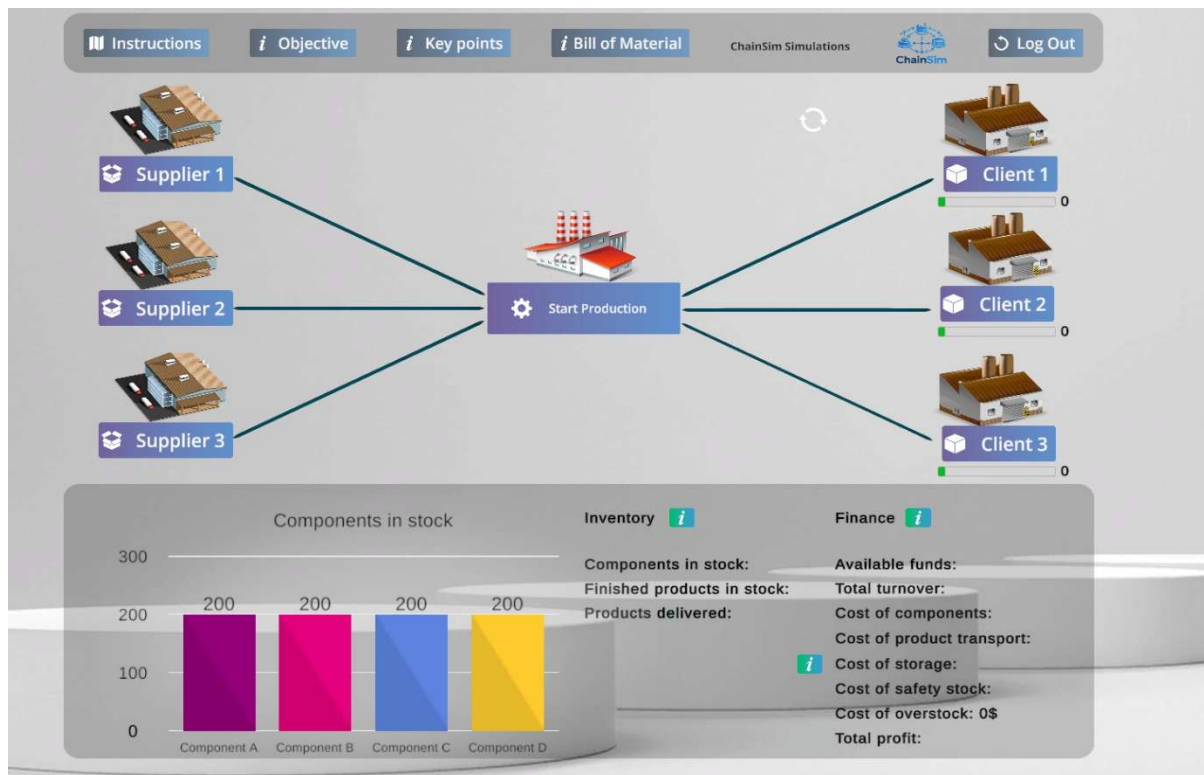




ChainSim Simulation

Student Handbook & Teacher Guide



PART A: STUDENT HANDBOOK

1. Introduction

Welcome to **ChainSim**, an interactive online simulation designed to help you understand and apply core concepts of **Supply Chain Management**, **Operations Management**, **MRP**, and **LEAN thinking**.

In this simulation, you will manage the supply chain of a small manufacturing company over **15 simulated days**, completed in approximately **45 minutes of real time**. You may play individually or as part of a team.

Your performance will be evaluated using financial results, inventory efficiency, and delivery reliability.



2. Your Role

You are the manager of a mobile phone assembly company, **Nortek Manufacture Ltd.**

Your main objectives are to:

1. Fulfil all customer demand.
 2. Manage component inventory efficiently.
 3. Avoid production stoppages.
 4. Maximize total profit.
 5. Maintain 50 units of each component in stock.
 6. End the simulation with zero finished products in storage.
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3. Simulation Structure

- Duration: 15 simulated days
- Real-time duration: ~45 minutes
- Complexity: Increasing complexity based on the parameters

Each game can contain variables such as supplier selection, safety stock, transportation modes, delivery windows, and overstock.

4. Available Funds and Profit

Available funds refer to the amount of money held in the company's bank account that can be used immediately to purchase components from suppliers. At the beginning of the simulation, available funds are \$0; therefore, no additional components can be purchased initially. you must rely on the components already in stock (200 units of each component).

When finished products are delivered to clients, available funds increase based on the quantity delivered and the unit price of the product. The unit price is specified in the Client sheet as "price per item." Transportation costs for deliveries are not deducted from available funds; instead, they are deducted from profit.

The same rule applies to component sourcing: the cost of components is deducted immediately from available funds, while transportation costs related to sourcing are deducted from profit only.

Profit

Revenue:

Revenue = Delivered Products × Price per Item



Total Profit:

Total Profit = Revenue – All Costs (components, transport, storage, penalties, safety stock, overstock)

5. Production and Components

Bill of Materials (BOM)

To assemble **one final product**, you need:

- 1 unit of Component A
- 2 units of Component B
- 3 units of Component C
- 4 units of Component D

Initial inventory: **200 units of each component**

Production speed: **20 final products per day**

6. Suppliers

You can source components from **three suppliers**, each offering different:

- Prices
- Lead times
- Maximum shipment volumes
- Transportation methods
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In the ChainSim simulation, three suppliers are available, each offering different components with varying order volumes, prices, and lead times. Participants are required to place orders with the appropriate supplier and in appropriate quantities. To ensure continuity of the manufacturing process, sufficient component availability must be always maintained.

Suppliers' capacity limits:

If this parameter is activated, participants must consider that only a limited quantity of components can be ordered from each supplier, which may require sourcing some components from suppliers with higher costs than others.

Delivery times for suppliers:

The production speed is 20 final products per day. If the supplier delivery time parameter is activated, participants must consider that ordered components will arrive in stock only after the delivery time specified in the supplier window. **For example, if a supplier's lead time is two days, 40 final products will be produced before the shipment arrives in stock.**



Different transport methods and delivery times from suppliers:

With this parameter activated, you must also select an appropriate transportation mode (air, road, or sea), balancing cost against delivery speed. In some cases, more expensive transportation options may be required to ensure that production receives all necessary components on time.

7. Inventory Management

Effective inventory management is critical to your success.

Key rules:

- If any component reaches **0 units**, the simulation ends automatically.
- Finished products above **50 units** incur a storage cost of **\$0.50 per unit**.
- **Safety stock:** minimum 50 units per component, with extra costs (if parameter chosen)
- **Overstock:** inventory above 300 units per component incurs additional costs (if parameter chosen)

Safety stock at level 50:

You need to keep a minimum of 50 units of each component as safety stock (an extra level of inventory maintained to reduce the risk of stockouts caused by uncertainties in supply and demand).

You may use safety stock, but it is not recommended, as it will cause additional costs for your company. [The cost of using safety stock space is \\$0.20 for each unit of a component that is below the regular storage level.](#)

Overstock criteria for components:

Carrying excess inventory (overstock) causes additional costs. Your company has extra storage space where excess inventory is held until components on the floor clear out. Using more space for storage means less floor space available for selling. In addition, you must pay for utilities and other costs related to storage.

If the overstock criteria is active, your regular storage space is limited to 300 units per component. This means that if you have more than 300 units of any component in stock, you must pay an overstock cost. [The cost of using extra storage space is \\$0.20 for each unit that exceeds the regular storage limit.](#)



8. Customers and Delivery

There are three customers with different levels of demand for final products and different transportation costs. Product prices also vary by customer; therefore, participants must analyse delivery priorities in order to maximise available funds.

Products can be delivered in different shipment volumes, each associated with a corresponding transportation cost. Larger shipments benefit from lower transportation costs per unit. Prices of the final products (mobiles) are fixed and cannot be adjusted.

The customer demands are as follows:

- Client 1 requires 50 units of final products
- Client 2 requires 100 units of final products
- Client 3 requires 150 units of final products

The simulation ends and a summary window is displayed once all products have been delivered to all clients.

Delivery times for clients:

If the client delivery time parameter is activated, participants must consider that shipped finished products will arrive at the client only after a one-day delay. For example, once the delivery button is selected in the client window, it will take one day (equivalent to the production of 20 finished products) for the shipment to reach the client.

On-time delivery criteria (OTD) for clients:

If a specific parameter is activated, each client will have distinct delivery timing requirements. For example, Client 1 may require a total of 50 units, with 20 units delivered within two days. Participants must ensure that the correct quantities are delivered within the specified time frames in order to avoid delay-related costs.

If products are delivered late, a penalty of \$200 will be charged for each affected client.

The delivery-on-time rate indicates the proportion of a client's total demand that has been delivered within the required time.

Different transport methods and delivery times for clients' orders:

With this parameter activated, you must also select an appropriate transportation mode (air, road, or sea), balancing cost against delivery speed. In some cases, more expensive transportation options may be required to ensure that client receives all necessary products on time.



9. Performance Indicators

You will be evaluated using:

- Total Profit
 - Return on Investment (ROI)
 - Inventory levels and turnover
 - Delivery accuracy (on-time delivery)
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10. End of Simulation

The simulation ends when all customer demand is fulfilled.

You must complete the results form with:

- Your name or team name
 - Email address (optional)
 - Teacher's email (optional)
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PART B: TEACHER GUIDE

11. Educational Objectives

ChainSim is designed to help students:

- Understand end-to-end supply chain decision-making
 - Apply inventory management concepts (ROP, safety stock, overstock)
 - Analyze financial trade-offs between cost, service level, and profit
 - Develop analytical thinking under time pressure
 - Learn through competition and reflection
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12. Simulation Setup

- Suitable for individual or team-based learning
 - Recommended group size: 1 – 50 students
 - Can be used in-class or as an assignment
 - Typical session duration: 60–90 minutes including briefing and debriefing
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13. Monitoring Student Performance

Teachers can access a **teacher dashboard** that provides:

- Individual and group rankings
- Performance by level
- Inventory and funds graphs



- Delivery accuracy indicators

These tools allow instructors to quickly identify strategies, mistakes, and learning opportunities.

14. Assessment and Grading

Minimum requirement for passing a level:

- **All products must be delivered**

Points are awarded based on total profit thresholds per level.

Inventory deviation:

- If component stock is higher or lower than 200 units at the end of a level, **–1 point penalty** applies.

Suggested grade scale:

- Grade A (Excellent): 9–10 points
 - Grade B (Very Good): 7–8 points
 - Grade C (Good): 5–6 points
 - Grade D (Average): 3–4 points
 - Grade E (Accepted): 1–2 points
 - Grade F (Failure): Products not fully delivered
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15. Teaching Tips

- Encourage students to plan before starting the simulation
 - Pause the simulation for discussion and reflection
 - Compare different strategies during debriefing
 - Use rankings to motivate engagement, not only competition
 - Focus feedback on decision logic, not only final profit
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16. Learning Outcomes

After completing ChainSim, students should be able to:

- Explain key supply chain and operations concepts
- Calculate profit, ROI, and reorder points
- Evaluate supplier and transport trade-offs
- Understand the impact of inventory decisions on financial performance