

# Case Study 2 Analysis

Gestão de Operações e Logística

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# *Doré-Doré*

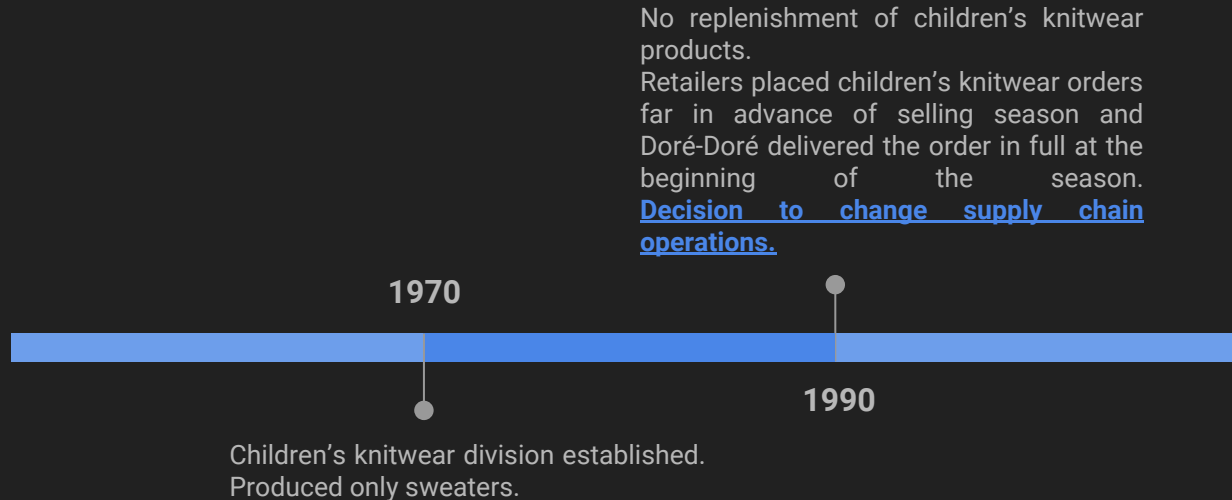
## *Case Study 2)*

*Hosiery and children's knitwear products company founded as an evolution of the family business Doré Society from 1819.*

1. Evaluate the changes Doré-Doré has made in its children's knitwear division.

How does the performance of the traditional operations and the cellular manufacturing system differ?

For example, how does work-in-process inventory change when cells are implemented?



### *Children's Knitwear Division*

**Sales representation:** 12%

**Operations:** Mery plant (20 Km from Troyes)

**Knitting & sewing:** Grès plant (10 Km from Troyes)

**Production:** 2,000 garments/day

#### **Planning & production cycle:**

1. Yarn & fabric suppliers;
2. Knitting;
3. Dyeing;
4. Cutting;
5. Sewing & finishing.

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**Before decision:**

Product designs completed, demand forecasts made and preliminary production schedules established a **full year before** finished goods were delivered to the selling floor.

Result:

Long lead times;

Manufacturers vulnerable to vagaries of consumer demand.

**Goal:**

Supply chain with enough speed and flexibility to respond quickly to shifting market demand.

Result:

Shorter lead times;

Replenishment based on actual sales data.




**Ensure supply chain meets consumer needs easily.**

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**How to achieve  
faster and more  
flexible supply  
chain?**

- Making demand forecasts;
- Establishing production schedules closer to selling season;
- Reducing manufacturing lead times;
- Basing replenishment on actual sales data.

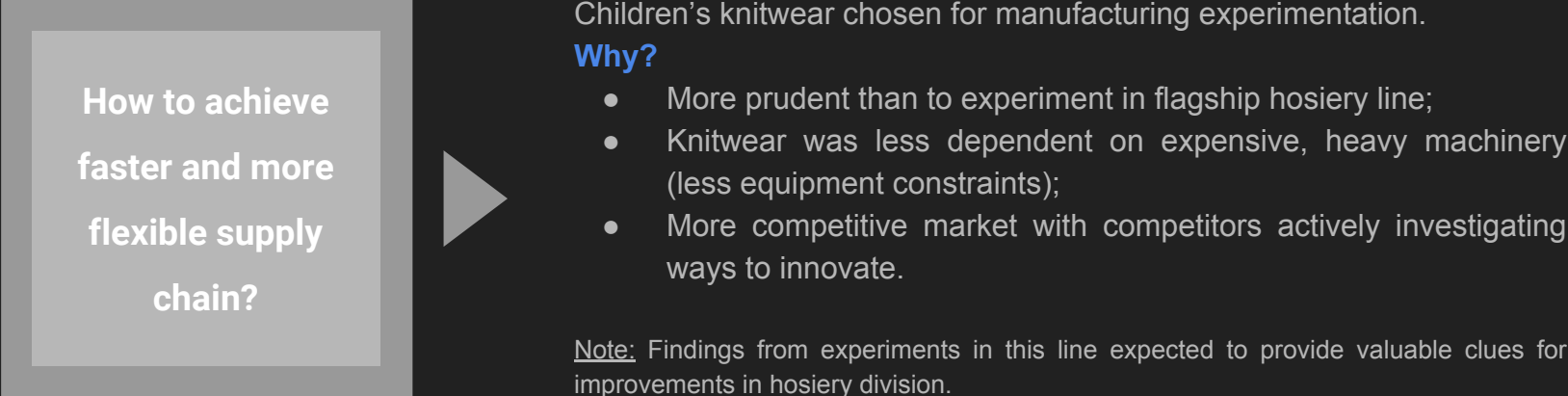
**Solution:**

Implementation of a cellular manufacturing system.

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**How to achieve  
faster and more  
flexible supply  
chain?**

Children's knitwear chosen for manufacturing experimentation.

**Why?**

- More prudent than to experiment in flagship hosiery line;
- Knitwear was less dependent on expensive, heavy machinery (less equipment constraints);
- More competitive market with competitors actively investigating ways to innovate.

Note: Findings from experiments in this line expected to provide valuable clues for improvements in hosiery division.

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### Traditional manufacturing

**Throughput time per garment:** 15 days

**Defect rate:** 5%

**Labor content:** 10 min

**Machine cost:** Low

#### Keywords:

Long lead times

Handle larger batches

Repetitiveness:

- Expertise
- Rhythm
- High levels of speed



### Cellular manufacturing

**Throughput time per garment:** 1 day

**Defect rate:** 2.5%

**Labor content:**  $\leq$  those made on the line.

**Machine cost:** High (& often thread change)

#### Keywords:

Shorter lead times

Handle decreasing batches

Teams with multi skilled workers:

- Autonomy
- Motivation
- Loyalty

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### Cellular manufacturing

In addition, defects were usually found before the item left the cell and corrected more easily due to cross-training and accessibility of appropriately configured machines.

#### Cell workers:

- Maintained motivation;
- Performed additional tasks such as:
  - Tasks traditionally performed by supervisors;
  - Moving to other machines when theirs were in need of repair;
  - Filling up for missing coworkers;
  - Taking the initiative to implement changes that better suited that cell.

#### Supervisors:

- Began to cross-train workers to prove their value.

#### Net result:

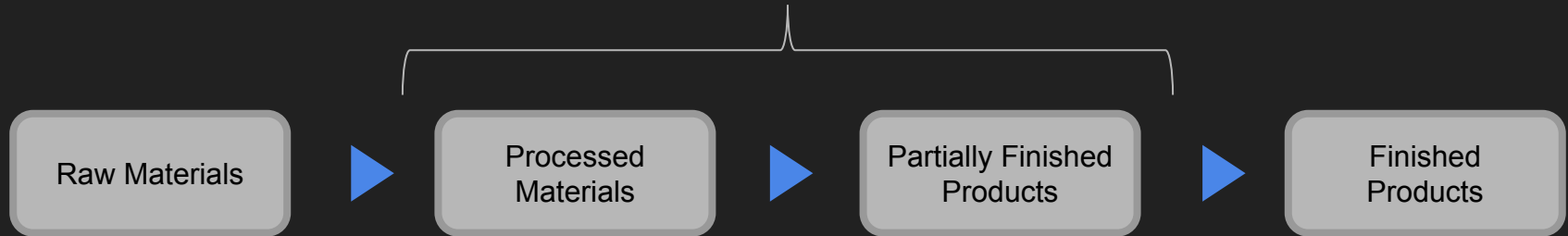
- Output per worker remained roughly the same.



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### Inventory

**WIP (work-in-progress)** → all materials and partially finished products that are at various stages of the production process



*“Firms in the industry typically experienced inventory carrying costs in the 20% to 25% range.”*

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**WIP** is directly related with **Setup Time**

#### **Setup Time**

Period required preparing a device, machine, process or system to be ready to function or accept a job.

Implementing cells layout...

Since manufacturing cells are designed to process parts having similar shapes and relatively similar sizes.

- Not required to change or adjust machines and tools within cells to process similar parts.
- Thus, setup time is greatly reduced in cellular manufacturing.

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LITTLE LAW

$$\text{Lead Time} = \text{WIP} / \text{Rate of Output}$$

**Traditional manufacturing**

**Lead Time** = 15 days

**Rate of Output** = 2,000 units per day

**WIP** =  $15 \times 2,000 = 30,000$



**Cellular manufacturing**

**Lead Time** = 1 day

**Rate of Output** = 2,000 units per day

**WIP** =  $1 \times 2,000 = 2,000$

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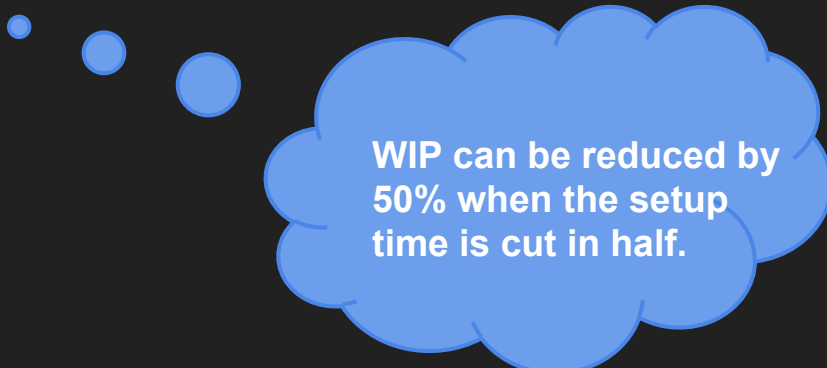
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*"Firms in the industry typically experienced inventory carrying costs in the 20% to 25% range."*

Implementing cells layout...

- Reduce setup times
- Reduce the amount of work-in-progress
- Reduce inventory costs



**WIP can be reduced by 50% when the setup time is cut in half.**

## 2. What changes are required to ensure successful implementation of cellular manufacturing? Is worker cross-training necessary?



Required changes?

- Attempt similar trial in hosiery division as in knitwear first;
  - Although findings from children's knitwear division trials are expected to provide clues for hosiery division, some might not apply since processes, the target market and so on are very different;
  - Less risk;
  - Opportunity to refine processes iteratively.
- Implement system that ensures availability of raw materials;
  - Biggest constraint in children's knitwear.
- Apply cell manufacturing to fashion items only.
  - Fashion items are more subjective to rapidly changing trends so shorter throughput time is essential.

## 2. What changes are required to ensure successful implementation of cellular manufacturing? Is worker cross-training necessary?



### Cross-training

The ideal point of view

- When workers are able to work with different machines and techniques, they are able to balance out work flows in situations of hardship;
  - Missing colleagues;
  - Machines in need of repair.
- When workers perform different tasks, repetitiveness of motion is reduced;
  - Helps with motivation and, consequently, performance.
- Since workers are trained in different competencies and cell is autonomous, members develop the initiative to solve their own problems to achieve the best performance.

## 2. What changes are required to ensure successful implementation of cellular manufacturing? Is worker cross-training necessary?



**Cross-training**

Another point of view

- The Director of Manufacturing of the hosiery division believed the teams should not be completely cross-trained. Firstly workers would be specialized for a specific task. After being specialists they would be trained in a second task.
- However, he also proposed that specialists in two particular activities mustn't have cross-training since it could compromise their work:
  - Blind-loop toe-closing, “(...) nearly extinct art requiring excellent eyesight, training and concentration.”
  - Quality control, “(...) quality standards might be compromised if those controlling quality understood how difficult some of the sewing tasks were.”

## 2. What changes are required to ensure successful implementation of cellular manufacturing?

Is worker cross-training necessary?

We believe the appropriate approach considering cross-training would be to:

- Cross-train all workers.
  - This method has proven to reduce defect rates and workers in this format feel more accountable, which is why concerns regarding quality are a bit unreasonable.

In addition, we believe:

- All workers who are not already dealing with the blind-loop toe-closing task or newcomers could receive some initial training to allow the company to understand if they would be suited for that job, since number of workers in this line of work is decreasing.
  - If they proved to have a knack for it, they should be more heavily trained into that task;
  - If not, they should continue with their current task and be cross-trained in different ones useful to the cell.

Maintain the benefits of cross-training where it can be successfully implemented while not taking the risk of reducing the quality of the end product.



**Cross-training**

**Conclusion**



### 3. What is Doré-Doré's motivation for converting to cells?

Should the company continue with its plans for complete implementation of cells in children's knitwear?

If not, which knitwear products (if any) should be manufactured in cells?



The diagram consists of a large light blue square with a darker blue border. Inside the square, the word "Motivation?" is written in white. To the right of the square is a blue right-pointing triangle. To the right of the triangle is the text "Doré-Doré aims to:" followed by a bulleted list. Below this list is a blue downward-pointing triangle, which points to the text "By:" followed by another bulleted list.

Motivation?

#### Doré-Doré aims to:

- Reduce costs;
- Improve customer service;
- Attain better working environment;
- **Strengthen competitive position.**

#### By:

- Improving manufacturing flexibility;
- Reducing lead times;
- Maintaining exceptional product quality despite those changes.

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#### Traditional Method

Long lead times



Vulnerability to fluctuations in demand

fashion lines (rapidly changing trends)

seasonal lines (hard to foresee climate changes)

#### **If offer > demand,**

additional cost to stock finished inventory;  
loss of value of unsold goods.

#### **If offer < demand,**

additional cost in labor requirements (extra working hours).

There was a year that...

- 20% of hosiery inventory could **not be sold at full price**.
  - 90% of excess stock sold the following year at cost in closeout sales or through a discount "second-quality" label;
  - 10% sold below cost through discounters and factory outlets.

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### Cellular Manufacturing

Allows to base production and replenishment on actual sales data



Reduced risk of significant difference between offer and demand

Cross-training in a cell allows workers to perform different tasks which eliminates repetitiveness of motion



More satisfying work environment

Workers work in groups



Generates loyalty and initiative since the whole team feels accountable for performance and wants to cooperate

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### Cellular Manufacturing

A cell is destined for a family of similar items so machines do not have to be adjusted



Reduced setup time and, consequently, reduced work-in-progress

Product produced in a single cell where machines are close to each other



Reduced material handling cost and time and material flow distance

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Current context

Currently children's knitwear is produced twice per year following the format of large orders taken in advance with clear delivery dates. Continuing with this methodology, the **traditional method is more suitable** than cells since it allows for dealing with large batch sizes. However, this format is increasingly more at **risk of becoming uncompetitive**, which is why innovation is impending.

### 3. What is Doré-Doré's motivation for converting to cells?

Should the company continue with its plans for complete implementation of cells in children's knitwear?

If not, which knitwear products (if any) should be manufactured in cells?

A possible solution would be to:

- Adopt **cell manufacturing** for more **fashion based products**;
  - This way, Doré-Doré could actually start offering **four production runs per year** instead of the traditional two for these items, increasing the offer to its customers and retailers and reducing the risk of putting out items that will be out of fashion by the time they reach the market.
- Maintain the **traditional method** for the **standard products**.
  - Since standard products are not subject to rapidly changing trends, if there is exceeding product, at least it will not lose value over time;
  - Restriction: These products would need to be produced in a big enough amount to benefit from large production outweighing finished inventory holding costs between seasons.

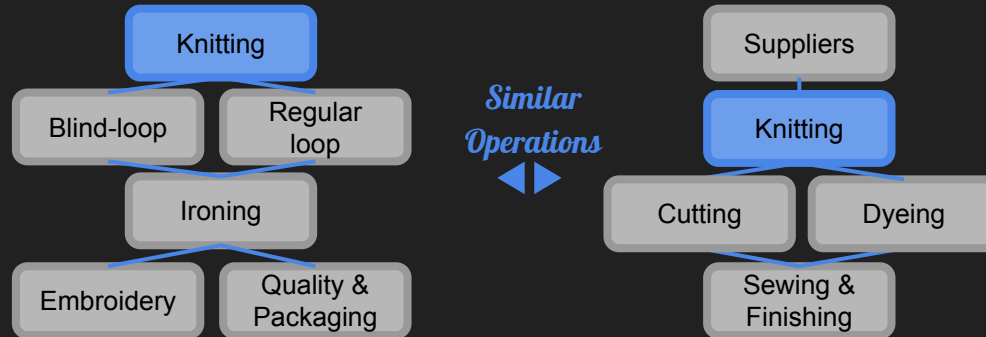
**All of this considered, there should be a full financial analysis of the real costs of cell implementation and forecasts on the resulting profit to ensure its benefits outweigh the cost.**

4. Should Doré-Doré implement cells in its hosiery production area? If so, would you suggest the changes to the cell design as currently proposed by M. Enfert? If not, what alternative approaches could Doré-Doré take to address the concerns Mr. Marguet raises in the case?

We believe cells should not be fully implemented in the hosiery division.

**Why not to fully implement cells in hosiery division? (1/2)**

- Hosiery production and knitwear involve very different operations which is why the trial performed in the children's knitwear division can not be considered fully when considering this area even if it proves fruitful;
  - For some of the operations in question it might not even make sense to work in a cell, for example, ironing or quality control.



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**Why not to fully implement cells in hosiery division? (2/2)**

- We are not given information concerning the company's budget but it is important to consider that machinery in the hosiery division is particularly expensive, so a machine or more of every type per cell is troublesome;
  - Ironing machines cost from 350,000 to 800,000FF.
- Maintaining M. Enfert's view of having cross-trained workers dividing their time in 80% for their primary activity and only 20% for the task they were cross-trained hardly allows for workers to eliminate the repetitiveness of their work;
  - Benefits related to better working environment will not be as evident if noted at all.
- M. Enfert's proposal of having 36 workers in a cell compared to the teams of 6 workers in children's knitwear once again reduces the benefit of loyalty and family-like relation between team members.



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**Proposed alterations:**

- Cross-training:
  - Give more importance to cross-training and assign more time for secondary task instead of 80/20 ratio;
    - This should help reduce bottlenecks in certain activities.
  - Include cross-training workers in blind-loop and quality control but making sure a worker does not perform quality control on a item they have helped produce to remove biased opinion.
    - Incentivise already existing workers to attempt to learn blind-loop and teach new employees.
- Placement of the cells, refrain from:
  - Locating cells in windowless lower floors as it is not conducive to good working environment or quality control;
  - Placing ironing operations close to quality control operations as the machines are noisy and the environment too hot.

Note: With task force proposed by M. Enfert of 236 workers divided in cells of 36 workers, there does not appear to be enough space to properly place all cells without sacrificing the points mentioned above.
- Cell implementation:
  - Since ironing machines can be used for all types of hosiery and work at high capacity, **do not implement** cells for this task.

# THANK YOU