea: container port competitiveness; and
- air: cargo capacity, competitiveness and airport landing fees.

Roy points out that the countries that lead the global logistics performance rankings have all invested heavily in major hubs to connect various transportation modes efficiently. As the new federal government looks to increase infrastructure spending, he urges them to take advantage of the opportunity to enhance Canada's trade-related infrastructure to support our trade, and thus our longer-term prosperity.

Over the past decade, Canada's goods trade has become far more reliant on marine transportation and less reliant on roads — although roads remain the most common mode by a wide margin:

Figure 4.6
Canada's trade shares, by transportation mode



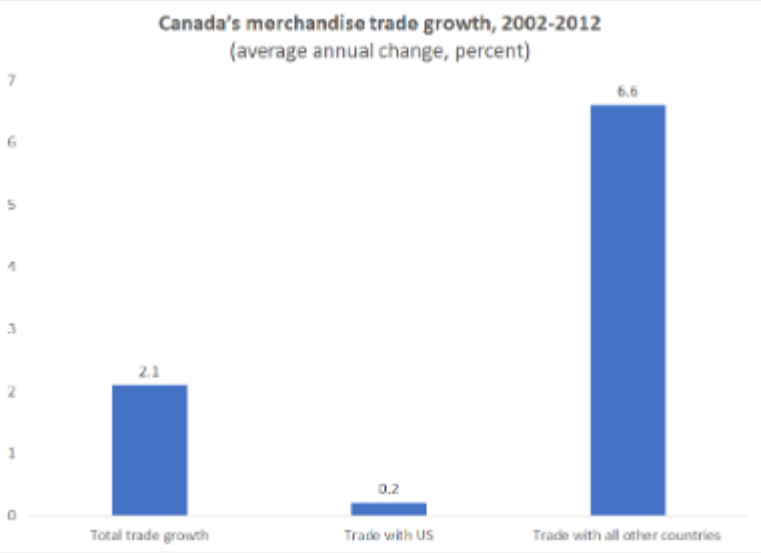
(click to enlarge)

The author suggests two key drivers of these trends.

Note. Driver 1: Canadian trade has stagnated with US, but grew with rest of world over the past decade. [Chart description].

Figure 4.7

Canada's merchandise trade growth



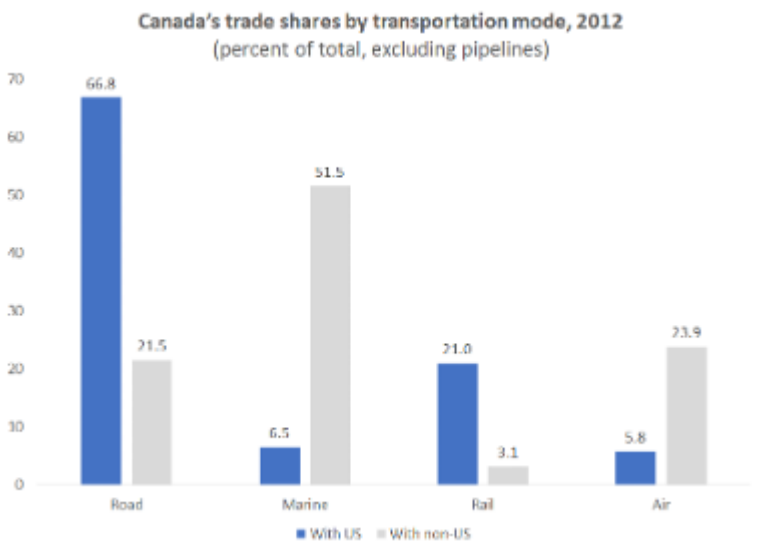
(click to enlarge)

Note. Canada's merchandise trade growth comparing total growth, trade with US, and other countries. [Chart description].

As a result of this differential performance, the share of Canada's overall merchandise trade conducted with the US shrank from 76% in 2002 to 63% in 2012. These regional shifts matter for transportation because Canadian trade with the US relies heavily on roads (and, to a lesser extent, rail and pipelines), whereas Canadian trade with the rest of the world relies much more — and increasingly — on marine and air modes (figure below). Air is the dominant mode used for trade with Western Europe, while sea is primarily used for trade with Asia.

Figure 4.8

Canada's trade shares by transportation mode



(click to enlarge)

Note. Driver 2: Increased use containerized freight in recent decades. [Chart description].

The value of Canada's trade moved by sea nearly doubled between 2002 and 2012. This is largely due to increased containerized freight, which has been a major development in marine (and other) transportation modes in recent decades. Containerization allows for standardized sizes and easier intermodal transportation changes, including the ability to transfer containers seamlessly from ships to rail or trucks. This opens up more possible routes between the origin and final destination.

Canada's biggest increases in marine traffic were on the country's West Coast at the ports of Vancouver and Prince Rupert (the latter only started handling containers in 2007), which likely relates to increased trade with Asia, particularly China.

The chapter describes some considerations and trade-offs that firms face when shipping goods in and out of Canada. Roy provides an overview of each transportation mode and some of the emerging issues — this table gives a quick summary:

Table 4.2

Overview the key features of various transportation modes

Mode	Road	Marine	Rail	Air
Attributes	Most flexible delivery option; generally fast and reliable	Cheapest option; large capacity	Cheaper than road and air; large capacity	Most expensive, fastest, but less capacity
Examples of goods shipped	Manufactured goods: machinery and equipment, vehicles	Petroleum products, grains, potash, vehicles	Raw materials, agriculture, chemicals, forest products	Pharmaceuticals, aerospace, high-tech, fresh food, newsprint, fashion
Key challenges for Canada	Weak exports to United States; higher energy use and emissions; traffic congestion in major cities	Potential impacts of climate change on river depth; labour disputes	Adjusting capacity; new safety regulations	Limited connections to Asia; competitiveness

The competitiveness of Canada's global supply chains and the reliability and efficiency of its transportation infrastructure go hand in hand. Over the past decade, a greater share of Canada's merchandise trade has been transported by sea and air, and relatively less by roads and rail. This is due, in part, to changing regional patterns of Canada's trade away from the US to other countries, as well as increased use of containers to ship goods.

Nonetheless, although roads have lost significant trade share over this period, they remain the most commonly used transportation mode for Canadian trade by a wide margin. Here, international border crossings no long seem to be a major concern for Canadian businesses. Instead, the bigger outstanding issues are Canada's weak trade performance with the US, and domestic road congestion in major cities (such as Toronto, Montreal and Vancouver), which causes delays and additional costs for Canadian traders.

For its part, Canada's rail system has faced capacity constraints and service issues, as well as safety concerns and regulatory reviews after the tragic accident in Lac-Mégantic in 2013.

Canadian ports and airports have become bigger conduits of international trade over the past decade, and recently concluded trade deals (CETA with the European Union and the TPP with 11 other Pacific Rim countries), if implemented, could reinforce these trends.

Canadian ports are generally well-equipped to handle bulk products, but the competitiveness of container ports is more fragile. Recent challenges include labour disputes, in both Canada and the US, reduced rail capacity in the winter to transport containers further inland to their final destinations, and the longer-term concern over climate change, which could reduce river depth and handling capacity along the Saint Lawrence Seaway.

A perennial challenge for Canada's air cargo is its limited market size. This limits freighter capacity and makes it hard to compete on costs relative to US alternatives, which increasingly have been used to transport Canada's aerospace exports (a phenomenon called "international leakage"). Canada's competitive disadvantage is exacerbated by relatively high taxes and landing fees.

Compared with other countries, Canada generally has a competitive transportation infrastructure and overall good logistics performance.

As the new federal government looks to increase infrastructure spending, it should adopt a long-term view and take advantage of the opportunity to enhance Canada's trade-related infrastructure to support the country's international trade and longer-term prosperity.

(Tapp, 2016). CC-ND-4.0

Check Your Understanding

Explain how transportation adds value to the global value chain.

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 4.7.

Overall Activity Feedback

Transportation adds value to the global value chain for many aspects such as reducing time delivery, efficiency, reliability, flexibility, increasing visibility, transparency, and enhancing customer satisfaction and service. The global chain relies on efficiency and flexibility of transport; that is why many companies use intermodal modes. Maximizing inbound and outbound logistics and operations are keys to success in the competitive world's business field. It's self-evident that technical improvements help intermodal transportation be more efficient for connecting between modes of transport and the value chain.

4.6 Summary

Transportation is an essential and integral part of the Global Value Chain. Transportation is beneficial for society and helps in the globalization of the world economy. That is why it plays a vital role in human life, companies, suppliers and distributors. Demand for transport depends on a party wishing to move goods or freight efficiently and effectively from one point to another. Modes of transportation are classified into the following types: road, rail, air, water, pipeline. Moreover, intermodal or multimodal shipping refers to a combination of different types of transportation to move goods from origin to destination (Faramarzi & Drane, n.d.).

A typical example is a combination of truck/ship/train (Faramarzi & Drane, n.d.). Intermodal transportation has excellent advantages, such as reducing the time and the chance of freight damage, flexibility, and secure goods flow. In addition, the containerization system improves productivity, reduces time, and increases delivery time to meet customer expectations and satisfaction. The goal is to ship the goods as efficiently as possible (Faramarzi & Drane, n.d.). A greater share of Canada's merchandise trade has been transported by sea and air, and relatively less by roads and rail (Tapp, 2016).

Transports add value in international supply chain management by reducing transportation time, and as a result, supply chain costs and frees up time on other areas of the supply chain. The vital key role in deciding the freight shipment is the cost factor. Transportation adds value to the global value chain for many aspects such as reducing time delivery, efficiency, reliability, flexibility, increasing visibility, transparency, and enhancing customer satisfaction and service. The international Transport Networks consist of shipping routes worldwide and container ports connecting many countries and continents for moving goods and freights. Routes include Trans Mongolian and Trans-Siberian railways as well as Northern Sea and Commercial Maritime routes and Air Freight Hub (Mangan & Lalwani, 2016, p.114). Companies need to select the proper transport and route for moving their goods. Without transportation, businesses cannot exist.

4.7 Key Terms, References, and Accessibility Descriptions

Key Terms

Full Truckload (FTL) – A categorization of trucking transport when the entire truck is hired and delivered directly (Faramarzi & Drane, n.d.).

Less-than-truckload (LTL) – A categorization of trucking transport which generally includes using several orders to increase the utilization of the truck (Faramarzi & Drane, n.d.).

Garmentainers Container – A container which was made specifically for garments on hanger shipments created with a special system by using string or bar system (OOCL, 2022).

Intermodal Transport Unit (ITU) – A container for various transports that ship or move freight or good or products via intermodal transportation travel internationally or domestically.

International Transport Corridor (ITC) – A linear area such as highways, railways, roads determined by transportation modes and crossing countries or territories.

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Image Descriptions

Fig 4.1: Trucking: Flexible (truck load vs less-than-truckload), drivers in demand, creates highway congestion.
Railroads: Ideal for bulkier products or containers, cost effective over distances, energy efficient.
Airfreight: Ideal for small & light products, prioritizes speed over cost, reliable, air pollutant.
Waterway: Ideal for low cost, heavy products, very common, inexpensive.
Pipeline: Used for crude oil, gas, petroleum, once built, very cost effective, land and water pollutant.
Multimodal: Uses a combination of modes through a carrier, products secured in containers, contractual with a single carrier. [Return to image].

Fig 4.3: Trade in billion tons loaded:
1980 = 0.1 billion; 1985 = 0.15 billion; 1990 = 0.2 billion; 1995 = 0.4 billion; 2000 = 0.6 billion;

2005 = 0.95 billion; 2010 = 1.2 billion; 2015 = 1.6 billion; 2016 = 1.7 billion; 2017 = 1.75 billion; 2018, 2019, & 2020 = 1.85 billion. [Return to image].

Fig 4.4: Trans-Pacific is 32.2 million TEUs.
Europe-Asia-Europe is 26.3 million TEUs.
Transatlantic is 8 million TEUs. [Return to image].

Fig 4.5: World map illustrating various trade routes. Air freight hubs are indicated with a blue airplane icon. Northern sea route is indicated with a purple dashed line which goes north of all continents through the arctic. Trans-Mongolian and Trans-Siberian rails are indicated with yellow and red dashed lines respectively and are located through Russia into China. Commercial maritime routes are indicated with a green solid line and are located throughout the globe except for the arctic which is where the Northern Sea Route is located. Major ports are indicated with red target icons with various TEU levels: >20 million, 10-20 million, and < 20 million TEUs. [Return to image].

Table 4.2: Types of containers: general purpose (2 sizes 20ft and 40ft); flatracks (3 sizes 20ft, 40ft, and 40×9'6"); garmentainers (2 sizes 20ft and 40ft); high cube (40ft and 45ft); open top (3 sizes 20ft, 40×8'6", and 40×9'6"); refrigerated (2 sizes 20ft and 40ft); super rack (1 size 40ft) [Return to table].

Fig 4.6: Road: 66.8% with US, 21.5% non-US.
Marine: 6.5% US, 51.5% non-US.
Rail: 21.0% with US, 3.1% non-US.
Air: 5.8% with US, 23.9% non-US. [Return to image].

Fig 4.7: 2.1 average annual change in total trade growth. 0.2 average annual change in trade with US. 6.6 average annual change in trade with all other countries. [Return to image].

Fig 4:8: Road: 59.7% in 2002, 48.3% in 2012.
Marine: 14.8% in 2002, 24.9% in 2012.
Rail: 14.79% in 2002, 13.79% in 2012.
Air: 10.89% in 2002, 13.29% in 2012. [Return to image].

Alternative Text-Based Activities

Assessing What You Already Know (Text-Based)

Question 1:

Transportation is an essential and integral part of the Global Value Chain. Transportation is beneficial for society and helps in globalization of the world economy.

- True (Correct)
- False (Incorrect)

Feedback: Transportation is an essential and integral part of the Global Value Chain. Transportation is beneficial for society and helps in globalization of the world economy. That is why it plays a vital role in human life, companies, suppliers and distributors. This service should be effective, efficient and appropriately managed by an enterprise. Demand for transportation depends on a party wishing to move goods or freight efficiently and effectively from one point to another.

Question 2:

Does transportation add value in international supply chain management?

- Yes (Correct)
- No (Incorrect)

Feedback: Transportation adds value in international supply chain management by reducing transportation time and as a result supply chain costs and frees up time on other areas of the supply chain. Also, suppose delays happened in some areas of the supply chain. In that case, transportation can help to speed up their performance and reduce time more efficiently by choosing the fastest way of delivering goods to the customer.

Question 3:

Supply chain cost minimized by dint of transportation' benefits such as ….. Check all that apply.

- reducing inventory cost (Correct)
- safety stocks (Correct)
- cycle stocks (Correct)
- inventory velocity (Correct)
- extend activities (Incorrect)
- minimum dwell-times (Correct)
- increase shelf life % for customers (Correct)
- operational planning (Correct)
- flexible time (Incorrect)

Feedback: Transportation can help organizations to reduce cycle stock and increase customer satisfaction because of frequency deliveries. Supply chain cost minimized by dint of transportation' benefits such as reducing inventory cost, safety stocks, cycle stocks, inventory velocity, minimum dwell-times, increase shelf life % for customers, operational planning.

Question 4:

Transportation plays a vital role in supply chains which offer (_____) and (_____).

- Reliability and consistency (Correct)
- Freedom and fast (Incorrect)

Feedback: Transportation plays a vital role in supply chains which offer reliability and consistency; flexibility in terms of location, delivery, time, quantity, goods, cost; Just-in-Time delivery; customization by integration of supply chain; standardization by making activities predictable, reduction of total cost (Morash & Clinton, 1997) [Return to activity].

Check Your Understanding: Identify different modes of transportation and their characteristics (Text-based)

Question 1:

Choose criteria by which the mode of freight transportation will be chosen. Check all that apply.

- the distance (Correct)
- Value (Correct)
- availability of services (Correct)
- freight rates (Correct)
- characteristics of goods (Correct)
- Budget (Correct)
- Appearance (Incorrect)
- cost of transport (Correct)
- Reliability (Correct)
- safety (Correct)
- Urgency (Correct)
- carrier timing (Correct)
- none of the above (Incorrect)

Feedback: There are many criteria by which the mode of freight transportation will be chosen. It depends on the distance, value, availability of services, freight rates, characteristics of goods, budget, cost of transport, reliability, safety, urgency, carrier timing, etc. A critical decision for companies is to choose the suitable carrier to transport.

Question 2:

What are the five (5) modes of transportation? Write your response in the box below.

Feedback: Modes of transportation are classified into the following types – Road, Rail, Air, Water, Pipeline.

Question 3:

Drag and Drop the modes in correct Category

Modes	**Advantages**
Road	Advantages: direct access to consignee place and consignor; high accessibility, mobility, and availability level; cheapest investment funds; frequency, and dependability.
Rail	Advantages: Carrying capacity is high, energy consumption is low, and impact of weather conditions is low, good on speed, capability to transfer oversized freight.
Air	Advantages: High-speed delivery to far destinations; high security; risk of damage products is low; accessibility and flexibility; the great frequency for regular moving products from one location to the next; connecting national and international distance.
Water	Advantage: Cheap price and has a high capacity for bulky freights.
Pipeline	Advantages: high capacity; the impact of weather conditions is low; operation fee is cheap; conveyance is continuous; excellent dependability.

Feedback: It is important for companies to select the right mode of transportation. Transportation plays a vital role in supply chains which offer reliability and consistency; flexibility in terms of location, delivery, time, quantity, goods, cost; Just-in-Time delivery; customization by integration of supply chain; standardization by making activities predictable, reduction of total cost (Morash & Clinton, 1997)

Question 4:

Which mode of transportation is generally used when speed is more important than cost?

- Rail (Incorrect)
- Water (Incorrect)
- Air (Correct)
- Road (Incorrect)
- Pipeline (Incorrect)

Feedback: Urgent air shipping may be reasonable for expensive, small, and light goods. Air carriers charge by a combination of the weight and size of the shipment. This mode of

transport is generally used when speed is more important than cost. In addition, shipping by air is very reliable. [Return to activity].

Check Your Understanding: Assess infrastructure and equipment types used in different modes of transportation

Question 1:

Why is intermodal transportation used? Write your response in the box below.

Feedback: Because intermodal transportation uses only one container along the entire route, often goods move intermodal by using several transport modes in a single container along the whole route. As a result, intermodal transportation has excellent advantages, such as reducing the time and the chance of freight damage, flexibility, and secure goods flow.

Question 2:

If the company needs to deliver cargo quickly to their destination and over a short distance, they prefer to choose intermodal transportation on the road.

- True (Correct)
- False (Incorrect)

Feedback: If the company needs to deliver cargo quickly to their destination and over a short distance, they prefer to choose intermodal transportation on the road. The freight will be delivered in the shortest time to their last destination.

Question 3:

How many types of containers exist?

- 8
- 7 (correct)
- 9
- 3
- 6

- 5

Feedback: 7. General purpose, flatracks, garmentainers, high cube, open top, refrigerated, super rack. There are many types and standardized sizes of intermodal transport unit (ITU)/containers; however, 90 % of all containers used worldwide are general-purpose containers.

Question 4:

What is the largest shipping zone of cargo volume, which has transported over 31.2 million of freight in 2021?

- Trans-Pacific Ocean (Correct)
- Europe-Asia -Europe
- Transatlantic

Feedback: Also, as globalization continues growing, the largest shipping zone of cargo volume is the Trans-Pacific Ocean, which transported over 31.2 million twenty-foot equivalent units [TEUs] of freight in 2021 (UNCTAD, November 18, 2021). This mode of transport is environmentally friendly and the most cost-effective way to transfer freight internationally. [Return to activity].

Check Your Understanding: Describe International Transport Network

Question 1:

The international Transport Networks consist of shipping routes worldwide and container ports connecting many countries and continents for moving freight.

- True (Correct)
- False(Incorrect)

Feedback: Now that you know the modes of transportation in detail, it would be beneficial to analyze international transport networks. The international Transport

Networks consist of shipping routes worldwide and container ports connecting many countries and continents for moving freight.

Question 2:

Choose routes that exist now below? Check all that apply

- The Northern Sea Route (NSR)
- Trans-Siberian railway
- The Suez Canal/ Panama
- Trans-Mongolian Route
- Commercial Maritime Route
- All of the above (Correct)

Feedback: The Northern Sea Route (NSR), Trans-Siberian railway, The Suez Canal/ Panama, Trans-Mongolian Route, Commercial Maritime Route.

Question 3:

Which of the new two routes are planned and emerge globally? Check all that apply

- Nicaragua Canal (Correct)
- South Africa Canal
- Northern Sea Route (Correct)
- Ethiopia Sea Route
- Nairobi Sea Route

Feedback: New routes are planned and emerge globally, such as the Nicaragua Canal and the Northern Sea Route. Shipping channels can significantly impact global economic integration, export service, and world seaborne trade and help less economically developed regions stimulate foreign trade (Chen, Notteboom, Liu, Yu, Nikitakos, & Chen, 2019) [16]. The Nicaragua Canal will connect the Caribbean Sea with the Pacific Ocean to compete with the Panama Canal

Question 4:

What is the significant difference between routes? Check all that apply.

- Cost (Correct)
- Time (Correct)
- Flexibility
- Delivery speed
- Distance
- Risks
- Customer satisfaction

Feedback: The significant difference will be related to cost and time. The vital key role in deciding the freight shipment is the cost factor. [Return to activity].

Check Your Understanding: Explain how transportation adds value to the global value chain

Question 1:

Transportation adds value to the global value chain for many aspects such as reducing time delivery, efficiency, reliability, flexibility, increasing visibility, transparency, and enhancing customer satisfaction and service.

- True (Correct)
- False(Incorrect)

Feedback: Transportation adds value to the global value chain for many aspects such as reducing time delivery, efficiency, reliability, flexibility, increasing visibility, transparency, and enhancing customer satisfaction and service. In addition, various transportation networks can significantly impact global economic integration, export service, the connection between countries and continents, and help less economically developed regions stimulate foreign trade (Chen, Notteboom, Liu, Yu, Nikitakos, & Chen, 2019)

Question 2:

Global chain relies on (_____) and (_____) of transport; that is why many companies use intermodal modes. Choose two options.

- Efficiency (Correct)
- Reliance(Incorrect)
- Flexibility (Correct)
- Delivery time(Incorrect)

Feedback: The global chain relies on efficiency and flexibility of transport; that is why many companies use intermodal modes.

Question 3:

Which areas for improvement Jacques Roy (HEC Montréal, Professor of Logistics and Operations Management) identified? Check all that apply.

- roads: domestic congestion (Correct)
- rail: capacity constraints (Correct)
- road: cheap price (Incorrect)
- sea: container port competitiveness (Correct)
- air: the impact of weather conditions and conveyance (Incorrect)
- air: cargo capacity, competitiveness and airport landing fees (Correct)

Feedback: Jacques Roy (HEC Montréal, Professor of Logistics and Operations Management), examines the role of Canada's transportation infrastructure in moving goods in and out of the country by four key transportation modes: road, rail, sea and air. Overall, he finds that Canada's transportation and logistics networks perform reasonably well compared with other countries. But he identifies several areas for improvement, namely for:

- roads: domestic congestion;
- rail: capacity constraints;
- sea: container port competitiveness; and
- air: cargo capacity, competitiveness and airport landing fees.

(Tapp, 2016) [CC-BY-ND]

Question 4:

Minimizing inbound and outbound logistics and operations are keys to success for the competitive world's business field.

- True (Incorrect)
- False (Correct)

Feedback: Maximizing inbound and outbound logistics and operations are keys to success for the competitive world's business field. It's self-evident that technical improvements help intermodal transportation be more efficient for connecting between modes of transport and the value chain. [Return to activity].

PART V

CHAPTER 5: INBOUND AND OUTBOUND STORAGE FACILITIES

5.1 Introduction

Figure 5.1

Inbound and Outbound Storage



Note. Modern Warehouse with pallet rack storage system. From Wikimedia Commons, 2007. CC BY SA 3.0.

Learning Objectives

After reading this chapter, you should be able to understand and answer the following questions:

1. Explain the importance of storage in Global Value Chain and the concept of Inbound and Outbound Storage.
2. Offer Insights on how warehouses help in storage and role of technology in it.
3. Discuss the importance of demand planning and Inventory Management in value chain.
4. Describe inventory control systems and strategies used for ensuring optimal inventory levels.

Introduction

In this chapter, you will be explained about the importance of Inbound and Outbound storage in the global value chain. Storage of goods received by a firm is known as Inbound Storage, and storage of goods which are scheduled to move out of a firm is known as Outbound Storage. The concept of Material handling will also be explained with special reference to its importance in storage. Inbound and Outbound goods are stored in warehouses and distribution centers where they are managed using different concepts of Stock Keeping Unit, Electronic Data Interchange and cross-docking. For optimal space utilization in warehouses, an accurate demand forecast is essential. Techniques such as demand planning, Collaborative Planning, Forecasting and Replenishment, Value Chain Visibility and Value Stream Mapping could help avoid be helpful in avoiding shortages or excess inventories. Various Inventory Management Techniques were also discussed, such as Economic Order Quantity, Vendor Managed Inventory, Just In Time and Activity- Based Cost Analysis.

Assessing What You Already Know

Read through the case below and try to think of solutions to Wanda's storage and process issues. To know more about the case, read the information contained in the document 'Salty Pawz Background'.

Opening Case: Salty Pawz

Baking dog treats seems like a straightforward undertaking, and Wanda has never really given much thought to the process she uses. In fact, she produces her dog treats out of her kitchen the same way she did when she first started—one batch, one cookie sheet at a time.

She measures and mixes the ingredients in her trusty KitchenAid stand-up mixer, rolls them out on her counter using her mother's old wooden rolling pin, and then uses cookie cutters to cut each biscuit out of the dough. Her oven will hold two cookie sheets at a time, and she does paperwork or checks email while they are baking. The only time it gets to be a hassle is when she does special-order "iced treats" and has to use the same mixer for the icing as the dough.

Once the treats are baked and cooled, she places them in a small cellophane treat bag. She threads a ribbon through a hole in a small card that has the company name and logo on one side and the ingredients on the other. She prints the cards off on her home printer, using some stock business card blanks she gets at the local office supply store. She then stacks the bagged treats into tubs she has sitting on her washing machine (which can be a hassle come laundry day), and there they sit until she is ready to pack and ship them to

customers. Sometimes she worries that the ones on the bottom of the tubs are stale, but she figures dogs don't know stale from fresh.

She wraps the bags of treats in a layer of bubble wrap, so they don't get broken in shipping, packs them in boxes she gets from the office supply store, and prints out shipping labels on her computer. She makes at least one trip a day to Ship & Go to have them picked up by UPS later in the day. Ship & Go does not have "accounts," so she pays for her packages every time she takes orders to be shipped. Once she is finished, it's back home to mix up the next batch of treats!

Wanda doesn't have much storage space, but she put shelving in her garage, where she stores the ingredients for the treats. She orders her chicken, bison, and lamb when her supply gets low, but all of the other ingredients usually come from the grocery store, unless Jamie is going to Sam's Club and can pick up larger bags of flour and other ingredients. For the treats that contain vegetables, Wanda usually goes to Ed's Farm Stand early in the morning and buys just what she will need for the day.

Salty Pawz is growing, and Wanda will soon expand to a commercial kitchen, which looks much more like a production facility than her small kitchen. She has never considered how her process will change when she makes the move. In fact, she hasn't planned for it to change at all. She also has not considered inventory, storage, process flow, layout, or anything else related to production and operations management.

Media Attributions and References

Axisadman. (2007, Dec 11). *Modern Warehouse with pallet rack storage system* [Photograph]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Modern_warehouse_with_pallet_rack_storage_system.jpg. CC BY-SA 3.0.

5.2 Inbound and Outbound Storage

Learning Objective

1. Explain the importance of storage in global value chain and the concepts of inbound and outbound storage.

Importance of Storage in Warehousing

The Logistics Cycle (discussed in chapter 2) is a complex process involving a series of stages that must run smoothly to ensure that goods reach their destination on time and in good condition. One of those stages is **Storage**, which plays a vital role in distribution logistics. In the logistics cycle, Storage includes both Warehousing and Inventory Management.

Let's look at the main flows in value chain to understand importance of storage. There are three types of main flows that happen in any value chain (outlined in Figure 5.2):

- The flow of materials/goods,
- The flow of money/cash, and
- The flow of information.

There is a regular forward flow of materials/goods that happens all the way from higher-tier suppliers (upstream) to the end-consumer (downstream). In addition, if there are returns for any reason, there will be a reverse flow of materials/goods in the opposite direction to the forward flow.

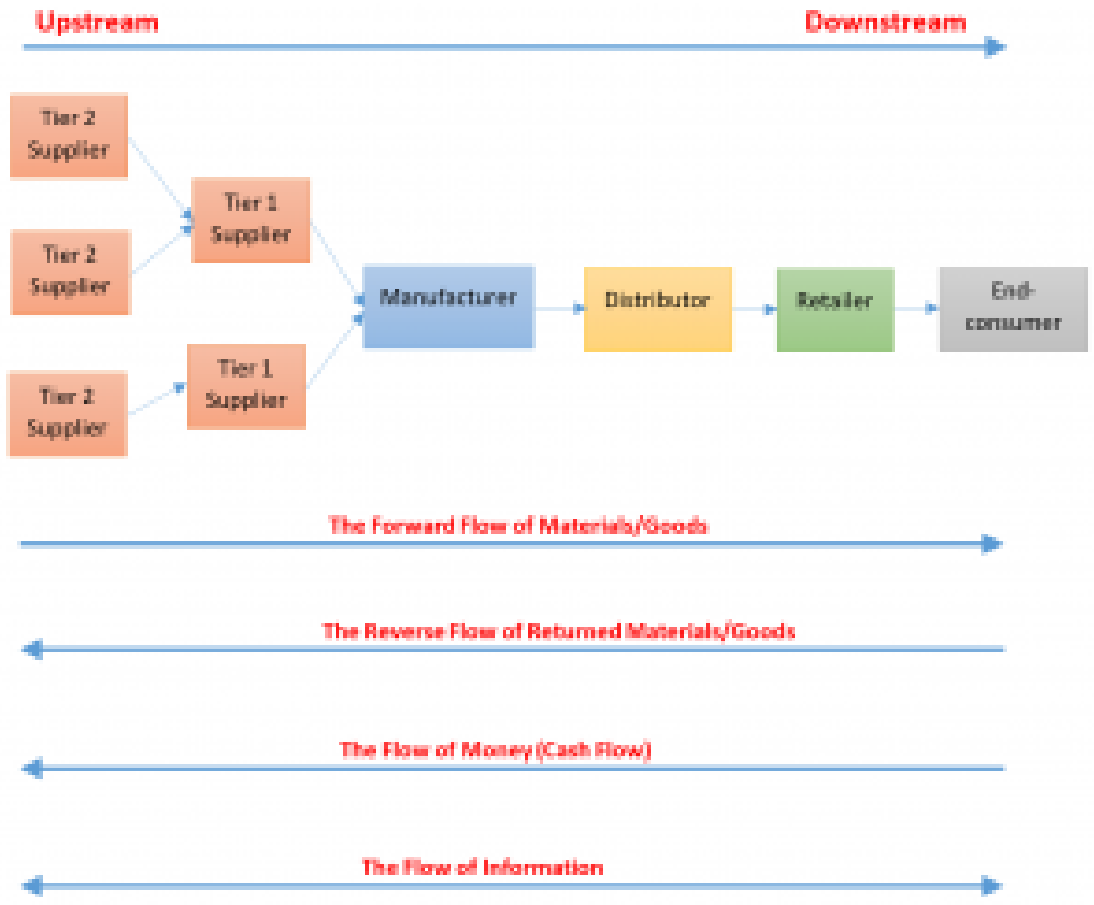
The flow of money (cash flow) happens from downstream to upstream. For example, the retailer needs to pay the distributor for the goods they have received. from them.

The flow of information happens both ways in the supply chain since organizations will

need to share a different type of information so that the whole supply chain can make better decisions to improve overall performance.

Figure 5.2

Main Flows in Value Chain



Note. From Faramarzi & Drane, n.d. CC BY-NC-SA 4.0. [Image description].

When materials move from **upstream** to **downstream** or vice versa, there arises a need to store goods either at specific destinations or while in-transit. Efficient storage helps to:

- guarantee consumer satisfaction by maintaining good delivery times
- Reduce warehouse losses by keeping a track of goods coming in and going out of the storage facility

- Offer better services which ultimately increases profit

Video: Inside Amazon's Smart Warehouse (10:48)

Watch this video to see amazing facts about Amazon's Storage Management.

Media 5.1. *Inside Amazon's Smart Warehouse* [Video]. Tech Vision. (URL: https://youtu.be/IMPbKVb8y8s)

Storage of goods received by a firm is known as '**Inbound Storage**', and storage of goods which are scheduled to move out of a firm is known as '**Outbound Storage**'. In some cases, companies have different storage facilities to manage inbound and outbound storage. As per Jenkins, 2020:

> **Inbound Storage** includes managing the materials before they go to manufacturing or customer fulfillment. This department is responsible for making sure items are placed in logical locations for fulfillment and the right storage conditions are met. A company keeps a certain quantity of goods on hand to meet demand. **Outbound Storage** Facilities help store these goods securely in the right conditions and organize them.

Material handling is an integral part of Inbound and Outbound Storage. Therefore, it is important to discuss it here before moving on to the subsequent sections on Warehousing and Inventory Management.

Material handling relates to transporting raw materials, finished goods and other kinds of inventories within the manufacturing unit, and out of the unit to warehouses, distribution centers or directly to consumers (Rosenblatt, 2001, p-492). It is estimated that 20% to 50% of the total operating expenses within manufacturing are attributed to material handling (Tompkins et al., 1996). Material handling activities may account for 80% to 95% of total overall time spent between receiving a customer order and shipping the requested items (Rosaler and Rice, 1994).

The Ministry of Labour, Training and Skills Development, Canada recognizes the importance of material handling and specifies that:

> The efficient handling and storing of materials are vital to industry. Activities

involving material handling enable the supply of raw materials as well as a continuous flow of parts and assemblies through workplaces and ensure materials are available when needed.

Many manufacturing companies have adopted computerized systems to control the flow of resources and inventory. **Materials requirement planning (MRP)** is one such system. MRP uses a master schedule to ensure that the materials, labor, and equipment needed for production are at the right places in the right amounts at the right times. The schedule is based on forecasts of demand for the company's products. It says exactly what will be manufactured during the next few weeks or months and when the work will occur. MRP also helps to ensure the smooth flow of finished products.

Some manufacturing firms have moved beyond MRP systems and are now using **Enterprise Resource Planning (ERP)** systems. ERP systems provide an integrated and continuously updated view of core business processes using shared databases maintained by a database management system. ERP systems track business resources—cash, raw materials, production capacity—and the status of business commitments—orders, purchase orders, and payroll. The applications that make up the system share data from and between various departments (e.g., manufacturing, purchasing, sales, accounting, etc.). ERP facilitates information flow between all business functions and manages connections to outside stakeholders.

Video: Introducing The Material Handling and Logistics Industry (5:40)

Watch this video to know more about material handling and logistics industry.

Media 5.2. *Introducing The Material Handling and Logistics Industry* [Video]. MHI. (URL: https://youtu.be/dEtn3P2kFFI)

Check Your Understanding

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Check Your Understanding: Inbound and Outbound Storage

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 5.7.

Overall Activity Feedback

The Logistics Cycle is a complex process involving a series of stages that must run smoothly to ensure that goods reach their destination on time and in good condition. In the logistics cycle, Storage includes both Warehousing and Inventory Management. There is a forward flow of materials/goods for the regular flow that happens all the way from higher- tier suppliers (upstream) to the end-consumer (downstream). In addition, if there are returns for any reason, there will be a reverse flow of materials/goods in the opposite direction to the forward flow. Material Handling is an integral part of Inbound and Outbound Storage. Many manufacturing companies have adopted computerized systems such as Materials requirement planning (MRP) to control the flow of resources and inventory.

Media Attributions and References

Faramarzi, H. & Drane, M. (n.d.).*Introduction to operations management*. Seneca College Pressbooks System. https://pressbooks.senecacollege.ca/operationsmanagementintro/. CC BY-NC-SA 4.0.

MHI. (n.d.). *Introducing the material handling and logistics industry* [Video]. YouTube. https://www.youtube.com/watch?v=dEtn3P2kFFI.

Tech Vision. (n.d.). *Inside Amazon's smart warehouse* [Video]. YouTube. https://www.youtube.com/watch?v=IMPbKVb8y8s.

5.3 Warehousing

Learning Objective

2. Offer insights on how warehouses help in storage and role of technology in it.

Warehouse

Figure 5.3

Warehouse



Note. Shallow focus photo of gray steel muscle rack photo. From Unsplash. Reused under Unsplash Licence.

A warehouse is one of the most important parts of a company with distribution functions, on which the entire company's **sustainability** largely depends. It has a significant impact on economic and social sustainability as a part of the company that most absorbs the consequences of changes in demand. This has been best demonstrated nowadays, where there are large differences in demand (Popovic et . al., 2021). Though warehousing requires additional expenses in terms of labor, capital (land and storage-and-handling equipment) and information systems, we need them because they provide valuable services essential for businesses to operate in the current economic situation.

To learn more about the importance of warehouses with examples, please read Section 1.1: Why Have a Warehouse in *Warehouse and Distribution Science* by John J. Bartholdi and Steven T. Hackman.

Figure 5.4

More Oil Storage



Note. More Oil Storage. From Flickr. CC BY 2.0.

You might not know where the tiny town of Cushing, Oklahoma, is, but oil producers and

traders around the world do. Cushing is one of the largest oil storage areas in the United States. Storage tanks like these cover more than nine square miles on the outskirts of the town (Davis, 2009).

In some cases, warehouses are also called **Distribution Centers** (DC). The major difference between these two is that former store products to be used by manufacturers, importers, exporters, wholesalers, transport businesses etc., later is a warehouse or storage facility where the emphasis is on processing and moving goods on to wholesalers, retailers, or consumers. A few years ago, companies moved towards large, centralized warehouses to keep costs down. For example, in 2005, Walmart opened a four-million-square-foot distribution center in Texas. (Four million square feet is about the size of eighteen football fields.) (University of Minnesota, 2015).

Today, however, the trend has shifted back to smaller warehouses. Using smaller warehouses is a change driven by customer considerations rather than costs. Warehousing products regionally, closer to consumers, can also help a company tailor its product selection better to match customers' needs in different regions. Ultimately, a company selects their warehousing needs depending upon its consumers.

Did You Know?

Goya Foods has many challenges due to the variety of customers it serves. The company sells more than 1,600 canned food products. Because the types of beans people prefer often depend on their cultures — whether they are of Cuban, Mexican, or Puerto Rican descent, and so forth — Goya sells thirty-eight varieties of beans alone. Goya's truck drivers deliver products daily to tens of thousands of U.S. food stores, from supermarket chains in Texas to independent mom – and – pop bodegas in New York City. Delivering daily is more costly than dropping off jumbo shipments once a week and letting stores warehouse goods, says the company's CEO Peter Unanue. However, it's more of a just-in-time method that lets Goya offer stores a greater variety and ensure that products match each store's demographics. "Pink beans might sell in New York City but not sell as well in Texas or California," says Unanue (De Lollis, 2009).

Functioning of Warehouses and Distribution Centers

A question may arise – How do **warehouse associates** find a product or pallet of products in a warehouse or distribution center the size of eighteen football fields? To begin with, each product is given its identification number, **SKU (stock-keeping unit)**. Then, when

the product enters the warehouse, it is scanned and given an “address,” or location, in the warehouse where it is stored until it is plucked from its shelf and shipped.

Figure 5.5

An Example of a SKU



Note. Scanning. From Flickr. CC BY-NC-SA 2.0

Warehouses and distribution centres are also becoming increasingly automated and wired. For example, some warehouses use robots to pick products from shelves. At other warehouses, employees use voice-enabled headsets to select products. Via the headsets, the workers communicate with a computer that tells them where to go and what to grab off shelves. As a result, the employees can pick products more accurately than at a sheet of paper or computer screen.

Video: Fulfillment by Amazon (2:02)

Amazon.com's mission is "to be Earth's most customer-centric company where people can find and discover anything they want to buy online." Watch the following video to see one of Amazon's order-fulfillment centers in action.

Media 5.3. *Fulfillment by Amazon* [Video]. Jon Norris. (URL: https://youtu.be/Qt9hkZmbNfU)

It is amazing when you think about how the thousands of products that come in and out of Amazon's distribution centres every day ultimately end up in the right customer's hands. After all, how many times have you had to look hard to find something you put in your closet or garage? The concept of **Order Fulfillment** helps here. Processing orders — order fulfillment — is a crucial part of the job in supply chains. Why? Because delivering what was promised, when it was promised, and how it was pledged are key drivers of customer satisfaction (Thirumalai & Sinha, 2005).

One of the ways companies are improving their order fulfillment and other supply chain processes is by getting rid of paper systems and snail – mail. So, for instance, instead of companies receiving paper orders and sending paper invoices to one another, they send and receive the documents via **electronic data interchange** (EDI). **Electronic data interchange** (EDI) is a particular electronic format that companies use to exchange business documents from computer to computer. It also makes for greater visibility among supply chain partners because they can all check the status of orders electronically rather than having to fax or e-mail documents back and forth.

Companies also use **Warehouse Management System** (WMS) to manage their warehouse operations. A warehouse management system is an application that helps to monitor and handle the day-to-day tasks of a warehouse. WMS systems allow companies to control and oversee third-party logistics processes (Patel, 2021).

To know more about how WMS works, benefits, types and features of WMS, read through What is Warehouse Management System? (Process, Benefits, Features, & Types).

Another new trend is **cross-docking**. A broad definition of **crossdocking** is the transfer of goods and materials from an inbound carrier to an outbound carrier without the products entering the warehouse or being put away into storage (Faramarzi and Drane, n.d.) . Thus, the products "cross the docks" from the receiving dock area to the shipping

dock area. It can provide significant inventory savings, the cost of holding inventory and the costs of handling the inventory are reduced (Kulwiec, 2004). Crossdocking helps to provide excellent customer service by speeding up customer deliveries. In other words, cross-docking is the logistics process of transshipping inventory in a flow-centre by unloading the shipments from the inbound trucks directly to the outbound trucks to reduce shipment time and cost (Belle et al., 2012). It also helps by eliminating storage and order picking activities, thus accelerating the flow of the shipping cycle (Ladier & Alpan, 2016).

According to Belle et al. (2012), The Material Handling Industry of America defines cross-docking as "the process of moving merchandise from the receiving dock to shipping dock for shipping without placing it first into storage locations".

Industries implement a cross-docking strategy to improve the "just-in-time" deliveries within their supply chain in order to minimize the number of inbound and outbound trucks and enhance sustainability (Dulebenets, 2018). Under a cross-docking strategy, the inventory is stored only for a short time before being reloaded onto outgoing trucks; the inventory does not stay beyond 24 hours within the cross-dock station (Moghadam et al., 2014 and Mavi et al., 2020).

Check Your Understanding

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Check Your Understanding: Warehousing

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 5.7.

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5.4 Demand Planning, Inventory Management & Control

Learning Objectives

3. Discuss the importance of demand planning and Inventory Management in value chain.
4. Describe inventory control systems and strategies used for ensuring optimal inventory levels.

Demand Planning and Inventory Management

Imagine you are a manager who has done everything in their power to help develop and promote a product—and it's selling well. But now the company is running short of product because the demand forecasts were too low. This is the scenario Nintendo faced when the Wii first came out. The same happened with IBM when it launched the popular ThinkPad laptop in 1992. Not only is the product shortage that adversely affects profitably of a company, but it affects all the stakeholders.

Thus, **demand planning** is essential for a company to manage their inventories well. **Demand planning** is the process of estimating how much good customers will buy from you. If you're a producer, demand planning will affect not only the amount of finished goods you have to produce but also the raw materials you must purchase to make them. It will also affect the production scheduling or the resources, events, and processes needed to create an offering. For example, if demand is heavy, you might need your staff members to work overtime. Closely related to demand forecasting are lead times. A product's **lead time** is the amount of time it takes for a customer to receive a good or service once it's been ordered. Therefore, lead times also have to be considered when a company is forecasting demand.

Forecasting decisions must be made more frequently — sometimes daily. Nowadays, companies are also moving to demand forecasts for multiple work shifts during a day.

One way for you to predict the demand for your product is to look at your company's past sales. This is what most companies do. But they don't stop here. Why? Because changes in many factors — the availability of materials to produce a product and their prices, global competition, oil prices (which affect shipping costs), the economy, and even the weather — can change the picture.

In addition to looking at the sales histories of their firms, value chain managers also consult with other managers when they are generating demand forecasts. Firms also look to their value chain partners to help with their demand planning. **Collaborative planning, forecasting, and replenishment** (CPFR) is a technique value chain partners use to share information and coordinate their operations (University of Minnesota, 2015).

Did You Know?

Walmart has developed a Web-based CPFR system called Retail Link. Retailers can log into Retail Link to see how well their products are selling at various Walmart stores, how soon more products need to be shipped to the company, how any promotions being run affect the profitability of their products, and so forth. Because different companies often use different information technology systems and software, Web-based tools like Retail Link are becoming a popular way for value chain partners to interface with one another.

The trend is clearly toward more shared information, or what businesspeople refer to as **value chain visibility**. After all, it makes sense that a supplier will be more reliable and in a better position to add value to your products if they know what your sales, operations, and marketing plans are — and what your customers want. By sharing more than just basic transaction information, companies can see how well operations are proceeding, how products are flowing through the chain, how well the partners are performing and cooperating the extent to which value is being built into the product. Demand-planning software can also be used to create more accurate demand forecasts.

Litehouse Foods, a salad dressing manufacturer, improved its forecasts dramatically by using demand-planning software. Initially the company used a traditional sales database and spreadsheets to do the work. "It was all pretty much manual calculations. We had no engine to do the heavy lifting for us," says John Shaw, the company's Information Technology director. Yet, in a short time, the company \ reduced its inventory by about one-third while still meeting its customers' needs (Casper, 2008).

Video: Inventory Planner Overview | Demand Planning | Sales Forecasting | Replenish Stock and Inventory (3:43)

Watch this video to know more about the benefits of Demand and Inventory Planner:

Media 5.4. Inventory Planner Overview | Demand Planning | Sales Forecasting | Replenish Stock and Inventory[Video]. Inventory Planner. (URL: https://youtu.be/pmkYiKt9QTI)

Companies are also moving towards Lean Manufacturing techniques to enhance visibility through out the value chain network. One such technique is **Value Stream Mapping** or Material and Information Flow Mapping (Manos, 2006) . "It is a lean -management method for analyzing the current state and designing a future state for the series of events that take a product or service from the beginning of the specific process until it reaches the customer (Wikipedia, 2021)."

As per Purdue University,

> The process of creating a value stream map takes all the necessary people, processes, information and inventory, and displays them in a flowchart format. By visualizing all elements that go into creating a product or service, organizations can apply Lean Principles to reduce waste in specific areas of their processes.

To gain more information about the concept of 'Value Stream Mapping', read the article What is Value Stream Mapping?

Inventory Management and Control

Inventory management is one of the essential business processes related to purchases, sales and logistic activities. It is concerned with the control of stocks throughout the value chain. The essence of inventory management is to augment business operations to ensure the adequate flow of goods, products, and services is in place (Chalotra, 2015). In this context, '**inventory**' is the aggregate list of items, several goods in stock or stock of the product an organization produces for sale and the components that make the sale. '**Stock**' consists of a wide range of goods or materials – stationery, office equipment, plant, machinery, consumables, etc., available for use or sale.

Inventory control sits at the data level, where the day-to-day business is organized. Activities here are data-driven and primarily concerned with short-term planning and recording events. Inventory control is concerned with maintaining the correct stock level and recording its movement.

According to Kotler, Roberto & Lee (2002), inventory management referred to all the activities involved in developing and managing the inventory levels of raw materials, **semi-finished** materials and finished goods so that adequate supplies are available and the costs of over or under stocks are low. Inventories are essential for keeping the production wheels moving, the market going, and the distribution system intact.

Did You Know?

When on the World Trade Center attack occurred, many Americans rushed to the store to buy batteries, flashlights, American flags, canned goods, and other products if the emergency signaled a much bigger attack. Target sold many items and could not replenish them for several days, partly because its inventory tracking system only counted up what was needed at the end of the day. On the other hand, Walmart counted what was required every five minutes. Before the end of the day, Walmart had purchased enough American flags, for example, to meet demand and, in doing so, completely locked up all their vendors' flags. Meanwhile, Target was out of flags and out of luck — there were no more to be had.

Video: Types of Inventory : The 4 Different Buckets to know. (2:30)

Watch this video for an introduction to different types of inventories.

Media 5.5. Types of Inventory : The 4 Different Buckets to Know [Video]. LeanVlog. (URL: https://www.youtube.com/watch?v=TU2OniIvVmw)

To help avoid **stock outs**, most companies keep a certain amount of **safety stock** on hand. Safety stock is backup inventory that serves as a buffer in case the demand for a product surges or its supply drops off for some reason. However, maintaining too much inventory ties up money that could be spent in other ways — perhaps on marketing

promotions. Inventory also has to be insured, and in some cases, taxes must be paid on it. Products in inventory can also become obsolete, deteriorate, spoil, or "shrink." Shrinkage is a term used to describe a reduction or loss in inventory due to shoplifting, employee theft, paperwork errors, or supplier fraud (Hudson, 2020).

Do You Know – Why Companies Hold Inventories?

Many reasons exist for keeping stocks of inventory. Some of the most common include:

- Manufacturers often build up inventories throughout the year because of seasonal demand.
    - An example is a chocolate manufacturer. To handle high demand for chocolate during Christmas, they begin building inventory in late spring to have enough on hand for orders in November and December.
- At the same time, a manufacturer may carry large amounts of inventory if they have some uncertainty or risk in their supply base. If there are chances of shortages, work stoppages, poor quality or late deliveries from suppliers, more stock may be carried.
- Firms may be tempted by extra discounts often provided by purchasing large order sizes. Perhaps they may want to minimize transportation costs. There may also be some worry about future price increases that can cause organizations to build up their inventories.
- Retailers carry inventory to ensure that they do not run out of what they anticipate their customers may want. Distributors and retailers may try to balance the cost of keeping extensive inventories on hand and providing excellent customer service with few or no disappointed customers. However, it is often a challenge to anticipate exact customer behaviour.
- It is a challenge to synchronize the incoming flow of materials and goods to meet production schedules and ship to customers as promised. As a result, inventory may be stored at many locations along the supply chain. This causes extra costs and inefficiencies for each organization.

Inventory Management Techniques

Inventory management techniques are extremely important as they result in success and cost reduction of a company. In this section, different techniques of inventory management are discussed.

Economic Order Quantity

One of the biggest problems that affect the profitability of a business is balancing its inventory orders with the demand for the inventory in the marketplace (Luenendonk,

2021). This is where Economic Order Quantity Model helps. The Economic Order Quantity (EOQ) model of inventory management and control is used to determine the optimal order quantity of a product that meets the demand. This optimum order quantity leads to minimal inventory costs and maximum benefits in terms of cost saving (Hertini, Anggriani, Mianna & Supriatna, 2017). According to Chambers & Lacey (2011), EOQ model is a technique that determines the optimal amount of inventory to order each time the inventory of that item is depleted. There are different extensions to this model but the basic Economic Order Quantity Model is used to identify a fixed order size that minimizes the sum of the annual holding and ordering inventory costs with following assumptions (Saylor Academy, 2019) :

1. Only one product involved
2. Annual demand requirements are known
3. Demand is spread evenly throughout the year so that the demand rate is reasonably constant
4. Lead time does not vary
5. Each order is received in a single delivery
6. There are no quantity discounts

Vendor Managed Inventory (VMI)

The Vendor Managed Inventory model of inventory management allows collaboration between vendors and the company.

According to Oluwaseyi J, Onifade & F. (2017),

> VMI enables the vendor in a vendor/customer relationship to plan, monitor, and control inventory for their customers. The vendor manages the inventory within specific levels previously agreed upon, while the customer concentrates on improving demand accuracy. The customer organization relinquishes the order-making responsibilities in exchange for timely inventory replenishment, ultimately increasing overall capacity planning and institutional efficiency.

Video: Vendor Managed Inventory from Mars Electric (1:10)

Watch this video to see how a vendor knows as Mars electric is helping their consumers.

Media 5.6. Vendor Managed Inventory from Mars Electric [Video]. Mars Electric. (URL: https://youtu.be/gmvH4boZX5c)

Just in Time Technique

Just in time (JIT) is a production strategy striving to improve business' return on investment by reducing in-process inventory and associated carrying costs. To meet JIT objectives, the process relies on signals or Kanban between different points in the process. Kanban are usually "tickets" but can be simple visual signals, like the presence or absence of a part on a shelf. Implemented correctly, JIT focuses on continuous improvement and can also result in improved return on investment, quality and efficiency. To achieve continuous improvement, key areas of focus are:

- flow
- employee involvement
- quality

Did You Know?

Dell is an example of a company that utilizes a just-in-time inventory system that's vendor-managed. Dell carries very few parts. Instead, its suppliers accept them. They are located in small warehouses near Dell's assembly plants worldwide and provide Dell with components "just-in-time" for them to be assembled (Kumar & Craig, 2007). Dell's inventory and production system allows customers to get their computers built precisely to their specifications; a production process called **mass customization**. This helps keep Dell's inventory levels low. Instead of a huge inventory of expensive, already-assembled computers consumers may or may not buy, Dell simply has the parts on hand, which can be configured or reconfigured should consumers' preferences change. As a result, Dell can more quickly return the pieces to its suppliers if, at some point, it redesigns its computers to match better what its customers want. And by keeping track of its customers and what they are ordering, Dell has a better idea of what they might order in the future

and the types of inventory it should hold. Because mass customization lets buyers "have it their way," it also adds value to products, for which many customers are willing to pay.

ABC Based Costing Technique

The ABC analysis is an inventory categorization technique often used in material management wherein accuracy and control decrease from A to C. It is also known as "Selective Inventory Control" (Saylor Academy, n.d.). Fellows & Rottger (2005) agree that having inventory in your store has an added advantage for the organization since customers will be satisfied instantly, leading to improved performance ratings. ABC Analysis is based on Pareto (80/20) Principle that indicates that 80% of value addition is from 20% inventories companies hold.

This technique categorizes goods based on their unit value and divide them in 3 categories:

- A, items with high unit value, very tight control and accurate records,
- C, with relatively small unit value, large presence in warehouse, simplest control and minimal records, and
- B, which lies between category A & C and has moderate unit value, less tightly controlled and good records.

Where A needs tighter control because of its high value addition, B cannot be ignored as these items have a potential to convert into A items.

Table 5.1

PARTICULARS	A ITEMS	B ITEMS	C ITEMS
CONTROL	Tight	Moderate	Loose
REQUIREMENT	Exact Close	Exact Some	Estimated
CHECK	Regular	Some	Little/No
EXPENDITURE	Industrial	Individual	Group/None
POSTING	Low	Medium	n/a
SAFETY STOCK	High	n/a	Rare

Note. Activity Based Costing. From Oluwaseyo, Onifade & F. (2017). CC BY-NC-ND 3.0.

Table 5.2 outlines how application of these and a few other techniques improves company's performance:

Table 5.2

NO.	INVENTORY MANAGEMENT TECHNIQUES	HOW IMPROVED PERFORMANCE WILL BE ACHIEVED
I	Economic Order Quantity	Ability to know how much and when to replenish inventory
II	Marginal Analysis	Reduce loss for inventory that is perishable within a short period of time by ensuring they are ordered at the right time.
III	Just-in-Time	Ordering inventory when they are required thus reducing storage/holding costs
IV	Simulation	Capability of laying out inventory management plans for the organization
V	Order Batching	Minimizing on unnecessary costs on transport
VI	Vendor Managed Inventory	Improving on inventory management systems by engaging outsourced suppliers to management inventory monitoring and replenishment.
VII	ABC Analysis	The organization is able to account for each inventory according to its classification and this can be achieved through the Pareto analysis.

Note. Inventory Management Techniques. From Oluwaseyi, Onifade & F. (2017). CC BY-NC-ND 3.0.

Inventory Tracking

Some companies, including Walmart, are beginning to experiment with new technologies such as electronic product codes to manage their inventories better. An **electronic product code** (EPC) is similar to a barcode, only better because its number is truly unique. You have probably watched a checkout person scan a barcode off of a product identical to the one you wanted to buy—perhaps a pack of gum—because the barcode on your product was missing or wouldn't scan. Electronic product codes make it possible to distinguish between two identical packs of gum. In addition, the codes contain information about when the packs of gum were manufactured, where they were shipped from, and where they were going. Knowing the difference between "seemingly" identical products can help companies monitor their expiration dates if they are recalled for quality or safety reasons. EPC technology can also combat "fake" products or knockoffs in the marketplace.

Electronic product codes are stored on radio-frequency identification (RFID) tags. A radio-frequency identification (RFID) tag emits radio signals that can record and track a shipment as it comes in and out of a facility. If you have unlocked your car door remotely, microchipped your dog, or waved a tollway tag at a checkpoint, you have used RFID technology. Because each RFID tag can cost anywhere from $0.50 to $50 each, they are generally used to track larger shipments, such as cases and pallets of goods rather than individual items.

Video: The Basic of RFID and EPC (4:14)

Watch this video to know the Basics of RFID and EPC Technology.

https://youtu.be/k-w6ZYIo37E

Media 5.7. *The Basic of RFID and EPC* [Video]. erwinofm. (URL: https://youtu.be/k-w6ZYIo37E)

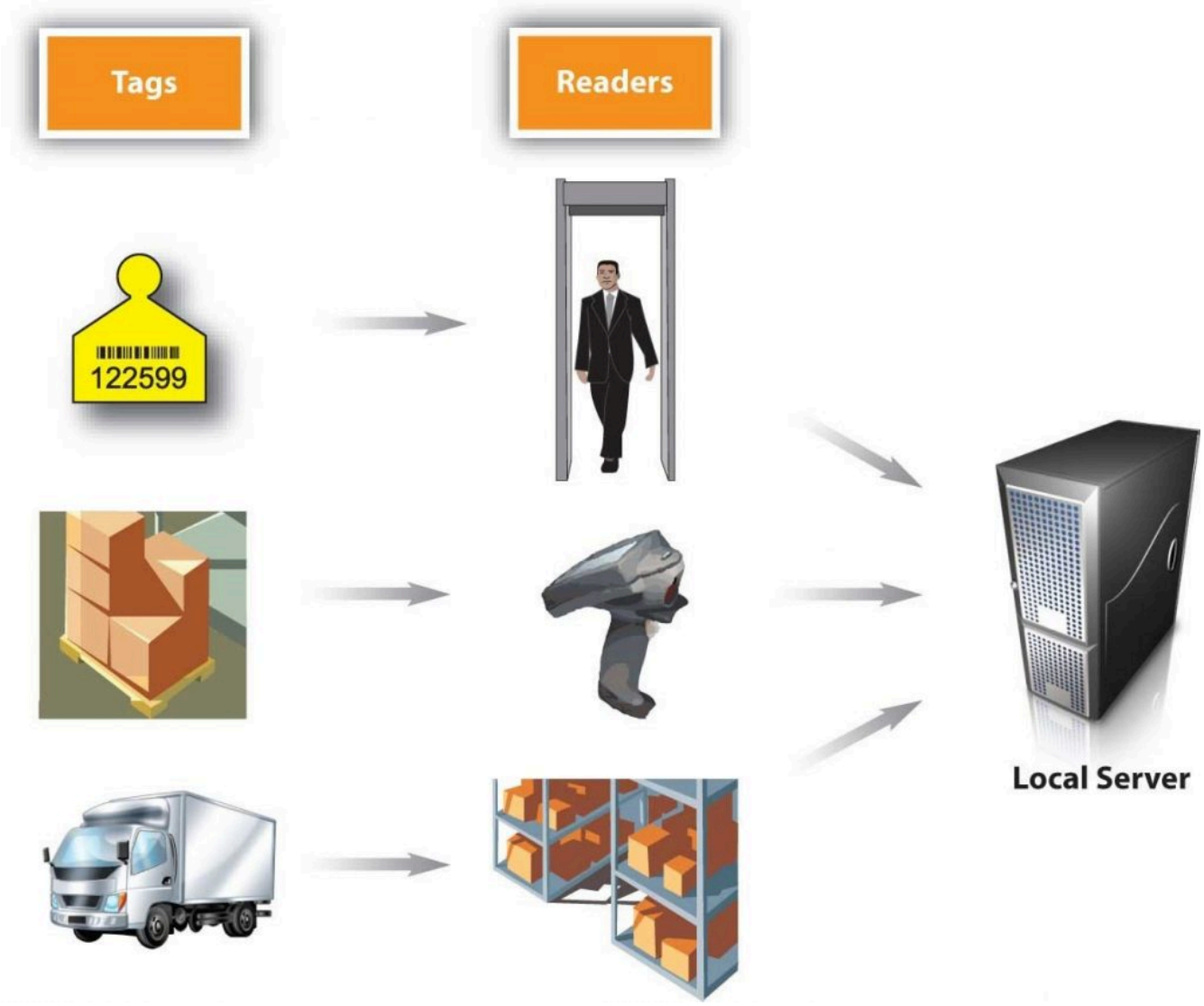
Some consumer groups worry that RFID tags and electronic product codes could be used to track their consumption patterns or for the wrong purposes. But keep in mind that the codes and tags are designed to work only within short ranges like your car-door remote.

(You know that if you try to unlock your car from a mile away using such a device, it won't work.)

See Figure 5.6 to get an idea of how RFID tags work.

Figure 5.6

How RFID Tagging Works



Note. How RFID Tagging Works [Image]. From Principles of Marketing, 2015, CC BY-NC-SA 4.0. [Image description].

Proponents of electronic product codes and RFID tags believe they can save consumers and companies time and money. These people believe consumers benefit because the information embedded in the codes and tags helps prevent **stock outs** and out-of-date products remaining on store shelves. In addition, the technology doesn't require cashiers

to scan barcodes item by item. Instead, an electronic product reader can automatically tally up the entire contents of a shopping cart—much like a wireless network can detect your computer within seconds. As a customer, wouldn't that add value to your shopping experience? (University of Minnesota, 2015).

Check Your Understanding

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Check Your Understanding: Demand Planning, Inventory Management & Control

Interactive activity unavailable in this format

Text-based alternative. to interactive activity available in Chapter 5.7

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5.5 Summary

This chapter focused on explaining the importance of storage in the global value chain. Storage of goods received by a firm is known as Inbound Storage, and storage of goods scheduled to move out of a firm is known as Outbound Storage. Material handling was also explained with special reference to its importance in storage. Inbound and Outbound goods are stored in warehouses and distribution centers where they are managed using different concepts of SKUs, EDIs and cross-docking. For optimal utilization of space in warehouses, accurate demand forecasts are essential. Techniques such as demand planning, CPFR, Value Chain Visibility and Value Stream Mapping could help avoid shortage or excess inventories. Various Inventory Management Techniques were also discussed, such as EOQ, VMI, JIT and ABC Analysis.

5.6 Key Terms, References, and Accessibility Descriptions

Key Terms

Cross-docking: The process of moving merchandise from the receiving dock to shipping dock for shipping without placing it first into storage locations.

Demand Planning: The process to forecast consumer's demand in future.

Downstream: Consumer side

Electronic Data Interchange: Exchange of business documents from computer to computer.

Enterprise Resource Planning: ERP systems provide an integrated and continuously updated view of core business processes using shared databases maintained by a database management system.

Inventory Management: Managing the stock of goods in warehouse

Inventory: Aggregate list of items, several goods in stock or stock of the product an organization produces for sale and the components that make the sale.

Lead Time: The time gap between placing an ordering and receiving it.

Materials Requirement Planning: A system that ensures that the materials, labor, and equipment needed for production are at the right places in the right amounts at the right times.

Order Fulfillment: The process of delivering what was promised, when it was promised, and how it was pledged are key drivers of customer satisfaction

Safety Stock: back up inventory

Semi-finished materials: work in progress

SKU (Stock-keeping unit): A unique number given to products when they arrive in warehouses.

Stock outs: Shortages or availability of less than required Inventory.

Stock: The goods or materials such as stationery, office equipment, plant, machinery, consumables, etc., available for use or sale.

Storage: The act of storing something in a warehouse.

Sustainability: Environment friendliness

Upstream: Supplier side

Value Chain Visibility: Making a company's operations visible to all stakeholders.

Warehouse Associates: Persons working in Warehouses

Warehouse Management System: An application that helps to monitor and handle the day-to-day tasks of a warehouse.

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Image Descriptions

Figure 5.2: The figure shows upstream and downstream flow of material and information. Upstream, the supplier end is at the top left corner and moves through downstream, the consumer end at the top right corner. The flow from upstream to downstream starts with Tier 2 Suppliers and moves to Tier 1 Suppliers to Manufacturer to Distributor to Retailer to finally end-consumer. The image also shows that forward flow of information is from left to right i.e. from upstream to downstream. Reverse flow of information is from right to left same as flow of money and flow of information. [Return to image].

Figure 5.6: The figure presents Tags used by readers and then stored into local servers representing 'How RFID tags work'. [Return to image].

Alternative Text-Based Activities

Check Your Understanding: Inbound and Outbound Storage

Question 1:

From Logistics Cycle perspective, which activities are a part of Storage?

1. Order Processing (Incorrect)
2. Transportation (Incorrect)
3. Warehousing and Inventory Management (Correct)

Feedback: In the logistics cycle, Storage includes both Warehousing and Inventory Management.

Question 2:

Forward flow of materials/ goods happens _____ to _____. Conversely, Reverse flow of materials/goods happen _____ to _____.

1. Upstream to Downstream; Downstream to Upstream (Correct)
2. Downstream to Upstream; Upstream to Downstream (Incorrect)
3. Both happens through out the supply chain (Incorrect)

Feedback: There is a forward flow of materials/goods for the regular flow that happens all the way from higher- tier suppliers (upstream) to the end-consumer (downstream). In addition, if there are returns for any reason, there will be a reverse flow of materials/ goods in the opposite direction to the forward flow.

Question 3:

Storage of goods received by a firm is known as _____, and storage of goods which are scheduled to move out of a firm is known as _____.

1. Inbound Storage; Outbound Storage (Correct)
2. Outbound Storage; Inbound Storage (Incorrect)
3. Inbound Logistics; Outbound Logistics (Incorrect)

Feedback: Storage of goods received by a firm is known as '**Inbound Storage**', and storage of goods which are scheduled to move out of a firm is known as '**Outbound Storage**'.

Question 4:

_____ is a computerized system to control the flow of resources and inventory.

1. Inbound Storage System (Incorrect)
2. Outbound Storage System (Incorrect)
3. Material Requirement Planning (Correct)

Feedback: Many manufacturing companies have adopted computerized systems to control the flow of resources and inventory. **Materials requirement planning (MRP)** is one such system.

Overall Activity Feedback

The Logistics Cycle is a complex process involving a series of stages that must run smoothly to ensure that goods reach their destination on time and in good condition. In the logistics cycle, Storage includes both Warehousing and Inventory Management. There is a forward flow of materials/goods for the regular flow that happens all the way

from higher- tier suppliers (upstream) to the end-consumer (downstream). In addition, if there are returns for any reason, there will be a reverse flow of materials/goods in the opposite direction to the forward flow. Material Handling is an integral part of Inbound and Outbound Storage. Many manufacturing companies have adopted computerized systems such as **Materials requirement planning (MRP)** to control the flow of resources and inventory. [Return to activity].

Check Your Understanding: Warehousing

Question 1:

What are benefits of having a Warehouse? Check all that apply.

- It helps in matching Supply with Consumer Demand. (Correct)
- It helps in reducing transportation cost and providing customer satisfaction. (Correct)
- It enables postponing product differentiation and product configuration close to customers. (Correct)
- It helps proper storage and arrangement of goods within the storage space. (Correct)

Question 2:

What is an SKU (Stock Keeping Unit)?

- Product's identification number given by manufacturer. (Correct)
- Products number defined by Supplier. (Incorrect)
- Products number that generates when consumer orders a product. (Incorrect)

Question 3:

All activities are the part of Warehouse Management System Except:

- Inventory Management (Incorrect)
- Order Management (Incorrect)

- Reporting & Analytics (Incorrect)
- Role Play (Correct)

Question 4:

What is the difference between Warehouse Management & Inventory Management?

Feedback: Warehouse management solutions provide a more holistic framework that covers all facets of operating and developing business warehouse systems, while inventory management takes a simple approach to manage stock volumes.

Question 5:

Crossdocking is the process of moving merchandise from the receiving dock to shipping dock for shipping without placing it first into storage locations.

- True (Correct)
- False

[Return to activity].

Check Your Understanding: Demand Planning, Inventory Management & Control

Question 1:

Demand Planning is important because it helps in forecasting demand and taking supply decisions accordingly.

- True (Correct)
- False

Question 2:

Value Chain Visibility makes value chain transparent and helps suppliers to know what your customers want.

- True (Correct)
- False

Question 3:

What is the difference between Inventory and Stock? Fill in the blank to show your understanding.

_____ is the aggregate list of items, several goods in stock or stock of the product an organization produces for sale and the components that make the sale.

_____ consists of a wide range of goods or materials – stationery, office equipment, plant, machinery, consumables, etc., available for use or sale.

Feedback: Inventory is the aggregate list of items, several goods in stock or stock of the product an organization produces for sale and the components that make the sale.

Stock consists of a wide range of goods or materials – stationery, office equipment, plant, machinery, consumables, etc., available for use or sale.

Question 4:

Inventory Stock outs happen when inventories are more than required and Surplus when inventories are less than required.

- True
- False (Correct)

Question 5:

All are Inventory Control techniques except:

- Vendor Managed Inventory

- Just-In-Time
- ABC Analysis
- Simulation (Correct)

[Return to activity].

PART VI

CHAPTER 6: FACILITATING INTERNATIONAL FREIGHT FLOWS

6.1 Introduction

Watch or Listen to the Following Media Clip

Media 6.1 *Why Do Countries Trade?* [Video]. Mindlever Education Centre. (URL: https://youtu.be/-IW8ZzY3xt8)

Learning Objectives

After reading this chapter, you should be able to understand and answer the following questions:

1. Describe the International Chamber of Commerce (ICC) Incoterms.
2. Explain different ways to facilitate and promote trade.
3. Introduce Harmonized commodity classification system and its use in international trade.

Introduction

This chapter will provide different ways to facilitate international freight flows. As you have seen in the previous chapters, complex international trade is important, and countries gain by participating in trade activities. Here, we will look into various approaches that can be used to simplify trade. The chapter starts with an introduction to Incoterms rules that manage trade complexity by guiding importers and exporters on cost and risk decisions. Then, realizing that international trade is beneficial, it should be facilitated and promoted through economic integration and trade security programs. Finally, we will look into the product classification system of Harmonized System Coding and how it helps simplify international trade.

Assessing What you Already Know

Play the simulation below multiple times to see how different choices lead to different outcomes. All simulations allow unlimited attempts so that you can gain experience applying the concepts.

Simulation: International Trade available at https://library.achievingthedream.org/herkimermicroeconomics/chapter/simulation-international-trade/

Media Attributions and References

Mindlever Education Centre. (n.d.). *Why do countries trade*? [Video]. YouTube. https://youtu.be/-IW8ZzY3xt8.

6.2 Incoterms Rules

Learning Objective

1. Describe the International Chamber of Commerce (ICC) Incoterms.

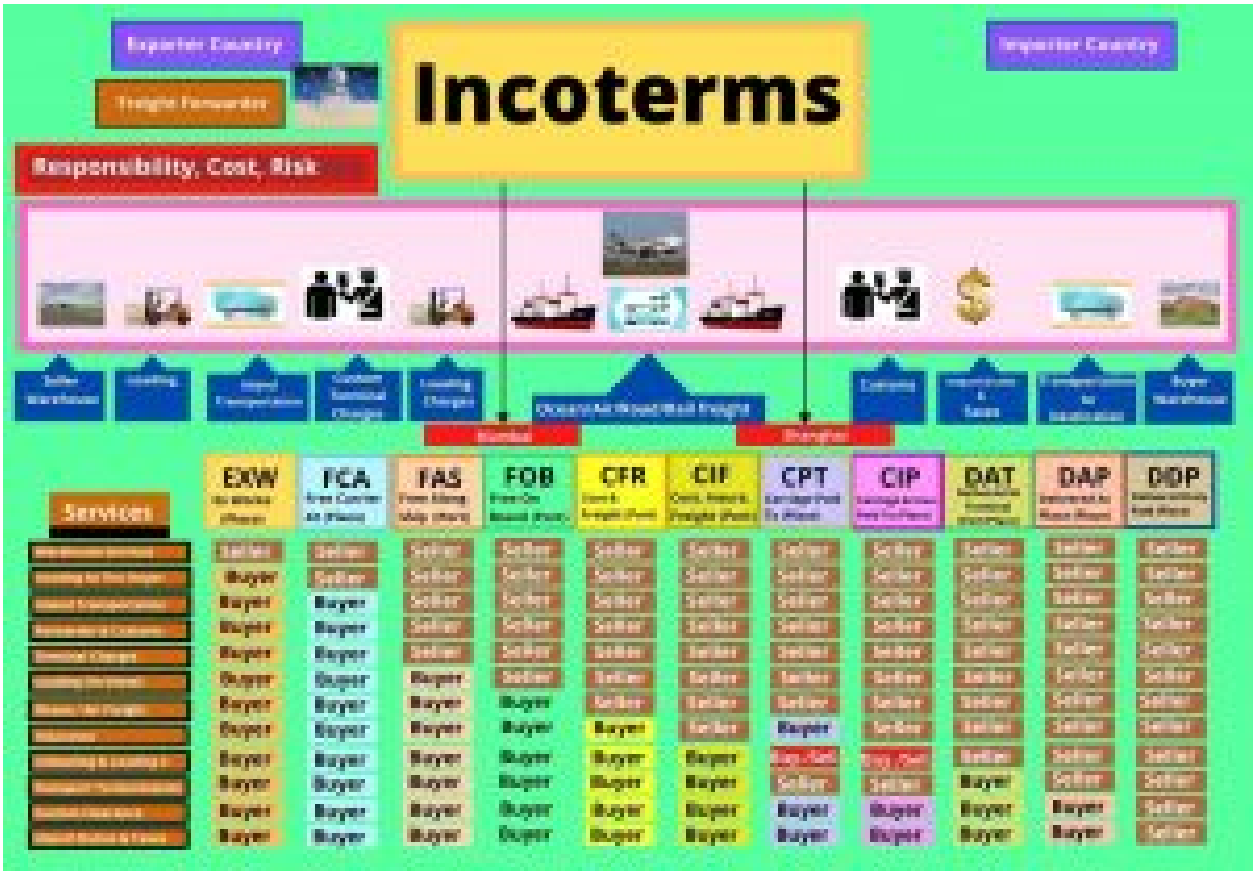
Incoterms Rules

Import and **export** are the critical components of all industries, particularly manufacturing, where imports act as inputs to the production process to export finished goods to their final destinations. **International trade** is complex because of the many parties involved taking diverse decisions related to **transportation**, delivery, risks and costs associated, **storage**, loading, unloading etc. Incoterms (**In**ternational **Co**mmercial **Terms**) rules try to manage this complexity by guiding **importers** and **exporters** on two significant decisions:

- **Costs:** Who is responsible for expenses associated with the shipment?
- **Risks:** Who bears the risk of loss or damage to the load?

Figure 6.1

Incoterms Chart



Note. Incoterms Chart. From Wikimedia Commons, 2021. CC BY-SA 4.0. [Image description].

Incoterms rules are developed and published by International Chamber of Commerce (ICC) to facilitate the global trading system. The ICC codified their first study of most generally used trade terms as a pre-incoterms edition in 1923 and published their first set of Incoterm Rules in 1936 (Thompson, 2020). Since then, this organization reviews and updates Incoterms rules every ten years, the previous edition was published in 2010 (Lowe, 2020). ICC has announced the latest edition Incoterms 2020 Rules containing 11 terms, which have been effective since 1 January 2020 (See Figure 6.1 for details). The Incoterms 2020 Rules is the ninth edition of Incoterms, which has the aim of being more inclusive and uses simple language for the current international trade decisions (Suraraksa, Amchang, Sawatwong, 2020).

Video: Incoterms 2020 Explained for Import Export Global Trade (6:21)

To know more about Incoterms Rules 2020, read their brief description and also watch this video that explains Incoterms Rules 2020 in detail.

Media 6.2. *Incoterms 2020 Explained for Import Export Global Trade* [Video]. Inco Docs. (URL: https://youtu.be/7g7IC4IzjDM)

Incoterms Breakdown

To understand Incoterms better, these can be categorized into two parts. One is based on **mode of transportation** and the other is based on **point of delivery**. View the following interactive to know more about these categories.

Check Your Understanding

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Check Your Understanding: Incoterms Rules

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 6.7.

Media Attributions and References

Inco Docs. (n.d.). *Incoterms 2020 explained for import export global trade* [Video]. YouTube. https://youtu.be/7g7IC4IzjDM.

Naveen7829. (2021). *Incoterms chart* [Chart]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:%E0%A4%87%E0%A4%A8%E0%A4%95%E0%A5%8B%E0%A4%9F%E0%A4%B0%E0%A5%8D%E0%A4%AE%E0%A5%8D%E0%A4%B8_%E0%A4%9A%E0%A4%BE%E0%A4%B0%E0%A5%8D%E0%A4%9F.jpg.

6.3 Trade Facilitation and Promotion

Learning Objective

2. Assess the importance of economic integration in international trade.

Trade Facilitation and Promotion

The American statesman Benjamin Franklin (1706–1790) once wrote: "No nation was ever ruined by trade." Many economists would express their attitudes toward international trade in an even more positive manner (Greenlaw & Shapiro, 2017). The evidence that **international trade** confers overall benefits on **economies** is pretty strong. Trade has accompanied economic growth in the United States and around the world. Many of the national economies that have shown the most rapid growth in the last several decades — for example, Japan, South Korea, China, and India — have done so by dramatically orienting their economies toward international trade. There is no modern example of a country that has shut itself off from world trade and yet prospered.

Video: Why do Countries Trade? | Introduction & Overview | IB International Economics | The Global Economy (12:27)

Countries participate in trade activities and facilitate exchange through trade agreements and trade programs to gain from trade. Let's watch this video to understand how countries gain from trade.

Media 6.3. *Why do Countries Trade? | Introduction & Overview | IB International Economics | The Global Economy* [Video]. Brad Cartwright. (URL: https://youtu.be/Jyw5p1EEZNM)

"Trade facilitation looks at how procedures and controls governing the movement of goods across national borders can be improved to reduce associated cost burdens and

maximize efficiency while safeguarding legitimate regulatory objectives" (Wikipedia, 2021) .

As per OECD Trade Facilitation and the Global Economy Report, 2018 :

> Trade facilitation benefits exporters and importers alike by allowing better access to inputs for production and enhancing participation in Global Value Chains. On the supply side, trade facilitation helps reduce business losses resulting from delays of goods at the border. Delays in delivery increase firms' costs for managing inventory and undermine their ability to respond rapidly to changes in consumer preferences. On the demand side, faster and more predictable delivery of intermediate goods through the supply chain can reduce firms costs (p. 16, para 5).

Economic Integration

For a variety of reasons, it often makes sense for nations to coordinate their economic policies. Coordination can generate benefits that are not possible otherwise. If countries cooperate and set zero **tariffs** against each other, then both countries are likely to benefit relative to the case when both countries attempt to secure short-term advantages by setting optimal tariffs. Benefits may also accrue to countries that liberalize labour and capital movements across borders, that coordinate fiscal policies and resource allocation toward agriculture and other sectors, and that coordinate their monetary policies (Saylor Academy, 2012).

Any type of arrangement in which countries agree to coordinate their trade, fiscal, or monetary policies is referred to as **economic integration**. There are different degrees of integration:

- Preferential Trade Agreement (PTA)
- Free Trade Area (FTA)
- Customs Union
- Common Market
- Economic Union
- Monetary Union

Let's discuss these in detail.

Preferential Trade Agreement

A preferential trade agreement (PTA) is perhaps the weakest form of economic integration (Saylor Academy, 2012). In a PTA, countries would offer tariff reductions and not eliminations, to a set of partner countries in some product categories. Higher **tariffs** would remain in all other product categories. This type of trade agreement is not allowed among **World Trade Organization** (WTO) members, who are obligated to grant most-favored nation (MFN) status to all other WTO members. Under the MFN rule, countries agree not to discriminate against other WTO member countries. Thus, if a country's low tariff on bicycle imports, for example, is 5 percent, then it must charge 5 percent on imports from all other WTO members. Discrimination or preferential treatment for some countries is not allowed. The country is free to charge a higher tariff on imports from non-WTO members, however. In 1998, the United States proposed legislation to eliminate tariffs on imports from the nations in sub-Saharan Africa. This action represents a unilateral preferential trade agreement since tariffs would be reduced in one direction but not the other.

Free Trade Area

A free trade area (FTA) occurs when a group of countries agrees to eliminate **tariffs** among themselves but maintain their own external tariff on imports from the rest of the world. The North American Free Trade Agreement (NAFTA), now USMCA is an example of an FTA. When NAFTA/USMCA is fully implemented, tariffs of automobile imports between the United States and Mexico will be zero. However, Mexico may continue to set a different tariff than the United States on automobile imports from non-NAFTA countries. Because of the different external tariffs, FTAs generally develop elaborate "rules of origin." These rules are designed to prevent goods from being imported into the FTA member country with the lowest tariff and then transshipped to the country with higher tariffs.

Customs Union

A customs union occurs when a group of countries agrees to eliminate **tariffs** among themselves and set a common external tariff on imports from the rest of the world. The European Union (EU) represents such an arrangement. A customs union avoids the

problem of developing complicated rules of origin but introduces the problem of policy coordination. With a customs union, all member countries must agree on tariff rates across many different import industries.

Common Market

A common market establishes free trade in goods and services, sets common external **tariffs** among members, and also allows for the free mobility of capital and labour across countries. The EU was established as a common market by the Treaty of Rome in 1957, although it took a long time for the transition to take place. Today, EU citizens have a common passport, can work in any EU member country, and can invest throughout the union without restriction.

Economic Union

An economic union typically will maintain free trade in goods and services, set common external tariffs among members, allow the free mobility of capital and labor, and also relegate some fiscal spending responsibilities to a supranational agency. The EU's Common Agriculture Policy (CAP) is an example of a type of fiscal coordination indicative of an economic union.

Monetary Union

A monetary union establishes a common currency among a group of countries. This involves the formation of a central monetary authority that will determine monetary policy for the entire group. The Maastricht treaty, signed by EU members in 1992, proposed the implementation of a single European currency (the Euro) by 1999.

Perhaps the best example of an economic and monetary union is the United States. Each U.S. state has its own government that sets policies and laws for its own residents. However, each state cedes control, to some extent, over foreign policy, agricultural policy, welfare policy, and monetary policy to the federal government. Goods, services, labor, and capital can all move freely, without restrictions among the U.S. states, and the nation sets a common external trade policy.

Visualizing Trade Data

Visit World Integrated Trade Solutions for examples of trade-related data visualizations.

Canada's Trade Agreements

The trade agreements of Canada represents Canada's cooperation in **multinational trade pacts** and plays a large role in the development of Canadian economy. Canada is regularly described as a trading nation, considering its total trade is worth more than two-thirds of its GDP (Hart, 2003). Of that total trade, roughly 75% is done with countries that are part of free-trade agreements with Canada—primarily the United States through the Canada–United States–Mexico Agreement (CUSMA), and its predecessor the North American Free Trade Agreement (NAFTA) (Coyne, 2012) . According to Global Affairs Canada, one in every five Canadian jobs is directly linked to exports (Kingston, 2017) .

By 2030, two-thirds of middle – class consumers will be in Asia, which can create new trade opportunities for Canadian companies (Kingston, 2017). In 2020, **merchandise trade** between Canada and ASEAN reached $26.7 billion, making it evident that a free trade agreement would boost **GDP** and exports to ASEAN countries, create new market opportunities for Canadian goods and services, and support a more predictable environment for trade and investment. As a result, in November 2021, Canada and ASEAN nations agreed to proceed with Free Trade Agreement negotiations (Government of Canada, 2022).

Canada's Free Trade Agreement – Interactive

Scroll down the article '*What are the Benefits of Canada's Trade Agreements*' to view interactive map titled 'Canada's Free Trade Agreement'. Click on each country for more details.

Trade Programs

There is another way to facilitate and promote trade: Trade Security Programs. Participation in these programs helps make the customs clearance process easier and quicker. Each country has its own international trade security program; this section will discuss trade security programs in Canada and the US.

- PIP (Partners in Protection)
- Customs Self Assessment (CSA)
- FAST (Free and Secure Trade)
- Single Window Initiative
- Custom Trade – Partnership Against Terrorism (CT-PAT)

Let's discuss each of these in detail.

Partners in Protection (PIP)

According to the Government of Canada (2014), "Partners in Protection (PIP) is a cooperative program between private industry and the CBSA (Canada Border Services Agency) aimed at enhancing border and trade chain security" (para. 1). Partners in Protection program:

- does not cost anything if an organization decides to participate in the program as a member
- is designed for business that have been identified as "trusted traders"
- outlines responsibility for these traders in PIP Terms and Conditions of Use.
- improves the efficiency of trading across the border
- allows your organization's trading processes to be evaluated by the CBSA (Government of Canada, 2014)

To learn more, visit Partners in Protection by the Canadian Border Services Agency.

Customs Self Assessment (CSA)

According to Government of Canada (2008), "The Customs Self Assessment (CSA)

program is designed for low-risk, pre-approved importers, carriers and registered drivers. To take advantage of the program, CSA-approved importers and carriers must use a registered driver to carry CSA-eligible goods into Canada in the highway mode." The CSA program:

- makes imports of low-risk products, quick and easy, and
- helping CBSA to focus only on high-risk shipments.

To learn more, visit Customs Self Assessment Program by the Canadian Border Services Agency.

Free and Secure Trade (FAST)

The Free and Secure Trade (FAST) program is a joint United States – Canadian program between the Canada Border Services Agency and the U.S. Customs and Border Protection. The FAST initiative offers pre-authorized importers, carriers and drivers expedited clearance for eligible goods, building on what Canada previously implemented under their Customs Self Assessment (CSA) program (Government of Canada, 2021).

The program aims to clear shipments faster and more cheaply by:

- Reducing the information needed for border/customs clearance
- Eliminating the need for importers to transmit data for each transaction
- Dedicating lanes for FAST clearances at border crossings (Wikipedia, 2021).
- Reducing the rate of border examinations
- Verifying trade compliance away from the border
- Streamlining accounting and payment for all goods imported by approved importers (Canada only)

The FAST Card is available to drivers who Canada and the United States have jointly approved. Each country must approve carriers and importers separately. As a result, a FAST importer and/or carrier can choose to be approved only in Canada or only in the United States (Office of Press Secretary, 2002).

Video: Trusted Traders (3:30)

Watch this video that summarizes PIP, CSA and FAST trade security programs.

Media 6.4. *Trusted Traders* [Video]. Canada Border Services Agency. (URL: https://youtu.be/SVxRtifbQuY)

Single Window Initiative

The single-window system is a trade facilitation concept that allows an international (cross-border) trader to submit information to a single agency, rather than dealing with multiple agencies in multiple locations to obtain the necessary papers, permits, and clearances to complete their import or export processes.

"A single window is defined as a facility that allows parties involved in trade and transport to lodge standardized information and documents with a single entry point to fulfill all import, export, and transit related-related regulatory requirements" (World Custom Organization, n.d.).

Figure 6.2 and 6.3 in the interactive below explain change in trade processes pre and post single window initiative respectively. Complete image descriptions available here.

In Canada, the Single Window Initiative is managed by Canada Border Services Agency (CBSA) and simplifies sharing of commercial data between importing countries and the government of Canada (Government of Canada, 2020).

Custom Trade – Partnership Against Terrorism (CT-PAT)

The Customs-Trade Partnership Against Terrorism (C-TPAT) is a voluntary supply-chain security program led by U.S. Customs and Border Protection (CBP) focused on improving the security of private companies' supply chains concerning terrorism. The program was launched in November 2001 with seven initial participants, all large U.S. companies. As of

December 1, 2014, the program had 10,854 members. The 4,315 importers in the program account for approximately 54% of the value of all merchandise imported into the U.S (Wikipedia, 2022) .

Check Your Understanding

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Check Your Understanding: Trade Facilitation and Promotion

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 6.7.

Media Attributions and References

Brad Cartwright. (n.d.). 3 *Why do countries trade? | Introduction & overview | IB international economics | The global economy* [Video]. YouTube. https://youtu.be/Jyw5p1EEZNM.

Canada Border Services Agency. (2015, July 20). *Trusted traders* [Video]. YouTube. https://youtu.be/SVxRtifbQuY.

Jieholee. (2016). *[Trade processes pre-single window initiative]* [Flowchart]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:BeforeSW.jpg#/media/File:BeforeSW.jpg.

Jieholee. (2016). *[Trade processes post single window initiative]* [Flowchart]. Wikimedia Commons. https://upload.wikimedia.org/wikipedia/commons/5/54/AfterSW.jpg.

6.4 Trade Harmonization

Learning Objective

3. Introduce Harmonized commodity classification system and its use in international trade.

Trade Harmonization

According to United Nations Trade Facilitation Implementation Guide, harmonization is

> "the alignment of national procedures, operations and documents with international conventions, standards and practices. It can come from adopting and implementing the same standards as partner countries, either as part of a regional integration process or as a result of business decisions."

Trade harmonization becomes even more important in **international trade** where multiple countries, languages and systems are involved. In simple words, Harmonization of trade implies standardized processes and procedures to facilitate and simplify trade. This section will cover the standardization of product classifications and documentation.

Standardization of Product Classification

Correct product classification is crucial as it helps prepare accurate documentation, calculate tariffs and taxes and completion of customs formalities. World Customs Organization (WCO) established a standardized product classification system in 1983 known worldwide as 'Harmonized System (HS) Coding. HS Coding categorizes goods into approximately 5,000 commodity groups, used in by more than 200 countries worldwide. It is also known as the HS code or HTS — the Harmonized Tariff Schedule code (Zurkow, 2016).

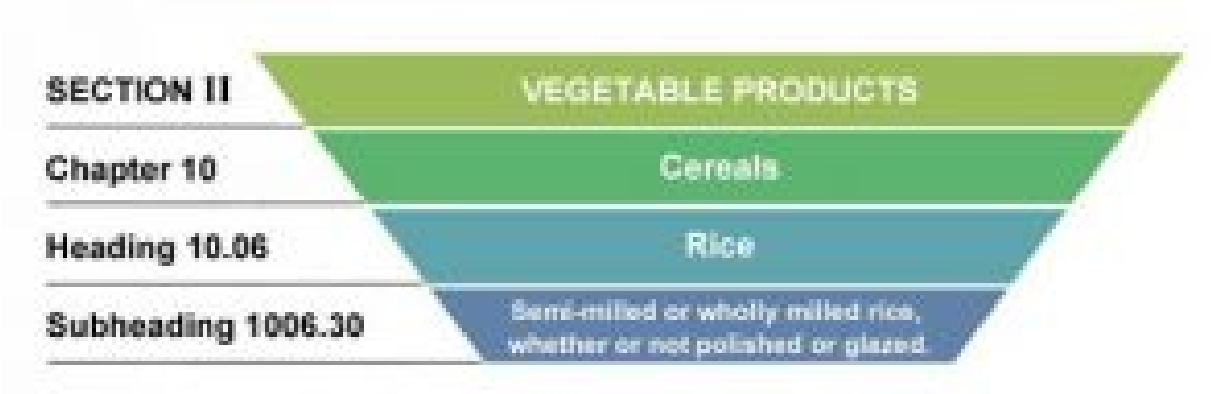
The HS is organized logically by economic activity or component material. The HS is

organized into 21 sections subdivided into 99 chapters. The 99 HS chapters are further subdivided into 1,244 headings and 5224 subheadings (Wikipedia, 2022). Section and Chapter titles describe broad categories of goods, while headings and subheadings describe products in more detail. Generally, HS sections and chapters are arranged according to a product's degree of manufacture or technological complexity. Natural commodities, such as live animals and vegetables are described in the early sections of the HS. In contrast, more evolved goods such as machinery and precision instruments are described in later sections.

Generally, the HS code consists of 6-digits. The first two digits designate the HS Chapter. The second two digits represent the HS heading. The third two digits designate the HS subheading. HS code 1006.30, for example, indicates Chapter 10 (Cereals), Heading 06 (Rice), and Subheading 30 (Semi-milled or wholly milled rice, whether or not polished or glazed).

Figure 6.4

Hierarchy of Harmonized Code: Example



Note. Example of hierarchical structure of the Harmonized System for rice. From Wikimedia Commons, 2016. CC-BY-SA-4.0. [Image description].

More HS Coding Examples

Table 6.1

Product Name	HS Code	Headings and Subheadings
Fresh potatoes	701.9	Header Potatoes, fresh or chilled, Sub header Other
Frozen potatoes	710.1	Header Vegetables (uncooked or cooked by steaming or boiling in water), frozen, Subheader Potatoes
Picture frames made of wood	4414	Subheader Wooden frames for paintings, photographs, mirrors or similar objects
Picture frames made of plastic	3924.9	Subheader Tableware, kitchenware, other household articles and hygienic or toilet articles, of plastics. Other
Picture frames made of glass	7020	Subheader Other articles of glass
Personal hygiene soap in the form of a bar, cake or moulded shape	3401.11	Subheader Soap and organic surface-active products and preparations, in the form of bars, cakes, moulded pieces or shapes, and paper, wadding, felt and nonwovens, impregnated, coated or covered with soap or detergent: For toilet use (including medicated products)
Liquid personal hygiene soap	3401.20 or 3401.30	Subheader Soap in other forms or Organic surface-active products and preparations for washing the skin, in the form of liquid or cream and put up for retail sale, whether or not containing soap
CO detector that captures and displays gas measurements	9027.1	Subheader Instruments and apparatus for physical or chemical analysis (for example, polarimeters, refractometers, spectrometers, gas or smoke analysis apparatus; instruments and apparatus for measuring or checking viscosity, porosity, expansion, surface tension or the like; instruments and apparatus for measuring or checking quantities of heat, sound or light (including exposure meters); microtomes; Gas or smoke analysis apparatus
CO detector that does not capture and display gas measurements	8531.1	Electric sound or visual signaling apparatus (for example, bells, sirens, indicator panels, burglar or fire alarms), other than those of heading 85.12 or 85.30. Burglar or fire alarms and similar apparatus.

Note. This table gives different HS Code examples.

Use this online database to search list of products and commodities with their 6-digit, 4-digit and 2-digit HS codes: Foreign Trade Online.

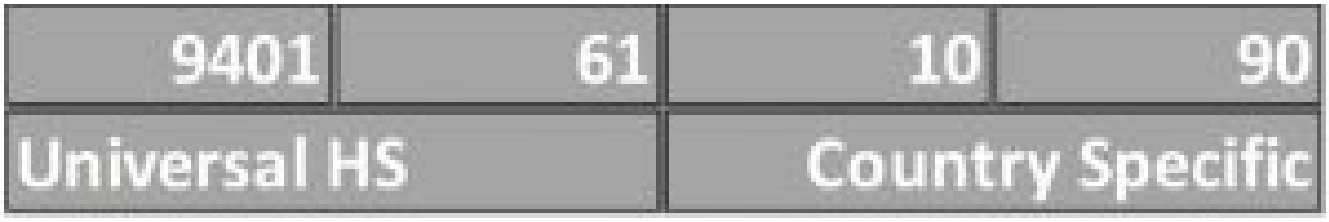
The contracting parties (such as countries participating in international trade) to the

Convention on the Harmonized Commodity Description and Coding System must agree to base their national tariff schedules on the HS nomenclature and legal notes. They can subdivide the HS nomenclature beyond 6-digits and add their legal notes according to their tariff and statistical requirements. Parties often set their customs duties at the 8-digit "tariff code" level. Statistical suffixes are often added to the 8-digit tariff code and make it 10 digits. If the number of digits is more than 8, additional digits are called the national subheading.

For example, a leather sofa can be classified as **9401.61.10.90.**

Figure 6.5

HS Code Breakdown



Did You Know?

Canada has its own HS Coding System called Custom's Tariff which is based on Harmonized System Coding developed by WCO. Visit Canadian Customs Tariff, Government of Canada website for more details.

Video: Classifying Imported Goods (2:21)

Watch this video that summarizes classification of goods in Canada.

Media 6.5 Classifying Imported Goods [Video]. Canada Border Services Agency. (URL: https://youtu.be/K4KML-rENVM)

Check Your Understanding

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Check Your Understanding: Trade Harmonization

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 6.7.

Media Attributions and References

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6.6 Key Terms, References, and Accessibility Descriptions

Key Terms

Economies – countries

Export – Sending the goods from originating country.

Exporters – A person or organization that sells products and services in foreign countries that are sourced from the home country.

GDP – Gross Domestic Product

Import – Receiving the goods in destination country.

Importers – A person or organization that sells products and services that are sourced from other countries.

International Trade – Bi-lateral or Multi-lateral exchange of goods and services.

Merchandise Trade – Trade in goods only

Multinational Trade Pacts – Trade policies between multiple nations

Storage – The act of storing something in a warehouse.

Tariffs – Tax or duty paid on exports/ imports.

Transportation – The entity handling the physical transportation of the goods, such as UPS, FedEx, and DHL.

World Trade Organization – WTO is a global organization that outlines rules to trade and all the member nations are bound to follow these rules.

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Image Descriptions

Figure 6.1: The chart shows different Incoterm Rules and provides information about responsibility, cost and risk involved. The entire breakdown is explained in Media 6.1 video below this chart. [Return to image].

Figure 6.2: The image shows trade process where documents journey starts with port authorities and ends with regulatory agencies. Departure and arrival documents pass

through the same process in two different countries to finally reach regulatory agencies making the process slow, costly, complicated, unpredictable and inefficient. [Return to image].

Figure 6.3: The image shows the functioning of single window system where documents are submitted once to the single window and are used whenever required by different authorities and government offices in importing and exporting countries. [Return to image].

Figure 6.4: The image shows 6-digit HS code classification for product Rice. As you go deep into the classification, products can be defined more specifically. In the figure there is an example for product rice. Its classification starts with the section, moving down to Chapter (2-digit), headings (4-digit) and subheadings (6-digit). For rice, it is a part of Section II (vegetable products), Chapter 10 (Cereals), Heading 10.06 (Rice) and subheading 1006.30 (Semi-milled or wholly milled rice, whether or not polished or glazed. [Return to image].

Alternative Text-Based Activities

Check Your Understanding: Incoterms Rules

Question 1:

What does Incoterms stand for:

- International Commerce Terms
- International Commercial Terms (Correct)
- Interactive Common Terms
- Innovative Commercial Terms

Feedback: Incoterms stand for International Commercial Terms.

Question 2:

Incoterm Rules 2020 are divided into four groups (_____) which consist of _____ terms.

- (A, B, C, D); 14
- (P,X,S,U); 7
- (C, F, A, W); 10
- (C,D,E,F); 11 (Correct)

Feedback: Incoterm Rules 2020 are divided into four groups (C, D, E, F), which consist of 11 terms.

Question 3:

In which two Incoterms Rules, seller must pay for insurance?

- EXW and DAP
- FOB and DDP
- FAS and DAP
- CIF and CIP (Correct)

Feedback: There are only two incoterms rules out of 11 for which seller must pay for insurance and they are CIF and CIP where 'I' stands for insurance.

Question 4:

Out of the following options, which incoterms rules is NOT multimodal?

- FCA
- CPT
- DDP
- CIF (Correct)

Feedback: CIF (Cost, Insurance and Freight) is single modal which applies only to sea and inland waterways.

Question 5:

Out of the following options, which incoterms rules is NOT single modal?

- FAS

- CFR
- DAP (Correct)
- CIF

Feedback: DAP (Delivered at Place) is multimodal which applies for land, air and waterway transportation. [Return to activity].

Check Your Understanding: Trade Facilitation and Promotion

Question 1:

Countries benefit from trade by (Check all that apply):

- Opening their economies to foreign goods, services, and finance (correct)
- Making their domestic markets more competitive (correct)
- Protecting domestic industry by reducing competition (Incorrect)

Question 2:

Economic Integration can be in the form of Preferential Trade Agreements, Free Trade Areas, Customs Union, Common Market, Economic Union and Monetary Union.

- True (Correct)
- False

Question 3:

USMCA (previously NAFTA is an example of a free trade area and include these three countries:

1. *US*
2. *Canada*
3. *Mexico*

Question 4:

What is the difference between Customs Union and Common Market. Fill in the blank to show your understanding:

A *customs union* occurs when a group of countries agrees to eliminate tariffs among themselves and set a common external tariff on imports from the rest of the world whereas A *common market* establishes free trade in goods and services, sets common external tariffs among members, and also allows for the free mobility of capital and labor across countries.

Question 5:

By 2030, two-thirds of middle- class consumers will be in Asia, which can create new trade opportunities for Canadian companies.

- True (Correct)
- False

Question 6:

Partners in Protection is a program led by the U.S. whereas Customs Trade-Partnership against terrorism is a trade program led by Canada.

- True
- False (Correct)

[Return to activity].

Check Your Understanding: Trade Harmonization

Essay-Based Question

Select a product importing to Canada. Using examples above, use Canada's Customs Tariff Schedule to find it's HS Code at 2-digit, 4-digit, 6-digit, 8-digit and 10 digit levels. Also, specify the tariff arrangement for that product.

Solution:

Let's consider a product: Umbrellas

When looked into Customs Tariff Schedule, It was in **Chapter 66 – Umbrellas, sun umbrellas, walking-sticks, seat-sticks, whips, riding-crops and parts thereof**.

When researched further, we were able to find it's HS Code:

2-digit: 66 (Chapter 66 – Umbrellas, sun umbrellas, walking-sticks, seat-sticks, whips, riding-crops and parts thereof)

4-digit: 66.01 (Umbrellas and sun umbrellas (including walking-stick umbrellas, garden umbrellas and similar umbrellas)

Let's say now we are looking for Umbrellas that can be used in garden. HS Code will be:

6-digit: 66.01.10 (Umbrellas and sun umbrellas (including walking-stick umbrellas, garden umbrellas and similar umbrellas) – Garden or similar umbrellas

8-digit: 66.01.10.00

10-digit: 66.01.10.00.00

To find Tariff, we need to look into custom's tariff schedule again.

So, the tariff on our selected product is: 7% MFN Tariff; For CCCT, LDCT, UST, MXT, CIAT, CT, CRT, IT, NT, SLT, PT, COLT, JT, PAT, HNT, KRT, CEUT, UAT, CPTPT, UKT: Free and For GPT: 5%.

[Return to activity].

6.5 Summary

Different ways to facilitate international freight flows were discussed in the chapter. Realizing that countries gain from trade, it is important to simplify, facilitate, promote and harmonize it, various approaches that can help were discussed. First, the importance of Incoterms rules were highlighted, and 11 terms were discussed. Further, economic integration and trade security programs were explained wherein trade agreements, Canada's Partners in protection, Free and Secure Trade, Customs Self – assessment, single – window initiative and US's CT-PAT program were discussed. At last, Harmonized Coding System was introduced, highlighting its importance in the product classification world wide.

PART VII

CHAPTER 7: VALUE CHAIN VULNERABILITY

7.1 Introduction

Watch or Listen the Following Media Clip

Media 7.1 *Global Value Chains: The Production Revolution of the 21st Century*. [Video]. OCED. (URL: https://youtu.be/ktx2_Dzy3tM)

Learning Objectives

After reading this chapter, you should be able to understand and answer the following questions:

1. Explain the concept of value chain vulnerability by reviewing current challenges
2. Identify types of risks and disruptions
3. Examine risk management strategies to mitigate the supply chain vulnerability

Introduction

Globalization transformed international business significantly by enhancing cutting-edge technology as well as increasing shipping trade worldwide. As a result, the connection between countries and continents became shorter and faster, impacting economic performance and gaining economic benefits. On the other hand, due to globalization and trade openness, companies faced challenges that amplified the vulnerability in Supply Chain Management and increased the risks. Supply Chain Management can promote competitiveness in the business field, and risk mitigation strategies can help organizations reduce risks such as human-made or natural disasters (Gurtu & Johny, 2021). CC BY-4.0

Assessing What You Already Know

As you answer the following questions, reflect upon what you already know about how company's work.

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 7.6.

Overall Activity Feedback

It is true that globalization transformed international business significantly by enhancing cutting-edge technology as well as increasing shipping trade worldwide. As a result, the connection between countries and continents became shorter and faster, impacting economic performance and gaining economic benefits. Risks have always existed everywhere; however, globalization has increased the risk significantly internally and externally. Supply Chain Management can promote competitiveness in the business field, and risk mitigation strategies can help organizations reduce risks such as human-made or natural disasters.

Media Attributions and References

OECD. (2013, May 27). *Global value chains: The production revolution of the 21st century* [Video]. YouTube. https://youtu.be/ktx2_Dzy3tM

7.2 Value Chain Vulnerability and Current Challenges

Learning Objective

1. Explain the concept of value chain vulnerability by reviewing current challenges.

What is vulnerability? According to the Cambridge University Press (2022),

> "Vulnerability is the quality of being vulnerable (able to be easily hurt, influenced, or attacked), or something that is vulnerable" (Cambridge University Press, 2022).

Risks have always existed everywhere; however, globalization has increased the risk significantly internally and externally. Challenges within the global value chain could be lack of visibility within companies, chaos, inaccurate research or forecast, human mistakes, mother nature, political situation and so forth. The global value chain is a complex model with simultaneous flow of information and products . The right quantity of products must be effectively delivered to the right place and the right customer. Globalization has made the global value chain model more sophisticated and more vulnerable for all parties, with many interruptions and disruptions on the supply chain network. Nataliya Smorodinskaya, Daniel Katukov & Viacheslav Malygin (2021) presented a typical global value chain organizational model that can help you understand various value chain activities, which each of them can be at risk and have challenges.

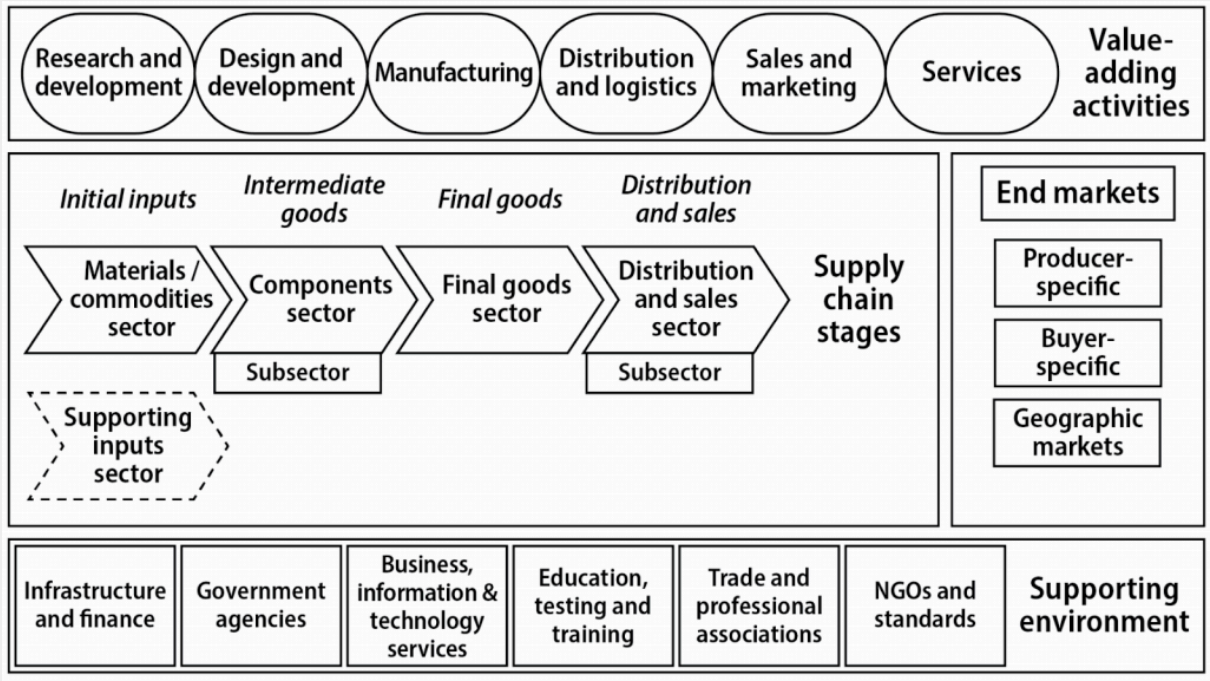
Consider This: Global Value Chain Vulnerability

The following material is adapted from *Global Value Chains in the Age of Uncertainty: Advantages, Vulnerabilities, and Ways for Enhancing Resilience* by Smorodinskaya, Katukov & Malygin (2021) under Creative Commons Attribution License 4.0.

The concept of Global Value Chain relies on the value chain organizational model used for mapping particular firms, activities, and geographic locations involved in the co-creation of a final product, be it a physical good, a service or an enabling technology. This model is multi-structural, containing four key elements.

Figure 7.1

A typical Global Value Chain organizational model (industry-neutral)



(click to enlarge)

Note. From Smorodinskaya, Katukov & Malygin, 2021. CC BY-4.0

They are:

1. *six main value-adding activities* representing basic operational functions that Global Value Chains firms are engaged in to bring a product from an idea to the end use.
2. *four main supply chain stages* (often termed in literature as 'supply chains' or 'global supply chains') illustrating the input–output structure of a product or the downstream flow of inter-firm interactions for its creation. Each stage represents supplier firms from a certain sector that can be further

disaggregated into subsectors or intermediates delivered by second- or third-tier suppliers.

3. *end markets* for final goods (basically, an extension of the supply chain), classified into several categories within a given industry, such as producer specific markets (e.g., for consumer electronics or automotive electronics in the electronics chains), buyer-specific markets (e.g., for retail consumers or industrial buyers in the apparel industry chains), and geographic markets.
4. *supporting environment* uniting multiple local or global actors who do not directly produce and trade products but provide various supporting and regulative facilities enabling the chain's smooth functioning (from utility providers and financial institutions to governments and international organisations)

For 30 years of evolution, the distributed production system has fundamentally enhanced functional interdependences among suppliers, their industry domains and their countries of origin, thus making the world economy much more interconnected through transnational flows of trade, foreign direct investment [FDI] and labour force. This interconnectedness not only brings mutual benefits but also risks to Value Chain Partners.

In economic and business literature, uncertainty is viewed as the probability of risk occurrence, when unexpected events cause certain kinds of damage to systems' economic performance, with the scale of this damage being neither predicted nor insured against. Indeed, participation in Global Value Chain's [GVC] allow companies and economies to co-create increasingly complex products that they would never manufacture on their own. But at the same time, the involvement in value-added production and trade puts interdependent Global Value Chain partners at risk of rolling disruptions in their performance in case of a sudden idiosyncratic shock happening at the level of a certain supplier firm (Smorodinskaya, Katukov & Malygin, 2021).

GVCs Under the Pandemic Shock

Since the start of the digital age, GVCs and their supplier ecosystems have been facing increasingly frequent and severe systemic shocks of various origins, causing supply disruptions and imposing damage on international business and national economies. So, the propagation of shocks through supply chains and its macroeconomic implications have been widely studied even before the COVID-19 pandemic, both in economic and management literature, both theoretically and empirically. According to McKinsey Global Institute, over the past decade, at least one-month-long disruptions in supplier networks occurred on average every 3.7 years, with one major disruption capable to stop production in a GVC for 100 days, thus depriving firms in a number of industries of annual revenues. In the year of 2019 alone, the supply disruptions caused only by natural disasters had imposed damage on the world economy up to USD 40 billion. However, the 2020 pandemic crisis has brought the worst shock to the distributed production system for its entire 30-years evolvement. The crisis has demonstrated that increased interconnectedness of economies as GVCs' partners can put them at enormous destabilizing risks in case of a sudden fall in deliveries from just a single country, particularly from China. It has become clear that with all its advantages the modern system of production and trade is yet not tailored to safely meet powerful unpredictable shocks and should be seen fundamentally vulnerable to impacts of rising uncertainty. Among the biggest disruption risks that had fully realized at the start of the crisis was a combination of two factors — the involvement of GVCs' country partners in the just-in-time delivery practices that had critically increased their

interdependences and the revealed dependence of a significant share of these countries on intermediary imports from China, that had been steadily growing through over the past decade.

(Smorodinskaya et al., 2021) CC-BY-4.0

This is an excellent example of a current challenge that our world and global value chain have now faced and are dealing with it.

Check Your Understanding

Explain the concept of value chain vulnerability by reviewing current challenges.

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 7.6.

Overall Activity Feedback

Globalization has made the global value chain model more sophisticated and more vulnerable for all parties, with many interruptions and disruptions on the supply chain network. The global value chain is a complex model with simultaneous flow of information and products . Also, it is essential to know activities of the concept of Global Value Chain which relies on the value chain organizational model. The model used for mapping particular firms, activities, and geographic locations involved in the co-creation of a final product, be it a physical good, a service or an enabling technology. This model is multi-structural, containing four key elements.

Media Attributions and References

Smorodinskaya, N., Katukov, D., & Malygin, V. (2021). Global value chains in the age of uncertainty: advantages, vulnerabilities, and ways for enhancing resilience. *Baltic Region* (13), 78-107. https://journals.kantiana.ru/eng/baltic_region/4953/31214/

7.3 Types of Risks and Disruptions

Learning Objective

2. Identify types of risks and disruptions

Figure 7.2
Dice



Note. Dice with letters arranged to form words: profit, loss, risk. From AbsolutVision, 2017. Pixabay Licence

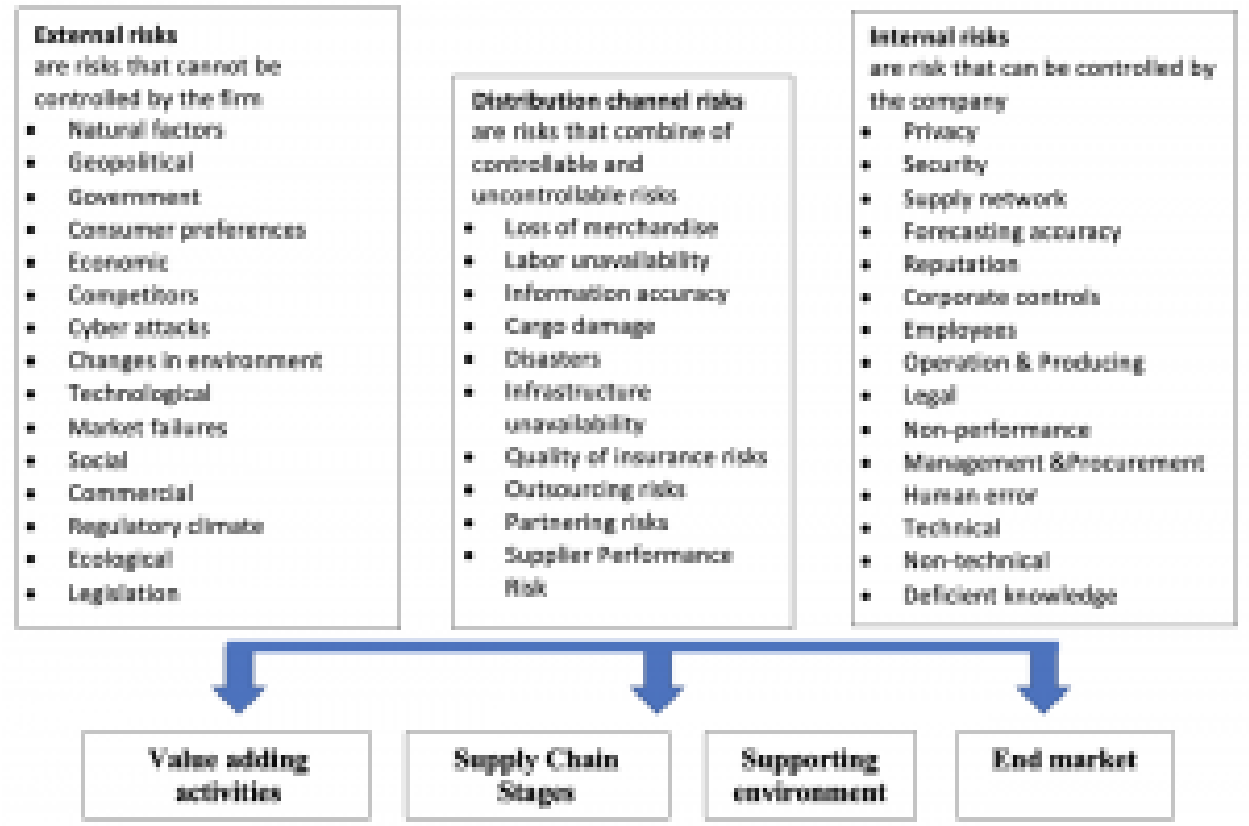
Risk is a possibility of an event that can occur and affect the global value chain. There are different types of risks: external and internal, and distribution channel risks. These risks can be predictable, unpredictable, controllable, uncontrollable, technical, non-technical. Some of them combine a few criteria, such as predictable and uncontrollable or unpredictable and uncontrollable. External risks are risks that the firm cannot control and often are difficult to influence. Therefore, they require a complex approach and try to identify and mitigate them.

According to the FITT (2013), external risks can be predictable and uncontrollable such as cost fluctuations, market risks, inflation, environmental, operational, taxation. In addition, external risks can be unpredictable, such as natural hazards and sabotage, which are uncontrollable (FITT, 2013). Internal risks are risks that the company can control, and they are technical and non-technical. These risks are controllable because the organization can eliminate or avoid them. For example, non-technical internal risks are human error, management, delays, inappropriate procurement, or loss of profits (FITT, 2013). Non-technical risks are related to the interactions between stakeholders such as the public, government, regulatory, partners, contractors, communities. Technical internal risks consist of risks associated with technology and design issues. These risks impact the following parts of the organizational model of the global value chain: value-adding activities, supply chain stages, supporting environment, and end markets such as buyer, producer, or geographic market (Smorodinskaya et al., 2021).

Risks in the global value chain significantly influence domestic and international companies and the environmental organizations overall.

The most identified risks in the global value chain are political, accidents, natural disasters, product integrity, physical supply security (theft), cybersecurity, financial supply chain, performance risks (Supply Chain Risk, 2020, February 18). CC-BY-SA-4.0

Figure 7.3
Supply Chain Risks



(click to enlarge) [Image description].

Additionally, a stable political environment helps businesses flourish and maintain long-term plans because of a business-friendly political environment. A great source of checking a country's political stability is Global Economy.com (2022). For example, the strongest indicator of the politically stable countries is Liechtenstein, Andorra, New Zealand, and Singapore, while the weakest are Syria, Afghanistan, Yemen, and Iraq. The lowest countries are often developing countries with more extreme instability caused by civil wars, corruption, turmoil, or protectionism. Firms have no control over politically unstable countries and their problems that can cause disruptions within the global value chain. Moreover, companies often cannot operate within the country during a difficult time, and they often lose permission or lose business.

Please explore the Global Economy website.

Video: Container Vessel Collision in Karachi Port (1:24)

Traffic at the South Asia Port Terminal Limited (SAPT) was suspended after two ships reportedly collided at the Karachi port here on Monday.

Media 7.2 *Container Vessel Collision in Karachi Port*. [Video]. Heavy Lift Specialist. (URL: https://www.youtube.com/watch?v=Y0OY9XrOLcs)

Video: Aftermath of Explosion at Beirut Port (4:27)

A view of damaged buildings in the Gemmayzeh neighborhood of Beirut on Aug. 13, 2020. The explosion at Beirut's port last week killed over 170 people, injured thousands and upended uncounted lives.

Media 7.3 *Aftermath of Explosion at Beirut Port*. [Video]. Los Angeles Times. (URL: https://www.youtube.com/watch?v=BuTVd_jwRuw)

Video: What Really Happened at the Suez Canal? (11:33)

Exploring the engineering principles behind the recent obstruction of the Suez Canal, which caused a weeklong disruption in global shipping traffic. I give a brief overview of the bank effect and dilatancy of coarse-grained soils. Hopefully, the video helps you understand a few of the engineering challenges associated with navigating massive ships through tiny canals and what can happen when they run aground!

Media 7.4 *What Really Happened at the Suez Canal?* [Video]. Practical Engineering. (URL: https://www.youtube.com/watch?v=Ty-m4pm8oog)

Video: Coronavirus Outbreak: The Impact COVID-19 is Having on the Global Economy (4:55)

In an effort to flatten curve of the COVID-19 pandemic the world has been forced to come to a standstill. Streets are empty, shops are closed and people are out of work, public gatherings have been banned in many places and travel restrictions have been imposed. And all of this is having a major impact on the global economy. The United Nations says we may see a $2 trillion shortfall in our global income and a $220 billion hit to developing countries because of COVID-19.

Media 7.5 *Coronavirus Outbreak: The Impact COVID-19 is Having on the Global Economy.* [Video]. Global News. (URL: https://www.youtube.com/watch?v=0cGLrSpaf4o)

Video: Explosion in China Which Could Be Seen From Space (9:54)

In China an explosion devastated the port of Tianjin, near Beijing. The blast was large enough to be seen from space and registered as 2.9 on the earthquake scale but how did an explosion that detonated with the force of over 300 tonnes on TNT happen?

Media 7.6 *Explosion In China Which Could Be Seen From Space | Disasters Engineered.* [Video]. Quest TV. (URL: https://www.youtube.com/watch?v=z39sNRK614U)

Consider This: Supply Chain Risk Management

The following material is adapted from *Supply Chain Risk Management: Literature Review* by Amulya Gurtu & Jestin Johny under Creative Commons Attribution License 4.0.

Additionally, risks cause disruption, which ripples through the network of the supply chains. Supply Chain Risk Management [SCRM] ensures the smooth functioning of supply chains. Risk can be termed as vulnerability, uncertainty, disruption, disaster, peril, or hazard. A lack of foresight about a likely disruption in a supply chain and its causes makes a supply chain vulnerable, and the SCM leaders less effective.

SCRM can be divided into two broad categories of approaches. The first is the strategy for a comprehensive risk management approach, and the second is a focused approach to a specific disruption. These specific disruptions could be security, lead times, or terrorism. For instance, Children's toys contained lead-based paint in 2007 without the knowledge of Mattel. This caused disruptions in Mattel's supply chains. Mattel ended up setting quality assurance centres at the suppliers' factories to avoid the repetition of the lead

paint crisis. The supplier used lead-based paint to save small operational costs. The cost of disruption to Mattel was much more significant and could have been avoided.

Disruptions in supply chains are evolving to be more comprehensive and recurrent in the business environment. The scale and rate of risk events in supply network are increasing. Disruptions determine the robustness of SCM in a company. Disruption events are described as when "the tornado hits, the bomb explodes, a supplier goes out of business, or the union begins a wildcat strike" (Sheffi and Rice 2005). There are different types of risk identified by various academicians and practitioners from the field of SCM. The risk classified by various authors can be elaborated to include the scale and risk occurrence. Some other parameters to classify risks in SCM are: (i) based on the sources of risk and mitigation strategies (ii) as organizational risks, environmental risks, and network risks (iii) demand and supply risks (iv) industry and organizational risks, and (v) network risks.

An uncertain business environment causes supply chain risks. The uncertain business environment results from cyclical business behaviour, fluctuation in demands, or a disaster. Therefore, uncertainty may be seen as a risk that can disrupt supply chain performance. Some authors have categorized risks in supply chains under operational risk, network risk, and external risks. Operational risks are due to a strategic re-engineering failure arising from within the system. For example, a ferry named Moby Prince collided with a ship named Agip-Abruzzo in the Mediterranean Sea on 10 April 1991, causing a loss of 140 lives and 25,000 tons of oil; a fire in the Haven oil-tanker caused the loss of six lives, and 50,000 tons of oil on April 11, 1991. Network risks are derived from the supplier network layers based on the title, vendor strategies, and agreements between the supply chain network vendors. Thirdly, external risks result from an organization's external environment, which poses a significant threat to the existing business environment. According to Silva and Reddy (2011), 73% of the U.S. organizations suffered more than USD 1 billion in sales in the previous five years due to volatile disruption in the business cycle, with the most recurrent disruption caused by unmanageable natural disasters. Such turmoil often immobilizes supply chains for an extended duration.

(Gurtu & Johny, 2021). CC-BY-4.0

A lack of foresight risks in the organization can cause disruptions. Disruptions can ripple through the global value chain, which causes vulnerability, uncertainty, and colossal loss of money. For example, during economic hardship, disturbances in the global value chain cost a lot for organizations. According to Statista (2021), an average 184 million US dollars per year costs organizations worldwide supply chain disruptions. The highest annual average cost in the United States accounted for 228 million US dollars. View graph Estimated average annual cost to respondents' organizations as a result of global supply chain disruptions in 2021, by region or country. [Chart description].

Check Your Understanding

Identify types of risks and disruptions.

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 7.6.

Overall Activity Feedback

It is important to know that risk is a possibility of an event that can occur and affect the global value chain. There are different types of risks: external and internal, and distribution channel risks. These risks can be predictable, unpredictable, controllable, uncontrollable, technical, non-technical. Some of them combine a few criteria, such as predictable and uncontrollable or unpredictable and uncontrollable. External risks are risks that the firm cannot control and often are difficult to influence. Therefore, they require a complex approach and try to identify and mitigate them. According to Silva and Reddy (2011), 73% of the U.S. organizations suffered more than USD 1 billion in sales in the previous five years due to volatile disruption in the business cycle, with the most recurrent disruption caused by unmanageable natural disasters.

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Quest TV. (2021, April 1). *Explosion In China which could be seen from space | Disasters engineered*. [Video]. YouTube. https://www.youtube.com/watch?v=z39sNRK614U

7.4 Risk Management Strategies to Mitigate the Supply Chain Vulnerability

Learning Objective

3. Examine risk management strategies to mitigate the supply chain vulnerability.

Video: Supply Chain Risk Management (SCRM) | AIMS UK (3:35)

If you manage a supply chain, you need to do all in your power to get the very best supply chain risk management or SCRM options at your disposal. It will not be easy to do that, and this is why you have to first identify the supply chain risk factors and deal with them to the best of your capabilities.

Media 7.7 *Supply Chain Risk Management (SCRM)* [Video]. AIMS Education, UK. (URL: https://www.youtube.com/watch?v=7-jpmngs6aw)

Risk Management

The following material adapted from *Supply Chain Risk Management: Literature Review* by Amulya Gurtu & Jestin Johny under Creative Commons Attribution License 4.0.

Risk management refers to the implementation of strategies and plans to manage supply chain networks through constant risk assessment and reduce vulnerabilities to ensure resilience in supply chains. All supply

chains do not have the same risks, but some risks are common. The risks are also specific to an area of business or the field of study. A supply chain is as strong as the most vulnerable member of the supply chain. Therefore, the longer a supply chain, the greater the risk of failure of the supply chain. Supply chains have many players. A high number of players present risks. However, building a robust supply chain is expensive. Numerous research articles have suggested the need for such supply chains due to the magnitude of the adverse effects of risk on its performance. A risk event is an indicator of a threat that disrupts a supply chain. Global supply chains have many challenges and greater risks. The dependence on an organization for parts has changed to a supply chain. This requires greater transparency and sharing of information among supply chain players.

"Risk management refers to strategies, methods, and supporting tools to identify and control risk to an acceptable level" (Alhawari et al. 2012). Additionally, risk management can also be referred to as a synchronized set of actions and approaches to direct an organization to minimize the risk for achieving the organizational goals. Managing risks allows the decision-maker to understand and assess the impact of risk in a supply chain network. Controlling complexity leads to higher cost efficiency and reduces risks.

Risk detection plays a pivotal role before disruption occurs. Force majeure disruptions are challenging to manage but can be estimated through conscious risk assessment strategies, identifying risk indicators, and applying the principles of Total Quality Management (TQM) in sharing information among SCM partners. Corporations should have contingency plans in the case of the occurrence of a disruptive event. Performance failures of a supply chain can be monitored through audits in an organization. Toyota have applied these principles in their supply chains and minimized the disruptions due to product recalls.

Strategies to control risk may be divided into seven categories: prevention, rescheduling, conjecture, numerical and economic, vertical integration, risk-sharing, and technology and security. The prevention strategy is used when risks are linked with each product or its terrestrial markets, or close engagement with suppliers/customers is not possible. Divestiture of resources, delay of entry, or contributing to less ambiguous markets is prevention. Ensuring flexibility and delay in spending refers to rescheduling. Market demand, customization of products or services, input costs, product life cycle, and product modularity affects rescheduling. The conjecture is the opposite of rescheduling, and decisions are influenced by projected demand. Supply chain resources are leveraged to maximize the competitive advantage in serving the customers. Financial risks are addressed through numerical and economic approaches. The numerical approach is for a large population, e.g., insurance. The occurrence of an event for many people at the same time requires an economic approach. A few risks incentivize vertical integration because vertical integration reduces the risks due to better supply and demand control. Opportunism and asset specificity, capacity constraints, and improved supplier–buyer power balance are such incentives. Contracts with flexibility for possible changes in the environment reduces risks. Designing flexible contracts acts as a control mechanism. Outsourcing or offshoring transfers risks in SCM. Technology to detect nuclear, chemical, or biological elements exists and reduces the risk of carrying such shipments.

(Gurtu & Johny, 2021). CC-BY-4.0

Effective Risk Management Processes

Companies need to use an effective risk management process that consists of the

following steps: identifying, assessing, responding, communicating, and monitoring risks in the global value chain. The process is the so-called risk management cycle. The risk management cycle is a helpful tool for helping companies in a variety of industries to recognize potential risks at all levels and then manage risks at all levels. The most comprehensive risk management cycle was created by the Government of Canada (2016). The risk management cycle helps organizations to choose "the best course of action under uncertainty" (Government of Canada, 2016). The cycle includes the following steps: identity, assess, respond, communicate, and monitor risks (Government of Canada (2016). It is a systematic, proactive, and ongoing process that equips organizations to be more effective, high-performance, and build confidence when companies face uncertainty (Government of Canada, 2016).

Identifying Risk

Identifying risk in the global value chain is the initial step in the risk management process. In this step, the organization has to identify as many risks as possible and share them with every stakeholder and third party. Next, identify warning signs of risks by creating questions, for example, is our new technology proven and mature for the global value chain? Why does the organization have significant gaps between partners and information? Why does the organization not have a mitigation or contingency plan? (FITT, 2021)

The organization should spread the mitigation plan, expectations, and valuable tools with stakeholders, partners, and staff. According to the Government of Canada (2016), there are several techniques and tools available for identifying risks, such as checklists, workshops, and risk assessment forms (Government of Canada (2016). In addition, identification activities have to be provided by the staff, such as identifying people who should be involved in identifying risk roles, how to document identified risk and what type of information should be collected and recorded (Government of Canada, 2016).

Assessing Risk

Assessing risk includes analyzing and prioritizing steps (Government of Canada, 2016). The scope of the risk has to be determined by the assigned person. Also, determine the factors about the severity of this risk and how this risk impacted businesses in the past. The likelihood and the impact of an event are the significant parts of this step. The

organization should take into account two terms together impact and probability. Probability is how often the event occurs in the past. For assessing risks, companies should characterize, evaluate, and prioritize risks for supporting the chosen decision. This action will help the organization to manage risk in the future. There are a variety of assessments: qualitative, quantitative, and semi-quantitative. Quantitative assessment consists of numerical risk criteria such as numbers which can be counted or measured. Qualitative assessment based on the qualitative descriptions of risks, for example characteristics or information that cannot be counted. Semi-quantitative which combines quantitative and qualitative data. After getting information, risks have to be measured and ranked. The top priority risks have the highest probability and greatest impacts (FITT, 2021). There are a few specially designed tables for this purpose.

Responding to Risk

According to the Government of Canada (2016), this step includes selecting and implementing measures to the risk. Responding to the threat has several mitigation strategies: accepting, reducing, avoiding, monitoring, and transferring risks (Government of Canada, 2016). Accepting risk is the same as retention risk, and an organization accepts particular risk because it is not enough to spend money to mitigate it. For example, it can cost a small amount of money. Accepting is the most common approach for small risks in the global value chain. Reducing risks can be through control or prevention. Installing security systems, burglar alarms, protective equipment, and insurance companies are common approaches to minimizing risks. Avoidance strategy is applicable for organizations that want to eliminate as many challenges as possible and potential risk sources. This strategy is not acceptable for all hazards and can be mitigated by creating policies, procedures, training and so forth. For example, if a country has the weakest political stability, the company can avoid the political risk and avoid expansion to that country. Monitoring risks have to be an ongoing process within the global value chain. Companies can transfer risks to the insurance company by purchasing an insurance policy. Also, transfer risk to the third party who will be responsible for consequences and loss, meaning transferring risks.

Communicating Risk

The government of Canada (2016) describes this step as the risk management process of

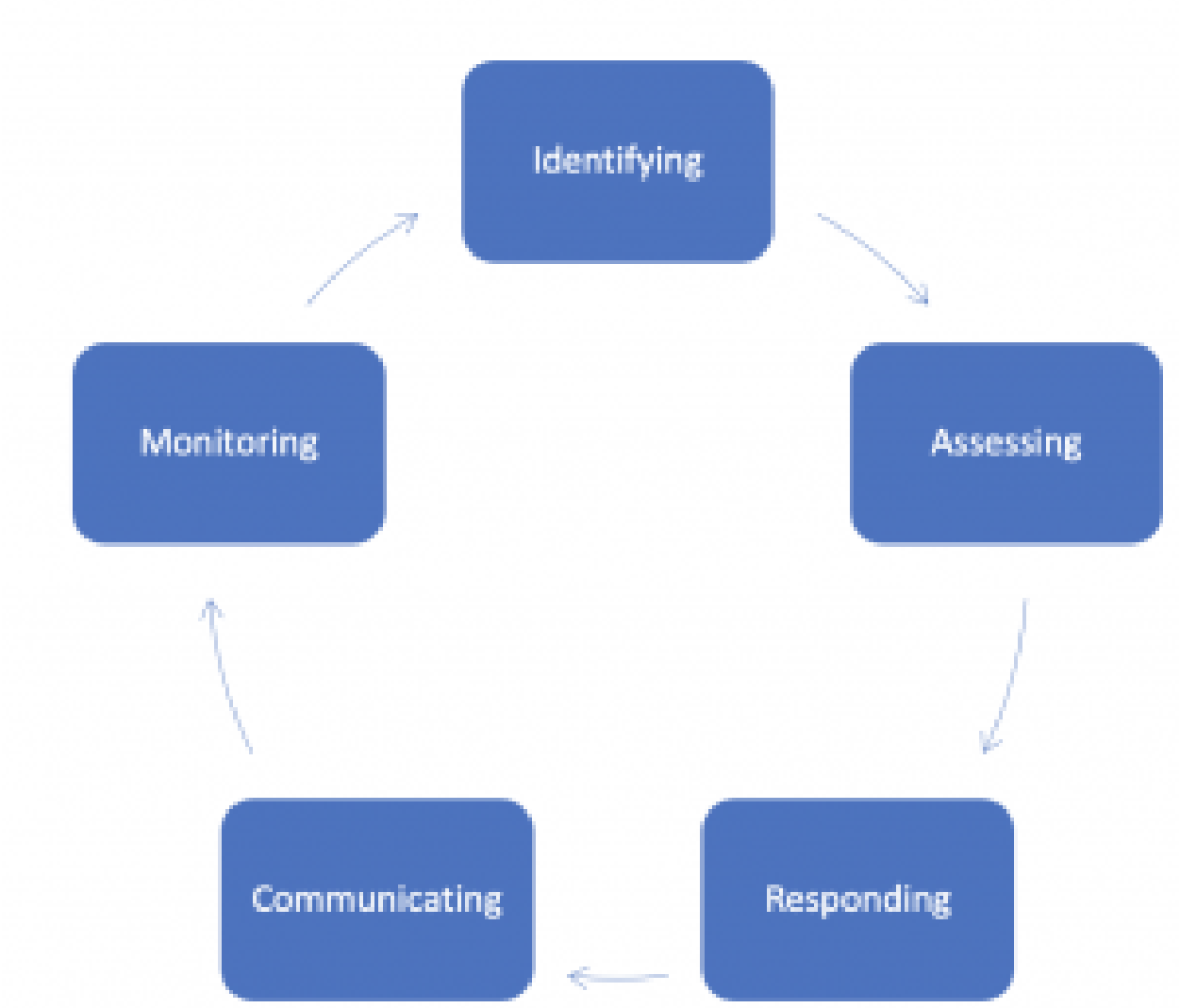
making decisions according to the communication and reporting information about risks to the particular department. The communication process must be internally between employees and externally between clients, stakeholders, and third parties. An integral part of communications is providing enough information to make the right decision (Government of Canada, 2016).

Monitoring Risk

Regular review of risks' information and mitigation plan is an ongoing process for the global value chain. Review risk responses to ensure that the plan is implemented effectively and efficiently. It is an essential part of the whole cycle because new improvements or opportunities can be effectively identified and executed (Government of Canada, 2016).

Figure 7.4

Risk Management Cycle



(click to enlarge)

Note. Adapted from Government of Canada, 2016.

Check Your Understanding

Examine risk management strategies to mitigate the supply chain vulnerability.

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 7.6.

Overall Activity Feedback

Risk management refers to the implementation of strategies and plans to manage supply chain networks through constant risk assessment and reduce vulnerabilities to ensure resilience in supply chains. All supply chains do not have the same risks, but some risks are common. Companies need to use an effective risk management process that consists of the following steps: identifying, assessing, responding, communicating, and monitoring risks in the global value chain. The process is the so-called risk management cycle. Strategies to control risk may be divided into seven categories: prevention, rescheduling, conjecture, numerical and economic, vertical integration, risk-sharing, and technology and security.

Media Attributions and References

AIMS Education, UK. (2022, January 14). *Supply chain risk management* (SCRM) | AIMS UK. [Video]. YouTube. https://www.youtube.com/watch?v=7-jpmngs6aw

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7.5 Summary

Globalization transformed international business significantly by enhancing cutting-edge technology as well as decreasing shipping trade worldwide. As a result, the connection between countries and continents became shorter and faster, impacting economic performance and gaining economic benefits. On the other hand, due to globalization and trade openness, companies faced challenges that amplified the vulnerability in Supply Chain Management and increased the risks. Supply Chain Management can promote competitiveness in the business field, and risk mitigation strategies can help organizations reduce risks such as human-made or natural disasters (Gurtu & Johny, 2021).

Risk is a possibility of an event that can occur and affect the global value chain. There are different types of risks: external and internal, and distribution channel risks. Risks in the global value chain significantly influence domestic and international companies and the environmental organizations overall. A lack of foresight risks in the organization can cause disruptions. Disruptions can ripple through the global value chain, which causes vulnerability, uncertainty, and colossal loss of money. The risk management cycle is a helpful tool for helping companies in a variety of industries to recognize potential risks at all levels and then manage risks at all levels.

7.6 Key Terms, References, and Accessibility Descriptions

Key Terms

Force majeure disruption – "an unexpected event such as a war, crime, or an earthquake which prevents someone from doing something that is written in a legal agreement." (Cambridge Dictionary, 2022)

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Image Descriptions

Fig 7.1: Value adding activities (across top): Research and development, design and development, manufacturing, distribution and logistics, sales and marketing, services. Supply chain stages (centre left): Initial inputs (materials/commodities sector, supporting inputs from sector), intermediate goods (components sector (sub-sector)), final goods (final goods sector), distribution and sales (distribution and sales sector (sub-sector)). End markets (centre right): producer-specific, buyer specific, geographic markets. Supporting environment (across bottom): infrastructure and finances, government agencies, business, information & technology services, education, testing and training, trade and professional associations, NGOs and standards. [Return to image].

Fig 7.3: 3 categories of risks.
External risks are risks that cannot be controlled by the firm (natural factors, geopolitical, government, consumer preferences, economic, competitors, cyber attacks, changes in environment, technological, market failures, social, commercial, regulatory climate, ecological, legislation).
Distribution channel risks are risks that combine of controllable and uncontrollable risks (loss of merchandise, labour unavailability, information accuracy, cargo damage, disasters, infrastructure unavailability, quality of insurance risks, outsourcing risks, partnering risks, supplier performance risk). Internal risks are risk that can be controlled by the company (privacy, security, supply network, forecasting accuracy, reputation,

corporate controls, employees, operation & producing, legal, non-performance, management & procurement, human error, technical, non-technical, deficient knowledge). Below the columns of risks are arrows pointing cumulatively to value adding activities, supply chain stages, supporting environment, end market. [Return to image].

Fig 7.4: United States 228 million, Nordic countries 196 million, Global 184 million, United Kingdom 146 million, DACH 145 million [Return to image].

Fig 7.5: Risk management cycle: Identifying, Assessing, Responding, Communicating, Monitoring

Alternative Text-Based Activities

Assessing What You Already Know

Question 1:

Globalization transformed international business significantly by enhancing cutting-edge technology as well as increasing shipping trade worldwide.

- True (Correct)
- False

Feedback: It is true that globalization transformed international business significantly by enhancing cutting-edge technology as well as increasing shipping trade worldwide. As a result, the connection between countries and continents became shorter and faster, impacting economic performance and gaining economic benefits.

Question 2:

Supply Chain Management can promote (_____) in the business field, and risk mitigation strategies can help organizations reduce (_____) such as human-made or natural disasters.

- competitiveness, risks (Correct)
- ways, opportunities

- relationships, problems
- networking, issues

Feedback: Supply Chain Management can promote competitiveness in the business field, and risk mitigation strategies can help organizations reduce risks such as human-made or natural disasters.

Question 3:

Globalization has increased the risk significantly (_____) and (_____).

- internally, externally (Correct)
- globally, internally

Feedback: Risks have always existed everywhere; however, globalization has increased the risk significantly internally and externally. Challenges within the global value chain could be lack of visibility within companies, chaos, inaccurate research or forecast, human mistakes, mother nature, political situation and so forth.

Question 4:

What is vulnerability? Write your answer in the box below.

Feedback: According to the Cambridge University Press (2022),
"Vulnerability is the quality of being vulnerable (able to be easily hurt, influenced, or attacked), or something that is vulnerable" (Cambridge University Press, 2022).

[Return to activity].

Check Your Understanding: Explain the concept of value chain vulnerability by reviewing current challenges

Question 1:

Globalization has made the global value chain model more sophisticated and more

vulnerable for all parties, with many interruptions and disruptions on the supply chain network.

- True (Correct)
- False

Feedback: Globalization has made the global value chain model more sophisticated and more vulnerable for all parties, with many interruptions and disruptions on the supply chain network. The global value chain is a complex model with simultaneous flow of information and products .

Question 2:

How many value-adding activities representing basic operational functions exist?

- 4
- 6 (Correct)
- 7
- 8
- 5

Feedback: 6 (six) main value-adding activities representing basic operational functions that Global Value Chains firms are engaged in to bring a product from an idea to the end use.

Question 3:

Choose the right value-adding activities below. Check all that apply.

- Research and development (Correct)
- Design and development(Correct)
- Manufacturing(Correct)
- Education, tasting, and training (Incorrect)
- Distribution and logistics(Correct)
- Sales and marketing(Correct)
- Service(Correct)

Feedback: Research and development, Design and development, Manufacturing, Distribution and logistics, Sales and marketing, Service

Question 4:

Drag and Drop activities in correct Category

Supporting Environment	**Supply Chain Stages**
Infrastructure and finance	Materials/commodities sector
Government agencies	Components sector
Business, information & technology services	Final goods sector
Trade and professional associations	
NGOs and standards	

[Return to activity].

Check Your Understanding: Identify types of risks and disruptions

Question 1:

Drag and drop risks into correct category

External Risks	Internal Risks
Natural factors	Privacy
Geopolitical	Security
Governement	Supply network
Consumer preferences	Forecasting accuracy
Economic	Reputation
Competitors	Corporate controls
Cyber attacks	Employees
Changes in environment	Operation & Producing
Technological	Legal
Market failures	Non-performance
Social	Management & Procurement
Commercial	Human error
Regulatory climate	Technical
Ecological	Non-technical
Legislation	Deficient knowledge

Question 2:

Drag and Drop definitions in correct Category

External Risks	Distribution Channel Risks	Internal Risks
are risks that cannot be controlled by the firm	are risks that combine of controllable and uncontrollable risks	are risk that can be controlled by the company

Question 3:

According to the FITT (2013), external risks can be (_____) such as cost fluctuations, market risks, inflation, environmental, operational, taxation.

- predictable and uncontrollable (Correct)
- unpredictable and uncontrollable

- unpredictable and controllable

Feedback: According to the FITT (2013), external risks can be predictable and uncontrollable such as cost fluctuations, market risks, inflation, environmental, operational, taxation. In addition, external risks can be unpredictable, such as natural hazards and sabotage, which are uncontrollable (FITT, 2013).

Question 4:

According to Silva and Reddy (2011), (_____) % of the U.S. organizations suffered more than USD 1 billion in sales in the previous five years due to volatile disruption in the business cycle, with the most recurrent disruption caused by unmanageable natural disasters.

- 83
- 94
- 63
- 73 (Correct)
- 67

Feedback: According to Silva and Reddy (2011), 73% of the U.S. organizations suffered more than USD 1 billion in sales in the previous five years due to volatile disruption in the business cycle, with the most recurrent disruption caused by unmanageable natural disasters.

[Return to activity]

Check Your Understanding: Examine risk management strategies to mitigate the supply chain vulnerability

Question 1:

Risk management refers to implementing strategies and plans to manage supply chain networks through inconstant risk assessment and increasing vulnerabilities to ensure resilience in supply chains.

- True
- False (Correct)

Feedback: Risk management refers to the implementation of strategies and plans to manage supply chain networks through constant risk assessment and reduce vulnerabilities to ensure resilience in supply chains. All supply chains do not have the same risks, but some risks are common. The risks are also specific to an area of business or the field of study.

Question 2:

According to the Government of Canada, how many steps does an effective risk management process consist of?

- 4
- 5 (Correct)
- 7
- 3
- 9
- 6

Feedback: Companies need to use an effective risk management process that consists of the following steps: identifying, assessing, responding, communicating, and monitoring risks in the global value chain. The process is the so-called risk management cycle.

Question 3:

Drag and Drop explanations in correct Category

Identifying	Assessing	Responding	Communicating	Monitoring
is the initial step in the risk management process	includes analyzing and prioritizing steps	this step includes selecting and implementing measures to the risk	as the risk management process of making decisions according to the communication and reporting information about risks to the particular department	regular review of risks' information and mitigation plan is an ongoing process for the global value chain

Question 4:

Choose strategies to control risk. Check all that apply.

- Prevention(Correct)
- Rescheduling(Correct)
- Conjecture(Correct)
- numerical and economic(Correct)
- vertical integration(Correct)
- Risk-sharing(Correct)
- technology and security (Correct)
- Scheduling (Incorrect)
- Support(Incorrect)
- Horizontal integration(Incorrect)

Feedback: Strategies to control risk may be divided into seven categories: prevention, rescheduling, conjecture, numerical and economic, vertical integration, risk-sharing, and technology and security. [Return to activity].

PART VIII

CHAPTER 8: SUSTAINABLE VALUE CHAINS

8.1 Introduction

Watch or Listen to the Following Media Clip

Media 8.1 *What is Sustainability*. [Video]. UCLA. (URL: https://www.youtube.com/watch?v=zx04Kl8y4dE)

Learning Objectives

After reading this chapter, you should be able to understand and answer the following questions:

1. Define the term Sustainable Value Chain and how it adds value in the global value chain
2. Explain the concept of Circular Economy
3. Describe various initiatives taken by organizations to make their supply chains sustainable
4. Learn the main dimensions of sustainability in the global value chain
5. Identify key sustainability challenges in value chains and recommend solutions

Introduction

Global climate change, intense competition, social and environmental responsibility forces the global value chain to vigorously act and use the world's resources more efficiently, commit to sustainable practices and be competitive nowadays. Three aspects should be included in the sustainable value chain to gain beneficial economic, social, and environmental results. First, many businesses put a lot of effort into demonstrating environmental and social responsibilities. The global value chain uses many global resources, money, human resources, and unnecessary sources. The total environmental impact shown in figure 1 below, where only greenhouse gas emissions from the most significant companies worldwide accounted for 31 percent out of 100 percent (Trucost & GreenBiz, 2018). All companies should start measuring social, environmental and economic impact from the beginning to the end of the product's life cycle of their

services and good; otherwise, the planet will deplete. View graph Distribution of natural capital impacts among companies worldwide in 2016, by issue. [Chart description].

Video: Sustainable Supply Chains Explained (3:34)

Technological advances, cheaper shipping and globalisation of trade have transformed how multinational companies make products and distribute them worldwide. Their supply chains can connect several countries, with different parts of goods and services sourced in different countries in a coherent interconnected network. These are called global value chains (GVC) and they create many opportunities for firms and people, but to take advantage of them, it is essential to better understand how they work, how they affect economic performance and what governments can do to ensure their economies benefit more from them.

Media 8.2 *Sustainable Supply Chains Explained*. [Video]. HSBC Business Insight. (URL: https://www.youtube.com/watch?v=ktx2_Dzy3tM)

Video: Sustainability of Supply Chains in the Age of Information | Tom Pathuis. (15:35)

Nowadays the word sustainability is bouncing everywhere around us. But, are we really aware of its meaning?. Tom proposes that, in a world where governments don't care about sustainability, we, the people, are the ones who need to take lead of the situation and make a change. Technology is only an axis of the process, but we are the ones who need to start it. A sustainability professional with experience in working with major global players in the pharmaceutical, technology, home furniture and consumer healthcare industries in improving environmental performance within the supply chain. Anne-Tom has a keen interest in the application of Information and Communication Technologies on questions of sustainability in order to achieve both positive business- and environmental impacts. He currently works for Ecodesk, a sustainable supply chain solutions business based in the United Kingdom.

Media 8.3 *Sustainability of Supply Chains in the Age of Information | Tom Pathuis*. [Video]. TEDxTalks. (URL: https://www.youtube.com/watch?v=zKOkEEmtlIo)

Video: How Supply Chain Transparency can Help the Planet | Markus Mutz (13:29)

Given the option, few would choose to buy products that harm the earth — yet it's nearly impossible to know how most consumer goods are made or where they're sourced from. That's about to change, says supply chain innovator Markus Mutz. He shares how he used blockchain technology to track Patagonian toothfish on their journey from ocean to dinner plate — and proved it's possible to offer consumers a product they can trust.

Media 8.4 *How Supply Chain Transparency can Help the Planet | Markus Mutz.* [Video]. TED. (URL: https://www.youtube.com/watch?v=ygxh6KR4BPk)

Assessing What You Already Know

As you answer the following questions, reflect upon what you already know about how companies work.

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 8.8.

Overall Activity Feedback

While answering the above questions, you got a chance to analyze what it means to be a sustainable company, the main dimensions of suitability in the global value chain, and the circular economy definition. The sustainable value chain focuses on global issues such as human rights, global warming, melting ice caps, etc. The sustainable value chain is related to the core of the whole business, from the strategy to developing products and relationships.

Media Attributions and References

OCED. (2013, May 27). *Global value chains: The production revolution of the 21st century* [Video]. YouTube. https://www.youtube.com/watch?v=ktx2_Dzy3tM

TED. (2020, February 14). *How supply chain transparency can help the planet | Markus Mutz* [Video]. YouTube. https://www.youtube.com/watch?v=ygxh6KR4BPk

TEDx Talks. (2015, May 5). *Sustainability of supply chains in the age of information | Tom*

Pathuis | TEDxYouth@Maastricht [Video]. YouTube. https://www.youtube.com/watch?v=zKOkEEmtlIo

UCLA. (2021, April 13). *What is sustainability* [Video]. YouTube. https://www.youtube.com/watch?v=zx04Kl8y4dE

8.2 Defining Sustainable Value Chain

Learning Objective

1. Define the term Sustainable Value Chain and how it adds value in the global value chain

Video: The Complex Path to Sustainability | Olivia Tyler | TED Institute (7:43)

Do you know where everything you buy comes from? Olivia Tyler illuminates the daunting challenges companies face when enforcing sustainability across their supply chains.

Media 8.5 *The Complex Path to Sustainability | Olivia Tyler* [Video]. TED Institute. (URL: https://www.youtube.com/watch?v=5lgxdOTIrCo)

When companies aim at minimizing the impact on the environment while benefiting the communities and the people, they address global issues and focus on Sustainable Value Chain. Sustainable value chain is a concept that focuses on global issues such as human rights, global warming and melting ice caps, fair labour practices, marine pollution, decreases of forest cover, plastic pollution, air pollution, etc. For example, many global values chain companies focus on the speed, delivery, cost, reliability, and quality of goods and operations. Still, only a few companies add strategic goals to consider global issues' environmental and human impact. These strategic goals can be decreasing carbon emissions and improving labour conditions. There are many ways of reducing the impact on the environment: changing the liner business model towards sustainable, inclusive, and resilient value chains is vital nowadays. In addition, companies have to look at the source of materials and their impact on the earth. Sustainability is an opportunity for businesses, but it is hard to understand the global goals, trade, policies, and improving three main parts simultaneously: social, environmental, and economical. Moreover, the

sustainable value chain is related to the core of the whole business, from the strategy to developing products and relationships.

Figure 8.1

Untitled Photo



(click to enlarge)

Note. From LeBoutillier, 2021. Unsplash License.

Did You Know?

The following material adapted from "The Role of the Global Value Chain in Improving Trade and the Sustainable Competitive Advantage: Evidence From China's Manufacturing Industry" by (Deqiang, Zhijun, Hajduk-Stelmachowicz, Larik, & Rafique, 2021) under a Creative Commons Attribution License 4.0.

In the domain of globalization, the global value chain (GVC) is formed across diverse economies. Owing to

the expansion of economic globalization and the resultant global trade liberalization, the geographical isolation of production and consumption has resulted in the transfer of polluting emissions from advanced economies to developing states. Developing economies, falling in the middle and low end of the GVC, have to strive hard to expand their production in the GVC, while simultaneously addressing the consequent environmental damage and attending to the core environmental concerns of sustainable growth, energy preservation and drastic cuts in CO2.

China's manufacturing industry addresses how manufacturing subsidiaries can improve their low-carbon innovation ability and help to achieve a sustainable competitive advantage through the embedded GVC. 31 manufacturing companies and 56 enterprise groups across 16 Chinese provinces were selected and studied. The results indicate that the embedded GVC significantly enhances low-carbon innovation capability and promotes a sustainable competitive advantage. Companies should continuously identify high-quality resources from the GVC and discover ways of integrating internal and external carbon innovation resources to form innovation capabilities.

Since the 1990s, the Chinese manufacturing sector, by virtue of trade and investment, has achieved tremendous milestones driven by the global manufacturing network. However, its further premium growth has been hampered by the resulting environmental degradation. The available data on environmental health reveal that around 70% of the global pollution is caused by the Chinese manufacturing sector, which produces nearly 700 million tons of environmentally damaging waste per annum. The Central Economic Working Conference, organized in 2014, suggested that the capability of China to pay due attention to the environment had been stretched to its limits and that it was high time to search for a model that was environmentally friendly and founded on preferences for low carbon. At present, the Chinese Organization of International Production has been overhauled and a gradual shift has been witnessed towards intra-product specialization that has transformed the manufacturing sector into a highly complex one. The upgrading of all the production processes to incorporate more advanced technology inevitably leads to a major increase in costs, despite the significant reduction in emissions. Since most enterprises are essentially profit-oriented, the pursuit of green technology in manufacturing processes is not of significant interest to them. Therefore, it is high time that the pace of the innovation factor input to output effect should be maximized, while CO2 emissions must be minimized.

The year 2018 marked the execution phase of "Made in China 2025" suggesting a win-win policy that simultaneously attends to the protection of the environment and also the development of the manufacturing sector. Currently, the Chinese manufacturing sector is under stress from both the domestic and international governments to limit the high-end of the value chain. The recent discourse argues that developing economies, especially China, should strive for knowledge spillovers employing the means of foreign direct investment (FDI), outward foreign direct investment (OFDI), and import and export trade that are all helpful for pro-green development. Under the "new normal" model, the Chinese economy should enhance the quality and sustainability of economic development in order to improve the total factor productivity employing GVC embeddedness. For sustainable economic development worldwide, the environmentally friendly growth path plays a key role in minimizing the greenhouse effect. However, most manufacturers seek to optimize their profits and are unwilling to manufacture low-carbon goods unless they are offered certain incentives. Apart from the concerns by consumers and firms on low-carbon goods, coordination plays a key role in the low-carbon supply chain production. The resource-based view (RBV) postulates that enterprises possess unique physical and intangible resources that may have exceptional

potential to produce a sustainable competitive advantage. A few studies have shown that firms that are embedded in the GVC can gain new skills and obtain specialized knowledge.

This example provides sufficient evidence to support the notion that embedment in the GVC significantly enhances the low-carbon innovation capability through global cooperation. The authors noted that the successful embedment of global low-carbon R and D, manufacturing, and marketing led to an increase in the low-carbon innovation capabilities. Secondly, the results indicate that an improvement in the low-carbon innovation capability has a considerable impact on the fostering of a sustainable competitive advantage and support for low-carbon technology, system, capital, and management innovation capability. Thirdly, the results obtained in this study confirm that the low-carbon innovation capabilities significantly mediated the positive effect of embedment in the GVC on the sustainable competitive advantage of Chinese manufacturing subsidiaries. (Deqiang, Zhijun, Hajduk-Stelmachowicz, Larik, & Rafique, 2021).

Figure 8.2

Iran Tractor Factory



Note. From Khorsand, 2019. Unsplash License.

This example also highlights some essential managerial implications that should be addressed. The manufacturing subsidiarie's capability to achieve a sustainable competitive advantage represents a significant asset when developing innovations. The findings reveal that a thorough evaluation of the company's innovation resources to identify potential positions for the GVC is highly advisable. Therefore, companies should continuously identify high-quality resources from the GVC and discover ways of

integrating internal and external carbon innovation resources to form innovation capability. Besides, companies should also analyze the cost issues of transforming the low-carbon innovation capability into a competitive advantage and evaluate the consistency of their low-carbon innovation strategy with the parent company. The findings can be used to facilitate manufacturing subsidiaries in increasing their sustainable competitive advantage and consequently supporting their capability to utilize external knowledge and insights from embedment in the GVC. Hence, it is evident that low-carbon innovation resources play the role of a sustainable competitive advantage for manufacturing subsidiaries.

(Deqiang, Zhijun, Hajduk-Stelmachowicz, Larik, & Rafique, 2021) CC-BY-4.0

Check Your Understanding

Define the term Sustainable Value Chain and how it adds value in the global value chain.

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Interactive activity unavailable in this format

Text-based alternative to interactive activity to interactive activity available in Chapter 8.8.

Overall Activity Feedback

When companies consider goals related to minimizing the impact on the environment while benefiting the communities and the people, this means that this company addresses global issues and focuses on a Sustainable Value Chain. The sustainable value chain focuses on global issues such as human rights, global warming and melting ice caps, fair labour practices, marine pollution, decreases of forest cover, plastic pollution, air pollution, etc. The main dimensions of suitability in the global value chain are environmental, economic, and social dimensions. Integration of three dimensions, economic, social, and environmental. Companies should continuously identify high-quality resources from the GVC and discover ways of integrating internal and external carbon innovation resources to form innovation capability. Besides, companies should also analyze the cost issues of transforming the low-carbon innovation capability into a competitive advantage and evaluate the consistency of their low-carbon innovation strategy with the parent company.

Media Attributions and References

Amin Khorsand. (2019, August 27). *Iran tractor factory* [Photograph]. Unsplash. https://unsplash.com/photos/tAnzPbVXjQo

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TED Institute. (2018, February 15). *The complex path to sustainability | Olivia Tyler*. [Video]. YouTube. https://www.youtube.com/watch?v=5lgxdOTIrCo

8.3 Circular Economy

Learning Objective

2. Explain the concept of Circular Economy.

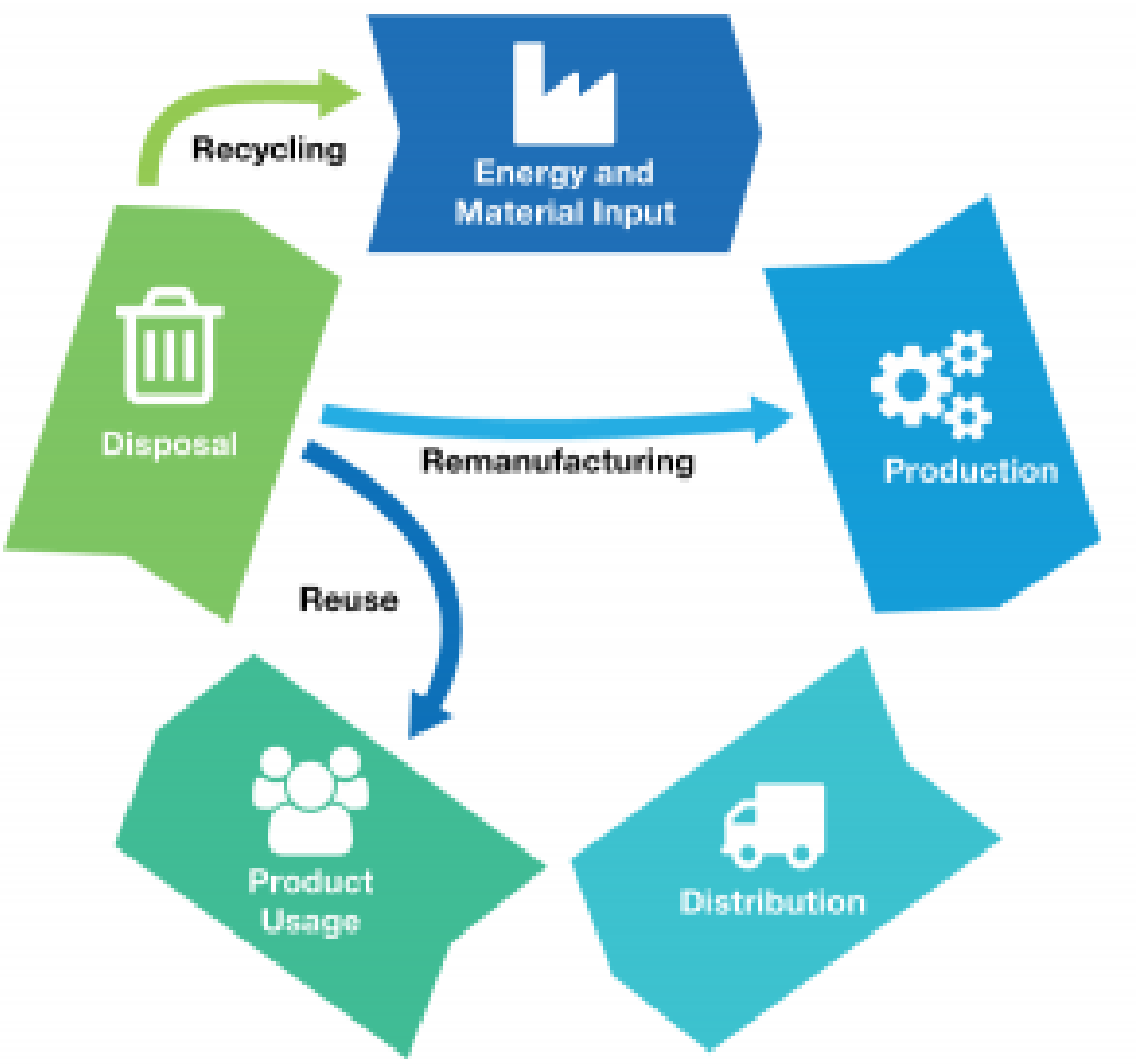
The European Union, the national government of many countries and businesses worldwide, promoted the concept of the so-called Circular Economy (CE) (Korhonen, Honkasalo & Seppälä, 2018). According to the European Commission, 600 billion euros can gain the manufacturing sector alone for the EU after the transition to the circular economy-type economy. Only the national Finland economy can earn 2.5 billion euros through a circular economy, and the global economy estimated benefits by 1000 billion US dollars annually (Korhonen, Honkasalo & Seppälä, 2018). It's interesting to say that the first country was China, which adopted the circular economy in 2008 because it was recommended for economic growth and part of the country's sustainable environmental and economic development (Korhonen, Honkasalo & Seppälä, 2018).

With the dawn of industrialization, the circular economy is a great practice to minimize the negative impact on the environment and simultaneously stimulate businesses to find new opportunities (Korhonen, Honkasalo & Seppälä, 2018). A circular economy implies the following solutions to reduce adverse environmental effects: remanufacturing, repair, reuse, refurbishment, disposal, cascading, upgrading, and recycling. Please see figure 8.3 below. Authors of the academic journal "Circular Economy: The Concept and its Limitations" (2018) have given the current concept of circular economy with inner circles of product reuse, recycling, disposal, remanufacturing. Those inner circles demand less energy, fewer resources, and it is more economical than the standard recycling of goods. It is essential to know that the time within circles must be maximized (Korhonen, Honkasalo & Seppälä, 2018). According to the CE, the latest material should be landfill disposal, and the last option has been combustion for energy (Korhonen, Honkasalo & Seppälä, 2018). Authors have mentioned that the product's life cycle and its value should retain the highest possible quality/value as long as possible (Korhonen, Honkasalo &

Seppälä, 2018). The Circular Economy concept is popular nowadays because it extends the utilization of typical waste of materials by utilizing the value embedded in products.

Figure 8.3

The Current Concept of Circular Economy



Note. Adapted from Korhonen, Honkasalo, & Seppälä, 2018. [Image description].

The circular economy is the win-win-win potential for sustainable development because the CE contributes to sustainable development's economic, social, and environmental

dimensions (Korhonen, Honkasalo & Seppälä, 2018). Read more about the Circular Economy.

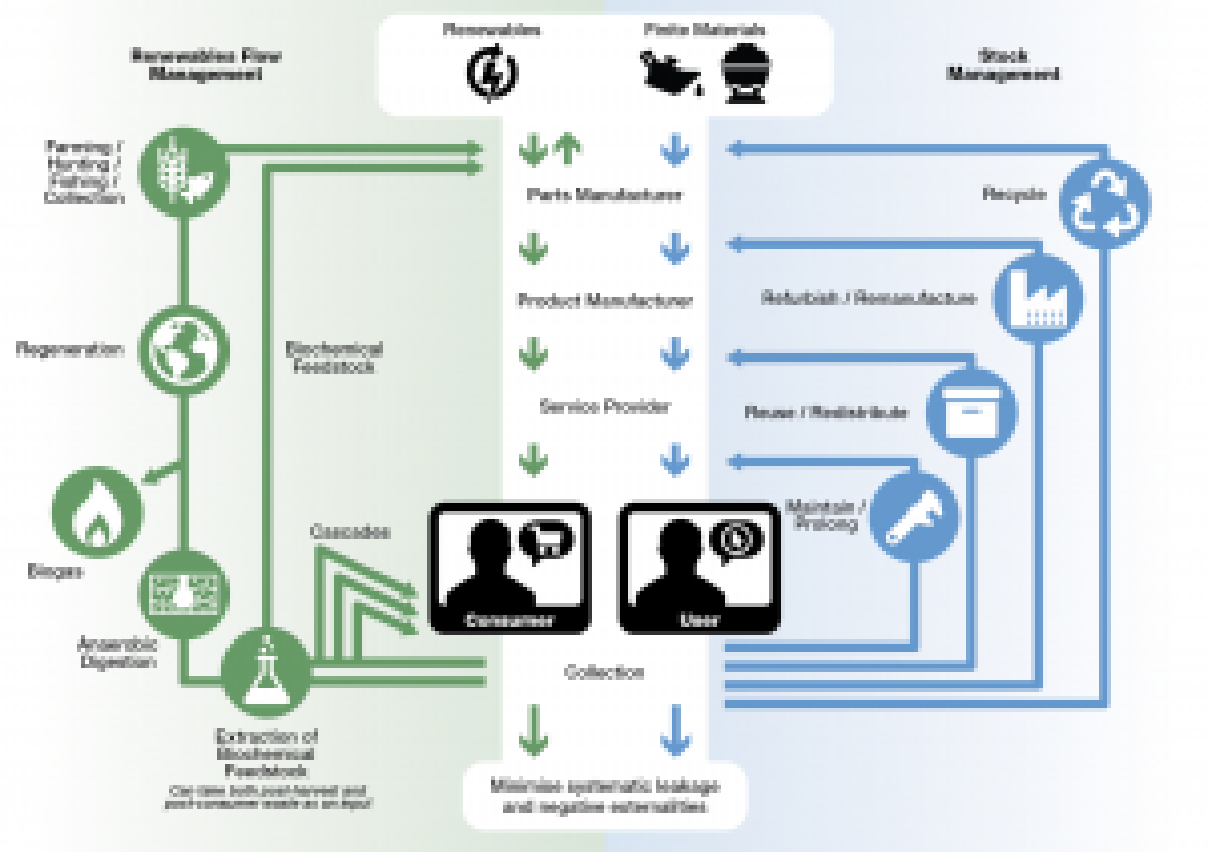
Let's look into the statistics below and interesting diagrams that clearly explain the Circular Economic system diagram concept, European countries with a circular economy strategy, job breakdown by pillar and sector in 2017 in terms of the number of people employed.

Consider This: Circular Economic (CE) Systems Statistics and Visuals

The following material is adapted from *Field Actions Science Reports, 23, 4-7* by Circular Economy: Strategies and Policies (2021) under a Creative Commons Attribution License 4.0.

Figure 8.4

Circular Economy System Diagram

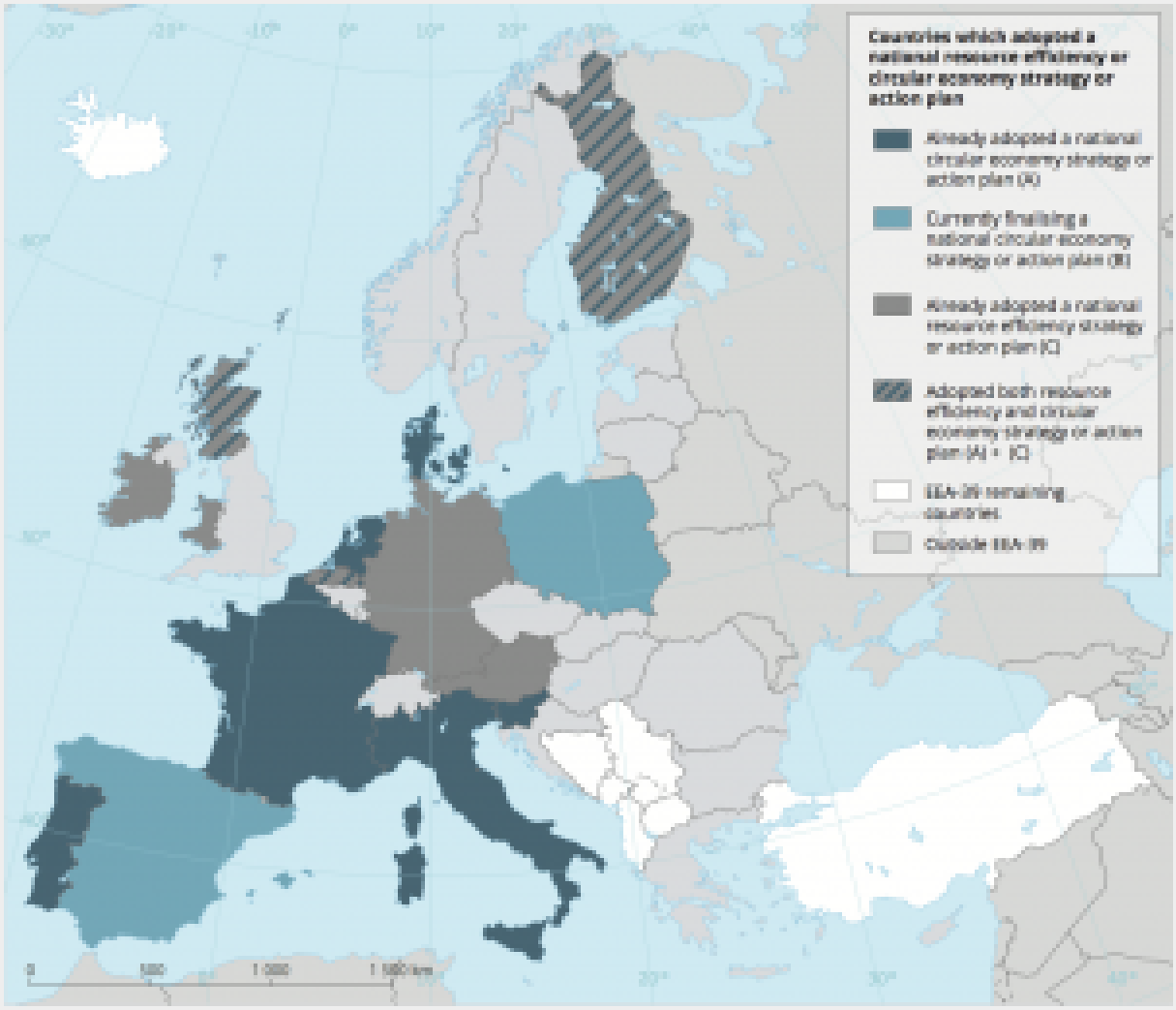


(click to enlarge) [*Image description*]

The diagram illustrates different strategies for looping material and energy flows to reduce resource extraction (top half) and avoid waste creation (bottom half). Two types of circularity strategies are depicted: for technical inputs from non-renewable resources (right-hand side) and for biochemical inputs from renewable resources (left-hand side). In principle, the shorter the loop (e.g.: maintenance, reuse), the greater the likelihood of maintaining economic value and minimizing environmental impacts (Circular economy: strategies and policies, 2021).

Figure 8.5

European Countries with a Circular Economy Strategy



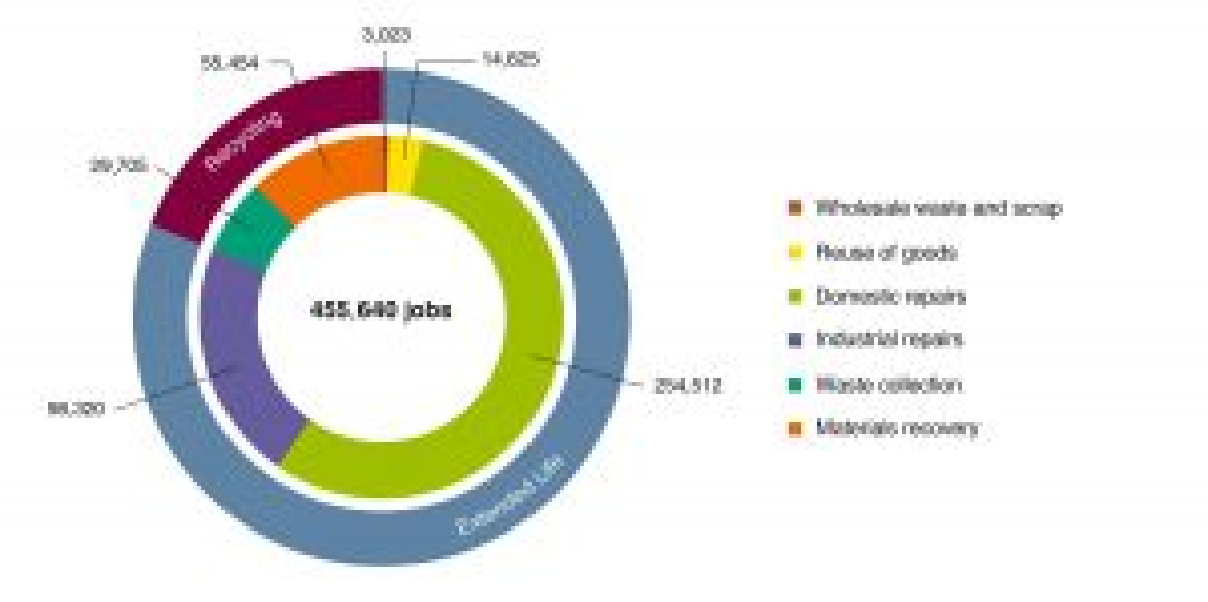
Source: Kazmierczyk, P., & Geerken, T. (2020). Resource efficiency and the circular economy in Europe 2019: even more from less; an overview of the policies, approaches and targets of 32 European countries. License to reproduce granted by authors within the publication. [Image description]

This map, taken from a European Environment Agency study, shows countries which had adopted a national resource efficiency or circular economy strategy or action plan as of 2019. The colour legend indicates the

state of progress with these measures. The map does not show countries that have simply indicated an intention to take action in the future. In total, 21 of the 32 countries in the study stated they had begun work on drafting national policies relating to the circular economy (Circular economy: strategies and policies, 2021).

Figure 8.6

Job Breakdown by Pillar and Sector in 2017 in Terms of the Number of People Employed



NB: *vehicle repairs and computer repairs were classified as domestic repairs even though they also involve services to professionals.* [*Image description*]

This is one of eleven indicators used to track circularity in the French economy. It seeks to quantify the number of jobs associated with economic activities within the circular economy. Only activities relating to "extended life" and "recycling" are studied here, i.e. reuse and repair of goods, waste collection and materials recovery. These activities create more jobs per unit managed than activities relating to waste disposal (landfill and incineration).(Circular economy: strategies and policies, 2021) CC-BY-4.0

Check Your Understanding: Explain the concept of Circular Economy

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 8.8.

Overall Activity Feedback

According to the European Commission, 600 billion euros can gain the manufacturing sector alone for the EU after the transition to the circular economy-type economy. Only the national Finland economy can earn 2.5 billion euros through a circular economy, and the global economy estimated benefits by 1000 billion US dollars annually. With the dawn of industrialization, the circular economy is a great practice to minimize the negative impact on the environment and simultaneously stimulate businesses to find new opportunities. A circular economy implies the following solutions to reduce adverse environmental effects: remanufacturing, repair, reuse, refurbishment, disposal, cascading, upgrading, and recycling. The circular economy is the win-win-win potential for sustainable development because the CE contributes to sustainable development's economic, social, and environmental dimensions.

Media Attributions and References

Circular Economy: Strategies and Policies. (2021, December 9). *Field action science reports* (23), 4-7. Institut Veolia. https://journals.openedition.org/factsreports/pdf/6515

Korhonen, J., Honkasalo, A., & Seppälä, J. (2018). Circular economy: The concept and its limitations. *Ecological Economics* (143), 37–46. https://doi.org/10.1016/j.ecolecon.2017.06.041

8.4 Initiatives to Make Sustainable Supply Chains

Learning Objective

3. Describe various initiatives taken by organizations to make their supply chains sustainable.

The following material is adapted from *A Lean Approach to Developing Sustainable Supply Chains* by Gargalo, Pons, Barbosa-Povoa, & Carvalho, (2021) under Creative Commons Attribution License 4.0.

Corporations and their supply chains have to go through significant changes to become more sustainable as society is pressing for sustainable systems. To this end, it is critical to develop new methodologies to trim away processes and activities that add no value and, thus, derive more sustainable supply chains.

Worldwide stressors, such as climate change, a consciousness of social and environmental responsibilities, stronger competition and lower profit margins, have been forcing companies to vigorously maintain their competitiveness and commit to sustainable practices and performance management. As a result, both academics and industries are motivated to find the best way to simultaneously include all three aspects of sustainability (economic, environmental and social) to achieve meaningful and beneficial results.

Lean management has proven to be a handy and innovative tool to promote continuous improvement and is easily adaptable to include sustainability aspects. Due to the ongoing interest and need to implement corporate environmental and social policies, combining lean management and sustainability has become more popular. An increasing number of studies have proven clear positive impacts (economic, environmental and social) on the supply chain performance when lean is linked to sustainability. Since one of the lean operational goals is to keep or improve the production quality but reduce the use of resources, lean principles lead to more environmentally friendly operations due to lower waste produced and thus lower environmental impact. By reducing the number of materials used, the costs are also reduced, and therefore sustainability's economic facet is likewise addressed. Increasing quality and efficiency leads to water and energy consumption improvements, which also gets reflected in the costs.

(Gargalo, Pons, Barbosa-Povoa, & Carvalho, 2021) CC-BY-4.0

Harvard Business Review (2020) has mentioned the rising number of corporations that pledged to work with companies that adhere to environmental and social standards.

Standards are related to suppliers, and those suppliers have to comply with those commitments; otherwise, multinational corporations cease working with them. This action creates sustainable practice, smoothly spread worldwide within the global value chain. However, according to the article, realizing this practice is hard for corporations to comply with social and environmental standards simultaneously. In addition, multinational corporations faced scandals that arose from their standards because suppliers were aware that these standards violated them.

Villena and Gioia (2020), authors of the article from *Harvard Business Review*, have posted best practices for multinational corporations for promoting environmental and social responsibility:

- They have to establish long-term sustainable goals;
- First-tier suppliers must establish their own long-term sustainability goals;
- Lower-tier suppliers should be included in the global corporate sustainability strategy;
- An employee responsible for promoting sustainability programs to lower and first-tier suppliers;
- First-tier suppliers have to be annually assessed by asking about their safety, health, labour, and environmental practices in their workplace;
- Conduct a survey about the sustainability of the supply chain to comply with multinational corporations' requirements within the company. There are many indicators and critical performance within the company to monitor supplier sustainability annually;
- Training first-tier suppliers to comply with their standards as well as providing incentives for using sustainability practices. The training and incentives led suppliers to increase awareness and make significant changes within the industry; (Villena & Gioia, 2020).
- Invite suppliers to the workplace and spread best practices related to the sustainability of the supply chain;
- Collaborating and cooperating with competitors to comply with these sustainable practices because fighting alone with this problem is impossible;
- Collaborative initiatives can increase awareness about sustainable practices and standards, increasing efficiency for suppliers and simultaneously satisfying customer needs. That is why suppliers will be willing to follow these requirements and be members of an association. Industry associations have a lot of benefits for parties

and members because all of them are prominent actors in that scene;
- Collaborate with NGOs and international associations for adopting and spreading sustainable practices and strategies within all industries. Spread information about the importance of complying with economic, social, and environmental standards.

These best practices are recommended for companies to adopt, use and spread through the supply network.

Managers can potentially improve indicators and simultaneously make their supply chains more sustainable. Gargalo, Pons, Barbosa-Povoa, & Carvalho (2021) created a table of recommendations for each indicator (Gargalo, Pons, Barbosa-Povoa, & Carvalho, 2021).

The following material is adapted from *A Lean Approach to Developing Sustainable Supply Chains* by Gargalo, Pons, Barbosa-Povoa, & Carvalho, (2021) under Creative Commons Attribution License 4.0.

Table 8.1

Recommendations to improve indicators of the supply chain's overall sustainability

Indicator	Recommendations
Material Value Added-Supply Chain (MVA-SC)	Redesign the production process, for example, by applying process intensification and/or process integration.
Energy Cost-Supply Chain (EC-SC)	Invest in equipment and vehicles that are more efficient, as well as investing in continuous heat integration
Total Inventory Level Cost (TILC) Entity Inventory Level Cost (EILC)	Decrease the level of production and demand uncertainty. The production uncertainty can be reduced by implementing more robust production processes. Demand uncertainty can be decreased by identifying a significant buffer near the end customer to protect the supply chain from market uncertainties or by applying a production leveling technique ("heijuka").
Backorder Cost (BC)	Improve supply chain coordination and inventory management policies.
Lead Time Factor (LTF) Operational Lead Time Factor (OLTF)	Ideally, all activities should be located at the same place near the end customer. This is often not possible, so the recommendation is to find facilities that share material flows and locate them as close as possible. Using "just in time" methods such as pull systems or process synchronization also shortens the lead time.
Inventory Turnover (IT)	Reduce the inventory by gradually ensuring not compromising the service level or reducing the batches' size and increasing the pick-up frequency.
Volume Flow (VF)	Redirect the flow of material to another path with a lower workload, or boost the work capacity acquiring newer and more effective equipment.
Ok-Parts (OK-P)	Implement failure prevention techniques ("poka yoke") to reduce scrap and rework in every facility's production processes.
Service Level Quantity Factor (SLQF) and Service Levels Time Factor (SLTF)	Improve the information sharing between the supply chain members to know the capacity constraints and each supplier's inventory management. According to the collected information, find out how to deliver the required orders in the proper quantity and time.
Overall Thoughput Effectiveness (OTE-SC)	Implement kaizen workshops to decrease the production uncertainty (technical, organizational and quality losses, and changeover times).
Variability Lead Time (VLT)	Homogenize all the processes of the value stream to gain stability and ensure consistent results over time.
Bullwhip Effect (BE)	Adopt a centralized multi-echelon inventory control system since it presents a superior performance over independently operating site-based inventory.
Carbon Emissions (CE)	Implement more energy-efficient equipment, vehicles and facilities; and/or optimize the supply chain operations.
Waste Factor (WF)	Reengineer the production process to be more efficient and promote recycling policies.
Sustainable Energy (SE)	Improve energy efficiency and invest in renewable and sustainable energy sources.

Indicator	Recommendations
Labour Equity (LE)	Improve the lowest salary and/or reduce the highest salary—decrease salary disparity.
Fatal Accident Rate (FAR)	Improve labor conditions by implementing robust security policies and provide training to the employees.
Corruption (C)	Organize workshops to raise awareness among managers and promote transparent communication of information.

(Gargalo et al., 2021) CC-BY-4.0

Check Your Understanding

Describe various initiatives taken by organizations to make their supply chains sustainable.

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 8.8.

Overall Activity Feedback

It is crucial to understand various initiatives taken by organizations to make their supply chains sustainable. In addition, it is essential to know recommendations to improve indicators of the supply chain's overall sustainability. As a result, managers can potentially improve indicators and simultaneously make their supply chains more sustainable. Lean management has proven to be a handy and innovative tool to promote continuous improvement and is easily adaptable to include sustainability aspects. Due to the ongoing interest and need to implement corporate environmental and social policies, combining lean management and sustainability has become more popular. An increasing number of studies have proven clear positive impacts (economic, environmental and social) on the supply chain performance when lean is linked to sustainability.

8.5 Main Dimensions of Sustainability in the Global Value Chain

Learning Objective

4. Learn the main dimensions of sustainability in the global value chain.

The main dimensions of sustainability in the global value chain are environmental, economic, and social dimensions. Integration of three dimensions, economic, social, and environmental, can help companies achieve a long-term goal, and the sustainable supply chain is a crucial success factor for the future. This concept is not only theoretical but enduring. Interesting that only proactive organizations can build sustainable supply chains and products (Sureka, Shiva, Palkar, Jarwal & Bhavsar, 2021). Organizations consciously find ways to be sustainable, which will help the world create a more sustainable ecosystem for the global value chain.

For achieving a sustainable value chain and development, companies have to integrate and balance economic, social and environmental dimensions within their companies (Neumüller, Kellner, Gupta, & Lasch, 2015). Decision-makers within organizations have to focus simultaneously on economic effects and consider the impact on the social and environmental aspects. Companies can compromise customer satisfaction but gain a tremendous impact on society and the environment. Therefore, a lot of corporate organizations consider and incorporate sustainability considerations in supply chain management as well as in operations. Because rising issues negatively impact the whole world and attract debates such as labour practices, emission generation, resource consumption and so forth (Neumüller, Kellner, Gupta, & Lasch, 2015). According to the authors of the academic journal (2015), organizations are aware of a clear positive correlation between social responsibility and customer satisfaction, and on the other hand, the negative link between a poor social reputation and customers' reactions to the product (Neumüller, Kellner, Gupta, & Lasch, 2015).

There are many benefits to being a sustainable organization. For example, reduced packaging can lead to cost savings and reduce waste of materials. In addition, the company can reduce turnover of employees and labour turnover costs by promoting good working conditions and safety in transportation and warehousing. As a result, employees will be motivated, productive and promote a great working environment (Neumüller, Kellner, Gupta, & Lasch, 2015). These can lead to support the positive development of the society and environment and prevent negative consequences by balancing three dimensions: economic, environmental, and social performance (Neumüller, Kellner, Gupta, & Lasch, 2015).

Check Your Understanding

Learn the main dimensions of sustainability in the global value chain.

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 8.8.

Overall Activity Feedback

It is crucial to understand the main dimensions of suitability in the global value chain. They are environmental, economic, and social dimensions. Integration of three dimensions, economic, social, and environmental, can help companies achieve a long-term goal, and the sustainable supply chain is a crucial success factor for the future.

8.6 Key Sustainability Challenges in Value Chains

Learning Objective

5. Identify key sustainability challenges in value chains and recommend solutions.

Consider This: Possible Challenges to Sustainability Initiatives

The following material is adapted from *Addressing the Challenges to Sustainable Initiatives in Value Chain Flexibility: Implications for Sustainable Development Goals* by Dwivedi, Agrawal, Jha, Gastaldi, Paul, & D'Adamo (2021) under Creative Commons Attribution License 4.0.

The value chain refers to the source of competition to facilitate organizations to maximize and sustain value for their consumers. Value chain flexibility is necessary to build sustainable initiatives in addressing ambiguity.

Thirteen potential challenges to sustainable initiatives in value chain flexibility are identified. Lack of supplier commitment to sustainable products and lack of knowledge toward sustainability in value chains are the challenges that achieved the highest driving power according to an analysis. The challenge 'inadequate communication among the suppliers in the value chain' is at the highest level in the analysis.

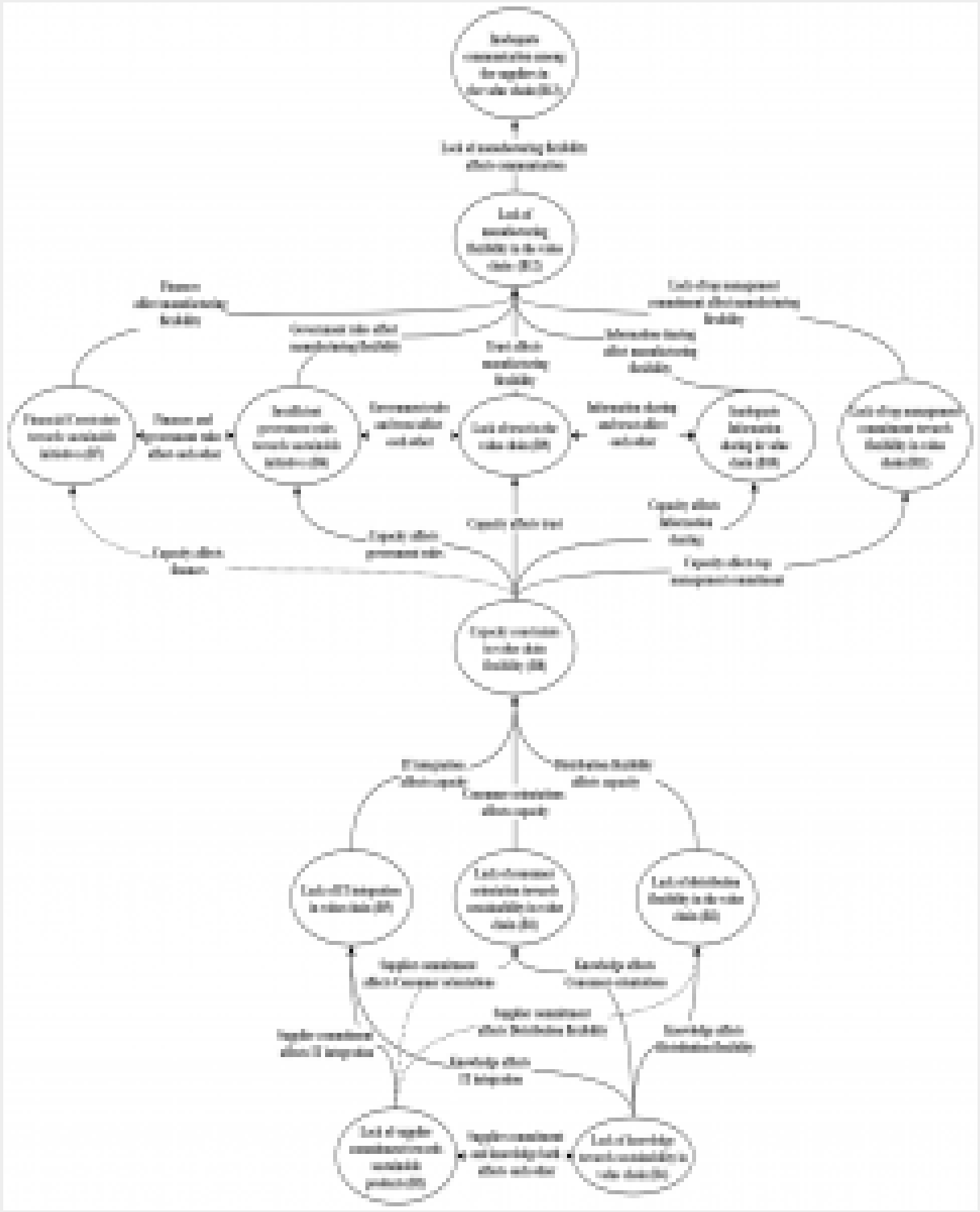
Table 8.2

Key sustainable challenges in the value chain

N^0	Challenges
1	Lack of consumer orientation toward sustainability in value chain
2	Lack of distribution flexibility in the value chain
3	Lack of supplier commitment towards sustainable products
4	Lack of knowledge towards sustainability in value chain
5	Lack of IT integration in value chain
6	Insufficient government rules towards sustainable initiatives
7	Financial constraints towards sustainable initiatives
8	Capacity constraints in value chain flexibility
9	Lack of trust in the value chain
10	Inadequate Information sharing in value chain
11	Lack of top management commitment towards flexibility in value chain
12	Lack of manufacturing flexibility in the value chain
13	Inadequate communication among the suppliers in the value chain

Figure 8.7

m-TISM Model Presenting Interrelationships Among the Challenges to Sustainable Initiatives in Value Chain Flexibility



(click to enlarge) [Image description].

The challenges are distributed into four different categories:

1. Autonomous challenges: The identified challenges that include weak driving power and dependence are categorized under the first quadrant. In this study, there are no autonomous challenges from our identified potential challenges.
2. Dependent challenges: Identified challenges that have weak guidance but strong dependence are categorized under the second quadrant. From the obtained list, challenges such as 'lack of top management commitment toward flexibility in value chain (B11)', 'lack of manufacturing flexibility in the value chain (B12) and 'Inadequate communication among the suppliers in the value chain (B13)' are posed as dependent challenges because they represent strong dependence but relatively weak driving power.
3. Linkage challenges: The identified challenges that have high dependence and high driving power are categorized under the third quadrant. In this study, linkage challenges among our identified potential challenges are 'insufficient government rules toward sustainable initiatives (B6)', 'financial constraints toward sustainable initiatives (B7)', 'capacity constraints in value chain flexibility (B8)', 'lack of trust in the value chain (B9)' and 'inadequate information sharing in value chain (B10).
4. Independent challenges: Identified challenges that have strong driving power but weak dependence are categorized under the fourth quadrant. In this study, challenges such as 'lack of consumer orientation toward sustainability in value chain (B1)', 'lack of distribution flexibility in the value chain (B2)', 'lack of supplier commitment toward sustainable products (B3)', 'lack of knowledge toward sustainability in value chain (B4)', and 'lack of IT integration in value chain (B5)' are classified as independent challenges because they reflect strong driving power but weak dependence. The construct for the dependence and driving power analysis.

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Recommended Solutions

The following material adapted from *Addressing the Challenges to Sustainable Initiatives in Value Chain Flexibility: Implications for Sustainable Development Goals* by Dwivedi, Agrawal, Jha, Gastaldi, Paul, & D'Adamo (2021) under a Creative Commons Attribution License 4.0.

Analyzing a business perspective, some authors show that risk management culture, supply chain flexibility, and internal integration are able to increase the financial performance of firms through resilience efforts. In addition, internal and external sources of change require the adoption of a dynamic model in which flexibility can play a key role. Flexibility is the ability of a company to respond to changes in the environment, technology, organization, and strategy both quickly and at a low cost. Thus, it consists of initiatives geared toward improving efficiency and organizational performance. In particular, the optimization process is oriented toward assessing the best economic solution. The relationship between SDGs and flexibility requires that this optimization also takes into account the social and environmental

side. The interaction between sustainable models and Industry 4.0, which aims to foster the automation and digitization of production systems, leads companies to rethink their strategies by identifying new business models. The current amount of funding and investment related to the SDGs is considered to be less than what is needed, and this appears to be particularly true in developing countries.

A conceptual framework emphasizes that sustainable supply chain flexibility increases in correspondence with managers' environmental attitudes and when managers' cognitive style is intuitive. The key findings of this study emphasize that two challenges out of all are the ones that can achieve the highest driving power: lack of supplier commitment toward sustainable products and lack of knowledge toward sustainability in the value chain. In fact, sustainable initiatives require a change not only in the way of doing business but also in the way of managing the public good. Climate change is objective evidence, and initiatives aimed at developing new economic models and strategies based on the green economy, the circular economy, and the bioeconomy represent a challenge that cannot be ignored by anyone, especially by governments. Consequently, in the presence of insufficient government rules toward sustainable initiatives, there is a strong risk of penalizing not only the present development of an area but also its future .

Sustainable optimization is based on the principle of proximity with supply chains that should be shortened to reduce the environmental impact of infrastructures. However, the balance between supply and demand with economic profit may be preferred. It is difficult to change this principle, which is the basis of doing business. However, it is necessary to communicate the advantages associated with the use of natural resources, of working in conditions of minimum risk to the health of citizens, of no exploitation of people. In fact, where the organization and the worker have the same objective, the benefits translate directly into the well-being of the company and the ability to generate income for the entire community. Inadequate communication among the suppliers in the value chain deriving by information asymmetries would lead to a loss of value for all the shareholders.

There is a gap between attitude and behaviour, as people struggle to transform their sustainability ideas and propensities into purchasing decisions. Often financial constraints toward sustainable initiatives are a barrier that does not allow to reach such development goals. A policy of subsidies, which are granted according to the actual level of sustainability associated with actions and practices in which the environmental benefit is quantified, must be flanked by a policy of taxation on what pollutes and on what causes serious damage to human health. So green finance would appear to be decisive support, as would a significant increase in the cost of CO2 compared to current values (in recent years we have gone from 20 €/tonne to 40 €/tonne).

Businesses that incorporate sustainability principles into their strategies and practices can be competitive in the local market by fostering the development of a local supply chain. This process includes the creation of smart networks in which companies share their resources in order to be competitive in a global market. The results show that inadequate communication among the suppliers in the value chain has among the lowest driving power. In addition, governments using public money to encourage the use of resources with a high environmental impact would risk favouring investments with only short-term effects, since in all sectors demand is very green and therefore supply should be able to meet it.

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Check Your Understanding

Identify key sustainability challenges in value chains and recommend solutions.

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 8.8.

Overall Activity Feedback

It is important to understand key sustainability challenges in value chains and recommend solutions. Also, it is necessary to communicate the advantages associated with the use of natural resources, of working in conditions of minimum risk to the health of citizens, of no exploitation of people. In fact, where the organization and the worker have the same objective, the benefits translate directly into the well-being of the company and the ability to generate income for the entire community. Inadequate communication among the suppliers in the value chain deriving by information asymmetries would lead to a loss of value for all the shareholders. Two challenges out of all are the ones that can achieve the highest driving power: lack of supplier commitment toward sustainable products and lack of knowledge toward sustainability in the value chain. In fact, sustainable initiatives require a change not only in the way of doing business but also in the way of managing the public good. Climate change is objective evidence, and initiatives aimed at developing new economic models and strategies based on the green economy, the circular economy, and the bioeconomy represent a challenge that cannot be ignored by anyone, especially by governments.

8.7 Summary

Global climate change, intense competition, social and environmental conscious responsibility force the global value chain to vigorously act and use the world's resources more efficiently, commit to sustainable practices and be competitive nowadays. Three aspects should be included in the sustainable value chain to gain beneficial economic, social, and environmental results. When companies consider goals related to minimizing the impact on the environment while benefiting the communities and the people, this means that this company addresses global issues and focuses on a Sustainable Value Chain. The sustainable value chain focuses on global issues such as human rights, global warming and melting ice caps and so forth.

With the dawn of industrialization, the circular economy is a great practice to minimize the negative impact on the environment and simultaneously stimulate businesses to find new opportunities (Korhonen, Honkasalo & Seppälä, 2018). A circular economy implies the following solutions to reduce adverse environmental effects: remanufacturing, repair, reuse, refurbishment, disposal, cascading, upgrading, and recycling.

There are a bunch of benefits to being a sustainable organization. For example, reduced packaging can lead to cost savings and reduce waste of materials. In addition, the company can reduce turnover of employees and labour turnover costs by promoting good working conditions and safety in transportation and warehousing. As a result, employees will be motivated, productive and promote a great working environment (Neumüller, Kellner, Gupta, & Lasch, 2015). These can lead to support the positive development of the society and environment and prevent negative consequences by balancing three dimensions: economic, environmental, and social performance (Neumüller, Kellner, Gupta, & Lasch, 2015).

8.8 Key Terms, References, and Accessibility Descriptions

Key Terms

Sustainable – "causing, or made in a way that causes, little or no damage to the environment and therefore able to continue for a long time" (Cambridge dictionary, 2022)

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Image Descriptions

Fig 8.1: Nutrients & Organic pollutants 33%; Greenhouse gases 31%; Water abstraction 18%; Heavy metal pollution 7%; Other 11% [Return to image].

Fig 8.4: Series of circles all moving clockwise. Inner circles (From smallest to largest) reuse, re-manufacturing, recycling, disposal. Outer circle (clockwise from top) product usage, product end-of-life, treatment, material end-of-life, nature, material/energy acquisition, material refinement, product manufacture. Around the outside at top and bottom: cost, time, energy [Return to image].

Fig 8.5: Four clockwise circles. Input with a an arrow pointing to the circles on the left and Output with an arrow pointing away from the circles on the right.
Input wins: Environmental (reduced virgin material and energy input, virgin inputs are predominantly (to the extent possible) renewable from productive ecosystems) and Economic (reduced ram material and energy costs, the value in resourced is used many times, not only once, the use of costly scarce resources is minimized, reduced costs that arise from environmental legislation, taxes and insurance, image, responsible and green market potential).

Output wins: Environmental (reduced wastes and emissions, resources in production-consumption systems are used many times, not only once, renewables are CO2 neutral fuels and their wastes are nutrients that can be used by nature) and Economic (value leaks and loses are reduced, reduced waste management costs, reduced emissions control costs, reduced costs from environmental legislation, taxes and insurance, new markets are found for the value in resources, new responsible business image attracts investment).
Social wins: new employment opportunities through new uses of the value embedded in resources, increased sense of community, cooperation and participation through the sharing economy, user groups share the function and service of a physical product instead of individuals owning and consuming the physical product [Return to image].

Fig 8.6: 3 sections to the diagram.
Centre: Renewables and Finite Materials arrows to parts manufacturer (renewable has up and down arrows), arrows to product manufacturer, service provider, consumer & user, collection, minimize systematic leakage and negative externalizes.
Left Side: Renewables flow management. Arrows from collection of middle diagram to Extraction of biochemical feedstock (post-harvest and post-consumer waste) arrows go back to consumer and then forward to anaerobic digestion, biogas, regeneration, farming/hunting/fishing/collection.
Right side: Stock management. Arrows from collection of middle diagram to maintain/prolong, resuse/redistribute, refurbish/remanufacture, recycle. [Return to image].

Fig 8.7: Examples of countries which adopted a national resource efficiency or circular economy strategy or action plan (non comprehensive list).
Already adopted a national circular economy strategy or action plan (A): France, Italy, Netherlands, Denmark, Portugal, Slovenia.
Currently finalizing a national circular economy strategy or action plan (B): Spain, Poland.
Already Adopted a national resource efficiency strategy or action plan (C): Germany, Austria, Ireland.
Adopted both resource efficiency and circular economy strategy or action plan (A) + (C): Scotland, Finland.
EEA-39 remaining countries: Bosnia & Herzegovina, Serbia, Albania, Turkey, Montenegro.
Outside EEA-39: Switzerland, Czech Republic, Slovakia, Croatia, Bulgaria, Hungary, Ukraine, England, Norway, Sweden, Baltic States, Russia [Return to image].

Fig 8.8: Wholesale waste and scrap: 3,023

Resuse of good 14,625
Domestic repairs 254,512
Industrial repairs 98,320
Waste collection 29,705
Materials recovery 55,454 [Return to image].

Fig 8.9: Various connections and relationships between a wide variety of factors such as lack of knowledge towards sustainability, supplier commitments, consumer orientations, lack of distribution and IT integration, financial constraints, insufficient government rules, lack of trust in the chain, lack of top management commitment to flexibility, lack of manufacturing flexibility, and inadequate communication. [Return to image].

Alternative Text-Based Activities

Assessing What You Already Know

Question 1:

Is the sustainable value chain focused on global issues? Check all that apply.

- human rights (Correct)
- global warming and melting ice caps (Correct)
- fair labour practices (Correct)
- Raw material (Incorrect)
- marine pollution (Correct)
- decreases of forest cover (Correct)
- plastic pollution (Correct)
- air pollution (Correct)

Feedback: The sustainable value chain focuses on global issues such as human rights, global warming and melting ice caps, fair labour practices, marine pollution, decreases of forest cover, plastic pollution, air pollution, etc. When companies consider goals related to minimizing the impact on the environment while benefiting the communities and the people, this means that this company addresses global issues and focuses on a Sustainable Value Chain.

Question 2:

What are the three dimensions of sustainability? Check all that apply.

- Social (Correct)
- Humanity (Incorrect)
- Ecological (Incorrect)
- Environmental (Correct)
- Economic (Correct)

Feedback: The main dimensions of suitability in the global value chain are environmental, economic, and social dimensions. Integration of three dimensions, economic, social, and environmental, can help companies achieve a long-term goal, and the sustainable supply chain is a crucial success factor for the future.

Question 3:

Sustainability is an opportunity for businesses?

- True (Correct)
- False (Incorrect)

Feedback: Sustainability is an opportunity for businesses, but it is hard to understand the global goals, trade, policies, and improving three main parts simultaneously: social, environmental, and economical. Moreover, the sustainable value chain is related to the core of the whole business, from the strategy to developing products and relationships.

Question 4:

On the basis of your previous experiences and knowledge, how would you define the term ‘circular economy’? Check all that apply.

- circular economy is a great practice to minimize the negative impact on the environment (Correct)
- circular economy helps company’s in inbound logistics (Incorrect)
- circular economy helps company’s in procurement (Incorrect)

Feedback: the circular economy is a great practice to minimize the negative impact on the environment and simultaneously stimulate businesses to find new opportunities. [Return to activity].

Check Your Understanding: Define the term Sustainable Value Chain and how it adds value in the global value chain

Question 1:

When a company addresses global issues and focuses on a Sustainable Value Chain, this means that

- companies consider expanding to the new market (Incorrect)
- companies consider goals related to minimizing the impact on the environment while benefiting
- the communities and the people – (Correct)
- companies would like to be socially responsible – (Incorrect)

Feedback: When companies consider goals related to minimizing the impact on the environment while benefiting the communities and the people, this means that this company addresses global issues and focuses on a Sustainable Value Chain. The sustainable value chain focuses on global issues.

Question 2:

Is the sustainable value chain focused on global issues? Check all that apply.

- human rights (Correct)
- global warming and melting ice caps (Correct)
- fair labour practices (Correct)
- Raw material (Incorrect)
- marine pollution (Correct)
- decreases of forest cover (Correct)
- Exploding data (Incorrect)
- plastic pollution (Correct)
- air pollution (Correct)

Feedback: The sustainable value chain focuses on global issues such as human rights, global warming and melting ice caps, fair labour practices, marine pollution, decreases of forest cover, plastic pollution, air pollution, etc. When companies consider goals related to minimizing the impact on the environment while benefiting the communities and the people, this means that this company addresses global issues and focuses on a Sustainable Value Chain.

Question 3:

What are the three dimensions of sustainability? Check all that apply.

- Social (Correct)
- Humanity (Incorrect)
- Ecological (Incorrect)
- Environmental (Correct)
- Economic (Correct)

Feedback: The main dimensions of suitability in the global value chain are environmental, economic, and social dimensions. Integration of three dimensions, economic, social, and environmental, can help companies achieve a long-term goal, and the sustainable supply chain is a crucial success factor for the future.

Question 4:

Companies should continuously identify …. Check all that apply.

- high-quality resources from the GVC (Correct)
- cost s in logistics activities – (Incorrect)
- discover ways of integrating internal and external carbon innovation resources – (Correct)

Feedback: The manufacturing subsidiaries' capability to achieve a sustainable competitive advantage represents a significant asset when developing innovations. The findings reveal that a thorough evaluation of the company's innovation resources to identify potential positions for the GVC is highly advisable. Therefore, companies should continuously identify high-quality resources from the GVC and discover ways of

integrating internal and external carbon innovation resources to form innovation capability. Besides, companies should also analyze the cost issues of transforming the low-carbon innovation capability into a competitive advantage and evaluate the consistency of their low-carbon innovation strategy with the parent company.

[Return to activity].

Check Your Understanding: Explain the Concept of Circular Economy

Question 1:

According to the European Commission, how many euros can the manufacturing sector gain alone for the EU after the transition to the circular economy-type economy?

- 500 million euros (Incorrect)
- 600 billion euros – (Correct)
- 300 billion euros – (Incorrect)

Feedback: According to the European Commission, 600 billion euros can be gained in the manufacturing sector alone for the EU after the transition to the circular economy-type economy. Only the national Finland economy can earn 2.5 billion euros through a circular economy, and the global economy estimated benefits by 1000 billion US dollars annually (Korhonen, Honkasalo & Seppälä, 2018).

Question 2:

What is a Circular economy?

- It is fair labour practices (Incorrect)
- It is a great practice to minimize the positive impact on the environment and simultaneously stimulate businesses to find great opportunities (Incorrect)
- It is a great practice to minimize the negative impact on the environment and simultaneously stimulate businesses to find new opportunities (Correct)

Feedback: With the dawn of industrialization, the circular economy is a great practice to

minimize the negative impact on the environment and simultaneously stimulate businesses to find new opportunities.

Question 3:

How can the circular economy be implied to reduce environmental effects? Check all that apply.

- remanufacturing, upgrading, and recycling (Correct)
- Repair and reuse (Correct)
- Constructing and using (Incorrect)
- upgrading, and recycling (Correct)
- refurbishment and disposal, (Correct)
- Destroying (Incorrect)
- cascading (Correct)

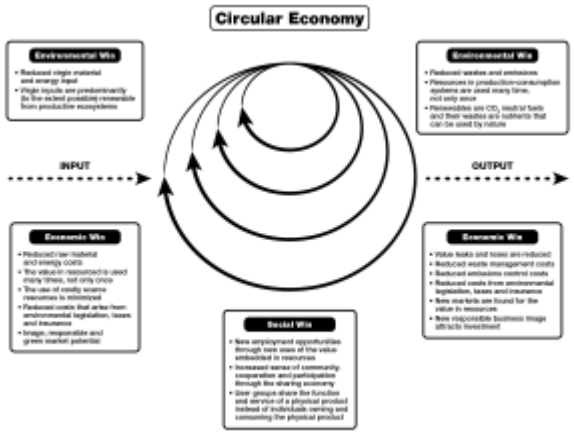
Feedback: A circular economy implies the following solutions to reduce adverse environmental effects: remanufacturing, repair, reuse, refurbishment, disposal, cascading, upgrading, and recycling.

Question 4:

The circular economy is the ……. potential for sustainable development because the CE contributes to sustainable development's economic, social, and environmental dimensions

- win-win-won (Incorrect)
- win-won-win – (Incorrect)
- win-win-win – (Correct)

Feedback: The circular economy is the win-win-win potential for sustainable development because the CE contributes to sustainable development's economic, social, and environmental dimensions.



[Return to activity].

Check Your Understanding: Describe various initiatives taken by organizations to make their supply chains sustainable

Question 1:

Drag and Drop recommendations in correct Category

Indicator	Recommendations
Material Value Added-Supply Chain (MVA-SC)	Redesign the production process, for example, by applying process intensification and/or process integration.
Energy Cost-Supply Chain (EC-SC)	Invest in equipment and vehicles that are more efficient, as well as investing in continuous heat integration
Total Inventory Level Cost (TILC) Entity Inventory Level Cost (EILC)	Decrease the level of production and demand uncertainty. The production uncertainty can be reduced by implementing more robust production processes. Demand uncertainty can be decreased by identifying a significant buffer near the end customer to protect the supply chain from market uncertainties or by applying a production leveling technique ("heijuka").
Backorder Cost (BC)	Improve supply chain coordination and inventory management policies.
Lead Time Factor (LTF) Operational Lead Time Factor (OLTF)	Ideally, all activities should be located at the same place near the end customer. This is often not possible, so the recommendation is to find facilities that share material flows and locate them as close as possible. Using "just in time" methods such as pull systems or process synchronization also shortens the lead time.
Inventory Turnover (IT)	Reduce the inventory by gradually ensuring not compromising the service level or reducing the batches' size and increasing the pick-up frequency.
Volume Flow (VF)	Redirect the flow of material to another path with a lower workload, or boost the work capacity acquiring newer and more effective equipment.
Ok-Parts (OK-P)	Implement failure prevention techniques ("poka yoke") to reduce scrap and rework in every facility's production processes.
Service Level Quantity Factor (SLQF) and Service Levels Time Factor (SLTF)	Improve the information sharing between the supply chain members to know the capacity constraints and each supplier's inventory management. According to the collected information, find out how to deliver the required orders in the proper quantity and time.
Overall Thoughput Effectiveness (OTE-SC)	Implement kaizen workshops to decrease the production uncertainty (technical, organizational and quality losses, and changeover times).
Variability Lead Time (VLT)	Homogenize all the processes of the value stream to gain stability and ensure consistent results over time.

Indicator	Recommendations
Bullwhip Effect (BE)	Adopt a centralized multi-echelon inventory control system since it presents a superior performance over independently operating site-based inventory.
Carbon Emissions (CE)	Implement more energy-efficient equipment, vehicles and facilities; and/or optimize the supply chain operations.
Waste Factor (WF)	Reengineer the production process to be more efficient and promote recycling policies.
Sustainable Energy (SE)	Improve energy efficiency and invest in renewable and sustainable energy sources.
Labour Equity (LE)	Improve the lowest salary and/or reduce the highest salary—decrease salary disparity.
Fatal Accident Rate (FAR)	Improve labor conditions by implementing robust security policies and provide training to the employees.
Corruption (C)	Organize workshops to raise awareness among managers and promote transparent communication of information.

Question 2:

Can managers potentially improve indicators and simultaneously make their supply chains more sustainable?

- True (Correct)
- False (Incorrect)

Feedback: Managers can potentially improve indicators and simultaneously make their supply chains more sustainable.

Question 3:

Is it easy to adapt to include sustainability aspects in lean management?

- Yes (Correct)
- No – (Incorrect)

Feedback: Lean management has proven to be a handy and innovative tool to promote continuous improvement and is easily adaptable to include sustainability aspects. Due to

the ongoing interest and need to implement corporate environmental and social policies, combining lean management and sustainability has become more popular. An increasing number of studies have proven clear positive impacts (economic, environmental and social) on the supply chain performance when lean is linked to sustainability.

Question 4:

Check all best practices for multinational corporations for promoting environmental and social responsibility. Check all that apply.

- Establish long-term sustainable goals (Correct)
- First-tier suppliers must establish their own long-term sustainability goals (Correct)
- Lower-tier suppliers should not be included in the global corporate sustainability strategy – (Incorrect)
- An employee irresponsible for promoting sustainability programs to lower and first-tier suppliers – (Incorrect)
- First-tier suppliers have to be monthly assessed by asking about their safety, health, labour, and environmental practices in their workplace – (Incorrect)
- Conduct a survey about the sustainability of the supply chain to comply with multinational corporations' requirements within the company- (Correct)
- Training first-tier suppliers to comply with their standards as well as providing incentives for using sustainability practices (Correct)

Feedback: They have to establish long-term sustainable goals (Villena & Gioia, 2020). First-tier suppliers must establish their own long-term sustainability goals. Lower-tier suppliers should be included in the global corporate sustainability strategy An employee responsible for promoting sustainability programs to lower and first-tier suppliers. First-tier suppliers have to be annually assessed by asking about their safety, health, labour, and environmental practices in their workplace. Conduct a survey about the sustainability of the supply chain to comply with multinational corporations' requirements within the company. There are many indicators and critical performance within the company to monitor supplier sustainability annually. Training first-tier suppliers to comply with their standards as well as providing incentives for using sustainability practices. The training and incentives led suppliers to increase awareness and make significant changes within the industry (Villena & Gioia, 2020).

[Return to activity].

Check Your Understanding: Learn the main dimensions of sustainability in the global value chain

Question 1:

What are the three dimensions of sustainability? Check all that apply.

- Social (Correct)
- Humanity (Incorrect)
- Ecological (Incorrect)
- Environmental (Correct)
- Economic (Correct)

Feedback: The main dimensions of suitability in the global value chain are environmental, economic, and social dimensions. Integration of three dimensions, economic, social, and environmental, can help companies achieve a long-term goal, and the sustainable supply chain is a crucial success factor for the future.

Question 2:

For achieving a sustainable value chain and development, companies have to integrate and balance economic, social and environmental dimensions within their companies.

- True – (Correct)
- False – (Incorrect)

Feedback: For achieving a sustainable value chain and development, companies have to integrate and balance economic, social and environmental dimensions within their companies (Neumüller, Kellner, Gupta, & Lasch, 2015). Decision-makers within organizations have to focus simultaneously on economic effects and consider the impact on the social and environmental aspects. Companies can compromise customer satisfaction but gain a tremendous impact on society and the environment. [Return to activity].

Check Your Understanding: Identify key sustainability challenges in value chains and recommend solutions

Question 1:

Drag and Drop the components in correct Category

Challenges	Definition
Autonomous challenges	The identified challenges that include weak driving power and dependence are categorized under the first quadrant. In this study, there are no autonomous challenges from our identified potential challenges.
Dependent challenges	Identified challenges that have weak guidance but strong dependence are categorized under the second quadrant. From the obtained list, challenges such as 'lack of top management commitment toward flexibility in value chain (B11)', 'lack of manufacturing flexibility in the value chain (B12) and 'Inadequate communication among the suppliers in the value chain (B13)' are posed as dependent challenges because they represent strong dependence but relatively weak driving power.
Linkage challenges	The identified challenges that have high dependence and high driving power are categorized under the third quadrant. In this study, linkage challenges among our identified potential challenges are 'insufficient government rules toward sustainable initiatives (B6)', 'financial constraints toward sustainable initiatives (B7)', 'capacity constraints in value chain flexibility (B8)', 'lack of trust in the value chain (B9)' and 'inadequate information sharing in value chain (B10).
Independent challenges	Identified challenges that have strong driving power but weak dependence are categorized under the fourth quadrant. In this study, challenges such as 'lack of consumer orientation toward sustainability in value chain (B1)', 'lack of distribution flexibility in the value chain (B2)', 'lack of supplier commitment toward sustainable products (B3)', 'lack of knowledge toward sustainability in value chain (B4)', and 'lack of IT integration in value chain (B5)' are classified as independent challenges because they reflect strong driving power but weak dependence. The construct for the dependence and driving power analysis.

Question 2:

Key sustainable challenges in the value chain. Check all that apply.

- Lack of consumer orientation toward sustainability in value chain (Correct)

- Lack of distribution flexibility in the value chain (Correct)
- Lack of supplier commitment towards sustainable products (Correct)
- Lack of knowledge towards sustainability in value chain (Correct)
- Sufficient government rules towards sustainable initiatives – (Incorrect)
- Financial constraints towards sustainable initiatives (Correct)
- Adequate Information sharing in value chain- (Incorrect)
- Capacity opportunities in value chain flexibility – (Incorrect)
- Lack of top management commitment towards flexibility in value chain (Correct)
- Lack of manufacturing flexibility in the value chain (Correct)
- Adequate communication among the suppliers in the value chain- (Incorrect)

Feedback:

N^0	Challenges
1	Lack of consumer orientation toward sustainability in value chain
2	Lack of distribution flexibility in the value chain
3	Lack of supplier commitment towards sustainable products
4	Lack of knowledge towards sustainability in value chain
5	Lack of IT integration in value chain
6	Insufficient government rules towards sustainable initiatives
7	Financial constraints towards sustainable initiatives
8	Capacity constraints in value chain flexibility
9	Lack of trust in the value chain
10	Inadequate Information sharing in value chain
11	Lack of top management commitment towards flexibility in value chain
12	Lack of manufacturing flexibility in the value chain
13	Inadequate communication among the suppliers in the value chain

Question 3:

Is it unnecessary to communicate the advantages associated with the use of natural

resources, of working in conditions of minimum risk to the health of citizens, of no exploitation of people?

- True- (Incorrect)
- False – (Correct)

Feedback: It is difficult to change this principle, which is the basis of doing business. However, it is necessary to communicate the advantages associated with the use of natural resources, of working in conditions of minimum risk to the health of citizens, of no exploitation of people. In fact, where the organization and the worker have the same objective, the benefits translate directly into the well-being of the company and the ability to generate income for the entire community. Inadequate communication among the suppliers in the value chain deriving by information asymmetries would lead to a loss of value for all the shareholders.

Question 4:

Businesses that incorporate sustainability principles into their strategies and practices can be competitive in the local market by fostering the development of a local supply chain.

- True- (Correct)
- False – (Incorrect)

Feedback: Businesses that incorporate sustainability principles into their strategies and practices can be competitive in the local market by fostering the development of a local supply chain. This process includes the creation of smart networks in which companies share their resources in order to be competitive in a global market. The results show that inadequate communication among the suppliers in the value chain has among the lowest driving power. [Return to activity].

PART IX

CHAPTER 9: EMERGING VALUE CHAIN CONCEPTS

9.1 Introduction

Watch or Listen to the Following Media Clip

Media 9.1 *What is Reverse Logistics*. [Video]. Daily Logistics.

Learning Objectives

After reading this chapter, you should be able to understand and answer the following questions:

1. Explain the concept of Reverse Logistics.
2. Define how ICT is supporting the global value chain.
3. Explain the concept of Value Stream Mapping.
4. Explain humanitarian supply chain management, identify issues, and define recommendations and the practical implications.

Introduction

Globalization has given a lot of opportunities for the economy, businesses, and international competition. Trades spread production, manufacturing and networks across many countries and continents. New technologies are coming, and enterprises have to be more flexible and adaptable nowadays. Businesses build export capabilities, leverage services, and move to high-value niches in the Global Value Chain by incorporating Artificial Intelligence, Reverse Logistics, Information Technology (IT), Value Stream Mapping and Humanitarian Supply Chain Management. Global demand for a skilled workforce and IT adds value in every industry, such as global value chain, manufacturing, tourism, automobile, agriculture, move industry, education, etc. Multinational organizations are increasingly trying to be socially responsible via Humanitarian Supply Chain Logistics.

Assess What You Already Know

As you answer the following questions, reflect upon what you already know about how companies work.

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 9.7.

Media Attributions and References

Daily Logistics (2021, October 21). *What is reverse logistics?* [Video]. YouTube. https://www.youtube.com/watch?v=r8u-vPd6igg

9.2 Reverse Logistics

Learning Objective

1. Explain the concept of Reverse Logistics.

Figure 9.1



Reverse Logistics

Until this chapter, the major focus was on activities related to forward logistics where raw material moves from suppliers and reaches consumers in the finished form. In this section, activities concerning reverse logistics will be explained.

According to Cambridge Dictionary, "reverse logistics is the process of dealing with goods that have been returned to the company by customers" (Cambridge Dictionary, 2022).

For example, the customer would like to return or recycle products or goods, and this process requires reverse logistics. Therefore, activities such as recovery, return, reuse or disposal of discarded products are part of reverse logistics activities. In short, when

products return from the final destination or user to another location for final disposal or recapturing value, the process is called reverse logistics.

A great example is Amazon which has no-fuss return policies and innovative reverse logistics. In addition, it provides excellent reverse logistics training programs. Amazon's reverse logistics focus on managing and running warehouses in a sustainable way. It also helps organizations build trust between logistics service providers, manufacturers, and customers. Moreover, a company has full control over a product's life from start to the end involving decisions relating to recycling, refurbishment, repair, warranty, disposal of discarded products, etc.

Let's take the example of E-commerce which is a fast-paced industry, and businesses use fast, free and easy return policies. Though it attracts customers, but also increases the volume of returned products. . For consumers, returns could be a motivator to shop with a particular online retailer but for retailers, it is adding to huge costs.

It is exciting that reverse logistics has existed for the last 100 years, and it is a part of the retail industry. The size of reverse logistics market worldwide has been significantly increasing. Let's watch this video that explains retail reverse logistics.

Video: Retail Reverse Logistics (6:36)

Usually the study of retail supply chain management focuses on goods going out to the customer. This article offers a conceptual framework for the management of products flowing in the opposite direction. "Retail Reverse Logistics" is concerned with the achievement of optimal efficiency for all the post- sale activity associated with a product. This is not a new subject but the growth of internet and home shopping has significantly increased the volume of returned goods.

Media 9.2 *Retail Reverse Logistics*. [Video]. Cranfield School of Management. (URL: https://www.youtube.com/watch?v=x6NiqMEnvos)

For more details on how e-returns could be costly, E-commerce return rates by industry, reasons of returns, strategies of handling e-commerce returns and impact of COVID-19, read though the first two sections of article: The Plague of Ecommerce Return Rates and How to maintain Profitability.

According to Statista (2021), the size of the reverse logistics market globally will be continuously expanded and projected to reach 958.3 billion U.S. dollars by 2028 (Statista,

August 4, 2021). As evident from the graph, a significant part of reverse logistics, electronic waste (e-waste), has become one of the fastest-growing fields. View graph Size of the reverse logistics market worldwide from 2020 to 2028 (in billion U.S. dollars) [Chart description].

The following material adapted from *E-Waste Reverse Supply Chain: A Review and Future Perspectives* by Linh Thi Truc Doan, Yousef Amer, Sang-Heon Lee, Phan Nguyen Ky Phuc, & Luu Quoc Dat, 2019, under a Creative Commons Attribution License.

With the significant amount of upgrading of electronic devices, electronic waste (e-waste) is one of the fastest-growing types of waste. For instance, 80% of mobile phones have been upgraded every two years, which leads to a large number of discarded products Which leads to E-waste RSC (Reverse Supply Chain) systems. It is a dynamic system with a high level of uncertainties in quantity, quality, and time of returned products. Firstly, there are three main sources of e-waste generation, including households, industries, and institutional sources (i.e., schools, hospitals, and governmental agencies). Secondly, e-waste collection is derived from municipality collection points, electronic industries, retailers, and informal and formal recycling sectors. Informal recycling activities are common in developing countries, such as India and South Africa, where recycling methods are rudimentary, and a significant proportion of e-waste components end up in uncontrolled landfills.

To mitigate the amount of product disposal, industries have been carrying out 6R concept (namely, Reduce, Reuse, Recycle, Recover, Redesign, and Remanufacture) to improve recovery implementation and minimize non-value-added activities within end-of-life (EoL) management. Companies gain many benefits by implementing product EoL treatment, such as financial benefits to companies, product usage, increasing market share, improved public reputation, and competitive advantage.

Did You Know?

In today's business world with a competitive electronics market, the production of electronic equipment is rapidly growing because customers are likely to own the latest models with more advanced functions and attractive designs. This leads to the amount of e-waste growing speedily, reaching around 41.8 million tonnes in 2014. The quantity of e-waste produced is approximately three times faster in comparison with other wastes. The amount of e-waste is estimated to reach 52 million tonnes or 6.8 kg per capita in 2021. However, around 20% of all e-waste generated is officially collected and recycled. For example, the average lifespan of a new computer in India has reduced from seven years to four years. Most e-waste was generated in Asia (16 million tonnes) whereas the least e-waste generation (0.6 million tonnes) was in Australia in 2016. The highest e-waste per resident (15.6 kg per capita) was in Europe, while Africa produced the lowest quantity of e-waste per capita (1.7 kg per capita). Both North and South Americas released around 11.7 million tonnes, which was equal to 12.2 kg per capita.

(Doan et al., 2019) CC-BY-4.0

The following material adapted from *Sustainability, Innovation and Entrepreneurship* by Larsen (2020) under a Creative Commons Attribution-NonCommercial-ShareAlike License.

There are different ways to handle customer returns. Many companies already have rudimentary reverse logistics systems to deal with customers' returns of items they do not want or that were found defective or otherwise unsatisfactory. An expanded reverse logistics system would ultimately replace the linearity of most production methods—raw materials, to processing, to further conversions and modification, to ultimate product, to use, to disposal—with a cradle-to-cradle, cyclical path or closed loop that begins with the return of used, outmoded, out-of-fashion, and otherwise "consumed" products. The products are either recycled and placed back into the manufacturing stream or broken down into compostable materials. The cycle is never ending because materials return to the land in safe molecular structures (taken up and used by organisms as biological nutrients) or are perpetually used within the economy as input for new products (technical nutrients).

Companies typically funnel spent items from consumers into the reverse supply chain by leasing their products or providing collection points or by other means of recovering the items once their service life ends.

Once collected, whether by the original manufacturer or a third party, the products could be inspected and sorted. Some items might return quickly to the supply chain with only minimal repair or replacement of certain components, whereas other products might need to be disassembled, remanufactured, or cannibalized for salvageable parts while the remnant is recycled or sent to a landfill or incinerator. Moreover, the reverse supply chain might spawn new suppliers as well as other sources of revenue for companies that engage in collection, disassembly, and so on, making the entire network more efficient.

(Larson, 2020) CC-BY-NC-SA-4.0

Forward and Reverse Supply Chain

The following material adapted from *E-Waste Reverse Supply Chain: A Review and Future Perspectives* by Linh Thi Truc Doan, Yousef Amer, Sang-Heon Lee, Phan Nguyen Ky Phuc, & Luu Quoc Dat. (2019) under a Creative Commons Attribution License.

A reverse supply chain differs significantly from a forward supply chain in a wide range of aspects. Figure 9. 2 outlines the process of forward and reverse logistics.

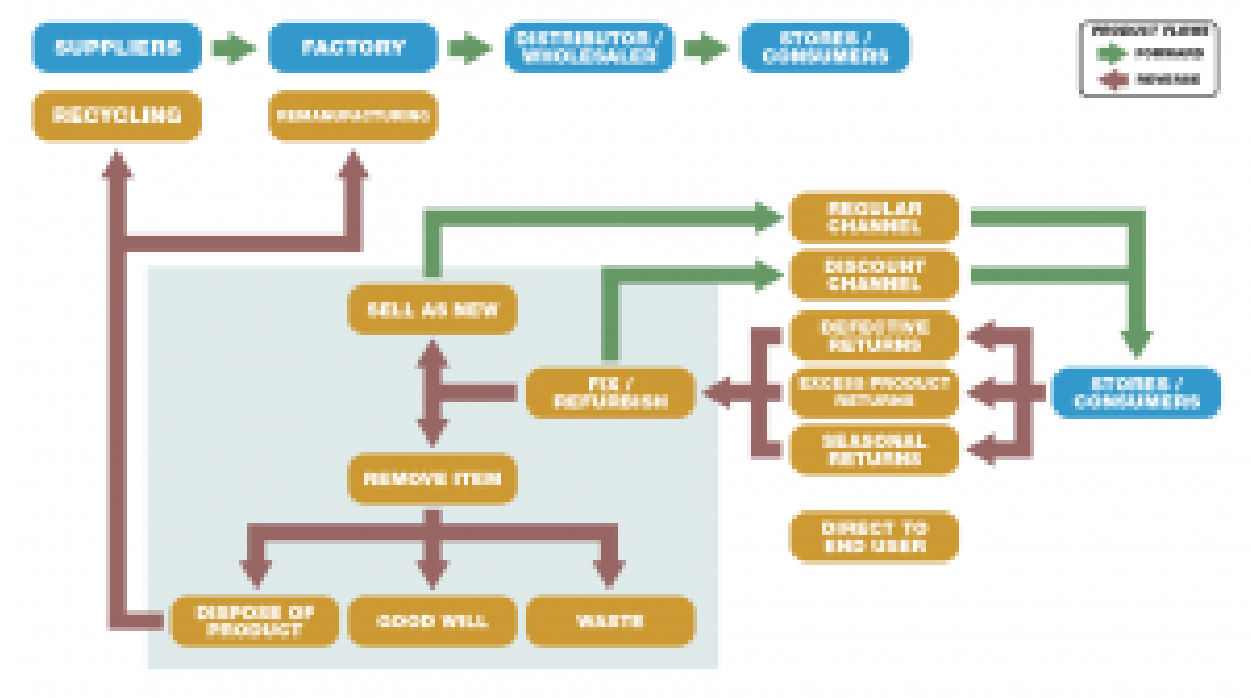
(Doan et al., 2019) CC-BY-4.0

Forward logistics is the same as traditional logistics, starting from the suppliers through

the factory and then moving to the distributor/wholesaler. Finally, the product moves to retailers and final customers. Forward or traditional flow is a green arrow in figure 9.2. On the other hand, reverse logistics starts from the opposite side- customers and moves to the first point of the supply chain according to a return policy of the product. Reverse logistics is a brown line in figure 9.2.

Figure 9.2

Forward and Reverse Logistics Processes



(click to enlarge) [Image description].

The following material adapted from *E-Waste Reverse Supply Chain: A Review and Future Perspectives* by Linh Thi Truc Doan, Yousef Amer, Sang-Heon Lee, Phan Nguyen Ky Phuc, & Luu Quoc Dat. (2019) under a Creative Commons Attribution License.

Table 9.1 shows a summary of the main differences between forward and reverse logistics. Reducing cost and increasing profit are considered as two vital goals in forward supply chains, while reverse supply chains focus on environmental regulations, cost minimization as well as profit maximization.

Table 9.1

Differences between forward and reverse supply chains

Forward Supply Chain	Reverse Supply Chain
Focus on increasing profit and cost minimization	Focus on environmental issues, regulations, profit and cost minimization
Product demand is quite straightforward to forecast	Returned products are relatively difficult to estimate
The quantity of product is less variation	The quantity of returned products are highly uncertain
Conventional marketing techniques can be used	There are some elements requiring complicated marketing
Processing times and stages are well identified	Processing times and stages are vary based on the quality of returned products
Products are delivered from one location to other locations	Used products are collected from a lot of locations and then reach to one processing center
Speed is one of the main factors in terms of competitive advantage	Speed is not an important element
Product packaging is standard	Returned product packaging highly varies or lack of packaging
Product structure is standard	Returned product structure is modified
Cost estimation is quite easier because of accounting systems	Cost factors are complicated to determine
Disposition options are rather clear	Disposition alternatives depended on the condition of a returned product
Inventory management is consistent	Inventory management is chaotic
Cost implications are quite clear	Cost implications are unclear
Processes for real-time product tracking are highly visible	Processes for returned product tracking are less visible because of lack of information system infrastructure
Product life cycle changes are easily managed	Product life cycle changes are difficulty managed
Models are relatively deterministic	Models are more stochastic
Key importance to manufacturers	Key importance to end-of-life processors (such as remanufacturers, recyclers)

(Doan et al., 2019) CC-BY-4.0

Recalls

Recalls products mean officially retrieving products from manufacturers or users to the place of origin because discovered defects can harm consumers, hinder performance or realize more cost-effective product production. The request to recall products can be by the government or company in the form of a letter shown below. This official act helps prevent and reduce risks related to injuries or safety concerns. In this scenario, companies provide consumers with compensation. Recalls can be mandated by Safety Commissions or voluntary. Please follow the link for more examples of recalls in Canada.

On the other hand, activities such as recovery, return, reuse or disposal of discarded products are part of reverse logistics activities. In short, when products return from the final destination or user to another location for final disposal or recapturing value. This process is so-called reverse logistics.

Figure 9.3

Rattlesnake Bicycles

Rattlesnake Bicycles®

April 6, 2022

Important Recall Notice

Rattlesnake Bicycles Spirit road bike

Model # 10445 - Spirit

Dear Davis & Daughters Bicycle Shop Customer,

Our records show that you purchased a *Spirit* road bike (Model #10445) built by Rattlesnake Bicycles between June 1, 2020, and August 2021.

Rattlesnake Bicycles is recalling this bicycle for a potential hazard regarding the frame. The weld where the Top Tube joins with the Head Tube can fracture. If a fracture occurs, the bike may become unstable and potentially lead to a crash.



Stop using it immediately if you have a Rattlesnake Spirit (Model # 10445). Return the bike to Davis & Daughters Bicycle for repairs. We will replace the frame without cost.

If you are not sure if your bicycle is involved in the recall or if you have questions, please contact Davis & Daughters at:

- 555-555-0101 or
- Visit the shop located at 25 Avenue B. Please bring your bicycle.

You may also contact Rattlesnake Bicycles:

- Phone: 1-800-555-0112
- Website: https://rattlesnakebikes.ca

We apologize for any inconveniences this recall may cause.

Respectfully,

Rattlesnake Bicycles

Note. Rattlesnake Bicycles recall notice. [Image description].

Check Your Understanding

Explain the concepts of reverse logistics and recalls.

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 9.7.

Overall Activity Feedback

Recall products mean officially retrieving products from manufacturers or users to the place of origin because discovered defects can harm consumers, hinder performance, or realize more cost-effective product production. The request to recall products can be by the government or company. This official act helps prevent and reduce risks related to injuries or safety concerns. In this scenario, companies provide consumers with compensation. Recalls can be mandated by Safety Commissions or voluntary. "Reverse logistics is the process of dealing with goods that have been returned to the company by customers" (Cambridge Dictionary, 2022).

It is essential to know that recalling products means officially retrieving products from manufacturers or users to the place of origin because discovered defects can harm consumers, hinder performance, or realize more cost-effective product production. The request to recall products can be by the government or company. This official act helps prevent and reduce risks related to injuries or safety concerns. In this scenario, companies provide consumers with compensation. Recalls can be mandated by Safety Commissions or voluntary.

On the other hand, activities such as recovery, return, reuse or disposal of discarded products are part of reverse logistics activities. In short, when products return from the final destination or user to another location for final disposal or recapturing value. This process is so-called reverse logistics.

Media Attributions and References

Cranfield School of Management. (2012, June 14). *Retail reverse logistics* [Video]. YouTube. https://www.youtube.com/watch?v=x6NiqMEnvos

9.3 ICT and the Global Value Chain

Learning Objective

2. Define how ICT is supporting global value chains.

Video: What is ICT (Information and Communications Technology)? (2:15)

ICT — it's like a beefed-up version of IT. ICT is a huge umbrella term. Short for information and communications technology, ICT is sometimes used interchangeably with IT, or information technology. Watch to learn more about information and communications technology, what it includes, and how it's impacted our lives.

Media 9.3 *What is ICT (Information and Communications Technology)?*. [Video]. Eye on Tech. (URL: https://www.youtube.com/watch?v=5PDQKu2-bAc)

A few examples of Information and Communication Technology (ICT) or Information Technology (IT) include Big Data, Blockchain Technology (BT), Internet of Things (IoT), robots, cloud computing, transactions, hardware, internet access, communications technology and so forth.

The difference between ICT and IT is that ICT is a broader and more comprehensive term than IT. There is no general definition of Information and Communication Technology (ICT). Information and Communication Technology (ICT) is the infrastructure for modern operation of computers which includes all devices, components, applications, systems that allow people and organizations to be connected and interact in the digital world (Pratt, 2019). ICT can connect through the internet and is mobile powered by wireless networks. ICT is vital nowadays for people and organizations because it allows businesses and the economy to grow. Other advantages of using ICT includes getting insights, building customer bases, creating new products and services, internet shopping, transactions, digitalization of businesses, finding fast solutions, speeding up

order tracking and processes, enhancing the exchange of information, increasing collaboration, and transparency in the global value chain.

Figure 9.4

A Mind Map on the Use of Information and Communication Technology (ICT) in Educational Assessment



(click to enlarge)

Note. A mind map on the use of ICT in education. From Paily, 2017. CC BY-SA 4.0 [Image description].

Consider This: Blockchain

The following material adapted from *Blockchain Technology's Impact on Supply Chain Integration and Sustainable Supply Chain Performance: Evidence from the Automotive Industry* by Kamble, Gunasekaran, Subramanian, Ghadge, Belhadi & Venkatesh, (2021) under a Creative Commons Attribution License.

Let's take the example ICT and automotive sector in India. The automotive sector is one of the driving

forces of the Indian economy, contributing about 49% to the country's manufacturing gross domestic product (GDP) and employing over 32 million workforces. Indian automotive industry is highly competitive and challenging, under pressure to continuously improve its sustainable supply chain performance (SSCP). Achieving SSCP needs the firms to be innovative in providing value to their customers.

(Kamble et al., 2021) CC-BY-4.0

The intervention of information and communication technologies (ICT) helps supply chains be more efficient. In addition, by integrating ICT, businesses gain more sustainable benefits, which makes them competitive in the field. Scientists are constantly studying the advantages of the correlation between SC and ICT and SSCP for helping businesses succeed. Therefore, the central part of improving partnership as well as collaboration between supply chain participants is supply chain integration (SCI). In addition, blockchain technologies are essential for enhancing supply chain integration, which contributes to business sustainability and excellence (Kamble, Gunasekaran, Subramanian, Ghadge, Belhadi & Venkatesh, 2021).

The following material adapted from the article *The Supply Chain Management Revolution* by Agarwal, Shiralkar, Aaher, & Jawade (2021) under a Creative Commons Attribution License.

Companies are nowadays targeting to enhance their performance in the industry, in terms of adaptability, cost, traceability, trust, delays and variety, thus the Global Value Chain (GVC) has now become the concept of concern due to the ever- increasing customer demands in terms of value, quality etc. GVC influences numerous day-to-day and economic activities. GVC has been considered as a major strategy for incorporating suppliers and consumers, to enhance responsiveness and flexibility of manufacturing and service organizations. Thus, to satisfy and adapt to changing customer expectations and needs, the following are some of the technological advancements in GVC.

1. Blockchain

In recent times, blockchain is mostly referred to as a cryptocurrency or digital money such as Bitcoin, Dogecoin, ripple etc. But in practice blockchain applications are not limited only to cryptocurrencies or finance. Blockchain is a decentralized digital ledger. Ledgers are used to keep a record of important things, financial or something else. Blockchain is nothing but a database or in other words, a collection of information stored on a computer system. The blockchain is a collection of blocks or nodes. These nodes are connected, all the transactions are stored throughout the network. If there is a new transaction or if

there is even a slight change in any of the transactions, then it gets verified immediately through the consensus of the nodes. Information cannot be altered, added, or removed without this consensus. This makes blockchain fraud-proof. In a global value chain, this kind of system (decentralization) may provide a much better foundation of trust as well as benefits due to the absence of a centralized authority. Similarly, blockchain could further be used to record the activity logs, ownership of assets etc. Further, Blockchain also holds an immense contribution to a global value chain, as Blockchain ensures information continuity and traceability. This is due to its irrevocable and immutable nature, which helps to share important information among stakeholders so that products and information can be tracked without risk. In addition, blockchains transparency makes it easy to access large amounts of data generated in the global value chain. This also increases global value chain visibility. Thus, blockchain in GVC truly can be a game-changer in the global value chain domain.

2. Internet of Things (IoT)

Internet of things is used to connect various devices through a network in order to sense and collect data around the world on the internet to process various intelligent applications with the aid of embedded systems, artificial intelligence (AI), various software and sensors. In this network of all the connected devices, each device has a unique identity and will work in harmony with others. The role of the IoT platform for an organization is to enable devices / objects to observe, recognize, and understand situations and surroundings without relying on human help. Devices connected through the internet of things possess the ability to transmit data between themselves devoid of any interaction between them. A traditional global value chain faces many challenges like lack of visibility, lack of flexibility, lack of trust of security amid stakeholders and many more. Integration of IOT in the global value chain network may help to solve many of such challenges that the traditional networks face. IOT helps improve the efficiency of GVC networks by connecting links between information flow and material flow at various stages of the GVC network. For instance, if we consider the automotive supply chain, the main goal of the manufacturing plant is to deliver the parts at the right time and to maintain an optimum inventory. This is only possible if there is good coordination amongst 3rd party logistics, transportation organisations, and multiple tiers of suppliers. These coordination processes are often enhanced by making use of the IoT integrated blockchain systems. Such a system utilises smart IoT sensors and numerous smart devices, which have the ability to track the location/whereabouts of parts as well as their quantity along with all the other useful information in real time. This advancement leads to various other improvements and benefits for the manufacturing supply chain, such as improvement in material and information flow, tracking system of goods as well as a planned production schedule. Similarly, the suppliers also greatly benefit from this as they experience reduction of faulty orders, improved inventory and inventory level, reduction in warehousing costs etc. the above explanation was in the context of incoming logistic services to the plant. Next, we will consider the benefits of IoT in the global value chain of outbound distribution services. The main goal of the manufacturing plant is to distribute outbound vehicles to all dealers and importers at the right time, while effectively coordinating many third-party logistics and transportation companies. All of this can be achieved using the IoT integrated blockchain system. As mentioned earlier, the system uses IoT sensors and many smart devices that can be used to track vehicle location and other important details in real time. This improvement leads to many benefits to the manufacturing plant itself. This means that the system can achieve just-in-time logistics, improvement in inventory controls as well as reduction in damaged vehicles. At the same time, dealers and importers also get the benefit by getting a lead time reduction in build to

order vehicles and a reduction in warehouse cost. Thus, we can say that the integration of the internet of things and blockchain can eliminate the problem and make the system more efficient and trustworthy.

3. Big Data

Nowadays there is enormous amounts of data being generated every-day. It has been predicted that the amount of data collected will keep increasing in the coming years in this digital era. Hence the term Big Data has been coined. The world generated/created more than 1ZB of data within the year 2010, and 7ZB of data per year by 2014. The main reason for such an enormous rise in data is due to diverse devices employed in the industrial enterprise of global value chain networks, which include smartphones, computers, devices, sensors. All of this data gives rise to new possibilities to obtain more value. We can hence define Big data as extremely large sets of data or fast growing amounts of data from different sources that present industrial organizations with a variety of storage and analysis issues. Big data in GVC promises a very positive impact as supply chains will be able to take more strategic and data-oriented decisions. Big data serves as an instrument to analyse global value chain risks and measuring the supplier performance with extremely high accuracy. Big data also enables the organization to identify and focus on credible areas for optimization. Big data can be utilised by organizations in various ways to optimize their supply chains, by using big data to predict crime, i.e. making the supply chain secure and transparent. Further data can also be used to prepare an efficient operational shift planning to achieve appropriate staffing for maximum output and good process quality. Big data in the supply chain can also avoid out-of-stock conditions and increase customer satisfaction. Customer retention analysis can be also carried out using big data to maintain good customer relations and to increase customer trust. Creation of new business models or products becomes easy by using big data analysis along with expansion of existing product lines. Even with all these benefits of big data, it still seems to be a relatively unexplored asset that the industries can still make use of if they have the correct tools and technologies.

(Agarwal et al., 2019) CC-BY-4.0

Check Your Understanding

Define how ICT is supporting the global value chain.

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 9.7

Text-based alternative.

Overall Activity Feedback

Companies are lucky to have advanced ICT because it provides a slew of cost savings. Advantages include insights, building customer bases, creating new products and services, internet shopping, transactions, digitalization of businesses, finding fast solutions, speeding up order tracking and processes, enhancing the exchange of information, increasing collaboration, and transparency in the global value chain. Today's organizations are constantly searching for innovative ways to integrate ICT into their business process to acquire sustainable benefits. Blockchain is mostly referred to as a cryptocurrency or digital money such as Bitcoin, Dogecoin, ripple etc. Blockchain is a decentralized digital ledger. Ledgers are used to keep a record of important things, financial or something else (Agarwal, Shiralkar, Aaher, & Jawade, 2021) CC-BY-4.0

Media Attributions and References

Eye on Tech. (2020, March 9). *What is ICT (Information and Communications Technology)?*. [Video]. YouTube. https://www.youtube.com/watch?v=5PDQKu2-bAc

Paily, M. U. (2017, April 8). *Technology assessment: Mind map on the use of ICT in education* [image]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:A_Mind_Map_on_the_Use_of_Information_and_Communication_Technology_(ICT)_in_Educational_Assessment.jpg

9.4 Value Stream Mapping

Learning Objective

3. Describe the concept of Value Stream Mapping.

Value Stream Mapping

The emergence of waste in supply chain activities directly impact availability of goods to the final consumers. One of the best ways to manage waste is to apply lean approach with Value Stream Mapping technique.

As cited by Adrianto & Kholil (2015) in the article by Amrina & Fitrahaj (2020), **Lean** is an approach in identifying and eliminating waste or non-value-added activities through continuous improvement. There are 8 things that cause waste (Helleno, Moraes & Simon, 2017):

- Overproduction (excessive production),
- Unnecessary Inventory (inventory that is not needed),
- Defect (defective product),
- Unnecessary Motion (movements that do not add value),
- Excessive Transportation (excessive material or product movement),
- Inappropriate Processing (inappropriate process),
- Waiting (waiting time), and
- Unutilized Talent (ability that is not utilized) (Amrina & Fitrahaj, 2020).

In the Lean concept, waste can be removed through 12 techniques, and one of them is **Value Stream Mapping** (Amrina & Zagloel, 2019). As cited by Firdaus (2018) in the article by Amrina & Fitrahaj (2020), Value Stream Mapping (VSM) is a method used to visualize waste in a complete process. VSM maps the process flow, information flow and material

flow. VSM helps decision makers identify activities that do not add value by mapping current conditions.

> Mapping the value-added processes within the supply chain is useful for management because it aligns stakeholders, from multiple departments, on the needs of the customer and the demands of the supplier. It's also an effective tool for illustrating the overall supply chain for a product to a variety of audiences (Justin, 2017).

Video: Value Stream Mapping (2:27)

Watch this video to understand how Value Stream Mapping works and its benefits.

Media 9.3. *Value Stream Mapping* [Video]. The Supply Chain Sustainability School. (URL: https://youtu.be/F9c2gHWUqsQ)

Five Lean Thinking Fundamentals:

Lean Approach is based on five principles:

1. Specify **Value**: It is hard to identify what adds value to your business. Value is defined by customers in terms of specific products and services they are willing to pay for.
2. Identify the **Value Stream**: The Value Stream itself is the series of individual processes that connect together to create the valuable goods or service that an organization produces for its customer. The process of mapping the Value Stream is designed to view the big, macro picture in order for executives to make strategic decisions as part of an extended organizational transformation effort.
3. Make **Value Flow** Continuous: The best way of having a continuous flow of material and information is to eliminate the wastes involved in supply chain process. Having eliminated waste, makes remaining value creating steps flow.
4. Let Customers **Pull** Value: There are two ways organizations work – Push and Pull. Traditional organizations used to work on Push System wherein what ever they produce were make available for consumers to consume. This no longer works in today's market, rather customer's pull cascades all the way back to the lowest level

supplier, enabling just in time production.

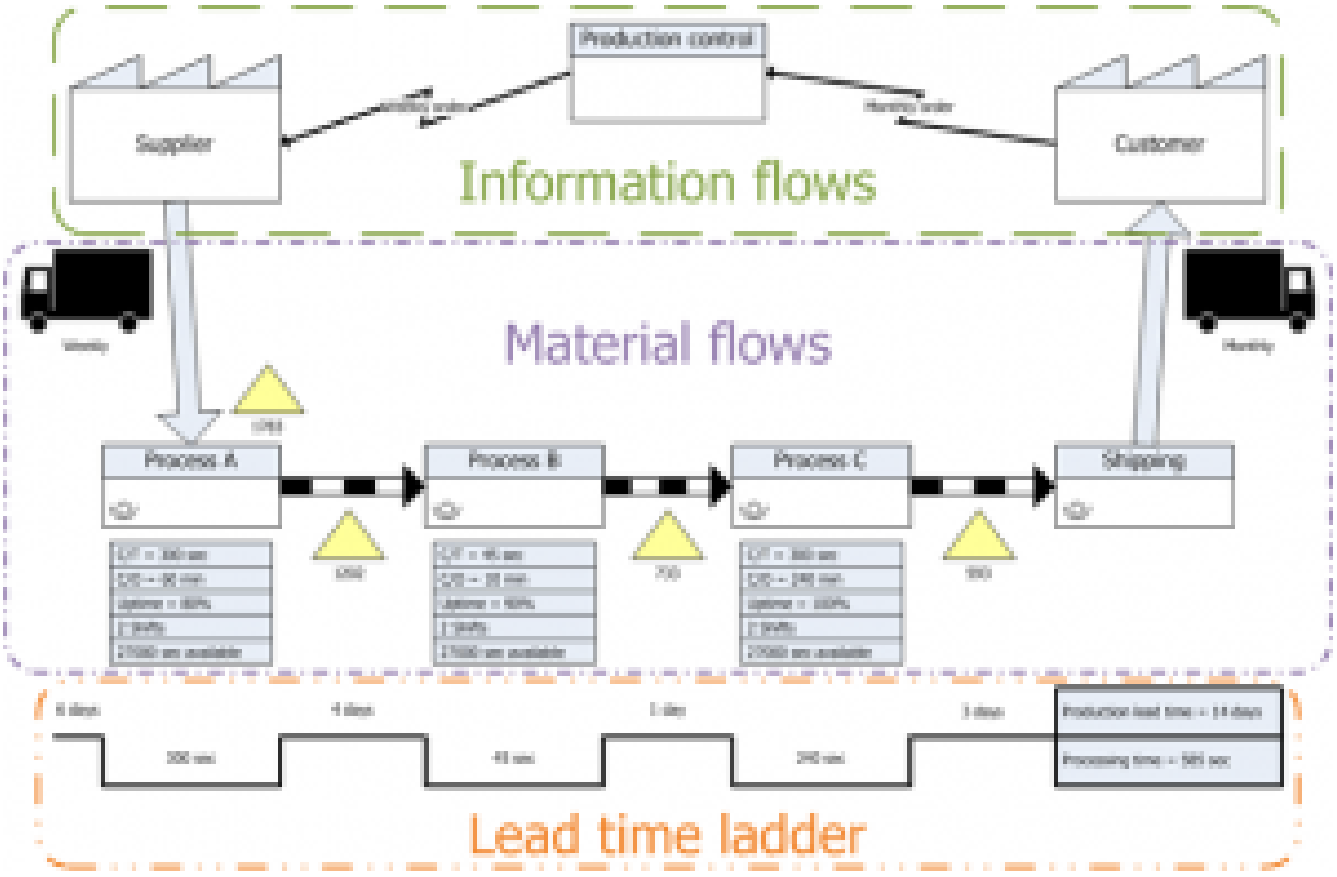
5. Pursue **Perfection**: Adding value and eliminating non-value added steps is a never ending process. With changing needs and demands of consumers, companies need to look into the processes time and again to ensure perfection.

Building a Value Stream Map

Value Stream Map in Supply chain is a visual way to identify steps involved in the supply chain process and their relationship. It makes decision makers to see value added and non-value added activities clearly by drawing the whole process from upstream to downstream on a paper. “To Create flow you need a vision. Mapping helps you see and focus on flow with a vision of an ideal or improved state (Rother and Shook, 2018) . Figure 9.5 shows an example of how Value Stream Map looks.

Figure 9.5

Value Stream Map: Example



Note. Components of a Value Stream Map. From Wikimedia Commons, 2013. CC-BY-SA 3.0. [Image description].

As shown in Figure 9.5, Value Stream Maps are divided into three sections – Information Flows, Material Flows and Lead Time Ladder. Let's look into these sections:

1. Information Flows: Information flow is located at the top half of the map and is drawn from right to left, starting with customers indicating the **pull value** principle. To present the flow of information between customer and company and then company and supplier, **narrow line** is used.
2. Material Flow: Material Flow is located in the center of the map and is drawn from left to right. It provides valuable information to decision makers and includes the activities such as identifying different processes along with a few statistics such as **cycle time**, **changeover time**, **uptime**, **batch sizes**, **working time** and **scrap rate**. The icons used at this stage are very important as they represent clear flow of material. This is the section that highlights wastage a company is making in terms of holding over or under inventory. **It is important to note that material movement is pushed by producer and not pulled by consumer.**
3. Lead Time Ladder: The bottom part is the simplest and extremely important. It indicates the length each process takes in value chain.

Did You Know?

The shorter your production **lead time**, the shorter the time between paying for raw material and getting paid for product made from those materials. A shorter production lead time will lead to an increasing in the number of inventory turns, a measure with which you may be more familiar (Rother and Shook, 2018).

Once the current information and material flow along with lead time calculation is complete, companies tend to reach at a **current state map** which is analyzed by all the stakeholder and company representatives to highlight wastes and its sources. These wastes are eliminated by implementing a **future-state map** which is the final stage of value stream mapping process.

Check Your Understanding

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Check Your Understanding: Value Stream Mapping

Interactive activity unavailable in this format

Text-based alternative to interactive activity available in Chapter 9.7.

Media Attributions and References

DanielPenfield. (2013). *[Value stream map: Example]* [Image]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:ValueStreamMapParts.png. CC BY SA 3.0.

9.5 Humanitarian Logistics

Learning Objective

4. Introduce the concept of Humanitarian Supply Chain Management.

Humanitarian Supply Chain Management

Disasters occurring across the world pose a severe threat to human society. Disasters may be natural (heavy rainfall, avalanches, earthquakes) or human made (industrial accidents, chemical leakages, building collapses) in nature (Maqbool & Khan, 2020). During and after the disaster, the provision of relief and recovery materials lowers victims' suffering. In such a situation, the supply chain network plays a crucial role.

Providing the "right materials" in the "right quantity" to the "right people" at the "right time" is the intention of typical supply chain management (SCM) (Sharma & Luthra, 2020). It is applicable for both commercial and humanitarian SCM (HSCM). In comparison with commercial supply chain management, the number of challenges in HSCM is greater (Barcik, Beamon, Krejci, Muramatsu & Ramirez, 2010). This is because HSCM is carried out under damaged infrastructure, such as limited energy resources and limited transport connectivity, working in coalition with multiple **stakeholders** (shown in Figure 9.6) involved in the relief activities, governmental interventions, and the final beneficiaries. From this, it may be well understood that HSCM operates in a more complex and challenging environment (Behl & Dutta, 2018). Furthermore, it is important that HSCM activities meet the triple bottom line (TBL) concept which is related to sustainability, i.e., addressing economic, environmental, and social concerns.

Figure 9.6

Actors in Humanitarian Logistics



*Note.*From Paciarotti, et al., 2021, p. 556. CC BY 4.0.. [Image description].

These humanitarian actors have distinct characteristics. They could have different **geographical coverage**. Furthermore, these actors can also be broadly different in nature, size, approach, mission, specialization, rules and regulations and scope of operations. Moreover, a humanitarian system is composed of a number of individualistic actors with self-sufficient perspectives which have a potential to become competitors (Maon, Lindgreen & Vanhamme, 2009). The presence of such a high number of differentiated and individualistic stakeholders raises the issue of better coordination of the relief chains and highlights the need for standards able to provide a shared language and shared understanding of procedures and processes.

The need for coordination will grow in the coming years also as a consequence of the increasing attention to localization in the humanitarian sector since the 2016 Global Humanitarian Summit (WHS, 2016). Localizing humanitarian response is "a process of recognizing, respecting and strengthening the leadership by local authorities and the capacity of local civil society in humanitarian action, in order to better address the needs of affected populations and to prepare national actors for future humanitarian responses." (OECD, 2017). In practical terms this implies a greater and greater

involvement of a plethora of different actors such as national authorities in aid recipient countries, national Societies of the Red Cross /Crescent, national/subnational/local non-governmental organizations (NGOs)/civil society organizations (CSOs), local and national private sector organizations (OECD, 2017). The resulting increasing complexity and necessity to cooperate adopting a shared "language" increasingly emphasizes the importance of widespread and shared standards. Usage of standardized processes, procedures, common templates, etc. increases interoperability between organizations, allowing coordination of the efforts between international and local partners.

The importance of coordination of humanitarian actors strongly emerged after the response to the Rwanda humanitarian crisis that began in 1994. In 1996, the problems and inefficiencies faced during this crisis determined the decision to launch the Sphere project, with the first set of minimum standards published and applied in 1998 (O'Donnell, Bacos & Bennish, 2002). In January 2000, the Sphere project published the first handbook identifying a set of a minimum standard in key lifesaving sectors to be achieved by emergency relief programs in order to improve the quality and accountability of NGOs for their actions in humanitarian responses.

Minimum standards are set in four key response sectors:

(1) water supply;

(2) sanitation and hygiene promotion (WASH);

(3) food security and nutrition;

(4) shelter, settlement and health.

In the following years, other standards have been developed adopting a similar approach, that is, via inclusive consultation processes with a wide group of practitioners. Currently, the Sphere, in coalition with other six standards initiatives:

(1) minimum standards for child protection in humanitarian action,

(2) livestock emergency guidelines and standards,

(3) minimum economic recovery standards,

(4) minimum standards for education,

(5) minimum standard for market analysis and

(6) humanitarian inclusion standards for older people and people with disabilities, constitutes the humanitarian standards partnership.

Despite that many areas of humanitarian operations are covered by this group of approved and widespread initiatives, the humanitarian logistics and supply chain are not yet deeply involved in this standardization process.

Syria Humanitarian Response

Syria represents one of the most complex Humanitarian Crisis in the world. With a total population of 21.7 million, 14.5 million people in Syria need humanitarian assistance. Out of which 11.8 million are already targeted by OHCA (United Nations Office for the Coordination of Humanitarian Affairs. (summarized from Humanitarian Insight, 2022).

Figure 9.7

Syria Crisis



Note. Syria Crisis From Freedom House, 2014. CC BY 2.0. Cropped.

The strategic objectives of Syria Humanitarian Response Plan 2022 -2023 are:

1. Provide life-saving and life-sustaining humanitarian assistance to the most vulnerable people with an emphasis on those in areas with high severity of needs.
2. Enhance the prevention and mitigation of protection risks and respond to protection needs through supporting the protective environment in Syria, by promoting international law, International Humanitarian Law (IHL) and International Human Rights Law (IHRL) and though quality, principled assistance.
3. Increase the resilience of affected communities by improving access to livelihood opportunities and basic services, especially among the most vulnerable households and communities.

There are 12 sectors in which help is provided to Syrian people under this plan:

1. Coordination and Common Services
2. Camp Coordination and Camp Management
3. Protection
4. Early Recovery and Livelihoods
5. Education
6. Food Security and Agriculture
7. Health
8. Nutrition
9. Shelter and Non-Food Items
10. Water, Sanitation and Hygiene
11. Logistics
12. Emergency Telecommunications

To learn more about what has been done in these sectors as Humanitarian Response, please visit Syria Humanitarian Response Plan 2022 – 2023.

Sustainable Humanitarian Supply Chain Management and Response to COVID-19

It is important that Humanitarian SCM activities meet the triple bottom line (TBL) concept, i.e., addressing economic, environmental, and social concerns. The TBL concept is aligned with the sustainability. Hence, it is necessary to carry out sustainable HSCM (SHSCM) activities. The organizations involved in relief activities are predominantly classified under three sections, namely bodies working under the United Nations (World Health Organization, Geneva, Switzerland), international organizations (International Committee of Red Cross, Geneva, Switzerland), and nongovernmental organizations (NGOs) (Doctors Without Borders, Geneva, Switzerland).

Disaster management is a set of operational activities and administrative decisions related to various disasters at all levels (Lu, Gao & Zhao, 2020). HSCM plays an integral role in disaster management. HSCM needs to be sustainable economically, environmentally, and socially; only then will HSCM meet the intended purpose of delivering medical essentials on time. Hence, SHSCM is critical in disaster management. Furthermore, SHSCM helps in meeting several sustainable development goals (SDGs), such as SDG 3 (good health and wellbeing) and SDG 17 (partnerships for the goals). SDGs are a set of goals proposed by the UN for the prosperity of people and the planet by the inclusive actions of global nations.

Did You Know? Challenges Faced by SHSCM

The role of SHSCM in COVID-19 is completely different and remains challenging compared to other more common disasters such as earthquakes, droughts, or floods. As a result, the organizations involved in SHSCM have no earlier experience (Lu, Gao & Zhao, 2020). Earlier studies have identified and discussed various challenges in SHSCM during a disaster situation. For instance, the study by Sabri et al. (2019) indicated a lack of coordination among the agencies involved in the relief activities as the fundamental challenge in SHSCM. This challenge results in a lack of communication, poor technological infrastructure, lack of administrative personnel, lack of clear policies, ineffective distributing relief material, and stagnation of relief activities (Vega, 2018).

Difficulty in fundraising is another challenge. With limited funds, only interim solutions are possible. For longer-term solutions, sufficient funds must be raised. Ozdemir et al. (2020) investigated the blockchain's efficiency in minimizing SHSCM challenges and embarked on introducing new technologies. Another study by Dubey et al. (2019) on the role of big data in organizational assistance revealed that the usage of big data paved the way for swift trust and collaborative performance. A similar study on the adoption of big data by Prasad et al. (2018) emphasized raising awareness among the government and NGOs about how the latest technology mutually benefits each party in SHSCM.

Adopting the latest cutting-edge technology greatly helps the functions of SHSCM activities, but such adoption by emerging countries remains a challenge (Queiroz, Wamba, De Bourmont & Telles, 2020). With limited technological advancement, limited capital support, and limited awareness of technological advancement, developing countries cannot be expected to competently address SHSCM challenges without the intervention of reliable technologies.

Video: Supply Chain in the Humanitarian Context (8:04)

Let's watch this video to know more about Supply Chain in Humanitarian Context.

Media 9.4. *Supply Chain in the Humanitarian Context* [Video]. HELP Logistics. (URL: https://youtu.be/CKNeGGmNuCE)

Check Your Understanding

Answer the question(s) below to see how well you understand the topics covered above. You can retake it an unlimited number of times.

Use this quiz to check your understanding and decide whether to (1) study the previous section further or (2) move on to the next section.

Check Your Understanding: Humanitarian Logistics

Interactive activity unavailable in this format

Text-based alternative to interactive activities available in Chapter 9.7.

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9.6 Summary

In the chapter, emerging concepts of Reverse Logistics, Information and Communication Technology, Value Stream Mapping and Humanitarian Reverse Logistics were discussed. Reverse Logistics works to manage problem inventories. Activities such as recovery, return, reuse or disposal of discarded products are part of reverse logistics. Information and Communication Technology helps in every facet of Value Chain. Be it Manufacturing, Transportation, Warehousing, Storage, Inventory Management or Distribution, ICT allows people and organizations to be connected and interact in the digital world. When organizations work, they tend to deal with a lot of wastes. Value Stream Mapping helps in eliminating these wastes, making the whole process, from upstream to downstream, transparent and increasing organization's efficiency. Humanitarian Logistics is a concept that integrates supply chain activities to help societies during disasters and natural calamities.

9.7 Key Terms, References, and Accessibility Descriptions

Key Terms

Batch Sizes – The number of products manufactured in one batch

Big Data – as extremely large sets of data or fast growing amounts of data from different sources that present industrial organizations with a variety of storage and analysis issues (Agarwal, Shiralkar, Aaher, & Jawade, 2021)

Blockchain – is mostly referred to as a cryptocurrency or digital money such as Bitcoin, Dogecoin, ripple etc. Blockchain is a decentralized digital ledger. Ledgers are used to keep a record of important things, financial or something else (Agarwal, Shiralkar, Aaher, & Jawade, 2021)

Changeover Time – Time elapsed during converting a line or machine from running one product to another

Cycle Time – Time taken from start of product to its completion

Geographical Coverage – Some actors act at regional and local levels, others operate at national and some at a global level.

Information and Communication Technology (ICT) – means all devices, components, applications, systems that allow people and organizations to be connected and interact in the digital world (Pratt, 2019).

Internet of things (IoT) – is used to connect various devices through a network in order to sense and collect data around the world on the internet to process various intelligent applications with the aid of embedded systems, artificial intelligence (AI), various software and sensors (Agarwal, Shiralkar, Aaher, & Jawade, 2021)

Lead Time – The time gap between placing an ordering and receiving it

Pull Value – The process that starts with customer demand.

Recalls products – mean officially retrieving products from manufacturers or users to the place of origin because discovered defects can harm consumers or hinder performance or realize more cost-effective product production.

Reverse logistics – "Reverse logistics is the process of dealing with goods that have been returned to the company by customers" (Cambridge Dictionary, 2022).

Scrap Rate – The rate that measures quality of output

Stakeholders – Participants

Uptime – Time during which a piece of equipment (such as a computer) is functioning or able to function (Mariam Webster, n.d.)

Working Time – The time spend on job for which a worker is paid salary

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Image Descriptions

Chart 9.2: Bar graph showing size of reverse logistics market world wide from 2020 to 2028 in billion US dollars. The chart gradually increases starting at 635.60 in 2020 to 958.3 in 2028.
2020 = 635.60
2021 = 669.07
2022 = 704.31
2023 = 741.40
2024 = 780.45
2025 = 821.50
2026 = 864.81
2027 = 910.36
2028 = 958.3

[Return to image].

Fig 9.2: Depictions of 2 product flows, forward and reverse.
Forward: Suppliers, factory, distributor/wholesaler, stores/consumers.
Reverse: Stores/consumers, defective returns/excess product returns, seasonal returns, fix/refurbish (can return to forward here through discount or regular channels), remove item, dispose of product/good will/waste, recycling/re-manufacturing [Return to image].

Fig 9.3: Letter reads:
April 6, 2022
Important Recall Notice Rattlesnake Bicycles spirit road bike Model #10445 – Spirit
Dear Davis & Daughters Bicycle shop customer,
Our records show that you purchased a spirit road bike (Model #10445) built by

rattlesnake bicycles between June 1, 2020 and August 2021.
Rattlesnake Bicycles is recalling this bicycle for a potential hazard regarding the frame. The weld where the Top Tube joins with the Head Tube can fracture. If a fracture occurs, the bike may become unstable and potentially lead to a crash.
[Image of the bicycle with area indicated]
Stop using it immediately if you have a Rattlesnake Spirit (Model #10445). Return the bike to Davis & Daughters Bicycle for repairs. We will replace the frame without cost.
If you are not sure if your bicycles is involved in the recall or if you have questions, please contact Davis & Daughters at: 555-555-0101 or visit the shop located at 25 Avenue B. Please bring your bicycle.
You may also contact Rattlesnake Bicycles: phone 1-800-555-0112, website https://rattleshankebikes.ca
We apologize for any inconveniences this recall may cause.
Respectfully,
Rattlesnake Bicycles

[Return to image].

Figure 9.5: The image shows parts of value stream map – Information flow, Material Flow and Lead Time Ladder. Information flows are at the top indicating flow of information from customs to company to suppliers. Material flow is in the middle indicating flow of material from upstream to downstream. Finally, lead time ladder is at the bottom indicating calculation of lead time between different processes.

[Return to image].

Figure 9.6: The circular chart shows stakeholders in Humanitarian Logistics. Clockwise from top: government, donors, inter-governmental organizations, non-governmental organizations, national police and armed forces, media, commercial/private sector organizations, and local populations.

[Return to image].

Figure 9.7: The image indicates the severity of Syria Crisis. It shows a person standing looking at demolished buildings around them.

[Return to image].

Alternative Text-Based Activities

Assessing What You Already Know

Question 1:

What does IT stand for?

- International Technology
- Information Technology – Correct
- Interactive Television
- Intercommunication technology

Feedback: IT stands for Information Technology.

Question 2:

What is Blockchain Technology?

- cryptocurrency
- digital money such as Bitcoin
- decentralized digital ledger
- All of the above – Correct

Feedback: All are blockchain technologies.

Question 3:

Value Stream Mapping is a Lean Concept that increases efficiency by reducing Muda (Waste).

- True (Correct)
- False

Feedback: Yes, Value Stream Mapping is a Lean Concept that increases efficiency by reducing Muda (Waste).

Question 4:

Supply Chain Logistics works around 7 R's. Which of the following is NOT one of them?

- Right time
- Right Condition
- Right Place
- Right Loading (Correct)

Feedback: Logistics aims at having the right item in the right quantity at the right time at the right place for the right price in the right condition to the right customer.

[Return to activity].

Check Your Understanding: Explain the concept of Reverse Logistics and Recalls

Question 1:

Drag and Drop definitions in correct category:

Recalls products	officially retrieving products from manufacturers or users to the place of origin because discovered defects can harm consumers or hinder performance or realize more cost-effective product production
Reverse logistics	is the process of dealing with goods that have been returned to the company by customers

Feedback: Recall products mean officially retrieving products from manufacturers or users to the place of origin because discovered defects can harm consumers, hinder performance, or realize more cost-effective product production. The request to recall products can be by the government or company. This official act helps prevent and reduce risks related to injuries or safety concerns. In this scenario, companies provide consumers with compensation. Recalls can be mandated by Safety Commissions or voluntary. "Reverse logistics is the process of dealing with goods that have been returned to the company by customers" (Cambridge Dictionary, 2022).

Question 2:

To mitigate the amount of product disposal, industries have been carrying out 6R concepts to improve recovery implementation and minimize non-value-added activities within end-of-life (EoL) management. Check all 6R concepts that apply.

- Reduce (Correct)
- Reuse (Correct)
- Recycle (Correct)
- Recover (Correct)
- Redesign (Correct)
- Remanufacture (Correct)
- Recreate (Incorrect)
- Reupdate (Incorrect)

Feedback: To mitigate the amount of product disposal, industries have been carrying out 6R concepts (namely, Reduce, Reuse, Recycle, Recover, Redesign, and Remanufacture) to improve recovery implementation and minimize non-value added activities within end-of-life (EoL) management.

Question 3:

According to Statista (2021), the size of the reverse logistics market globally will be continuously expanded and projected to reach (_____) billion U.S. dollars by 2028

- 958.3 (Correct)
- 900.3 (Incorrect)
- 938.3 (Incorrect)
- 853.6 (Incorrect)

Feedback: The size of the reverse logistics market worldwide has been significantly increasing. According to Statista (2021), the size of the reverse logistics market globally will be continuously expanded and projected to reach 958.3 billion U.S. dollars by 2028 (Statista, August 4, 2021).

Question 4:

Drag and Drop differences between forward and reverse supply chains in correct Category

Table 9.1

Differences between forward and reverse supply chains

Forward Supply Chain	Reverse Supply Chain
Focus on increasing profit and cost minimization	Focus on environmental issues, regulations, profit and cost minimization
Product demand is quite straightforward to forecast	Returned products are relatively difficult to estimate
The quantity of product is less variation	The quantity of returned products are highly uncertain
Conventional marketing techniques can be used	There are some elements requiring complicated marketing
Processing times and stages are well identified	Processing times and stages are vary based on the quality of returned products
Products are delivered from one location to other locations	Used products are collected from a lot of locations and then reach to one processing center
Speed is one of the main factors in terms of competitive advantage	Speed is not an important element
Product packaging is standard	Returned product packaging highly varies or lack of packaging
Product structure is standard	Returned product structure is modified
Cost estimation is quite easier because of accounting systems	Cost factors are complicated to determine
Disposition options are rather clear	Disposition alternatives depended on the condition of a returned product
Inventory management is consistent	Inventory management is chaotic
Cost implications are quite clear	Cost implications are unclear
Processes for real-time product tracking are highly visible	Processes for returned product tracking are less visible because of lack of information system infrastructure
Product life cycle changes are easily managed	Product life cycle changes are difficulty managed
Models are relatively deterministic	Models are more stochastic
Key importance to manufacturers	Key importance to end-of-life processors (such as remanufacturers, recyclers)

[Return to activity].

Check Your Understanding: Define how ICT is supporting the global value chain

Question 1:

Companies are lucky to have advanced ICT because it provides a (_____).

- slew of cost savings – (Correct)
- lack of visibility (Incorrect)
- raw materials (Incorrect)

Feedback: Companies are lucky to have advanced ICT because it provides a slew of cost savings. Advantages include insights, building customer bases, creating new products and services, internet shopping, transactions, digitalization of businesses, finding fast solutions, speeding up order tracking and processes, enhancing the exchange of information, increasing collaboration, and transparency in the global value chain.

Question 2:

Today's organizations are constantly searching for innovative ways to integrate ICT into their business process to acquire sustainable benefits.

- True (Correct)
- False (Incorrect)

Feedback: Today's organizations are constantly searching for innovative ways to integrate ICT into their business process to acquire sustainable benefits.

Question 3:

What does blockchain mean? Write your response in the box below.

Feedback: Blockchain is mostly referred to as a cryptocurrency or digital money such as Bitcoin, Dogecoin, ripple etc. Blockchain is a decentralized digital ledger. Ledgers are used to keep a record of important things, financial or something else.

Question 4:

Drag and Drop definitions in correct category

Blockchain	is mostly referred to as a cryptocurrency or digital money such as Bitcoin, Dogecoin, ripple etc. Blockchain is a decentralized digital ledger. Ledgers are used to keep a record of important things, financial or something else
Information and Communication Technology (ICT)	means all devices, components, applications, systems that allow people and organizations to be connected and interact in the digital world (Pratt, 2019).
Big Data	as extremely large sets of data or fast growing amounts of data from different sources that present industrial organizations with a variety of storage and analysis issues.
Internet of things (IoT)	is used to connect various devices through a network in order to sense and collect data around the world on the internet to process various intelligent applications with the aid of embedded systems, artificial intelligence (AI), various software and sensors

[Return to activity].

Check Your Understanding: Value Stream Mapping

Question 1:

Which of the following is not among the eight wastes discussed in the section:

- Unnecessary Inventory
- Waiting
- Unutilized Talent
- Water (Correct)

Question 2:

Drag the words. Value Stream Maps include:

Process Flow

Information Flow

Material Flow

Question 3:

Information flow indicates Push Value Principle.

- True
- False (Correct)

Question 4:

Is it True: The shorter your production lead time, the shorter the time between paying for raw material and getting paid for product made from those materials. A shorter production lead time will lead to an increasing in the number of inventory turns, a measure with which you may be more familiar.

- Yes (Correct)
- No

[Return to activity].