Case study

Implementation of an inventory management model along the entire supply chain under Demand Driven MRP

INDUSTRIAS HACEB
Medellín, Colombia

By
Haceb & Flowing Consultoría
December, 2018
Industrias HACEB - location

Copacabana, Antioquia province, Colombia

+4,000 Employees
250,000 m² Total plant area
4.5 M un Production capacity
78 years Market presence
Company’s timeline

- **40’s**: Start out
- **50’s**: Growth starts
- **60’s**: Enterprise consolidation
- **70’s**: Innovations’ speed up
- **80’s**: Technology update
- **90’s**: Market expansion
- XXI century: Harvesting success and looking out for the future

78 years competing in the world

1940 → 2018

2018: DDMRP implemented. In the way to the best practices under DDAE model.
José María Acevedo, Haceb’s founder, 99 years old and still goes to the company every day
A lifetime of perseverance

“When I got ask if I have had any difficult moment in this whole story, I answer ...

I just have not had any easy moments”.

José María Acevedo
Main figures

**$250MM**
Sales
Local sales: 91%
International sales: 4%
Whirlpool partnership: 5%

**32%**
Share
In the Colombian market

**12 countries**
Export markets
Central America & Ecuador make up 58% of the export market

**$120MM**
Capital investment
- New refrigerator manufacturing plant
- Plastic injection plant update and capacity expansion.
- New technology development for injection of plastic parts for HWI alliance
- Warehouse expansion and raw materials management centralization.
- Manufacturing of heating products centralized
- New packaging technology (Clear View).
- SAP
- DDMRP

Whirlpool’s partnership for manufacturing washing machines
Starting year: 2016
Washing machines per year: 85,000
Product’s portfolio

**Refrigerators**
- 35% local market share
- 400,000 units/year
- 6 SKU’s in the top 10 in the local market

**Washing machines**
- 24% local market
- 240,000 units/year
- The SKU most sold in local market

**Stoves**
- 37% local market share
- 200,000 units/year
- 6 SKU’s in the top 10 in local market

**Built – in devices**
- 51% local market share
- 415,000 units/year

**Gas water heaters**
- 50% local market share
- 70,000 units/year

**Air conditioners**
- 6% local market share
- 13,000 units/year
Supply chain network

- **Suppliers:**
  - Local: 70
  - International: 120
- **Raw materials:**
  - Local: 1800 SKU’s
  - International: 400 SKU’s
- **Customers:** 400+
- **500+ finished products: manufactured and commercialized**
- **More than 10,000 spare parts SKU’s**

**Commercialized products**

- Plastic injection plant
- Refrigerators plant
- Stoves and heaters plant
- HWI (washing machines) plant
- Spare parts center (SOAC)
- Distribution center Copacabana
- Customers
Supply chain flow - Appliances

Manufactured and commercialized

- One national distribution center
- Seven regional distribution centers in Colombia and three specialized sale rooms
- 411 manufactured and 96 commercialized parts

Suppliers

Warehouse 1000 Raw Material

Plants
- RM Refrigerators plant
- RM Plastic plant
- RM stoves and heaters plant
- Semi-finished
- Semi-finished
- Semi-finished

Commercialized products

A000

Spare parts warehouse

Customers

Medellín

Bogotá

Pereira

Show room

A001

A002

A003

A004

A005

A006

RM Refrigerators plant
RM Plastic plant
RM stoves and heaters plant
Spare parts

Show room

RM Refrigerators plant
RM Plastic plant
RM stoves and heaters plant
Spare parts

Semi-finished
Semi-finished
Semi-finished
Supply chain flow - Spare parts

Manufactured and commercialized

- One national distribution center (SOAC)
- Twenty regional distribution centers
- More than 10,000 SKU’s
- Service promise: 24 hours delivery after customer request
• Stoves and heaters plant: 8 production lines, 3,500 units/day
• Refrigerators plant: 6 product families, 1,300 units/day
• Washing machines plants: 2 product families: Agipeller (spindle) 400 units/day; Impeller (rotating hub) 400 units/day
2014: Improvement base line

### Planning
- Planning was not an important function.
- Priorities: equipment efficiency and costs.
- Inventory excess in order to protect service level.

### Procurement / Inventories
- Suppliers low level service.
- High stock - out of finished goods.
- High inventory’s level.
- Obsolescence.

### Information for making decisions
- Planning used to be the only responsible for the forecast.
- Sales were the paramount indicator.

### Results
- High inventories
- Working Capital excess
- Very large Business Operating Cycle
- Bad service level
- High lost sales
- Rising logistics expenses
- Obsolescence
Supply’s model evolution

2014
- Sales and operation model
- Vendors development
- KPI’s redefinition

2015
- SAP implementation
- New Commercial and Logistics role

2016
- Supply chain Management
- Raw Material

2017
- Beginning of DDMRP implementation:
  - Distribution’s centers
  - Spare parts
  - New planning role
  - Portfolio Management

2018
- DDMRP consolidation:
  - Procurement
  - Manufacturing
  - Production Wheel
  - Integration of the Logistics and Commercial areas

- Sales and operations planning’s model, the ERP (SAP) and the design of the supply chain renew the supply model.
- Between 2014 and 2017 the results of the strategic and tactical changes in the supply model were consolidated.
- And there is still possibility to better off those results ... ¿how is it possible?
Indicators’ Snapshot before DMRP

- **Service level**
  - Finished goods: 93%
  - Spare parts: 82%

- **Business Operating Cycle**: 79 days

- **Lost Sales**: 3.5%

- **Warehouse surface**: 28.180 m²

- **Stock outs – finished product**: 11%

- **Sales / net working capital**: 29%

The results reached between 2014 and 2017 evidenced very good performance, however it was required to improve the system in order to get a world class management:

**DDMRP**
Planning before DDMRP

Sales forecast at the SKU level (local, exports, services and partnerships)

Demand planning

Production planning

MPS and MRP processes

Execution process: sourcing, production, distribution

**Indicators measurement**

- Forecast accuracy:
  - Make product: 40%
  - Commercialized product: 30%
- Service level: 88%
- Inventory level: US$57.000.000
- Business operating cycle: 124 days
- Planning versus production execution: 85%
DDMRP model

- Aggregated demand planning
- Aggregated production planning
- Production wheel
- Planning priorities based on DDMRP/R+
- Follow up of execution alerts base on DDMRP/R+
- Procurement, production and distribution (stock deployment) processes

Aggregated sales forecast

Ongoing portfolio management

Push event’s permanently monitored

Roles, responsibilities, policies and KPI’s under DDMRP

Prioritized allocation of inventories.

Dynamic adjustments
The DDMRP implementation started with the design of a portfolio management process.

One of the several tools that were used in this process is the segmentation of products according to their variability in quantity and frequency of sale (four categories).

Around 57 SKU’s (produced and commercialized) withdrawn from the portfolio.

Each of these categories requires a specific DDMRP buffer design.
### Production wheel

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<tr>
<th>Part code</th>
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<th>To go</th>
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- Regular production sequence that minimizes change over time and maximizes productivity.
- Adjusting the DDMRP planning to the production wheel
- 8% increase in the productivity of the plant with zero investment.
## Forecasted daily usage

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### Inventory Management

| Buffer Profile                         | B21C |
| RPlus Lead Time                        | 11   |
| Fixed Lead Time                        | 11   |
| Average Daily Use                      | 579.53 |
| Forecasted Daily Usage                 | **602.13** |
| Effective Daily Usage                  | 590.83 |
| OrderCycle                             | 1    |
| Alert Horizon                          | 2    |
| Minimum Order                          | 10.00|
| Maximum Order                          | 0.00 |
| Order Multiple                         | 10.00|

Inclusion of future daily usage in order to properly deal with seasonalities and promotional demands (push events)
Haceb’s current DDMRP model - Appliances

Manufactured and commercialized

Buffer’s positioning: raw materials, semi finished products, finished products and regional distribution centers
Semi finished DMRP model

Shapes
- Slitting
- Shearing

Sheets

Bases
- Stamping
- Die cutting

Tables
- Stamping
- Die cutting
- Edge wrapping

Supermarket

Gridings
- Raw grids
- Glazing

Glazed grids

“Whites”
- Cutting

Cutting
- “Whites”

“Whites”

Covers
- Cable adding
- Screen
- Subtube assembly
- Support adding
- Add cardboard snap in

Assembly line

Covers

Strategic buffers positioning in both semi finished stoves and heaters plants
Haceb’s current DDMRP model – Spare parts

Manufactured and commercialized

Buffers in raw material, semi finished products and distribution center of spare parts as to attend all regional warehouses
### Current DDMRP roles

<table>
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<th>Planning roles</th>
<th>Execution roles</th>
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</thead>
<tbody>
<tr>
<td>• Review and daily generation of suggested orders in R+.</td>
<td>• Daily review of execution alerts:</td>
</tr>
<tr>
<td>• Ongoing follow up of DDMRP buffers performance and settings review:</td>
<td>• Current inventory</td>
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<tr>
<td>   • Buffers profiles</td>
<td>• Material synchronization</td>
</tr>
<tr>
<td>   • Variability category</td>
<td>• Projected stock out</td>
</tr>
<tr>
<td>   • Lead times factors</td>
<td>• Lead time managed parts</td>
</tr>
<tr>
<td>   • MOQ’s</td>
<td>• Updating alerts notes and confirming promised supply order dates in R+.</td>
</tr>
<tr>
<td>   • Order frequency</td>
<td>• Contacting vendors in order to expedite orders/make partial delivery agreements.</td>
</tr>
<tr>
<td>• Identification of push events and modeling them in R+.</td>
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</tbody>
</table>
### Buffer management

- Daily orders approval suggested by R+.
- Immediate actions based on the R+ alerts and follow-up notes.
- Continuous review of buffer’s percentage level.

![Image of buffer management](image-url)
Buffer behavior

- Available and on hand inventories in the ranges estimated by DDMRP.
- Buffer sizes decreasing without compromising service levels.
- Dynamic adjustments, both recalculated and planned, based on demand variability and push events.
Buffer management results

- Steady reduction of the finished product in excess.
- Decreasing trend for finished products stock out with demand.
Prioritized shared in distribution

- Hub and spoke deployment mode: one main distribution center and 7 regional centers.
- Minimum holdback percentage in the distribution center: 50%
- Demand window (days): 7.
Stock deployment module

- Regional buffers with available inventory in the green zone.
- Rightly distribution in order to meet both, the centralized and decentralized requirements (main and regional distribution centers).
- Regularly closing orders in the main and regional distribution centers.
Results
Sales & Working Capital

**Five points in less working capital for each dollar sold**

**Sales increase:** 27%

**NWC reduction:** 28%
Inventory & Business Operating Cycle

Inventory reduction: 12%

Business operating cycle reduction: 40%

Significant positive impact on cash flow
Service Level & Inventory

New service level: 96.2%
Inventory reduction: 12%

3.2 additional points in service level with half of inventory
About 80% less stock out with 12% less of the inventory
Lost Sales – Expenses – Finishes Product Returns

Business indicators

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
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<tr>
<td>Freight expenses</td>
<td>4%</td>
<td>3%</td>
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<tr>
<td>Lost sales</td>
<td>2%</td>
<td>2%</td>
<td>1%</td>
<td>2%</td>
<td>1%</td>
<td>0%</td>
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<tr>
<td>Finished returns</td>
<td>2%</td>
<td>2%</td>
<td>1%</td>
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<td>1%</td>
<td>0%</td>
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</table>

DDMRP´s beginning

Bigger sales, better service level, less inventory, lower expenses
Indicators’ Snapshot after DMRP

Service level
Finished goods: 96.2%
Spare parts: 97%

Lost Sales:
2.5%

Stock outs – finished product:
2.0%

Business Operating Cycle:
47 days (12% less inventory)

Warehouse surface:
12% lower

Sales/net working capital:
23%

And also:
98% adherence to production plan
Future challenges: The road to the Demand Driven Adaptive Enterprise model (DDAE)

- Permanent portfolio management
- DDMRP roll out to Haceb’s customers (VMI) and suppliers
- Production finite capacity scheduling with DBR+
- Component standardization (R&D)
- Reducing raw materials and commercialized products lead times, purchased from overseas suppliers

“None decision should affect the service’s level”
Santiago Gómez, Logistic’s Director
THANKS