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**Faculdade de Engenharia da Universidade do Porto
Mestrado Integrado em Engenharia Informática e Computação**



Analysis of an Oracle RPAS Planning Solution

MIEIC 2007/08 Project Report

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Abstract

This report documents the final project for the conclusion of the *Mestrado Integrado em Engenharia Informática e Computação*, a 5 year master degree in Computer and Software Engineering from the *Faculdade de Engenharia da Universidade do Porto*. This project was hosted by Wipro Retail (former Enabler Informática S.A.), a specialized company in software solutions for retailers.

The project consisted in the analysis of a development version of an Oracle Retail Planning Solution, which supported an Assortment process at fashion retail. The goal was to be able to underline its main functionalities and provide an in-depth description of the utility of this version to Wipro Retail.

This work performs a the state-of-the-art overview of the assortment process at fashion retail, considering current challenges and approaches as well as best practises. An outlined of Oracle's merchandise footprint is also presented to better understand how the solution integrates in it and to highlight which gap does it intent to fill in Oracle's offer. The main concepts of the RPAS tool are also included to capture the complexity of this kind of application. This in-depth knowledge helped to better uncover and map the functionalities available in the template; it also provided a more solid awareness to perform a broader analysis of the template's utility to Wipro Retail.

This report highlights the evolution of the available information during the course of this project and the reorientation of the approach to the problem according to it. The analysis output includes detailed functionalities' analysis as well as an assembly of the different conclusions and recommendations based on the stakeholders of this solution.

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List of Acronyms

SKU - Stock Keeping Unit

PLC – Product Lifecycle

PLM – Product Lifecycle Management

CRM – Customer Relationship Management

SCM - Supply Chain Management

KPI – Key Performance Indicators; also know as KPM

KPM - Key Performance Metrics

GMROI – Gross Margin Return On Investment

ROI - Return On Investment

OTB – Open To Buy

OLAP - On Line Analytical Processing

POS – Point Of Sale

RDF - Oracle Retail Demand Forecasting (or ORDF)

RDW - Oracle Retail Data Warehouse (or ORDW)

RMS - Oracle Retail Merchandise System (or (ORMS)

RPAS - Oracle Retail Predictive Application Server or (ORPAS)

AUR - Average Unit Price

TIS – Technology Infrastructure Services

BPO – Business Process Outsourcing

IS – Information Systems

IT – Information Technology

LIST OF ACRONYMS

1. Introduction

1.1. *The Internship institution*

This internship took place within Wipro Retail Portuguese unit (former Enabler Informática S.A.), here forth Enabler.

Enabler was established through the spin-off of the IS/IT department of Portugal's leading retailer *Modelo Continente Hipermercados* (a division of *Sonae Group*) having formed a separate legal entity in 1997. Driven by the six year knowledge and experience acquired at the conception and implementation of applications for the different areas of retail, Enabler quickly became an independent, specialised and international IS Services Company.

In July 2006, Enabler was acquired by Wipro Technologies¹, the world's first PCMM² Level 5, SEI CMM³ Level 5 certified IT Services Company and the first company outside USA to receive the IEEE Software Process Award [Wip'08a]. With over 25 years of IT Consulting, Systems Integration and Engineering Services experience, Wipro Technologies - the global IT Services arm of Wipro Limited - acquired Enabler to "strengthen Wipro's worldwide retail solutions portfolio as well as global delivery footprint" [Wip'08b].

Since 1st of July, Enabler has become known as Wipro Retail (a division of Wipro Technologies), aiming to be acknowledged as a global retail consultancy company able to operate at a highest level with larger customers, offering a broader range of complementary services.

1.1.1. **Services Offer**

By combining the already available assets of Enabler and now incorporating the Wipro Technologies capabilities, Wipro Retail value proposition is based on a broad range of services:

- Enterprise Application Services including Retail Package implementation
- Consulting and outsourcing
- Change Management
- Technology Infrastructure Services
- Testing Services

Wipro Retail aims to deliver high-value in an end-to-end delivery service, offering a complete set of services supporting business process and analytics, as one can see in Figure 1.

¹ NYSE: WIT

² PCMM stands for People Capability Maturity Model

³ SEI CMM stands for Software Engineering Institute Capability Maturity Model

INTRODUCTION

Sourcing & Procurement	Supply Chain Planning & Execution	Store Ops	Merchandising, Pricing & Marketing	Sales
- PO Management - Spend Management - Supplier Management - Procurement Processing - Contract Management - Compliance Monitoring	- Supply Chain Analytics - Demand Forecasting	- Seasonal Recruitment - Application screening - Manpower Scheduling - Category management - Assortment planning - Inventory Management - Store Cluster Analysis - Revenue & Profitability Analysis - New Store Opening	- Planogramming - Cluster level - Configuration level - Store level - Expediting Orders - Customer Analysis - Market basket analysis - Spend analysis - Customer segmentation - Price Analysis - Category Profitability Analysis - SKU Sales Trends & Analysis	- CRM - Customer service - Tele-sales - E-sales - Catalog sales - Internal employee helpdesk - Order Fulfilment - Returns handling - Orders processing - Order data capture - Collections - Loyalty Administration - Warranty Returns
Analytics				
Finance & Accounting - Order to cash, Fixed assets, Reporting, Reconciliation, Compliance services				
HR - Workforce management, Payroll, Benefits administration, Compensation administration, Recruitment & training				

Figure 1 - Services provided in Business Process and Analytics. Source: [Wip'08c].

1.1.2. Internal Organization

By the beginning of the internship, Enabler was organized as presented in Figure 2. It was composed of seven business units: Operations, Delivery, Competency Centres, Innovation, Business Development, Human Resources, Quality, Admin and Finance. Each of these units was further divided into functional areas.

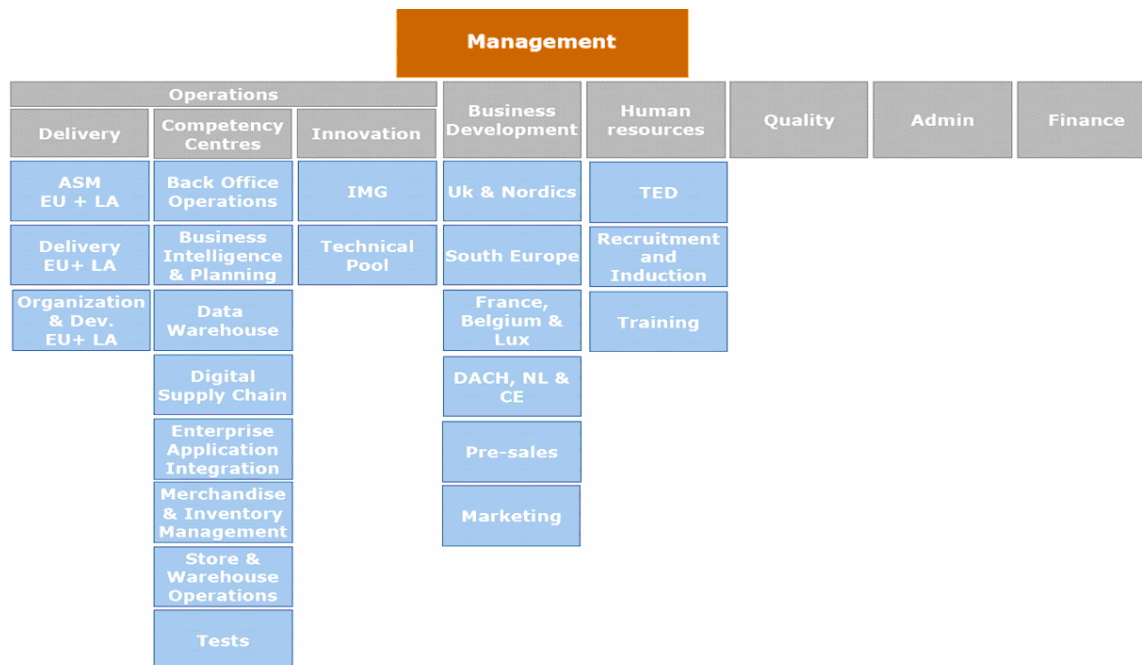


Figure 2 – Organizational Structure. Source: [Ena'07].

Competency Centres structures used to manage, maintain and develop a specific expertise within Enabler, related with a specific retail business:

- o Merchandise Management
- o Store & Inventory Management
- o Back Office Operations
- o Data Warehouse (DW)
- o Business Intelligence (BI)
- o Enterprise Application Integration (EAI)
- o Supply Chain (SC)
- o Planning
- o Tests
- o Technical Consulting
- o Management and Consulting

The internship took place within the Planning competency centre. This area comprehends the different planning processes at retail, such as merchandise planning, financial planning, category management, assortment planning, item planning, store planning, space planning and more. This internship was focused on the assortment planning business process for a specific type of retailer.

1.2. The Project

1.2.1. Project's Description

The Oracle Retail Predictive Application Server (RPAS) it's the basis of a set of applications that are used to generate forecasts and develop financial, merchandise and assortment plans, based on consumer behaviour. These applications employ best-of-breed forecast technology that analyse historical data in order to predict demand.

The main goal of this project was to analyse a development version of an application (also known as and further named template) that supported an Assortment process at fashion retail; it was asked to evaluate if this version was functional to present it at a CRP⁴. Identifying gaps between functionalities available and fashion retailers' processes was also considered in the project's scope, as well as analysing the template's utility to Enabler as a starting point for development of new functionalities. The integration of this template with other applications (namely, the Item Planning) was also considered important. Finally, the internee would need to deliver documentation that could support an assortment oriented CRP. At the end of the internship, it was expected that the internee would have gained specific knowledge of the RPAS tool, as well as business concepts in the planning area, becoming an autonomous resource in this area.

1.2.2. Project Plan

Prior to the beginning of the project, there was an induction at Enabler, which was anticipated to provide intensive training in the general skills that the intern would need to carry out at the company. At the beginning of the project, the internee did a more detailed training on the areas that the project spanned and prepared the working environment. A redefinition of the project's plan was done at mid May due to new available information. This new information consisted in a video presentation of the latest version of the template that was being explored. This new information provided the internee with a privileged update of how the template was evolving in terms of strategic development and functionalities; because of this, the internee decided to shift the approach and consider this new information to provide a better, more accurate and updated analysis to address Enabler's needs.

⁴ CRP stands for Conference Room Pilot

Since the project was based on deep analysis of both business process and technical details about the template, the activity that weighted more on the project's plan was the analysis task. The analysis of the business process and retail industry were done concurrently with the report building; this approach provided the internee with a ground base for knowledge consolidation.

During the internship, the internee tried to capitalize the training opportunities available at the company that could help in its project and integration within the company.

Figure 3 shows a Gantt Chart with a summary of activities that were done during the internship project. For a more detailed plan, please refer to APPENDIX B – Detailed Project Gantt Chart.

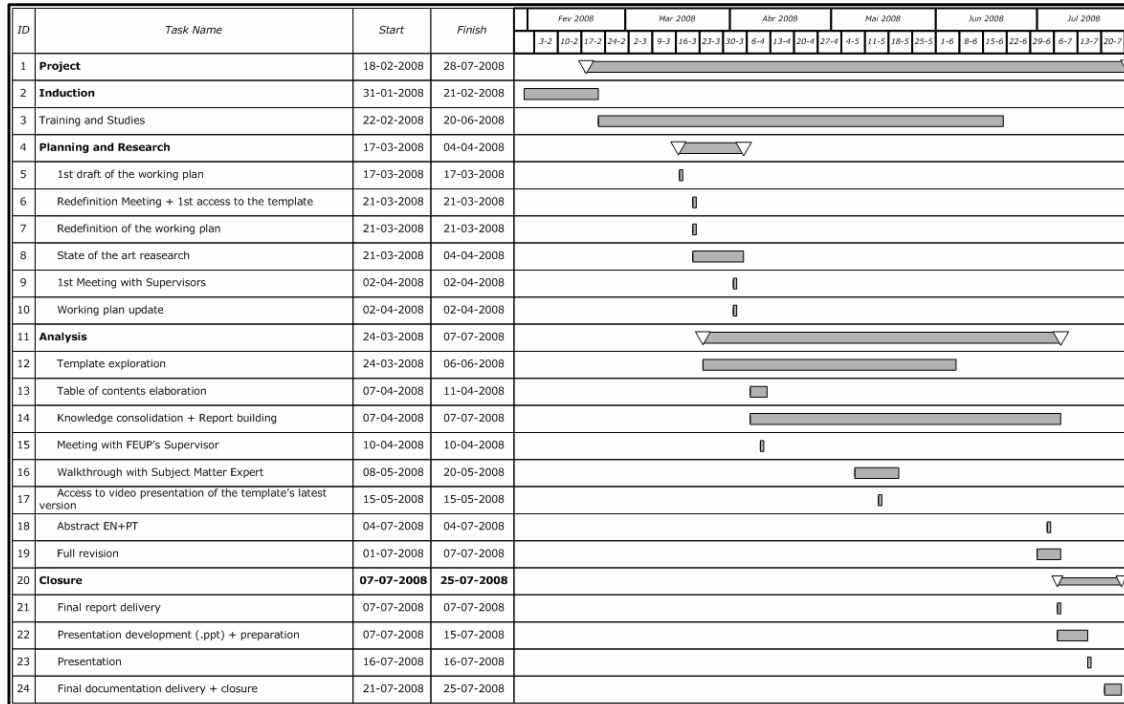


Figure 3 – Project's Gantt Chart

1.3. Report Structure

This introductory chapter aims to present the background of the project, introducing the institution environment, the project's scope, its goals and schedule.

Chapter 2 introduces the concepts needed to fully understand the theme of this project: the assortment process at fashion retail. An overview of the fashion retail business is provided, along with the several processes that integrate and influence the assortment process. Current challenges and approaches to assortment are also introduced, along with best practises.

Chapter 3 intends to provide the reader with an overview of Oracle's position in the market, in order to understand its strategy in the conception of this solution. Oracle's merchandise footprint is presented to better comprehend how the tool integrates in it and to identify which hole does it intent to fill in Oracle's offer. An overview of the tool is also included so that one can follow the next chapter.

Chapter 4 intends to detail the analysis that was done, including an explanation of the project's evolution and the chosen approach to the problem. The analysis' coverage is

presented from the different stakeholders' perspectives. Detailed functionalities' analysis is also included as well as a brief assembly of Enabler's opportunities.

Chapter 5 offers the conclusions of the project as a whole, presenting a summary of the work and overall appreciation. It also includes directions for future work.

2. Assortment in Fashion Retail

Assortment planning is a retail process conducted by a retailer that aims to determine the number and types of products in a product line. This process includes decisions about inventory depth and breadth variety and at apparel retail industry, the mix between basic and fashion merchandise needs also to be determined. The goal of assortment is to translate the company's goals into an executable plan to maximize the expected profits. [Raj'01]

This chapter aims to introduce the assortment planning process at a fashion retailer. In order to better understand how assortment is evolving and why it is such a hot issue in fashion area, one must understand the complexity around fashion retailing.

This chapter begins with the introduction of core concepts of the retail industry that are needed to understand how fashion industry fits within it. The fashion business process is then introduced, going through an overview of its specificities, explaining the business processes around it and the importance of its supply chain. Merchandise management is a specific business process of fashion retailing that considerably impacts its supply chain management. This process is described, going through its characteristics and detailing its importance in the general fashion industry.

Next, business challenges and opportunities are outlined, so that one can understand the history, evolution and current trends in the merchandise process. Consumer-centric merchandising is a current trend that addresses the current issues that retailing is suffering. This approach is described, as well as its importance, benefits and challenges in adoption.

Finally, one is introduced to the assortment process at fashion retail. With an overview of its surrounding done at the beginning of this chapter, it is easier to understand the importance of this process, its evolution, its integration within fashion retailing, so as the challenges in its application. The Consumer-Centric merchandising approach to assortment is outlined, so as current best practises to assortment planning. An essential step that must be done prior to assortment is the store clustering. This process is outlined, so as its utility to other processes.

By the end of this chapter, one should be familiar with the fashion retail process, outline the current approach to assortment process and understand its challenges.

2.1. Introduction to Retail

2.1.1. What is Retail

Retail, in short, can be defined as the sale of goods and services directly to the consumer and for personal use. If a company is also a manufacturer or also does wholesale, it is still considered a retailer if it interacts with the final consumer of the product or service and if its sales come primarily from retailing. This will be explored later.

Most industries that produce goods with individual consumers in mind cannot sell their products directly to them. Consequently these companies need retailers to get their products to consumers. So, the Retail business is important to the industry as it serves as a link between consumers and manufacturers, making it easy for the product to be sourced, easily distributed and accessed by the consumer. Possibly more important, it

also enables the possibility to offer a better buying experience to the consumer, providing services and special attention to their needs.

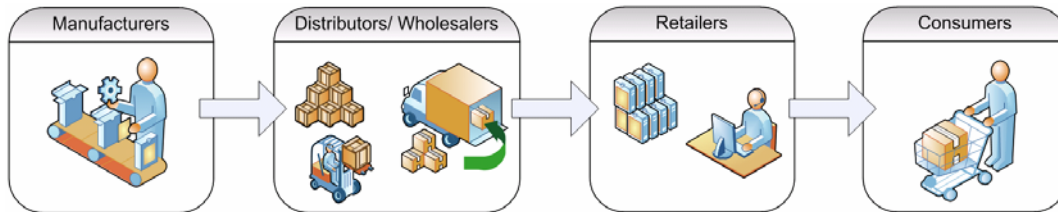
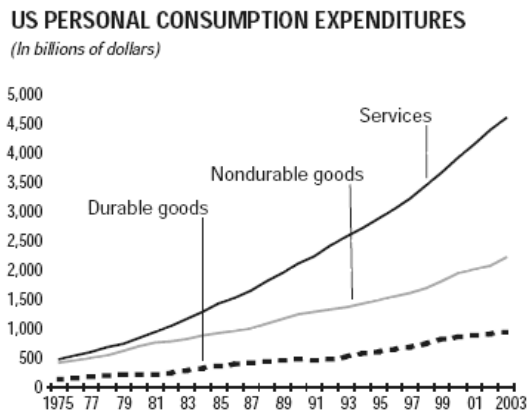


Figure 4 – Typical Retailer position at trading

2.1.2. Types of Retailers

For statistical and market analysis purposes, retailers are usually categorized by what they sell. There are entities which provide a standard classification model to classify retailers, such as the United Nations' ISIC (International Standard Industrial Classification) or the United States' NAICS (North American Industry Classification System) and SIC (Standard Industrial Classification). Their classifications are usually grouped by the retailer's main merchandise line, as it's the line that accounts for the largest share of store sales. The most general categories for statistical data in retailing are durable and non-durable goods. Conventionally, durable goods are expected to last longer (one year or more) and include items like electronics, furniture or motor vehicles whereas non-durable items are expected to last less than a year, like food, pharmaceuticals or toiletries. Non-durable goods sales tend to represent a larger percentage of sales than durables, although services represent the double of non-durable sales, as we can see in Figure 5. This is relevant to understand how a retailer's product fits in the global market.



Source: US Department of Commerce.

Figure 5 – US Personal Consumption Expenditures. Source: [SP'04].

Apart from this categorization that is mainly used for statistical and financial purposes, retailers are usually classified by four major characteristics: the amount of service provided, product lines, price policy and organizational approach. [Kot'83]

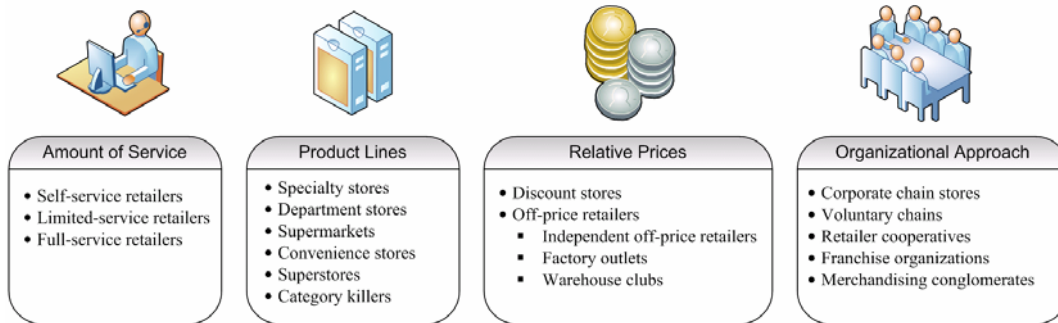


Figure 6 - Types of Retailers: Retailers may be classified by amount of service provided, product lines, price policy and organizational approach. [Kot'83]

• Amount of Service Provided

Retailers can be classified by the amount of service that they provide; usually there are three types: self-service retailers, limited-service retailers and full-service retailers [Wal'06]. Self-service retailers focus on customers that are willing to self-serve to save money and are usually used by sellers of convenience goods or fast-moving shopping goods. Limited-service retailers are mostly department stores such as El Corte Ingles: they offer sales assistance to a limited set of goods about which customers need information. Full-service retailers carry more slower-moving items and have sales people that assist customers in every aspect of their shopping experience; they are usually specialty stores like a car selling retailer.

• Product Lines

A classification by product lines requires an analysis of the depth and breadth of the retailer's product assortments. Depth of an assortment is the variety of styles or brands within a product line - depth can be narrow or wide. Breadth is the number of products available of a particular style or brand of a product line - breadth can be shallow or deep.

Different product lines are implemented at speciality stores, department stores, supermarkets, convenient stores, superstores and category killers [Wal'06]. Speciality stores usually have narrow product lines with deep assortments. Department stores, on the other hand, have a wide variety of product lines. Convenience stores have limited lines of products and are often located alongside busy roads or at petrol stations. Superstores offer food and non-food products as well as services. A supermarket is a self-service store offering a wide variety of food and non-food products; it's organized by departments and it's smaller than a hypermarket or superstore, but is larger in size and has a wider assortment than a traditional grocery store. A Category Killer is a giant retailer that has a sustainable competitive advantage that doesn't allow its competitors to operate profitably in the same industry; IKEA is considered to be a category killer in Europe's furniture industry.

• Relative Prices

Price strategy is also considered when classifying retailers; by analysing their relative prices they can be considered discount stores or off-price retailers [Wal'06]. The off-price retailers can also be further subdivided into independent off-price retailers, factory outlets and warehouse clubs. Discount stores have a high-volume low-profit strategy aiming to attract price-conscious consumers; these stores emerged mainly after World

War II and an example is German Lidl. Off-price retailers sell major-label products at a significant discount; these retailers take advantage of overruns, cancelled orders, and forecasting mistakes and sell the excess inventory at a 20%-60% discount. Independent off-price retailers buy this excess inventory with discounts from their suppliers and pass these savings to the consumers. Factory outlets are owned and operated by the manufacturer and sell not only the excess inventory, but also the discontinued or irregular goods. Warehouse Clubs sell a limited selection of items at deep discounts to members who pay annual membership fees.

- **Organizational Approach**

Finally, retailers can also be classified by their organizational approach: Corporate Chain Stores, Franchise Organizations, Voluntary Chains, Retailers' Cooperative and Merchandise Conglomerates [Wal'06]. Corporate Chain Stores are several companies owned and controlled by the same company, sharing a brand and central management, usually with standardized business methods and practices. Franchise Organizations are very special organizations; "the nature of the business format franchising focuses on the franchisor's ownership of the trade name and the proprietary method of doing business, which are leased to the franchisee in return for the payment of fees and royalties, and the submission to rather complete control for a limited time, with a very limited ability to sell or pass the franchise on to others" [GM'05]. Voluntary Chains are similar to franchising; they "are established when a wholesaler enters into a buyer-seller relationship with independent retailers, joining together for purchasing economies and to coordinate marketing efforts, but remaining distinct with separate profit motives." [GM'05]. A Retailers' Cooperative is a type of cooperative which takes advantage from economies of scale on behalf of its retailer members. Merchandising conglomerates or multi-channel retailers are combined diversified retailing lines, formed under central ownership, that have an integrated distribution and management of functions; they usually are retailers who own the manufacturer, production and distribution lines along with the retailing business to take the benefits of controlling the whole chain.

2.2. Fashion Retail Business

Fashion retail is usually referred to the apparel, footwear, textiles and home furnishings but its principals can also be applied to toys, computer games, books, computers, music, pharmaceuticals [MIT'05] or any other product type that is likely to suffer from trends and therefore has also short-lifecycle products with unpredictable demand. In this report, fashion retail is intended to be the apparel, footwear and textile industries, since they all share similar product attributes (style, size and colour). In this chapter it will be introduced the fashion retail merchandise concepts and the highly seasonability of it. These concepts are needed to better follow the succeeding descriptions of the specific fashion retail business process, its supply chain constraints, challenges and opportunities.

2.2.1. Fashion Retail Overview

At this overview, the basic concepts of fashion retail are going to be presented. To better understand the industry, the merchandise types and their lifecycle are described. A description of the internal hierarchical organization of the fashion industry is also introduced, so as the concept of seasons.

• Merchandise Types

General classifications of merchandise apply also to fashion. The typical types are basic, seasonal, event, thematic, kaleidoscopic and big ticket items [Mar'08].

Basic items have a long life-cycle and are easy to forecast demand and manage inventory; they are available in all seasons and can be repeatable each year. Fashion items on the other hand have a short life-cycle and are highly unpredictable; usually they last for a season, but can last more or less than that, depending on the trends. You may also classify items as **Seasonal**, **Event** or **Thematic**; examples of it are swimwear, Valentines items and sports accordingly. **Kaleidoscope** items are products that don't have continuity, generally limited editions. **Big ticket** items are like VIP's but for products: they need special care or have specific space needs; usually the stock is only at the display (have a limited stock or are only available from order). Usually Big Ticket items at fashion retail are those exclusive, rare and unique items, like a 1million dollar purse or a unique piece of jewellery.

• Merchandise / Product Lifecycle

Product Lifecycle represents the stages that a product is believed to go through from the beginning it is introduced until it is take out of circulation: introduction, growth, maturity and decline [CU'06].

At fashion, a product is adopted and discarded within a short period of time, that's why these products have the so called short lifecycle. As was said before, basic products such as t-shirts or blue jeans have a longer lifecycle than the other fashion products, as they are sold every year. Fashion goods, on the other hand, are more unstable and last shorter time than basic products. When consumers adopt a fashion style at a particular time, the product starts its growth, but when it is no longer adopted by many, its lifecycle ends drastically as it becomes to be "out of fashion"; this is why fashion products have a steep decline once they reach their highest sales.

There are also the "fad products", those who have the shortest lifecycle; these products are usually a style that is adopted by a particular set of customers (like a sub-culture or a younger demographic group) for a short period of time. To these products, the time to market and quick response to demand becomes critical to the success of sales.

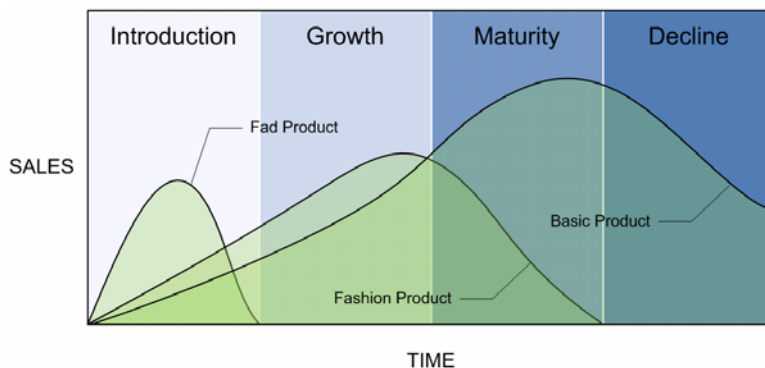


Figure 7 – Typical Products Lifecycle at Fashion Retail. Source: Adapted from [CU'06].

Further in this report, when refereeing to fashion products, it is meant to be these short-period lifecycle products - the fads and fashion products - as they represent best the products that can be found at a fashion retailer and also represent the most difficult items to work with.

Fashion products are sold within a particular season (the basic seasons are for instance the spring-summer and the autumn-winter seasons). The typical lifecycle of a limited-time offer is presented at Figure 8. Usually the retailer can start to sell an item a little bit before the season starts to test the products - to see how the customers react. Then for a typical period of 5 weeks, he takes advantage of the growth of the product sales, until it reaches its maturity. Right then, is when the retailer should start making markdowns, as the product starts to decline.

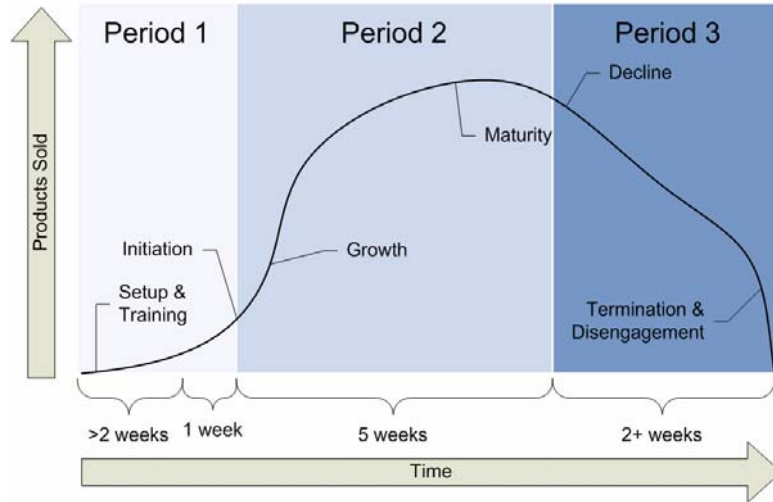


Figure 8 – Typical Lifecycle phases of a Limited-Time Offer. Source: Adapted from [GD'03].

• Merchandise Hierarchy

In order to plan the products lifecycle, a retailer must be able to fully identify a particular product within the company. Stock Keeping Unit (SKU) is a term used by retailers to identify the lowest level of product detail. When a customer goes to a store and says “I want blue jeans, size 27, low waste style, for women” he is referring to a SKU. At fashion retail there isn't a standard hierarchy due to the various types of classifications that a fashion item can have. An example of a possible merchandise hierarchy at fashion is presented in Figure 9.

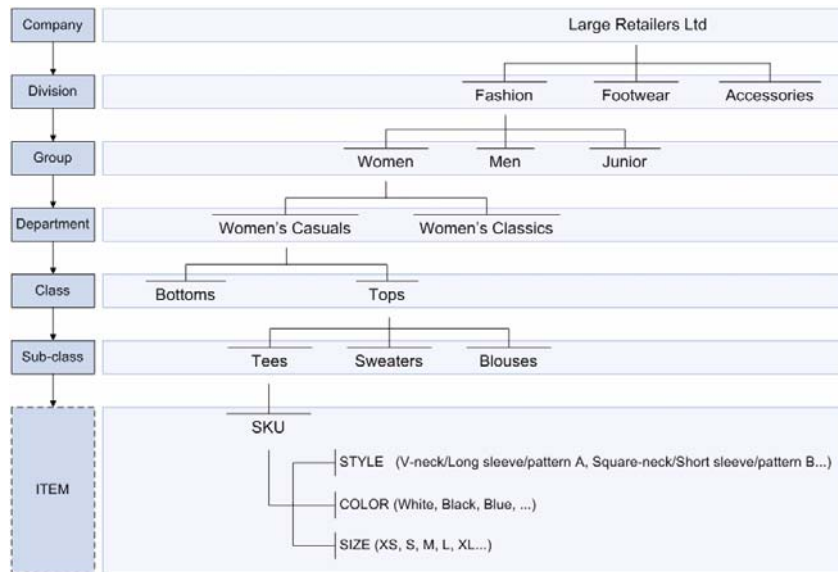


Figure 9 – Example of a Merchandise Hierarchy at Fashion Retail

o Location Hierarchy

A Location Hierarchy is also necessary in order to identify specifically which items should go to which location within the retailer's company. An example of a location hierarchy is presented at Figure 10.



Figure 10 – Example of a Location Hierarchy

• Fashion Retail Seasons

Each fashion retailer, depending on its strategy, considers many seasons within a year. A season represents the need of the retailer to offer specific products, pricing and promotions to maximise revenue and profit, allowing him to take advantage of flows of retail spending that occur throughout somewhat predictive periods. Figure 11 represents an example of a seasons' calendar at a retailer.

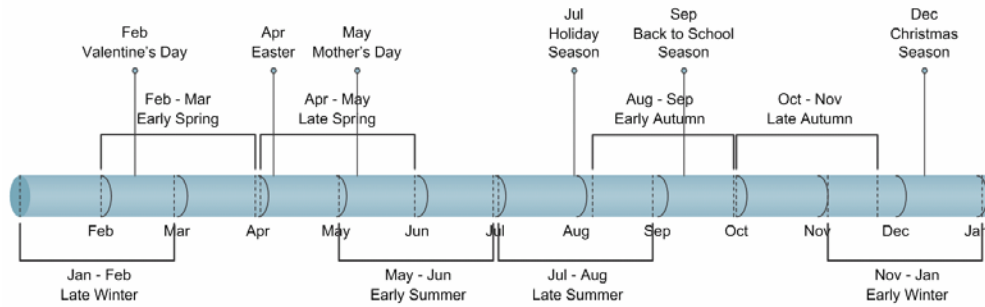


Figure 11 – Example of a retailer's calendar of seasons

Seasonality varies according to product, geography and other factors. For example, if a company sells products at both northern and southern hemispheres, he may need to consider separate seasons for the two hemispheres. Still in the example, he may create a “Summer 2009 Apparel U.S.” season and a “Summer 2009 Apparel Australia”, where these seasons would span different months. Seasons are particularly useful for the Assortment Process, as each assortment is created for a specific season.

2.2.2. Fashion Retail Business Process

As it was explained before, retailers can buy directly the goods or can manufacturer their own merchandise. But to fully understand how the manufacturer and retailer process are intertwined, it is necessary to understand how the fashion business process begins from the manufacture until the goods reach the client.

The fashion business doesn't have a standard process, as the internal organization and specificities of each retailer can vary a lot across the market. Typically, it is composed of six steps: Design, Planning, Sourcing, Trading, Distributing and Selling. [Wa'06], [Koe'06] and [Txt'07].

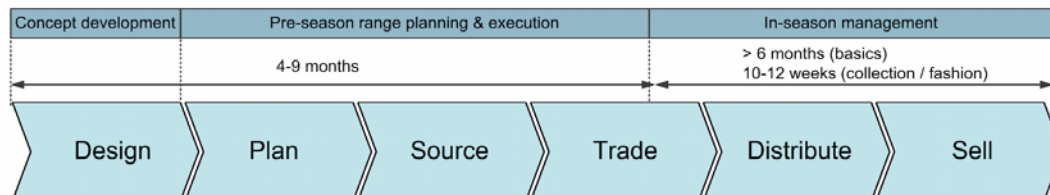


Figure 12 – Example of a Fashion Retailer business process. Source: Adapted from [Koe'06].

• Steps

Design

The process begins with the design stage, that is, the development of the collection from basics to more fashion items. The designers try to develop styles and colours based on several sources of information like *grand couturiers* trends, *haute-couture* and *prêt-à-porter* fashion, fashion shows, magazines, idols and VIP's styles, etc. This task is very important; innovation, creativity and sensitivity to perceive current trends are a must have for the job.

Planning

In the planning phase, a choice is made about which number of options will be available from the set made at the design stage. In this stage, is done the merchandise and financial planning, where the strategy of the company is converted into numbers that

will seed the assortment plan, which aims to choose which options should be kept and which options should be dropped (based on historical data and forecasting the demand at your particular set of stores). This stage should also output an assortment that indicates which stores should get which options; this is necessary as your stores have different characteristics that go from physical constraints, different climates and clients that influence sales, different needs of transportation of the goods to the stores, etc.

Sourcing

Sourcing is a term used in supply chain management which describes the improvement and re-evaluation of purchasing activities. This step includes sourcing the planned options from your vendors, bidding and getting the best price/quality (arrangement) at the best delivery time.

Trade

After the sourcing, the trade stage begins and the initial stock allocation is done. The retailer needs to choose which options at what quantity should go first to be able to respond to demand more quickly. This is called the in-season stock management, where you closely manage your stock quantity at each store, monitoring and receive constant feedback about what goods are selling more than others, so that you can make an effective replenishment.

Distribute

The replenishment stage is done after the beginning of the season and is based on the in-season stock management monitoring.

Sell

In the final stage, you only focus on selling the goods in order to obtain the maximum profit and end with no items at stock. This is where you manage the display of items at stores, marketing campaigns, markdowns, and others.

• Fashion business process applied

At Figure 13, it is possible to view how this whole process is applied to a specific season. Notice that the retailer ends the design stage at June (year 1) but only starts selling in February (year 2); in an industry so highly unpredictable, it is obvious that the planning stage becomes crucial. The only way to get a better performance and being able to respond quickly to the unpredictable demand is to shrink these stages. Inditex is a great model to this approach: getting to plan more closer to the beginning of the sales, being able to send “testing demand” items and respond quickly from close production sites with a product more adapted to demand, is proving to be more efficient. But this requires: high collaboration between each part of the stage business with almost no space to delays or errors; good planning tools with good input data from historical, CRM, climate, on-sight data; and highly supply chain optimization. This is not an easy task, it takes years to develop this kind of optimization and external factors can ruin a business - like in 2005 when the European Commission blocked 75 million items [BBC’05] of Chinese textile goods due to the exceeded annual quotas of China’s imports.

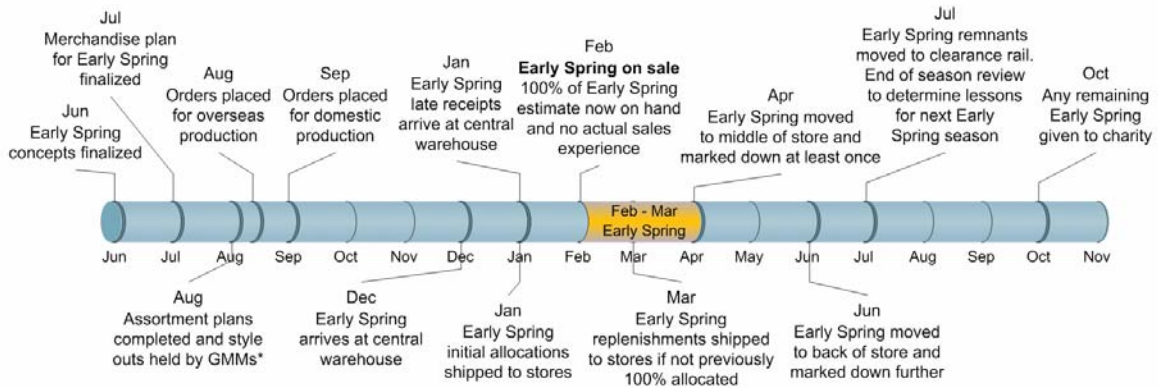


Figure 13 - An example of an Early Spring Season Planning and Execution Processes. As one can observe, the design stage ends in June year 1, but the selling time window starts 8 months later and lasts only 2 months. Source of the image's text: [Mar'08].

2.2.3. Fashion Retail Supply Chain overview

Supply Chain Management is the “integration of key business processes from end user to original suppliers that provides products, services, and information that add value for customers and other stakeholders” [LCP'98]. Supply Chain Management is critical to retail business, and in a fast moving unpredictable business like fashion, this area becomes even more critical. The need to have updated information that's integrated across the chain, with little space for delays or errors, with ever lessening lead times and managing the differences and needs of each part of the chain, it is really a challenge. That's why some retailers, in order to cut on the costs and gain control on the critical areas, are abandoning the manufacturers and outsourcing and start owning part or even the whole supply chain.

As said before, the process of taking a product to a store begins on the design, the planning of quantities, time to deliverer and locations for it to be sold, the bidding for price/quality/delivery time with suppliers and the actual products request and manufacturing, the transportation to the retailers warehouse, the allocation from the warehouse to the stores and presentation of the product at each store, the actual sales and the feedback of them in order to improve and forecast future demand to support this loop process.

Figure 14 illustrates perfectly how the various stages of the fashion retail business relate with each other and form a looping process.

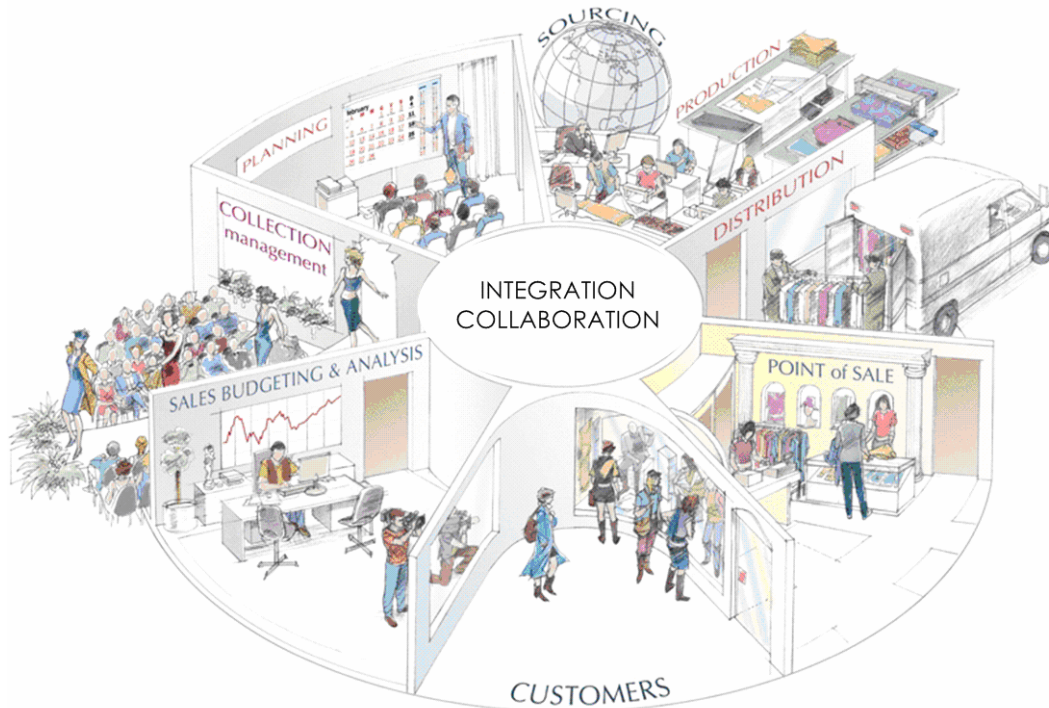


Figure 14 – A Vision of the complexity of the fashion retail business process and the need for its supply chain integration and collaboration. Source: Adapted from [TXT’07].

Various types of supply chains strategies can be followed by the retailers. Following is a brief description of how the retailers’ business chain can be organized. [Das’08].

- **Apparel supply chain and variants**

- ***Push Supply Chains***

Push Supply Chains are usual when the demand of homogenised products is stable. In this type of supply chain, production and distribution decisions are based on long-term forecasts. This type of supply chain was characteristic of the mass-market trend between 50s and 70s; these retailers had vertical organization structures and focused on optimizing their activities. This enabled a better response to the back-then predictive and stable demand since they had a buffer-stock; although in the current demand trend, this doesn’t apply. The bull-whip effect was very visible in this type of supply chain.

- ***Pull Supply Chains***

Between 70s and 90s, retailers were both vertically and horizontally aligned. As competition increased and market-demand became volatile, apparel retailers were trying to integrate their production and distribution towards customer-demand in a pull oriented supply chain. This enabled reduction of the unnecessary buffer stock and a more close fit into what the consumer wants and not what company makes. Although, the highly long lead-time to market was unable to quickly respond to customer-demand. As the consumer behaviour changed and become more heterogeneous, the necessity to have a bigger product mixed increased; this lead to significant operational difficulties since it reduced the responsiveness of the supply chain.

o *Push-Pull Supply Chains*

From the 90s, retailers were trying to shift their supply chains to take advantage of the best of the push and pull strategies. This resulted into a hybrid of the two systems, the Push-Pull supply chain system. In this synchronised strategy, the initial stages of the supply chain are operated based on a Push system, and the final stages are operated on a Pull strategy. The Push strategy is applied to the steps in the supply chain that don't have much error forecast variability; the Pull strategy on the other hand, is applied to the steps in the supply chain where uncertainty and variability are high, making the decisions as closer as possible to the real demand.

All of these types co-exist in the apparel industry, although it is evolving towards a push-pull synchronous strategy, where retailers start to also own a part of the supply chain to better integrate and react to the actual demand – the increasing bet in private labels are an example of this effort.

• *Owning the supply chain*

In order to cut costs and take more control on time, design and margins, a retailer can have its own part of the supply chain or outsource it; usually the globalization enabled the possibility to cut costs on acquiring the production and finishing of products at far more inexpensive locations (like China), with the benefit of having more control over the chain. As said before, in fashion industry, the process of negotiating with suppliers, the fabric production times, the cutting and sewing and application of garments, the finishing and the actual transportation to the stores are all processes that take time and money and these two assets are critical at fast-cheap fashion actual trend.

Figure 15 shows how a product is conceived and sold at a classic supply chain where each member of the chain has just one business and buys from the other members.

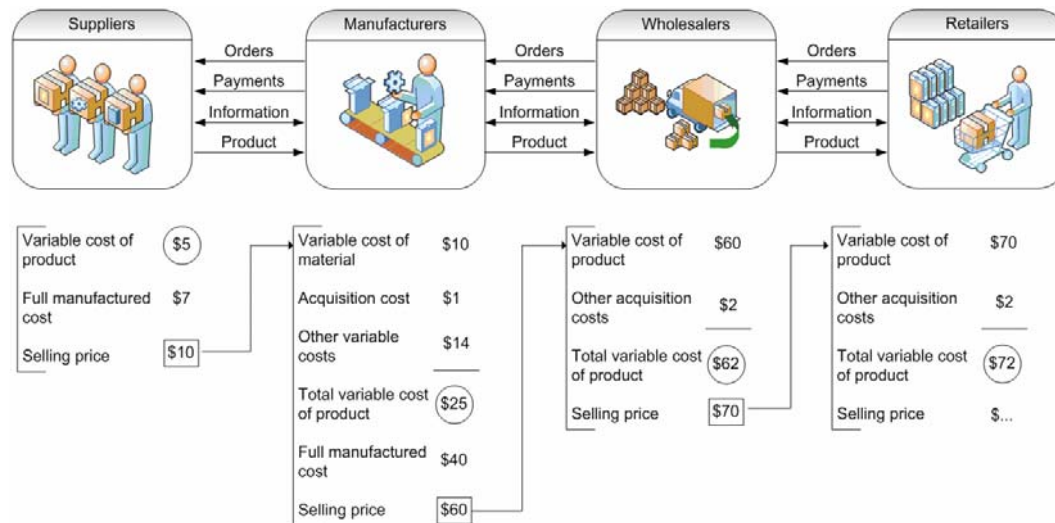


Figure 15 – Supply Chain example of price of item increase. Source: Adapted from [GD'03]

If the retailer can cut on the profit margin at each member on the supply chain, and gain control of strategy and times, it can achieve competitive advantage.

Retailers usually have one of three supply methods [AM'06, Fas'05 and Ric'96]:

- manufacturing their own products: the clothing is produced at factories owned by the retailers themselves;
- sub-contracting: the retailer does the design process and then forwards the design and cuts of the clothing to contracted manufacturers who will produce on the retailer's behalf;
- purchase the finished product: buying the finished product from wholesalers, buying syndicates or at the manufacturer themselves; the design and production is the responsibility of the manufacturer, the retailer has no say on it.

Depending on the method implemented, the supply chain and the planning process becomes more or less flexible to the retailer.

2.2.4. Merchandise Management at Fashion Retail

Merchandise Management can be defined as the retailer's product planning, development, buying, management, pricing and supporting sales, along through the retail business cycle that was presented before [UV'08]. Basically is the process that manages the merchandise from its conception to sale.

The main objective of the Merchandise Management is to ensure that the product is available to the customer at the right time, place, quantity and price. So this process needs to assure the best set of products that correspond to the companies global image, specify the order quantities, source them (selecting the suppliers) and distribute the products through the stores each with specific attributes (style, colour, size) and setting the optimal price of each product at that store.

As was said before, this process varies from industry and from the type of retailer. On the specific case of fashion merchandise, it goes usually from the design process, to the buying of the raw materials, manufacture, finishing and distribution.

So a typical fashion retailer can be either of three types: Brand/Collection buyer, Private Label owner or a combination of these two [AM'06, Fas'05 and Ric'96].

A Brand/Collection buyer buys already-made merchandise from vendors. Usually this is a less risky approach and requires a minor investment from the retailer. The cons of this approach is that the retailer has little or no control in the design process and manufacturing times, which means he has little or no flexibility on the supply chain.

A Private Label owner outsources the production of goods or manufactures its own goods, but usually he owns the design process. With this approach the retailer is able to control the design process, having more flexibility over decisions and margin gain. On the other hand, it requires more investment and the risk at predicting demand and trends are higher (because the products have to start being manufactured long before).

A combination of the above two approaches is also possible, in fact, many retailers are starting to take advantage of each solution to leverage the risks and take advantage of both approaches, as was explained before – Push-Pull strategy. This way, retailers can reach for instance the demanding customers by providing them branded assortments while also meeting the other side of the spectrum behaviour, the customers that want a fast-cheap fashion that don't mind to buy a private label. However, this approach has also cons; managing the company's global image while managing different kinds of merchandise it's not easy and a good strategy must be well placed and managed.

Following, an overview of the Merchandise Management process at the fashion retail industry is going to be made. A brief explanation of the differences between Merchandise Management and Category Management is going to be made, since it is a frequently asked question among retailers. Also, an overview of the Merchandise Planning Process is also presented, going over key-concepts like types of plans and roles involved in it.

• Merchandise Management Process

Figure 16 represents the Merchandise Management Process that basically consists on the management of the whole retail merchandise business process. In this figure it is possible to view the tasks and roles involved in each process; some roles and tasks are not going to be presented in detail, the report will only focus on the roles involved in the Assortment process.

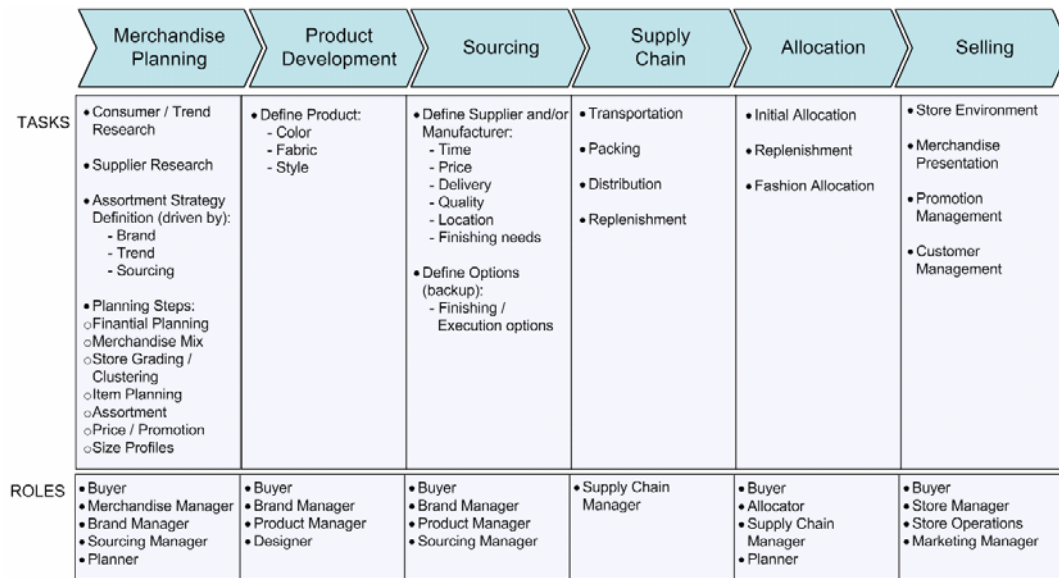


Figure 16 – Example of a Merchandise Management Business Process. Source: Adapted from [Kell’08].

• Merchandise Management versus Category Management

Category Management (CM) can be defined as “a process that involves managing product categories as business units and customising them [on a store by store basis] to satisfy customer needs” [Nie’93]. This approach was until recently the best of breed standard methodology to retailers. But since the changing in consumer behaviour started to appear and as fast-fashion started to become more competitive, there was a need to shift the processes.

The difference between CM and Merchandise Management (MM) it’s mainly in the focus. While CM is driven by customer segmented targets and focuses on space optimization and optimal display of items, MM focuses more on meeting customer demand and expectations, planning markdowns and controlling the items’ flow. Although each one has processes like assortment planning, vendor selection, sales forecasting, space and promotion planning, the processes are still a little different because basically, these are two different ways of managing a business.

At CM, the purpose of the category is what actually drives its content selection; while at MM, it is the content that tends to define a merchandise category. CM is more associated with the grocery and drugs industry, as it is more suited to long lifecycle items or basic items that have a relatively predictive demand. It often incorporates suppliers in the strategic and planning processes. On the other hand, MM is more suited to fashion items or short lifecycle items which have a highly unpredictable demand and need for rapid reaction to demand fluctuations. At MM, assortments are selected based on demand forecasting and market trends, leaving the vendors out of financial planning and strategic decisions.

• **Merchandise Planning at Fashion Retail**

Merchandise Planning (MP) process can be defined as the process used to match supply with demand. The objective of this process is to develop a plan that will support the sales execution process in order to meet company's targets [Raj'98]. MP is composed of several planning process, including Financial Planning, Location Planning, Product Planning, Space Planning, and others. There is no standard approach to MP [CFA'05], neither there is a consensus on processes' names and roles involved in the Planning process. Each retailer has its own MP process which means that the steps, level of detail and roles involved in each step vary from retailer.

o **Retail Plan**

A retail plan it's a financial model of a retail business process which expresses how it is expected to perform. It is typically composed by Key Performance Indicators (KPI), or measures, that should be translated into predefined rules of calculation. It should be focused on a specific time period in the future, usually at month level or week level if it's an operational plan or at season or year level if it's a strategic plan [OR'07a].

It's very common to have several different versions of the plan during the planning process, which reflects revisions and approvals by different people or roles in the organization. These versions are reconciled and linked after the management's review and should output a global and balanced approved plan.

The plan will be compared to the actual results throughout the in-season and updated accordingly in order to meet the initial goals set. We will go through this in more detail later at the merchandise planning process.

o **Roles**

There are no standard organizational roles at retail. Every retailer has its own hierarchical organization, role's names and responsibilities; even if two retailers have the same name role in the organization, the responsibilities may not be the same.

However, we can enumerate three typical levels of roles involved in the planning process: the executives, the managers and the planners [OR'07a].

The **executives** plan at a more high-level view of the organization, setting strategic and long-date financial goals. The executive role plans at the highest division level from a product hierarchy perspective, and at total company level in a location hierarchy perspective; it focus on key elements of the business like sales or gross margin and perform a top-down approach.

The **managers** work at a middle-level view, serving as an interface between the executives and the planners. They have the responsibility to communicate company goals to the planners at the highest level, through middle-out targets specified by a broader range of metrics then at the executive level.

The **planners** have the responsibility to build and track plans at the lowest level of the organization. Depending on the organization's structure and size, the planner may be responsible for building a detailed financial plan, category planning, item planning and assortment planning or be involved in location or channel planning.

- o ***Versions of plans***

To be able to reconcile the various perspectives of the different roles involved, there are plan versions. Different plan types are needed in order to carry out the different steps along the planning process. The typical plan versions can be classified as provisional, published or revised [OR'07a]. A **provisional** plan has a wider range of time; usually it has the next season and the following on sight. It should provide detailed sales and stocks targets, with the planned quantity information and the according times, with the best merchandise mix. A **published** plan is used to manage stock ordering and it's the base for the initial distribution; it is used also for performance monitoring of the current season or the nearest season. A **revised** plan is the current season's updated plan; usually it is updated each week and it's the rolling basis for forecasting, replenishment and decision making for the current season.

- o ***Types of planning processes***

There are three typical types of planning processes: top-down, bottom-up and middle-out. The roles involved at the planning process vary according to the industry as said before, but typically we have the executive, manager and planner roles that represent the top, middle and bottom levels accordingly [OR'07a].

- Top-Down Planning

A top-down approach is essentially breaking down the overall organization goals into smaller goals in order to spread them to the sub-levels and ending up with an implementation plan. It corresponds to the planning process at the executive level, where major targets and information must be passed to the manager and planner levels below it. This approach ensures a more consistent global strategy, but lacks the vision of the lowest levels and does not take account the differences within them and the resources available at the bottom level.

- Bottom-Up Planning

A bottom-up approach is the opposite of the top-down. It starts to specify the goals based on the vision of the lowest level and spreads up to the top level by aggregation. This approach enables a more accurate implementation plan that better matches the differences and available resources of the lowest levels, but may result in a non-consistent global strategy.

- Middle-out Planning

Middle-out planning is basically a distributed planning approach and usually produces the best results as it is a combination of the top-down and bottom-up approaches. It consists on a flexible framework in which the strengths of both the other two approaches are combined in order to have both visions: the up level and bottom level visions. This ensures a more consistent global strategy across the levels, and a match between the main goals of the upper levels and the specificities of the lowest levels.

- o ***Types of plans***

The retailer can have multiple plans depending on which perspective it is viewed, but if built properly, all will share the same numbers. Typically, you'll have three views of the

retailer company which will differ only in their focus, not in their results: Merchandise Plans, Range Plans and Store Plans.

Each of these types of plans are built by different teams with differing points of view, providing the retailer a shared, strong and more comprehensive big picture plan. This is done by collaboration, having periodic meetings between the three groups in order to share viewpoints, refine trends and roll-up to total plans.

Merchandise Plans are just summary level views of each hierarchy level. Store Plans on the other hand are the summary level view of each store. Range Plans are an aggregation of assortment & style level plans; it can also be called a macro-assortment plan.

2.3. Business Challenges and Opportunities

2.3.1. Consumer behaviour

Consumer behaviour is radically changing and retailers need to understand how this change affects the retail industry. The consumer diversification has increased in the last years making the traditional tracking of consumer purchase irrelevant; dramatic demographic and lifestyle changes and an increase on the accessibility of information are just a few examples. A retailer cannot keep up with a “one-size-fits-all” approach and has to increase its range of products in order to remain competitive. The mass market era is gone and an era of niches has arisen.

This shift in consumer behaviour [presented in Figure 17] is being translated into consumers becoming more critical, expecting more and better service and shopping experiences [IBM’04]. On the other hand, consumer’s behaviour is becoming so unpredictable that they actually trade-off the guaranteed quality and exclusivity principles to benefit from hot fashion goods “here and now”; they are actually putting their fickle personal matrixes of value on their money.

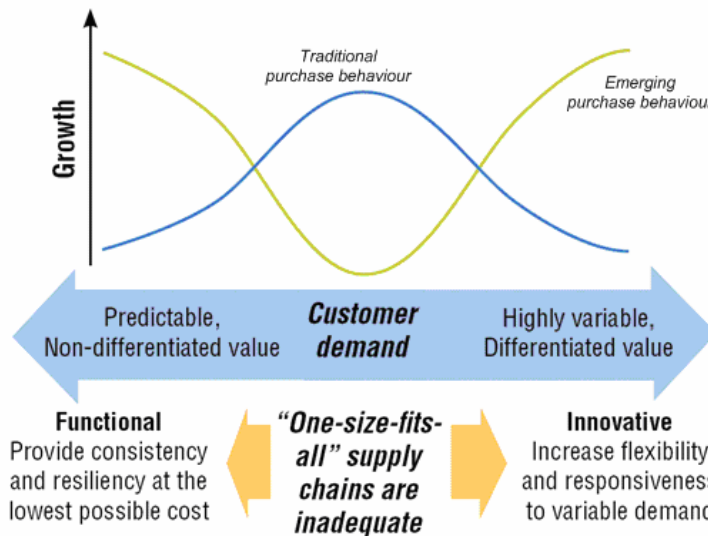


Figure 17 – Consumer polarization – A shift in consumer behaviour is forcing a change in fundamental product strategy. Source: Adapted from [IBM’04].

Retailer's spectrum is changing to keep up with this shift in consumer behaviour. Mega-retailers, like Wal-Mart had the capacity to reach more of these niches just by broadening their range of offer, while the remaining retailers were forced to move to the high-end of the spectrum or just stay in the middle. To survive, retailers must let consumers drive the direction of their brand and products.

Choosing the value position that a retailer wants to have has impact on the business; the characteristics of the planning, supply chain and execution are completely different depending on which side of the customer's spectrum behaviour a retail wants to be.

Industry leaders realized that in order to meet the fickle consumer demand, they needed to invest also on building consumer-driven supply chains so that they could respond to it almost in real-time. Synchronizing planning, manufacturing, distribution and replenishment is essential to maximize flexibility and responsiveness.

Also the investment on tools that could predict demand arisen as the usual data analysis and pattern finding became irrelevant. Predictive planning, real-time customer demand and customer behaviour feedback is now the key.

2.3.2. Evolution of the Merchandise Planning Process

• Traditional Approach

Although it may be surprising, not all retailers have a structured planning process in place [McW'08]. An example of a basic merchandise planning process that we may find consists in the following scenario:

- planning process is focused on the product (doesn't consider store level information);
- goes only at class or sub-class of product hierarchy; although, some key items can be planned more in depth;
- usually is done at month level (although in Europe is often at week level);
- basic set of KPIs (sales, inventory, markdowns, GMROI, turns, receipts – planned manually rather than optimized);
- frequently contained in an excel spreadsheet with links to other spreadsheets, typically with a format that can be easily changed;
- relies only at one person, who spends almost of their time keeping the spreadsheet alive (rather than analyzing business performance or doing efficient planning)

Keeping this process alive is hard enough by its own, so it's no wonder that most retailers struggle to go further. But why are retailers so reluctant to change? According to Nikki Baird⁵, merchandising is the "heart of retail" - the closest process to the core of the business – representing 80% of right product, right store, and right price; that's why retailers are reluctant to adopt standard processes and applications. They tend to develop custom applications that "fossilize arcane working practices and increase costs because they are hard to replace and difficult to support, upgrade, and integrate" [NG'07].

• Current approach

With the change in consumer-behaviour, the days where retailers were able to merchandise all stores with the same assortment are history. For many retailers, the solution to grow sales can no longer be about adding new stores but by "cracking the

⁵ former analyst from Forrester Research

code” and understanding and deliver more precisely what customers at each store really need and want.

We’ve seen that changes in the consumer behaviour and lifestyles diversity has increased over the years and retailers are challenged to respond quickly and tailored to the local consumer demand, while still differentiating their offer and pressuring on margins as the competition increases. To keep up the pace, retailers need a way to maximize profitability of the merchandise process while still exceeding customer expectations.

By applying a merchandise mix that sells best for each store, retailers can order and allocate inventory more effectively as well as setting optimal prices to improve profitability. More cost and time reductions can be made by optimised pre-packs and straight collaboration with vendors [RKS’07]. This is a change in mindset, this is moving from a Category-Centric Approach to a Consumer-Centric Approach. A buyer must no longer think about “which products should I buy for my “women’s casuals” category” but rather “which “women’s casuals” products should I buy for my customer segment B” - or even if it makes sense to have that category of products.

2.3.3. Opportunities and challenges

A Forrester study on collaboration between manufacturers and retailers [Nik’06] shows an increasing interest in this merchandise optimization approach from the market industry, stating that 64% of retailers and 58% of manufacturers were planning to increase the granularity of their assortments in 2007.

However, it is important to keep in mind that these are big projects and that not all retailers have the conditions and maturity to fully adopt these process; these are large retail chains with hundreds of stores and ten thousands of SKU’s to plan, with a lot of historical information data, matured processes and structured IT enabling shared data across the supply chain. Wal-Mart for instance, by 2007 had a chain with more than 6,000 stores, with some of them having almost a half-million SKUs; their database tables had something like 100 billion rows; by that time, their POS systems was dealing with approximately 276 million items a day; we’re talking about a data warehouse larger than 4 Petabytes [Eva’07]. The IT area is a major challenge and critical to the business, as it cannot stop or fail, running the risk of jeopardising the entire business.

The cost of implementation of these processes is heavy and needs to be balanced with the return on investment. Adding another application to the system simply will not work as it did in the past because this time, to get the most of this kind of approach, it needs to be fully integrated within the whole supply chain processes as well as with the front-end lines of the business.

2.4. Consumer-Centric Merchandising

2.4.1. Overview

Consumer-Centric Merchandising (CCM) it’s a recent approach that goes one step closer to the customer, leaving behind the traditional merchandising. The traditional merchandising approach was based on history and customer segmentation in order to reach “targeted” customers, whether CCM is more based on advanced forecasts and aims to meet customer’s needs and expectations [Dem’07]. CCM aims to have a common view of demand to all steps, having a bottom-up approach to forecast and focusing on item and store level decisions; the usual approach was more top-down

controlled and had disparate forecasts along the steps [DJ'07]. But possibly more importantly is that the focus in CCM is on the consumer and not on the merchandise. As said before, the traditional merchandise management aimed to meet local needs instead of justifying a buy quantity like in category management. A more efficient assortment and a critical component of CCM can be accomplished by having an Assortment Management Process, connecting the planning and execution steps and determining the right merchandise mix based on a granular level of store-specific demand intelligence [SG'08]. Figure 18 shows the integrated components of the Consumer-Centric Merchandising approach.

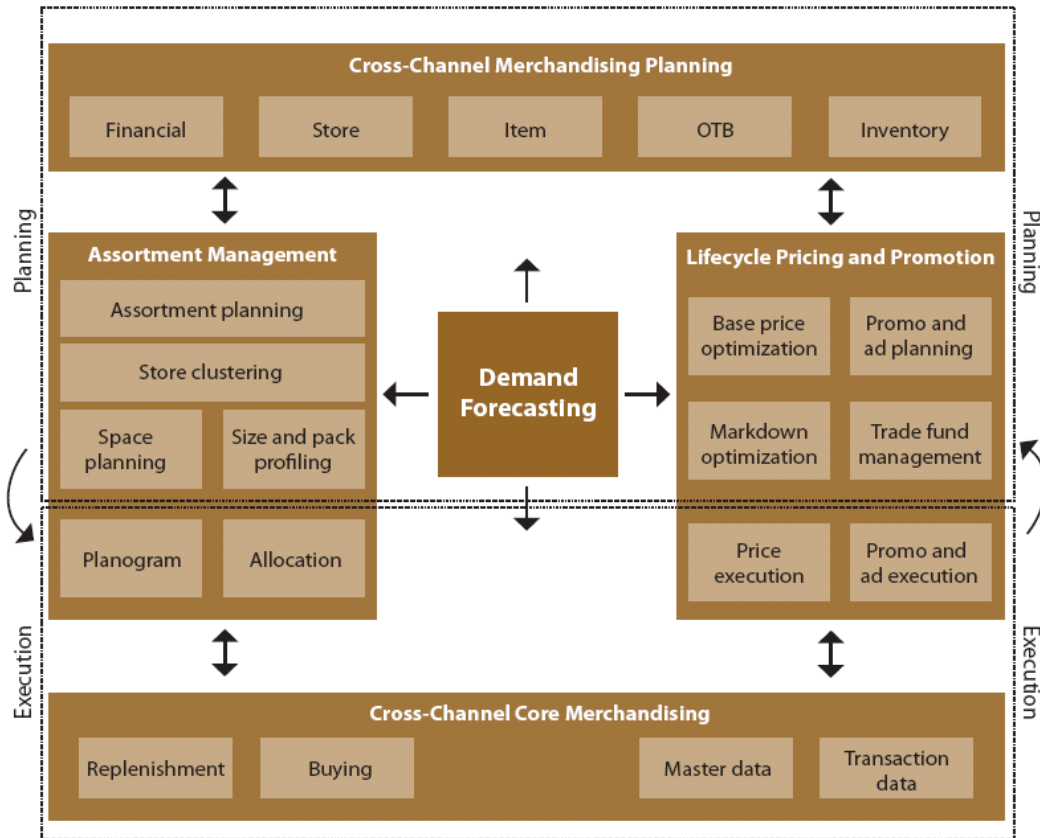


Figure 18 – Consumer-centric merchandising components. Source: Adapted from [SG'08].

2.4.2. Integrated Planning & Execution Process

Retailers are now facing a competitive market with increasing choices and options. As a result, customers are increasingly more selective on what they buy, where they shop and how much time are they willing to wait. This pressures retailers on time and budget: as inventory increases, so is the risk.

Consumer Behaviour and Market Trends affect forecast, strategy, planning and execution levels; on the other hand, having the 5 R's (Right Product, Right Price, Right Store, Right Time and Right Quantity) influences Consumer Behaviour. So this is a two-way street. If merchandising and supply chain aren't fully integrated, the further upstream you go in the supply chain, the greater fluctuation in demand appears – the so called Bullwhip effect. So there's a need to keep a single view of demand in order to leverage the risk and keep the Supply Chain and Merchandising processes focusing in the same data, becoming an integrated planning & execution process.



Figure 19 –Integration between Merchandising and Supply Chain: the need for a single view of demand. Source: [NRF'08].

2.4.3. Challenges, Organizational Barriers and Technology Enablers

With the retail industry changing with global sourcing, product variety, reduced life-cycles (fast-fashion), aggressive competition, ever less predictable demand, the pressure on retailers keeps increasing.

With the recent enhancements in technology, this consumer-centric merchandise management optimization may help to reduce the large markdowns due to excessive inventory and the lost sales opportunity due to the stock-outs so usual at the modern fashion industry.

A survey on collaboration [FCR'06] showed that retailers were already trying to manage their merchandising/category management activities on customer specific store clusters (49 percent) and demographically aligned store clusters (26 percent). Surveyed retailers stated that the biggest challenge they faced on effectively executing plans based on granular insights and customer specific clusters was by far the effective retail execution (53 percent) as you can see in Figure 20.

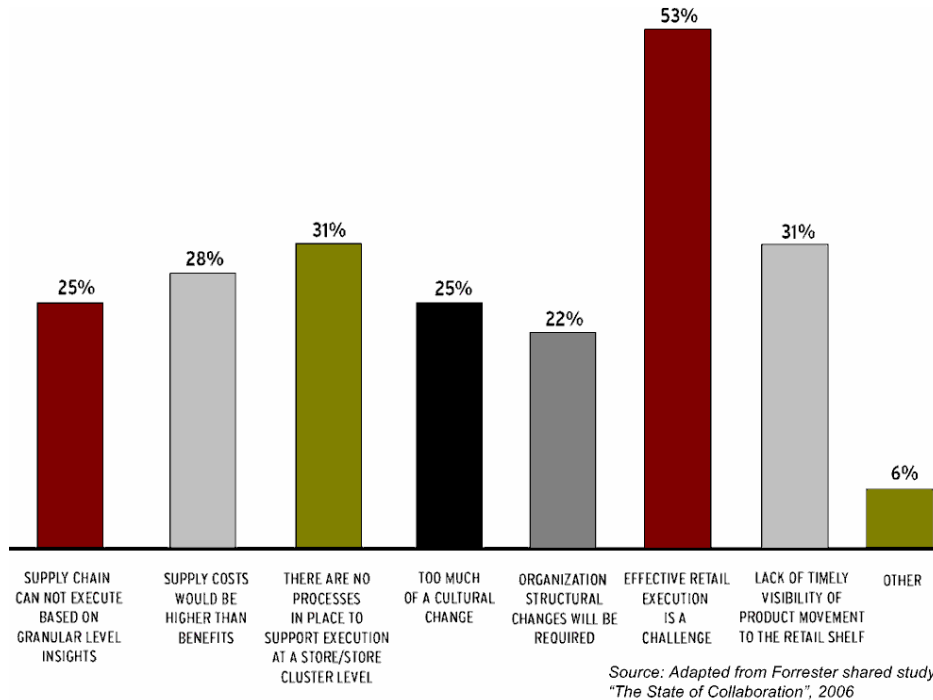


Figure 20 – “What are the challenges to effectively executing plans based on granular insights at customer specific store clusters?” Source: Adapted from [FCR’06].

A major challenge pointed at this study was that there was a big difference between retailers’ and manufacturers’ expectations: they had different ROI priorities. While retailers ranked assortment planning and inventory management as the most important ROI opportunities, manufacturers were more focused on demand planning and trade promotion management – this is a barrier at collaboration. The prediction was that the granular consumer focused merchandising and channel management trend was going to continue as barriers in collaboration and organizational changes are trying to be removed.

2.5. Assortment in Fashion Retail

2.5.1. Assortment Management – the CCM approach to Assortment

CCM approach to Assortment Management can be defined as “a comprehensive collection of planning and execution processes used to determine a product mix at a given store for a given time frame” [SG’08]. It connects merchandise planning with the execution steps, namely purchasing, allocation, replenishment and planogram execution. The key driver behind Assortment Management is localization: the granular customer-focused product assortment.

• Opportunities

With the recent concept trend of consumer centricity, retailers are focusing on increasing their assortment’s granularity. In the survey [FCR’06], only 10 percent of retailers were executing their assortments at store level although 40 percent were assorting by region or by store cluster. But on the other hand, only 17 percent of manufacturers could provide regional or store cluster assortments. There was clearly a disconnection between planning and execution: retailers were moving to a more

granular level in their assortment planning but most manufacturers just couldn't execute at that level.

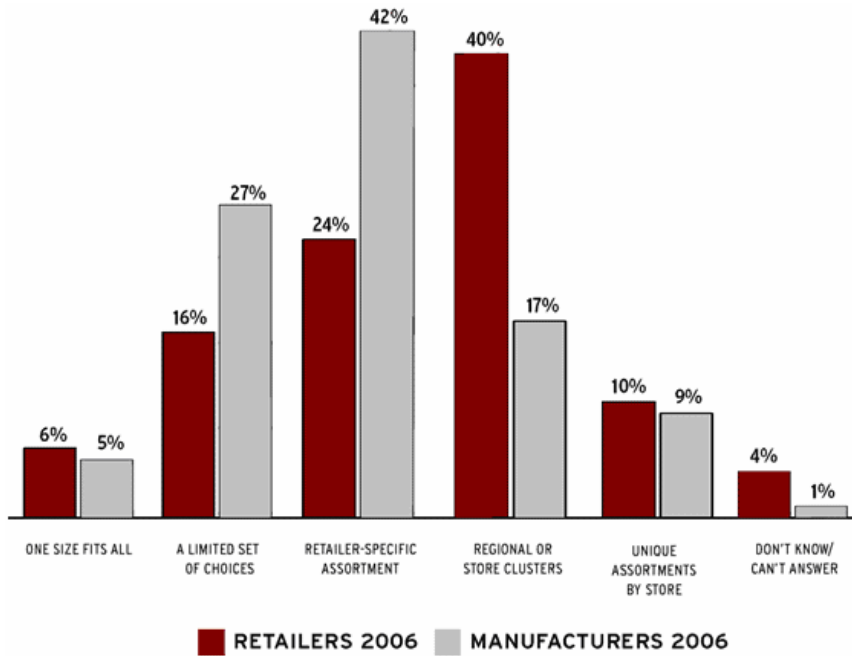


Figure 21 – “How Granular is your product assortment today?”. Source: Adapted from [FCR’06].

• Assortment Management Process

The expression Assortment Management means different things to different retail segments - its application and process varies to support the different verticals. In this report, the Assortment Management process is focused and applied to the apparel industry retailers.

Figure 22 shows an overview of a possible merchandise management process at a retailer, done by the interneer, based on best practises ([KCG’05], [SAS’07]) and compilations of several approaches to assortment planning and its integration with other processes ([Mar’08], [SG’08], [SAS’07], [VICS’01], [TR’07], [i2’05]) . The process should start with the definition of the strategic targets, the inputs to the Merchandise Planning process. In this example, the merchandise planning is composed of the following processes: Financial Planning, Product Planning, Store Planning, Space Planning and Assortment Planning. On the execution layer, Allocation process takes the output of the MPP and drills it down to size at SKU level. This integrated planning and execution approach at store and SKU level defines the Assortment Management footprint.

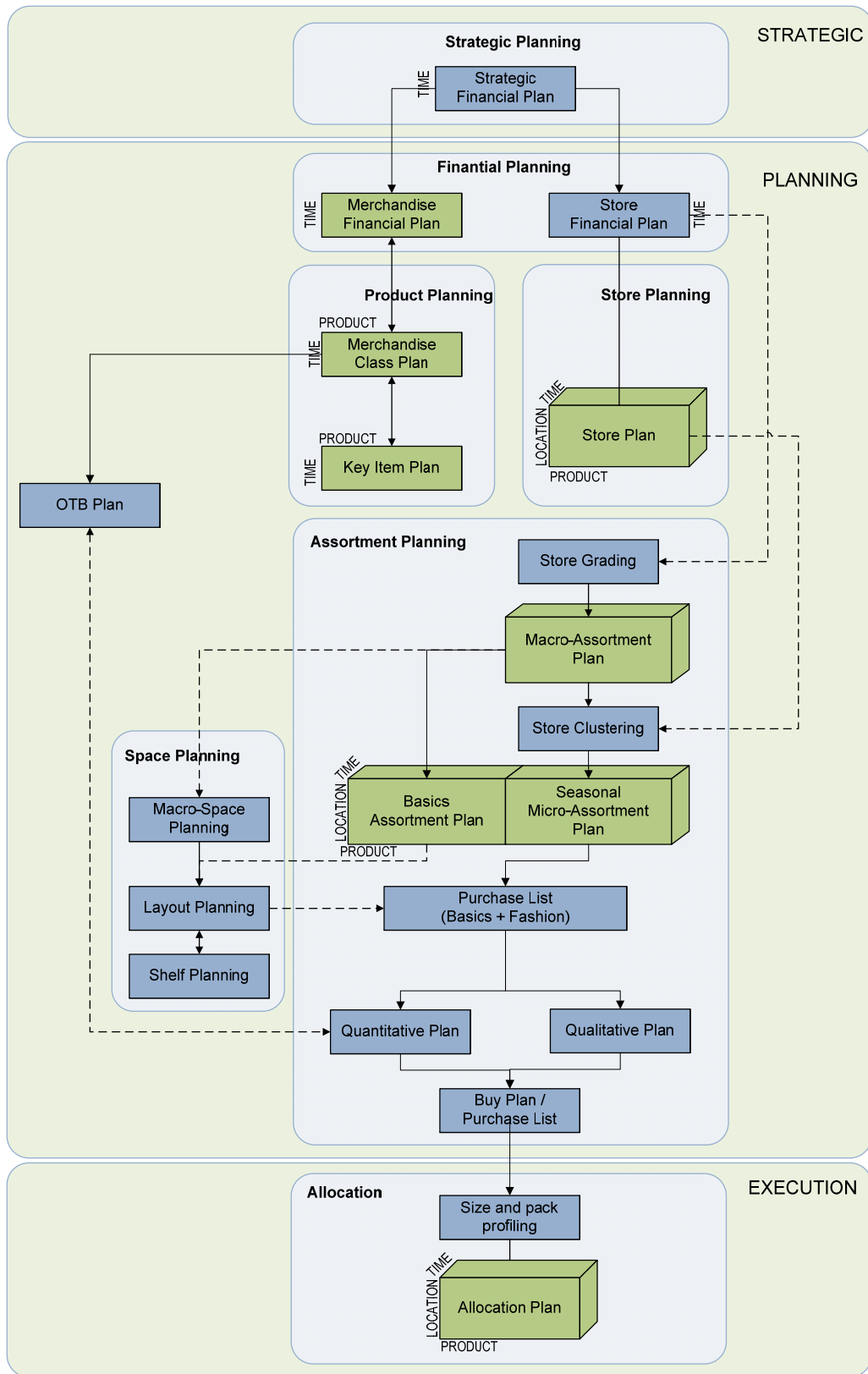


Figure 22 – An overview of how the Merchandise Planning is integrated with the Strategic and Execution phases, providing a complete Assortment Management integrated solution.

2.5.2. Assortment Planning Process

One of the decisions that retailers and suppliers face is the choice of assortments of retail items to be bought or distributed. According to [KF'06] “Assortment planning at a retailer is to find the optimal set of products to be carried and set the inventory levels of each product” keeping in mind that “there is a limited shelf space assigned to each product category”.

The Assortment Planning aims to output a purchase order guide with detailed information about products that the retailer is planning to order for the upcoming season. For each product, it is specified the total quantity and monetary amount to be order for the season and additionally, it can be breakdown to specify each delivery period within the in-season. This kind of breakdown is particularly useful for the apparel and footwear industries because of the complexity of the products available. For instance, each t-shirt style can be manufactured by one company (which may have special delivery times and transportation needs), can come in many different colours and sizes, can be only available during different seasons at different prices and might need to be delivered in various quantities and packs of size/colours for each store during a particular delivery period.

The Assortment plan helps the Sales Representative and the Buyer to determine the units they need to accomplish the targets set by the financial team. The assortment plan itself can be quickly changed to meet demand fluctuations but has always to meet up the buyer's budget and the manufacturer product offer. A Buyer's budget for a specific upcoming season (known in the industry as Open-To-Buy or OTB) is expected to be constantly changing based on consumer insight; for instance, if sales are high, a Buyer's OTB will increase.

Assortment Planning Process is a concept that is changing, especially in fashion industry. To better understand how this change in conception affects the retailer's processes, its background and roots are following presented.

• Evolution

Historically, the primary purpose of assortment planning was to justify the buy quantity of the pre-season purchase orders (which was done manually) and ensure these plans reconciled with the merchandise financial plan budgets ([Gri'07] and [SG'08]). But now, it is evolving to be a pre-season and in-season process that bridges the gap between the high-level financial plans and the low-level executable/operational actions, such as purchasing, product development, allocation, replenishment, and promotions execution. The traditional and basic assortment method was to identify a targeted customer, meet their needs through an assortment based on price and store format that appealed to that target and spread that model across the nation. Retailers were used to rely primarily on their personal experience and if needed, they would compare competitors' assortments in order to meet challenges. But as the competition at this market increased and as retailers start serving disparate markets, confiding only at a gut feeling or copying competitors starts to no longer be enough to continue on the race.

Factors such as ethnicity, age, wealth, urbanization, housing styles, family structures, and way of life are becoming more significant. For instance, Tapestry⁶ has 65 lifestyles

⁶ Tapestry: market segmentation system from consulting firm ESRI; <http://www.esri.com/>

profiles to define the US neighbourhood population along with Claritas⁷ that had in the 70's forty lifestyle segments to define the U.S. populace and today needs 66 which expresses this diversification on the 65% increase. This change in demographics along with the globalization emerge and as the markets became more competitive, retailers are now struggling to change from the “one-size-fits-all” approach into a more localized response to demand strategy. Adjusting assortment to location characteristics is not just smart, it can provide a means to cut costs and also limit the risk of negative customer reactions and loss of customers. This is only possible because only now is available the technology that is able to gather and analyse product, location and customer information at a huge detail, discerning patterns from millions of data.

• Traditional business process

The traditional approach to assortment planning is doing style plans based on store grades. Basically, retailers used to grade stores in terms of volume, and then they would create the assortment plans based on those grades.

For example, a retailer grades his stores as A Stores, B Stores and C stores (where A stores are high volume stores whereas C stores are the small volume stores). Then the retailer would grade his styles from “good sellers” to more “difficult/risky/slow sellers”. These “good sellers” would be the “core” assortment, an assortment of styles that would be present in every store; the other styles would only be available at the high volume stores [Mar’08]. This is intuitive for the end-consumer: the customer knows that the “big selling items” are available at all the retailer’s stores, whereas the “not-so-famous items” are only available at the retailer’s big stores. Figure 23 shows this idea.

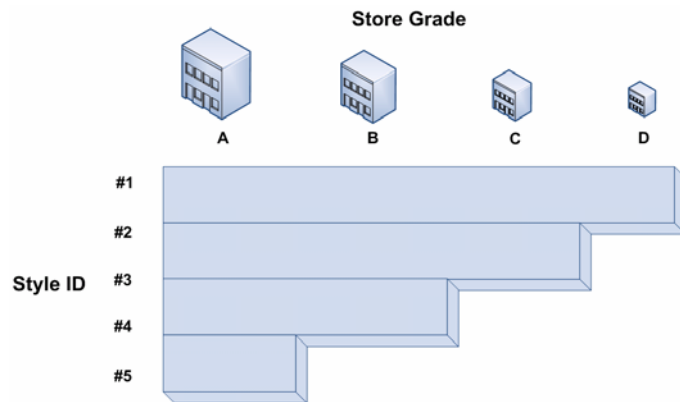


Figure 23 – The traditional approach to assortment planning, based on store volume grade. Source: Adapted from [Mar’08].

• Challenges and opportunities

Yet, in today's increasingly competitive environment, to attract the right customer to the store, the retailer must focus on creating appropriate assortment's breadth and depth of products based on the customer's desires and shopping patterns. This involves taking into account lifestyles, customer loyalty, trends and more. In addition, the retailer must

⁷ Claritas: demographic company; <http://www.claritas.com/>

not forget that the assortment created must represent the company's strategic vision, so the mix of products must be carefully balanced.

Although assortment planning directly affects product selection, price, timing and micro-merchandising, and even with technology available, this kind of optimization has often been left aside due to strict schedules and time to market pressure at fashion retail. This reality forces companies to take the easy approach to merchandising: repeating assortment breadth and depth from previous seasons, still creating assortments based on store volume and ranking items by volume of sales.

• CCM approach to Assortment Planning

CCM approach to the fashion assortment is based on an integration between the planning and execution steps in merchandise management.

The assortment plan should go to the lowest level of detail, where it specifies the number of each combination of style/colour of an item (a man's dress shirt). If the wrong assortments are bought or distributed, it can result in lost sales. Further, the size is also a major factor; if the sizes are not well distributed the resulting under or over stocking by size may lead to lost profit due to missed sales and excessive markdowns, customer dissatisfaction due to unavailable sizes, and excessive operational costs due to expedited shipping or store-to-store transfers [RKS'07]. That's why the size attribute is the last thing to plan – the decision is closer to the sales and demand forecast is more accurate (see Figure 24). And that's why the Assortment Management considers Allocation and size-profiling in its process.

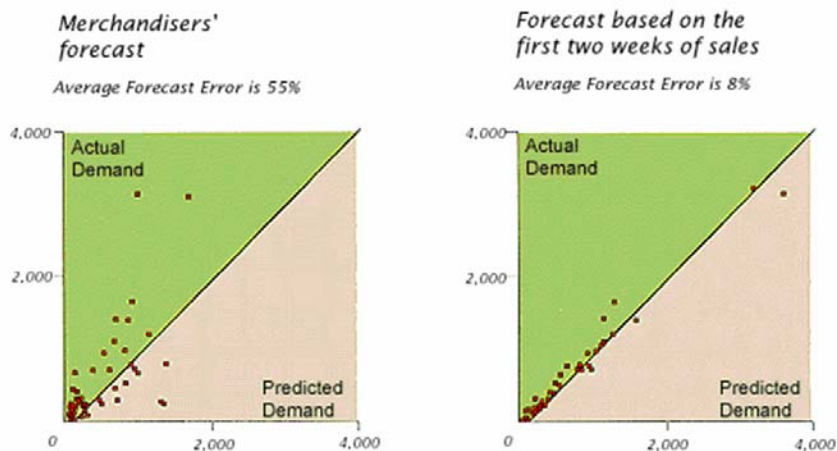


Figure 24 – Demand forecast accuracy. Forecast is more accurate the closer you plan with recent historical demand. Source: [FRM'00].

• Assortment Planning Best Practices

The following assortment planning best practises were based in the only found document about this subject [KCG'05]. Every direct transcript within this sub-chapter will be quoted.

- Definition of attributes and characteristics

The appropriate merchandise attributes and characteristics should be selected for each department's assortment and planned accordingly; these characteristics can be for instance fashion trend, vendor, price point, colour, size or theme.

An attribute hierarchy should be developed according to these characteristics. Alternative views of this hierarchy should be provided, so that the merchandise can be analyzed from the different perspectives.

- Weight attributes

These characteristics should be weighted as to what percentage each should contribute to the department in total. For instance: in a Fashion Trend analysis, the retailer should ask himself “What percentage will each factor contribute to each classification?” resulting in a classification of for instance, 10% Testing Trends, 40% Peak Trend, 50% Outgoing Trends.

- Plan core assortment

The core assortment - the baseline assortment to be carried in all the retailer’s stores - is then planned. The breadth of styles per attribute and the units per style is planned. Typically, “the top four styles within each classification should represent 55%-65% of the total classification’s purchases.”

- Cluster stores

Cluster stores by attributes: store type, store size, store format, store grade, customer demographics, competition, etc.

- Add breath and depth to the core Assortment plan with Assortment modules

For each cluster, an Assortment Plan should be made to cover each demand variation. These sub-Assortment Plans are called Assortment modules. Each Assortment module is developed according to the store clusters. “A module can add breadth or depth to the core assortment. Many best practice retailers use store input to tailor the specific store assortments.”

- Reconcile plans

“The plan is rolled-up and checked against the Merchandise Plan and Space Allocation Plan. Assortment Planning breaks the merchandise financial plan into units, price points, dollars and specific SKU’s”. Assortment plans should include the delivery times, as well as the exit strategies; typically the plans are done at week level.

o ***Efficient Assortment Planning***

A more Efficient Assortment Planning can be done if data is available, as the retailer moves closer to the end of the planning phase.

- Improve the building of the Assortment models

Build an assortment model for each category of products based on “retail data (e.g. sales, profit, sales per square foot, GMROI), market data (e.g. market share per SKU, sales velocity per SKU), and consumer data (e.g. loyalty, exclusivity, consumer worth, substitutability measures)”.

Input the targeted percentage of market share into the model for the product category selected, for SKUs that are core to all of the stores (e.g. a retailer might want to have 80% of market share coverage of “Women Casuals”).

- Assortment Analysis: Keep/Drop items

An assortment analysis should be done, in order to determine which SKUs fall below and above sales coverage target”; this identification should be based on “market, retail, and consumer measures” to judge propriety of deletion and retention accordingly.

Some examples of this analysis:

- if a particular brand has a low score on brand loyalty, it might fall out of the assortment;
- “a SKU could be eliminated, even if it scored highly, if other factors, such as sales, are very low” (e.g. “although a particular SKU may have scored high on consumer worth, the sales are so minimal that the SKU should not be retained”)

A revision of potential SKUs that are not carried by the retailer, but that are “predicted to fall above the sales coverage target” should be analysed to judge propriety of addition (this analysis should be based on the same metrics described above).

Examples of these additions:

- “Items not carried by the retailer are analyzed by using marketplace measurements and extrapolating them to the retailer. An item with exceptional market performance could be added.”
- “Perhaps the retailer might add a SKU manufactured by new vendor, due to excellent profitability, as well as exclusivity.”

- Assortment Analysis: Analyse by Vendor

An analysis of the entire assortment should be done from a vendor perspective, using a “matrix with brands on one axis and product attributes on the other”.

Finalize the assortment proposal based on the previous retentions, deletions, and additions.

- Assortment Analysis: Compare with current assortment

Analyse and quantify the impact of the proposed assortment: compare the proposed assortment with the current assortment “based on the scores from the retail, market and consumer data”.

“Conduct a profitability analysis to determine projected sales, profit, inventory, inventory turns and GMROI.”

- Assortment Approval

Accept the revised assortment if it scores better than the current assortment.

2.5.3. Store Grading and Clustering Process

An explanation of this process is made, as it is considered to be a crucial step in creating a competitive advantage on the assortment planning conception.

• Introduction

Store Grading and Store Clustering are processes to group stores according to common characteristics; this reduces the size of the store-planning task by categorizing stores into groups (or clusters), based on common characteristics or attributes [KCG’05]. This is especially useful for big chains with a big number of stores, enabling the user to plan more quickly and efficiently.

Store Grading is the process of defining stores by grouping them in terms of volume; for instance, stores with high volume are typically graded AA whether a low volume store would be graded a C or D.

Store Clustering is the process of defining stores by similar attributes; for example, lost sales can be reduced by sending the right goods to areas where there are weather opportunities.

- **Evolution**

Traditionally stores have been grouped by performance (e.g. volume of sales), size and geography /climate (e.g. warm vs. hot climate, strip vs. mall store format) attributes. Lately, stores have being clustered more on a consumer-centricity approach, considering the target customer (e.g. resort area, retirement group, ethnicity, economic demographics).

- **Application**

The ability to group stores based on local common characteristics is useful for the generation of effective store plans, assortment optimization and allocation.

Usually Store Clustering can be used for [SG'08]:

- Allocation (e.g. allocate goods based on similar store-demand)
 - o Size-profiling (e.g. size demand varies by store, instead of having a size pack for all stores, group stores with similar size demand and ship demand-driven similar packs)
- Planning (e.g. planning/analysing groups of stores instead of store by store)
 - o Choosing test stores (e.g. cluster stores and chose one test store that best represents all the stores from that cluster)
 - o Plan planograms (e.g. all stores in a cluster will have the same planogram)
- Customer centricity approach (e.g. analyse local customers by clustering stores based on similar customer characteristics; this enables customized store assortments and micromarketing)

It is important to have in mind that the Clustering is a process that is done over time, since store's characteristics, historical performance and consumer data is always changing.

As obvious, each store can be included at many clusters; for instance, store A can be at cluster "Climate Hot" and at the same time at cluster "Urban Area". The following are examples of applications of these cluster outputs.

- o ***Item Importance: Input to Assortment Planning***

A quantification of the relative importance of each group of item's characteristics is necessary, for the identification of opportunities. Using metrics such as sales index, sales contribution or profitability, a retailer can come up with a mixed percentage grid (example in Figure 25) [CG'08]. This is used to determine which groups of items are selling more at which clusters and will serve as an input to the Optimized Assortment process.

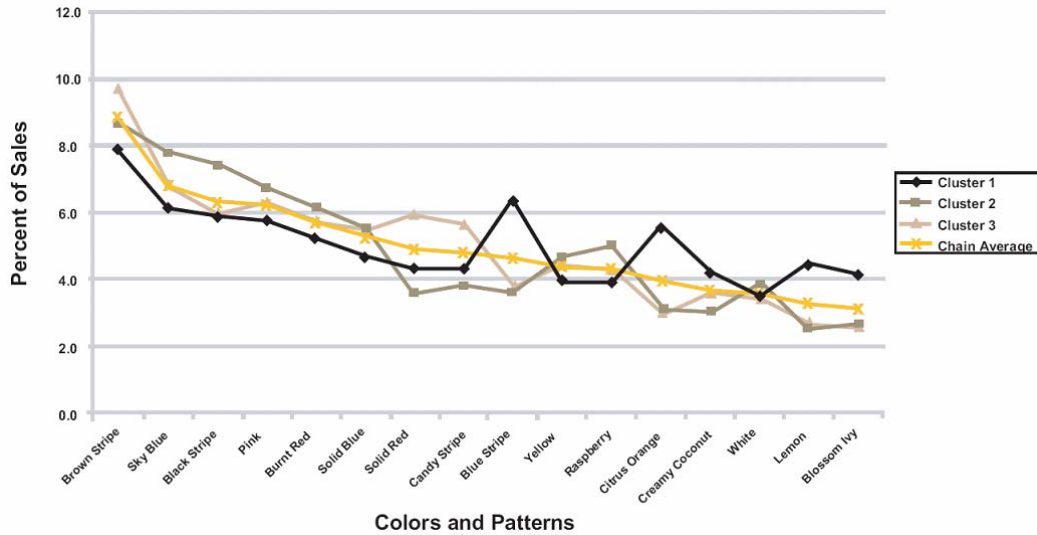


Figure 25 – Example of a Cluster Mix Percentage Grid. Source: [CG'08]

o **Space allocated by category of products: Input to Space Allocation**

Linear regression is used to determine which space a retailer will have for each category of products; this is useful for planning quantities to order, space available for the display of items, etc. A retailer will need to quantify the category sales-to-space relationship for each cluster; this is done by statistical tools (like regression analysis, as in Figure 26) that determine the category coefficients that specify the relationship between sales revenue and units. [CG'08]

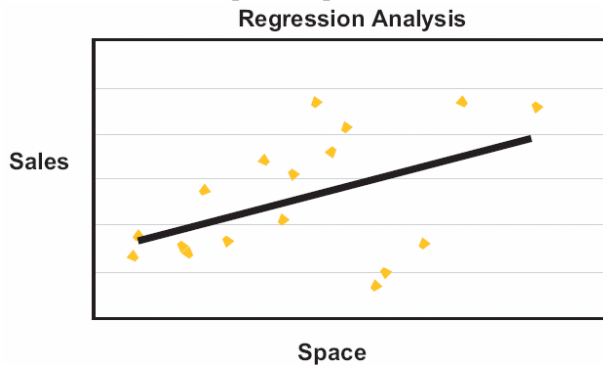


Figure 26 – Example of Regression Analysis. Source: [CG'08].

o **Size Profiling: Input to Allocation**

Many retailers have logistical limitations which forces them to not being able to consider and process multiple pack configurations. Thus, retailers often ship generic pre-packs, getting too many or too few of a size to stores. If the retailer has the means, size profiling is an option to end size over/understocks. [SAS'06]

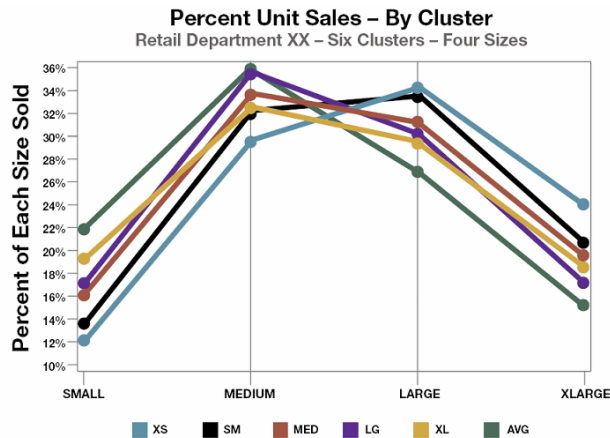


Figure 27 – “Percent unit sales by cluster: Each line represents the size demand of an item for a cluster of similar stores. The green line represents the average for all stores. If the retailer allocates sizes based on the average, stores would be either under or overstocked on some sizes at some point.” Source: [SAS’06].

2.5.4. Integration of processes

Processes’ integration is important to CCM approach, and thus, Assortment Management. The Assortment Planning function should be integrated not only with the Store Clustering that was presented before, but also with certain key planning functions like Merchandise Planning, Item Planning, Size and Pack Profiling and Allocation, becoming a full Assortment Management [SG’08]. The following are brief explanations of these integrations.

• Merchandise Planning

The output of the Merchandise Planning (MP) should be targets that are going to be used in the Assortment Planning (AP), so technically, MP should precede AP. However, they can begin concurrently due to the fashion business constraints; for example, you may need an Assortment output for a specific set of items in advance because of location constraints (for instance, items made in China need to be ordered in advance, in order to be manufactured and shipped months before to arrive on time at Europe or US). If we consider Europe, in 2006 a little more than half (51.5 %) of all EU-27 clothing imports came from China and Turkey [ESB’07]. So this is a reality that retailers must face.

• Item Planning

Item Planning is the escort of a key product through its whole lifecycle in an assortment. Basically is the management of a product at item/store/week level, with the goal of optimizing inventory and margins across multiple tiers. By looking at this level of detail, it is possible to take advantage demand fluctuations, sending enough items to the right stores, at the right price, at the right time. This process should be closely linked to the assortment planning, so that the made changes in the flow match the overall assortment plan. [SG’08]

- **Size and pack Profiling**

This process aims to assure optimal pre-packed quantities at store-level. While traditional assortment plans stop at style-colour level, advanced retailers develop size profiles in order to configure efficient pack sizes for each store. This way, they can optimise the buy order at the pack level, not losing time with inefficient packs or with the unpacking and re-allocation of products. ([SG'08] and [SAS'06])

- **Allocation**

Allocation is the opposite of the traditional demand-based pull process. It is basically the pushing of items down to stores, with the goal of filling holes and rebalance inventory at the store. This process should be automated, focusing the allocators on optimizing the in-season planned targets execution. [SG'08].

3. Assortment Management Solutions

As said before, Assortment Management is a relative new business process; its roots go back to the mid 90s when software vendors started to fill the gap between planning and allocation solutions [SG'08]. When choosing an assortment management solution, a retailer should focus on how the solution fits his needs and how it integrates with his other processes.

The market solutions to this problem have different backgrounds and characteristics. To better understand how the object of this study (Oracle's Assortment Planning solution for fashion retailers) is positioned in the market, a brief analysis of how Oracle approached the assortment management problem is presented. Enabler's position as an Oracle implementation provider is also outlined, so that one can understand the background of an implementation of this kind at a retailer.

Next, an overview of Oracle Retail solutions is presented, starting by a brief history about Oracle's path to understand its strategy. Oracle's solutions to retailing are presented to understand how Assortment Planning application fits within its footprint. Oracle Retail Predictive Application Server (RPAS) is Oracle's tool to solutions that address the planning process at retail. This tool is described, aiming to have the certain amount of detail needed to follow the analysis that was done, so as to understand the complexity of this work.

3.1. Vendor Analysis

Assortment management solutions are somewhat new; retailers are still finding a small number of solutions available which is leading into a "lack of critical mass in adoption and use of packaged applications" [SG'08]. Since retailers are showing a lot of interest in assortment management, software vendors are capitalizing this increasing in investment and bringing products to market.

3.1.1. Vendor Approaches to Assortment Management

Software vendors' approaches to the assortment management differ. A recent AMR research [SG'08] outlined five types of approaches to the assortment process from software vendors: Assortment Specialists, Merchandising suites, Supply Chain Extensions, Vertical Integrators and Emerging Vendors. A brief description of some of these approaches is presented to better understand the position of Oracle's solution to this problem.

- **Assortment specialists**

Assortment specialists are software vendors specialized in assortment planning; their solutions coexist with previously installed merchandising applications at retailers. They have strong knowledge about the assortment process and kept updated with the recent trends moving to assortment management. These vendors include 7thOnline, IT Resources, Maple Lake and Torex Retail.

- **Merchandising suites**

Merchandising suites vendors have a broader view of the whole merchandising process. Their strategy was to grow in capabilities (usually by vendor acquisitions) and use their accounts to expand to this emerging assortment planning solutions. Oracle fits within this category. Other Merchandise suite vendors include JDA Software, NSB Group, SAP, SAS Institute and Soft Solutions.

- **Supply Chain extensions**

Vendors specialized in supply chain planning and execution completed their offer by connecting to assortment management functionality; this is changing their solutions to become a complete merchandise offer. Vendors from this type include i2 Technologies and Manhattan Associates.

- **Vertical Integrators**

Vertical Integrators are vendors who integrate business processes between members of the market chain. Since there's a convergence in retail to connect to other parts of the chain, these vendors are connecting their Product Lifecycle Management (PLM) and sourcing applications with recent assortment management capabilities.

3.1.2. Oracle's position in Assortment Management

As the reader can see in Figure 28, Oracle is well positioned in terms of range of assortment management functionality.

Vendor	Store Clustering and Segmentation	Assortment Planning	Item and Flow Planning	Size and Pack Profiling	Allocation	In-Season and OTB
7thOnline*						
i2 Technologies*						
IT Resources						
JDA Software*						
Lawson*						
Manhattan Associates						
Maple Lake						
NSB Group*						
Oracle						
SAP						
SAS Institute						
Soft Solutions*						
Torex Retail						
TXT e-solutions						

* Retailer could not provide references for assortment management functionality.

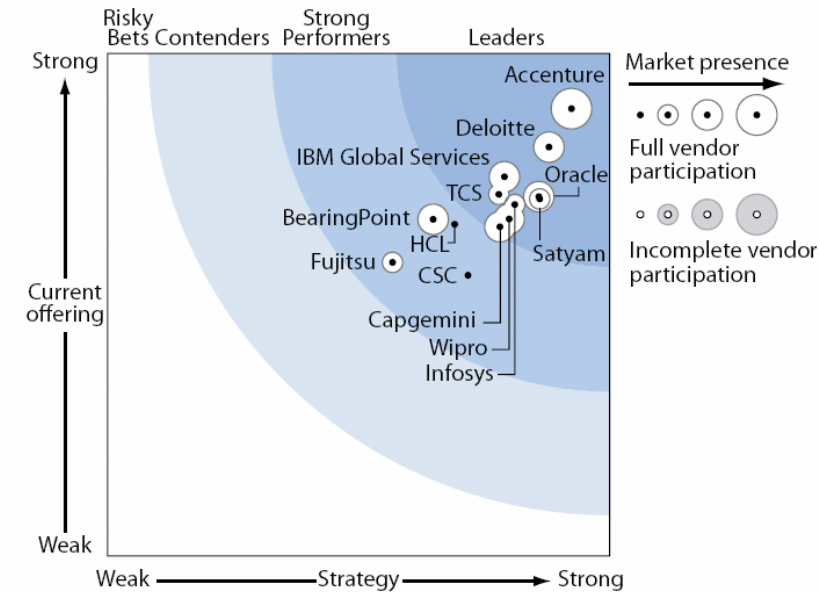
Source: AMR Research, 2008

Under development	
Existing functionality	
Vendor's area of strength	

Figure 28 – Assortment Management Applications functional footprint evaluation. Source: [SG'08].

3.1.3. Enabler's position

Enabler, being a Wipro Company, has not also increased its visibility as an Oracle systems implementer but also helped Wipro's strategy consulting practises, being recognised as delivering an end-to-end service. Wipro stands in Leader category [Figure 29] at the "Forrester Wave™: Oracle Implementation Providers, Q1'08", having one of the "largest offshore capabilities" in the market.

Figure 3 Forrester Wave™: Oracle Implementation Providers, Q1 '08

Source: Forrester Research, Inc.

Figure 29 – Forrester Wave™: Oracle Implementation Providers, Q1'08 – Wipro in Leader Category. Source: [Hel'07].

3.2. Oracle Retail Solutions

3.2.1. Oracle Retail Background

• History

Founded in 1977, Oracle Corporation⁸ is the world's leading supplier of software for information management, and the world's second largest independent software company. The company offers database, tools and application products, along with related consulting, education and support services to nearly every industry worldwide. Oracle technology can be found in 98 of the 100 Fortune companies and all of the top 20 banks are already running Oracle Applications [OR'08b], which makes its reputation undeniable.

Oracle has grown through acquisitions and merges, seeing this as a way to increase its product line, while also expanding into new markets. Aiming to expand to the retail industry, Oracle acquired Retek and ProfitLogic. Retek was the top leading provider specialized in complex business systems for retailers. Profitlogic was considered to have one of the most sophisticated analytical software among the retail software solution's industry. Oracle intend to integrate ProfitLogic's applications for pricing, assortment, and allocation with the Retek Merchandising System, which was used to manage inventory, track transactions, place orders, and execute price changes [Sul'05]. Retek turned out to be the heart and soul of the Oracle Retail suite, bringing merchandise and data management, demand forecasting, retail planning, store operations, multi-channel order management and supply chain functionalities [BG'06]. ProfitLogic however, brought to Oracle Retail the level of analytics that was missing

⁸ NASDAQ: ORCL

from Retek [BG'06], providing algorithms that went from space optimization to markdowns planning.

• Oracle Retail Solutions Footprint

Oracle offers a complete and integrated suite of applications for retail industry. The Oracle Retail solution footprint is the result of Oracle's "strategic acquisition of best-of-breed applications", as well as the realization of its "long-term vision for the retail sector" [OC'08]. Oracle Retail solutions footprint is driven to correspond to the needs of the many key vertical segments like fashion, grocery or hardlines, aiming to address each part of the specific business processes of each industry.

3.2.2. Oracle Retail Merchandise Solutions

Oracle was considered by Forrester [NG'07] as one of the few vendors that offer an End-to-End merchandising solution [see Figure 30]. Oracle Retail applications support every kind of retail business, from food to fashion industry, going through brick and mortar channel to e-commerce, providing a full range of functionality for the retailer's business.

Figure 2 Few Vendors Offer An Integrated End-To-End Solution

	Demand forecasting	Financial planning	Assortment planning	Price opt.	Size opt.	Store clustering	Inventory opt.	Allocation	Replenishment forecast	Replenishment	Space opt.
4R Systems	☐	☐	☐	☒	☒	☐	☒	☒	☒	☒	☐
7thOnline	☐	☐	☒	☒	☒	☒	☒	☐	☐	☐	☐
Aldata Solution	☒	☒	☒	☐	☐	☐	☒	☒	☒	☒	☐
DemandTec	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐	☐
Escalate Retail	☐	☒	☒	☐	☐	☒	☐	☒	☒	☒	☐
Galleria	☐	☐	☐	☐	☐	☐	☐	☒	☒	☒	☒
i2	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐
JDA	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒
Manhattan Associates	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐
Oracle	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒
SAP	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐
SAS Institute	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☒
Tomax	☒	☐	☐	☐	☐	☒	☒	☒	☒	☒	☐

41609

Source: Forrester Research, Inc.; 2007

Figure 30 – Oracle is one of the few vendors that offer an End-to-End Merchandise solution.
Source: [NG'07].

• Oracle Retail Assortment Planning Solution

The approach of Oracle Retail to Assortment Planning was formerly based on the offering of Oracle Retail Item Planning and Oracle Retail Category Management. These solutions were part of a complete set of planning solutions that included Merchandise Financial Planning, Space Optimization, Allocation and Inventory Planning.

With this new Assortment Planning template for Fashion Retailers and the already available Category Management template, Oracle broadens its offer to meet the needs of the different retailers and providing an integrated Planning workflow suite [see Figure 31]. Although Category Management and Assortment Planning templates share the same technology, the workflow, metrics, and data are completely different, since each of them addresses different industry needs.

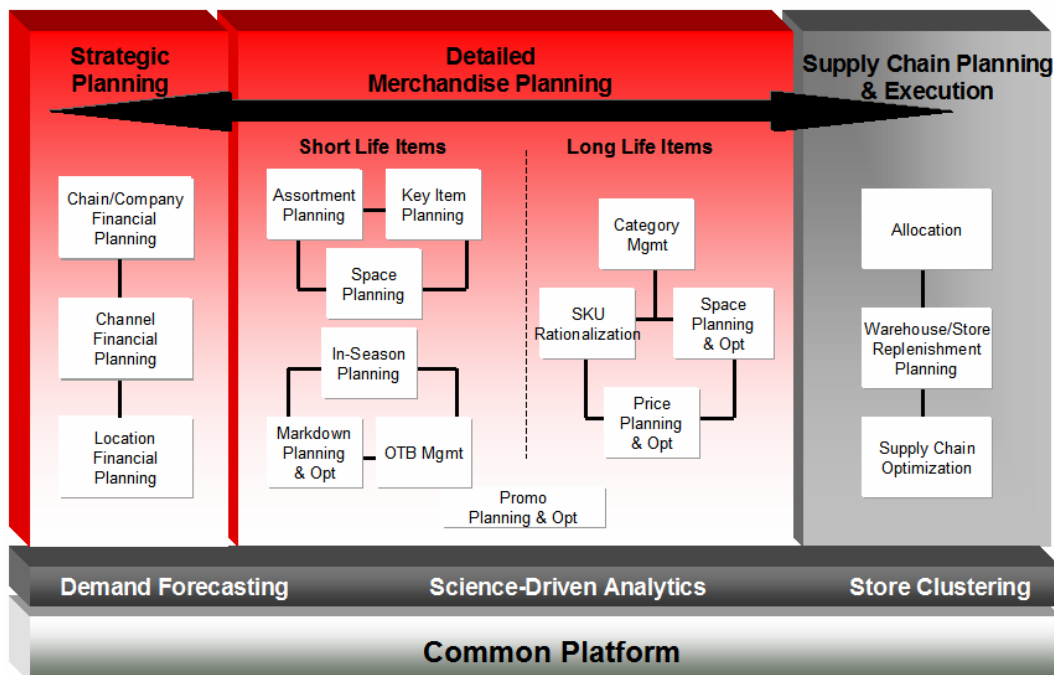


Figure 31 –Planning Integrated within Oracle Retail Footprint. Source: [OC'08b].

3.3. Oracle Retail Predictive Application Server - ORPAS

3.3.1. Introduction

Formerly known as Retek Predictive Application Server, ORPAS stands now for Oracle Retail Predictive Application Server.

The RPAS (or ORPAS) acronym is often used among retailers to describe a family of related retail-planning applications that uses historical data to predict future performance of specific retail processes [OR'07]. But more accurately, RPAS is best described as a “shared foundation” for the predictive applications, since it provides a centralized database where all data required is stored, shared, manipulated and retrieved.

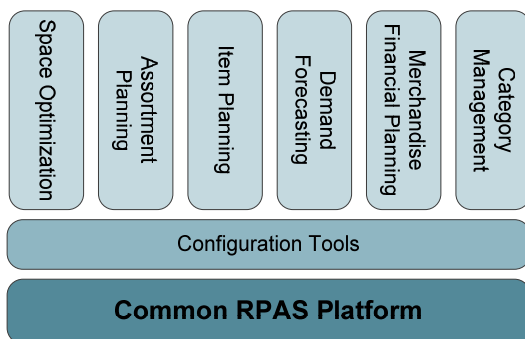


Figure 32 – RPAS as a foundation layer for other applications. Source: Adapted from [OR’07b].

RPAS can also be described as a powerful multidimensional planning and forecasting platform; it uses a multidimensional database called Oracle Retail Embedded Database (OREDB). The key feature of RPAS is its ability to process and store planning and forecasting data on a high level of detail.

• RPAS within Oracle Retail

RPAS is a standalone application within Oracle Retail footprint; it integrates with the other applications by flat-files. In planning applications, it is often needed to pass the planned information into the Oracle Retail Data Warehouse (RDW) and into the Oracle Retail Merchandise System (RMS). In Figure 33 is presented an example of how the Financial Planning application from RPAS integrates with these other Oracle platforms.

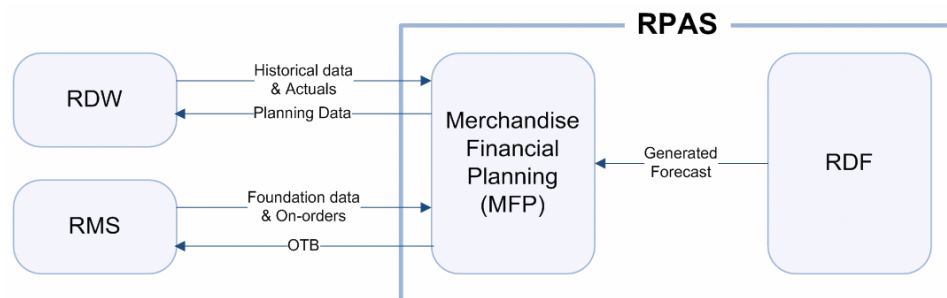


Figure 33 – RPAS integration with other Oracle Retail platforms. Source: Adapted from [OR’07b].

RPAS receives historical data from the RDW, foundation data and on-orders from the RMS and the generated forecasts from the Oracle Retail Demand Forecasting (RDF). When the planning process is done, it sends to RDW the planned data and from this example, since the planned process is Financial Planning that outputs the Open-To-Buy, it sends that information to the RMS. The other planning applications follow a similar process.

3.3.2. ORPAS Components

RPAS application consists of three components: RPAS Server, RPAS Client and RPAS Configuration Tools. The RPAS Server is the heart of the application and consists of a powerful calculation engine, with a multidimensional database, with rule-based architecture and shared data. The RPAS Client component is a graphical user interface for all RPAS applications. The RPAS Configuration Tools is used to create and modify

the RPAS applications, allowing a complete configuration to meet the business needs of each retail client company.

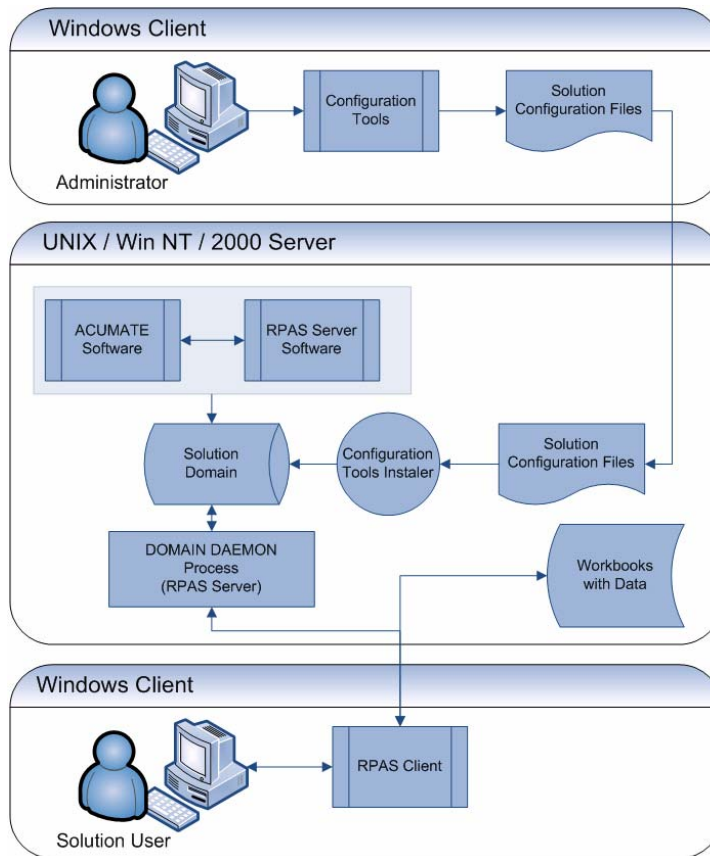


Figure 34 – RPAS' Architecture. Source: Adapted from [OR'07b].

3.3.3. ORPAS Concepts

- **Multidimensional Database**

As explained before, the purpose of the Merchandise Planning is to be able to have the 5 R's: the Right **Quantity** of the Right **Product**, with the Right **Size** at the Right **Store** at the Right **Time**. So in order to manage this kind of information, one needs to be able to identify a product, at a particular location, at a given time.

By combining all of these hierarchies, it is possible to have a three-dimensional data-set. With this multidimensional data organization, a retailer can clearly identify at a specific store (Store level at Location), which product (SKU level at Product), had more sales at a given week (Week level at Time) [Figure 35].

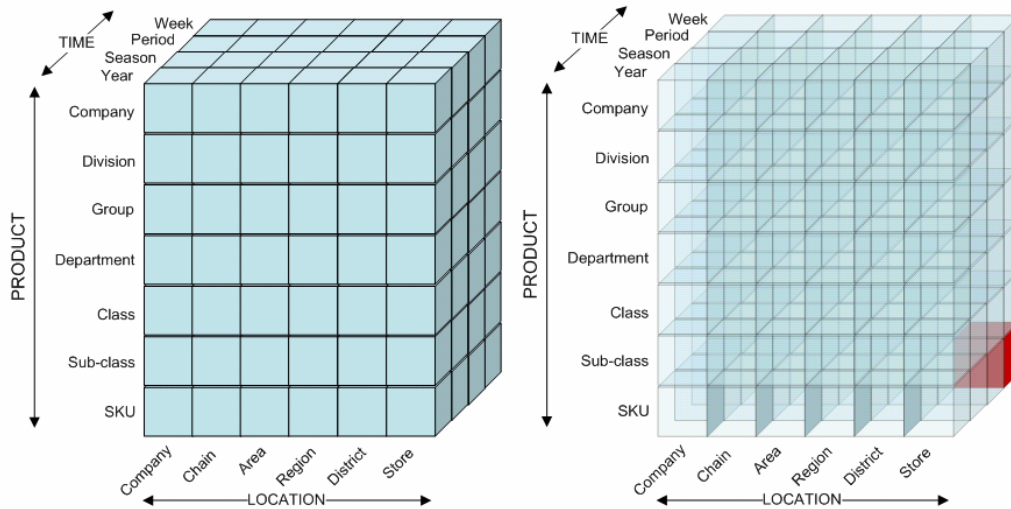


Figure 35 – Three-dimensional database visual view; on the right, the small red cube represents the all the data at the combination SKU/Store/Week levels.

This is often called an OLAP cube. OLAP stands for On Line Analytical Processing; the arrangement of data into cubes overcomes the limitation of relational databases, being able to provide almost instantaneous analysis and display of huge amounts of data, so usual in retail. RPAS is itself an OLAP tool, being able to perform multidimensional analysis of business data and providing means to analyse complex calculations, trend analysis and sophisticated data modelling.

- **Configuration Tool and Client Tool**

As said before, RPAS has a Configuration Tool and a Client Tool; following are descriptions of each of these tools.

3.4. Configuration Tool

The Configuration Tool provides a flexible mean to configure and build RPAS-based applications with customer-specific business parameters. Basically, this tool consists on an efficient, user-friendly interface to utilize RPAS functionality. It consists of an integrated set of task-specific configuration aids that are used to configure a solution template. Once a configuration is made, a domain is created or updated and is able to be opened in the Client Tool. The Configuration Tool interface has the elements presented at Figure 36.

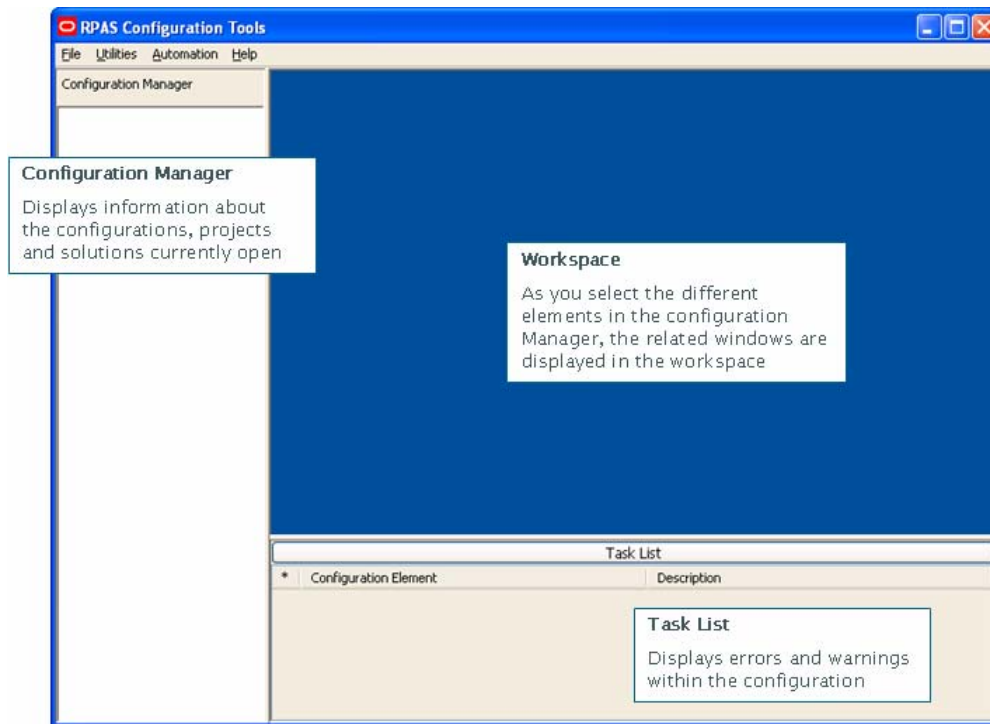


Figure 36 – Configuration Tool's elements and their description. Source: [Ena'05].

In order to have a configuration, several components need to be defined at the configuration manager. These steps are highlighted at Figure 37 and are further explained in detail.

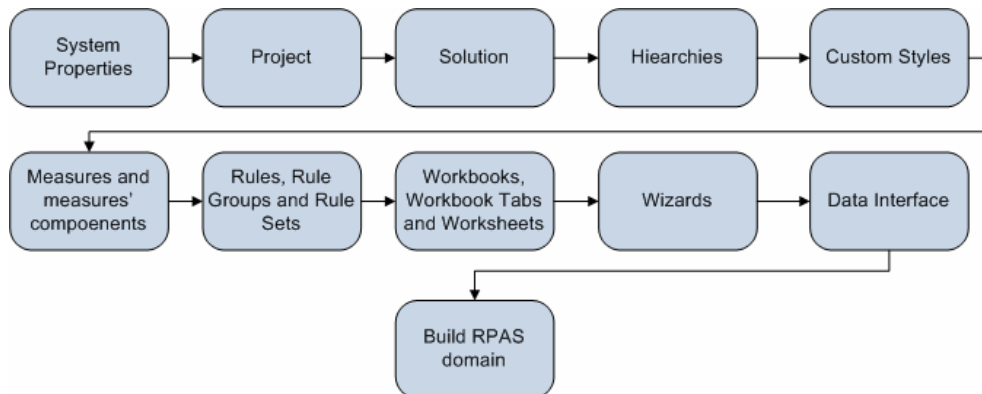


Figure 37 – Steps needed to perform at the Configuration Tool to build a domain in RPAS. Source: [Ena'05].

System Preferences

In the system preferences, the type of domain must be specified; this can be either a simple domain or a global domain. Simple domain is a traditional stand-alone domain that has no visibility to other domains. A Global domain has two or more local domains (or sub-domains) and a master domain with visibility to all local domains; this is especially useful for a retailer that wants to assign roles to specific sub-domains.

Definition of the workbench preferences can also be set (e.g. define number of measures per page, define number of most recently used workspaces, etc.).

Project

Projects represent a single logical RPAS domain although each logical domain may represent several physical domains. A project must have a definition of the hierarchies, dimensions and styles that are going to be shared across all solutions.

Solution

A solution corresponds to a configuration of an application (e.g. Merchandise Financial Planning or Assortment Planning). Each project may contain one or more solutions and for each one, measures, rules, workbooks, and wizards must be defined.

Hierarchies

As described before, these are the hierarchies that the client needs to have in order to treat and group his data. Hierarchies are a parent-child relationships set-up, done on a top-to-bottom approach, between levels that belong to the same entity. Typically retailers need three hierarchies: Product, Location and Calendar. Dimensions represent the different levels within each hierarchy (e.g. Month level at Calendar hierarchy). Each member in a dimension will have only one parent in the dimension above. The structure of a hierarchy is built on dimensions. This was best described at Figure 9 and Figure 10. Dimension's information needs to be defined; most of it specifies the format of the data file from which hierarchies and dimensions will be loaded. This information is e.g. column, prefix, width, label start, label width, etc. Alternate rollups can be defined to aggregate data in different ways. An example of three typical hierarchies and one alternate rollup at one of them is at Figure 38.

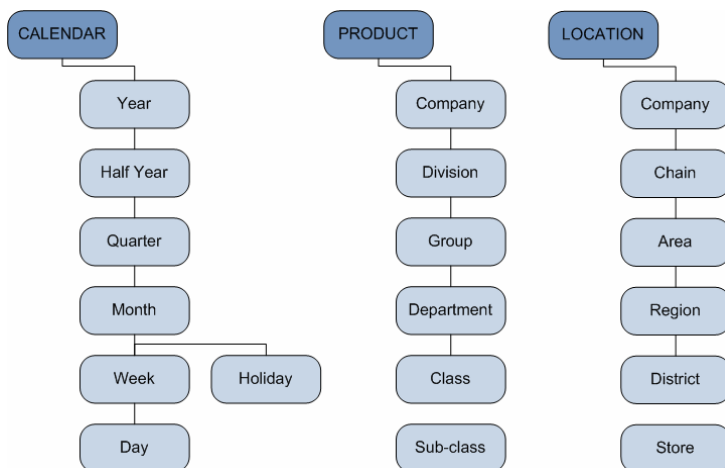


Figure 38 – Example of three typical hierarchies. The dimension Holyday of the Calendar Hierarchy is an alternate rollup.

Styles

A style definition can be done, that is, specifying how a measure is to be displayed within the RPAS Client.

Measures

Measures can be expressed as real numbers, text strings, calendar dates or Boolean flags.

They are usually a combination of four major components: Roles, Versions, Metrics and Units of Measure. These major components are break down into minor components that represent each major component in more detail.

Roles are the identification of the level at which planning occurs in the business (e.g. of minor components: Ex - Executive, M - Manager, P - Planner). **Versions** represent the different plan types that exist in the different plan cycles (e.g. of minor components: Ty – This Year, Ly - Last Year, WP - Working Plan). **Metrics** are the data elements that are being planned (e.g. of minor components: Sls - Sales, GM - Gross Margin). **Units of Measure** are the units used to measure the metrics (e.g. of minor components: U - Unit, Pct - Percentage, R - Retail, C - Cost).

Measures are auto-generated in RPAS by all the combinations of one minor component of each major component. (e.g. the generated measure “Ex Ly Sls R” would represent Executive Working plan version for Sales Retail). Of all these auto-generated combinations, the user will select only the ones that he wants to work with.

External measures can also be defined; these are measures that are loaded from database files from external systems. These measures need also to be defined, along with the path to the database files.

For each component, several proprieties must be set, like: name, label, description, type (e.g. Real, Int, Boolean), method of aggregation and spreading, base intersection, base and aggregation state, database, range, etc. The properties that are worth to mention are:

Spreading and the aggregation methods

The spreading method specified here is used when data is set at a higher level and needs to be viewed at a lower level, that is, needs to be top-down spread. For instance: if the user sets a Sales goal in the level “District”, the lower level “Store” which is composed by several stores, needs also to set each stores’ Sales goal; the spreading of the value, that is, the decomposed value into several parts, is done based on the method selected. There are predefined methods of spreading; some of these methods are presented in Table 1.

Spread Type	Description	Valid Data Types
none	values are not spread	numeric, string, date, Boolean
prop	spread value proportionally (previous total non-zero) or evenly (previous total zero)	numeric
prop_pop	spread value proportionally (previous total non-zero) or evenly (previous total zero) to all populated cells	numeric
even	spread value evenly	numeric
delta	Increment/decrement each cell evenly. Effectively the ‘even’ spreading of the change (‘delta’)	numeric
repl	replicate the value of each cell (this is not possible with recalc measures as a default spread type in RPAS 11.1)	numeric, string, date, Boolean

Table 1 – Spreading methods. Source: [OR’07b].

The aggregation method is the same process, but from a bottom-up approach, that is, setting values in a lower level and aggregating them into a higher level. Examples of aggregation methods are presented in Table 2.

Aggregation Type	Description	Valid Data Types	Recommended Spread Types
recalc	recalculate measure at each level, via recalc expression	numeric, string, date, Boolean	none
total	sum of all values	numeric	prop
total_pop	sum of all populated values	numeric	prop_pop
average	average of all values	numeric	prop
min	minimum of all values	numeric, date	repl
max	maximum of all values	numeric, date	repl
median	median of all values	numeric	repl

Table 2 – Aggregation methods. Source: [OR’07b].

Base Intersection

This is the definition of the lowest level at which data is stored for a measure. This is important for the exportation of data. In the domain, measures are only stored at the base intersection level whereas inside a workbook, values for a measure may be stored at aggregated levels.

Base and aggregation state

These are the editability of the measure at the base intersection level and at the aggregated level correspondingly.

Database

This is the physical location in the file system of the database that stores the information for a specific measure; these database files are contained within the “data” directory of the domain.

Rules

A rule consists of one or more *expressions* that describe the same relationship between measures, but solve for different measures. Expressions are calculations that express the mathematical relationship between measures – mathematical equations.

For example, a Rule that describes the Gross Margin in Euros is composed of two expressions:

“Gross Mgn €” = “Net Sls €” * “Gross Mgn %”

“Gross Mgn %” = prefer (“Gross Mgn €” / “Net Sls €”, 0) ⁹

There are also Rule Groups and Rule Sets. A Rule Group is a collection of rules that must be evaluated together to satisfy the calculation requirements of a specific business process. There are four default Rule Groups:

- o Load rule group: all rules in this group are executed automatically when a workbook is created;
- o Calculate rule group: all rules in this group are executed whenever a change is applied to a cell on the client tool (reflects the business request in terms of metric relationships);

⁹ RPAS has embedded functions; the *prefer* function returns the first non-error value from a series of expressions.

- o Refresh rule group: user request option; when executed, refreshes the data of the workbook with the data from the database;
- o Commit rule group: user request option; when executed, updates the data from the domain with the data in the workbook.

A Rule Set is a collection of rule groups; Rule Sets can be assigned to workbook templates.

The interface of these Rules, Rule Sets and Rule Groups definitions is presented at Figure 39.

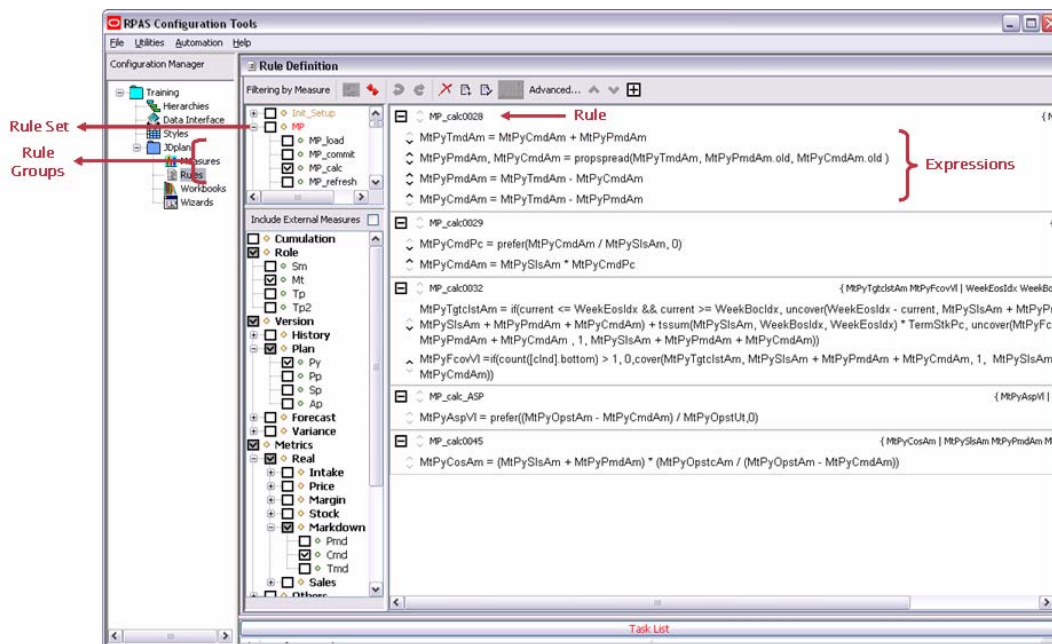


Figure 39 – Interface of the Rule's definition. Source: [Ena'05].

The Rules within a Rule Group are validated in the context of all other rules in that Rule Group (although, individual rules are also validated).

A Rule group validation is based on some regulations:

- Each rule in a rule group must represent a completely different measure relationship;
- An expression in the Calc Rule Group for each Recalc measure must exist;
- Any measure that is on the left side (LHS) of the ONLY expression in a rule may not be on the LHS of any other expression.

There are also transitions between Rule Groups; two types of transitions exist: the Full Group Transition and the Partial Rule Group Transition.

The Full Group Transition occurs when a workbook is built; RPAS will transition from Load Rule Group to Calc Rule Group (that is, when a workbook is built, RPAS executes all the rules of the Load Rule Group, and then automatically transitions to the Calc Rule Group and executes it also). An important notice: after this transition, RPAS has no longer visibility to the previous rule group, which means that data previously set/calculated might get wiped out or re-calculated in a different way.

The Partial Rule Group Transition occurs when a workbook is refreshed (as said before, refreshing means loading the workbook with the data from the database). The refreshed measures (the measures which data exist in the database and that were set with it) are treated as affected by the Calc Rule Group (i.e. treated as if the user changed them and

forced a re-calculation of all the measures – including those that are simply a re-statement of them).

This is not an easy process; these Rules validations are somewhat complex and need to be carefully defined. To illustrate this process, a typical example of a Partial Rule Group Transition is presented. When the refresh button is pressed at the Client Tool, RPAS calculates all the Rules in the Refresh Rule Group, and at the end, it transitions to the Calc Rule Group.

Refresh Rule 1: $EOP = EOP.master^{10}$

Refresh Rule 2: $BOP = BOP.master$

Refresh Rule 3: $Rec = Rec.master$

Refresh Rule 4: $Sls = Sls.master$

Refresh Rule 5: $Mkd = Mkd.master$

Calc Rule 1: $EOP = BOP + Rec - Sls - Mkd$

$Rec = EOP - BOP + Sls + Mkd$

When RPAS gets to the Calc Rule Group, it recognizes that each measure in Calc Rule1 has been affected by the refresh rules, which means, it will have no measures left to evaluate. This will generate an error, since RPAS needs a way to evaluate Calc Rule 1. The solution to avoid this error is to remove one of the measures from the Refresh Rule Group (e.g. EOP or Rec).

Workbooks

Workbooks are a user-defined subset of data that includes selected hierarchical dimensions and Rule Sets. A workbook is structured in several tabs. Each of these tabs contains one or more worksheets. Figure 40 illustrates the interface of this structure.

Tabs

A workbook Tab is a major subdivision of a workbook used to organize and support business needs.

Worksheets

Worksheets are multidimensional spreadsheets that are used to display workbook specific information.

¹⁰ This expressions means that the “EOP” measure is set with the data of the measure “EOP” from the domain database (the “..master” represents the domain-version of the measure that precedes it).

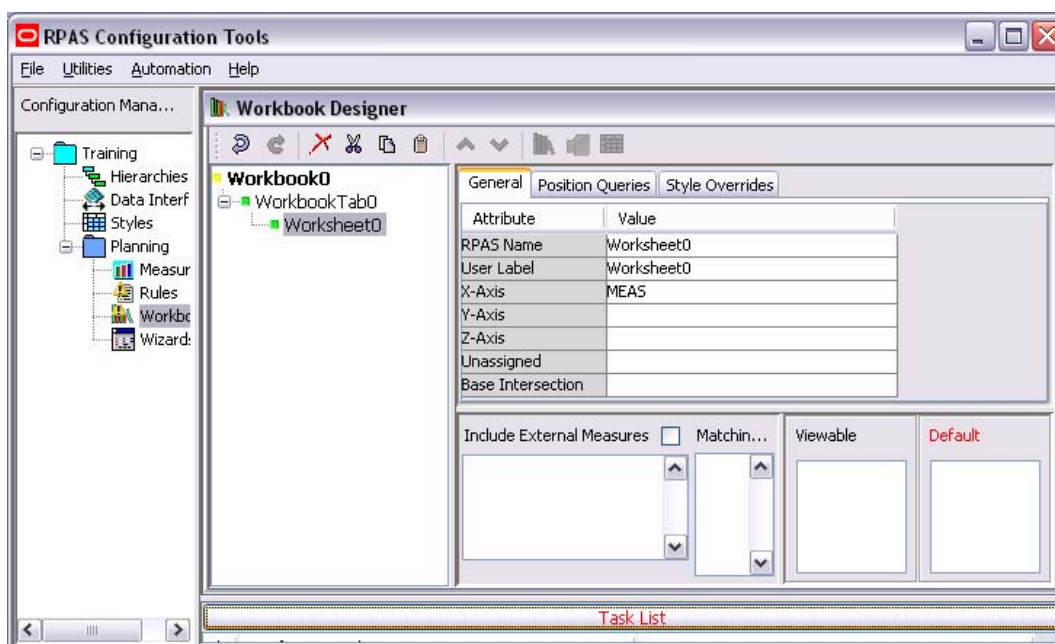


Figure 40 – Interface of the definition of workbooks, tabs and worksheets.

For each workbook, there are properties that must be set: Rule Set, Rule Groups, Axis definition, and definition of a custom tab.

The Rule Set property defines the Rule Set to be used in the workbook. There is also needed to define the Load, Commit, Calc and Refresh Rule Groups to be used for each of these Rule Group types. There is also needed to set the default axis layout of the worksheets in the workbook, that is, setting the X, Y and Z axis (that are represented by hierarchies) and which others should stay unassigned¹¹. This is similar as to defining which hierarchies should be at what axis in the cube format (see Figure 35).

Wizards

Wizards are used to build workbooks. They are a predefined workflow that is set at the configuration which will help the user to build a workbook at the Client Tool. Wizard definition includes defining the dimensions to be selected by the end-user.

3.5. Client Tool

Workbook creation

A workbook is created through a wizard. At the wizard, the user selects the dimensions at the various hierarchies where he wants to work. Then RPAS loads that data into the workbook, at the workbook it's showed with the default settings, ready for the user to work with.

Workbook visualization

The visualization of workbooks in the Client Tool is similar to Microsoft's Excel. At Figure 41 one can see how the configuration settings are present at the Client Tool interface.

¹¹ "Unassigned" means which hierarchies should be hidden by default; the user can, if he wants, select them and show them later

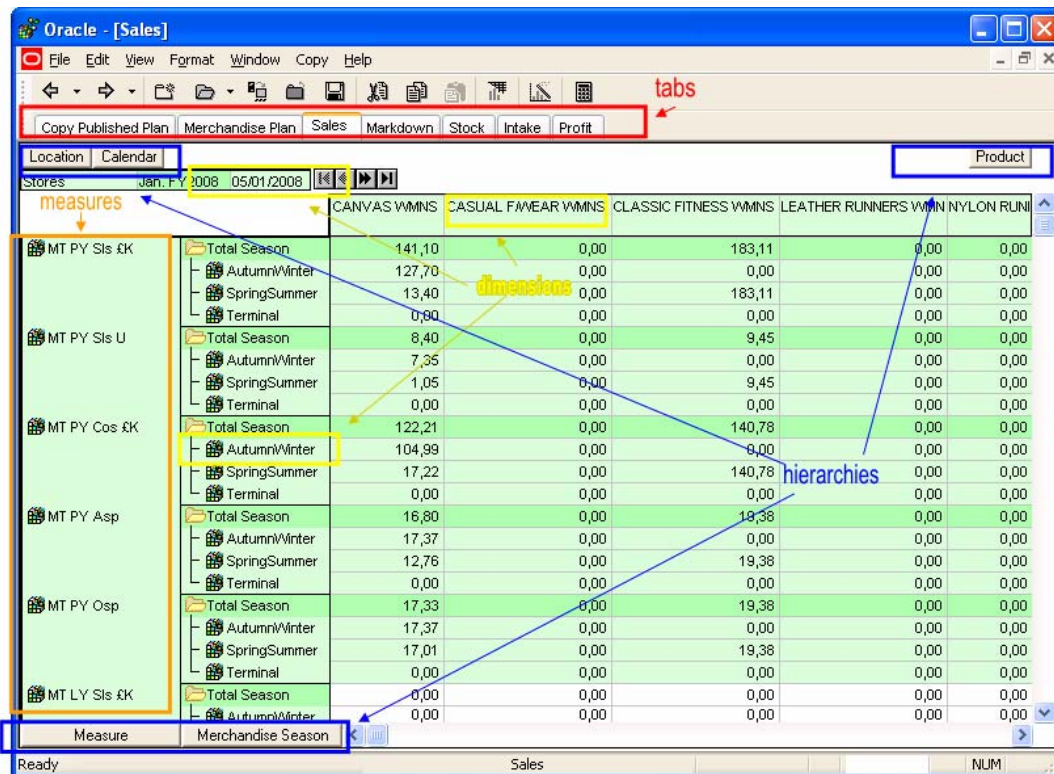


Figure 41 – An example of a RPAS Workbook, visualized in the Client Tool; the dimensions, tabs, worksheets, hierarchies and measures are highlighted.

All of this visualization is easily changed; the user can switch hierarchies, hide them or make viewable other available ones; the dimensions and measures can also be hidden or others can be set to be shown.

3.5.1. ORPAS Applications

- **Demand forecasting**

Oracle Retail Demand Forecasting uses statistical time-series forecasting algorithms and state-of-the-art modelling techniques that create accurate forecasts, with little human intervention. The user only has to review the highlighted anomalies and optionally optimize the selection of forecast methods. This frees up user's time to focus on the analysis of exceptions and the improvement of forecast accuracy.

The best features of the system are the forecasting at a low level of detail (by item, by store, by day) and forecasting for new products with no historical data. But perhaps the most important feature it's a single forecast for the entire enterprise, bringing together forecasts produced for replenishment, merchandise planning, financial planning, and collaborative planning.

- **Merchandise Financial Planning**

Oracle Retail Merchandise Financial Planning provides pre and in-season planning with key financial indicators such as sales, markdowns, receipts, inventory, gross margin, and open-to-buy. It guides the planner through best-practice planning process from top-down, bottom-up and middle-out functionality for developing, reconciling and approving plans.

- **Item Planning**

Oracle Retail Item Planning facilitates the management of key-items that have significant impact for achieving financial goals. It provides full lifecycle planning at an item-level, providing pre-season and in-season workflow. By giving sales history, actualized weekly sales and inventories for that specific item, it allows a proactive in-season management preventing lost sales, stock-outs or overstocks, excessive markdowns and unprofitable exit strategies.

- **Space Optimization**

Oracle Retail Space Optimization helps retailers to determine the most effective and profitable use of the retail space - their most important share of the costs. By analysing business rules, forecasted demand and profit potential, it is able to provide optimal space, fixture and item on-shelf allocation.

- **Category Management**

Oracle Retail Category Management generates optimal space allocation recommendations that maximize revenue and profits, based on scientific calculations. It is built to meet the needs of different types of retailers, allowing the use of different methodologies to define the optimal product mix. Category Management best practises can be followed by hard-line retailers, while soft-line retailers can concentrate on the best assortment depth and breadth. This application is more suited to manage category of products that have a long lifecycle or that are non-seasonal – typically food industry.

- **Assortment Planning**

Assortment Planning comes to complete Oracle's offer, aiming to address the specific needs of the fashion retailers. This template stands to meet the consumer-centric approach to merchandising, providing an integrated planning and execution workflow for the fashion industry.

4. Analysis of Oracle's Assortment template for fashion

4.1. Method of analysis

4.1.1. Available information

The internee had access to the development version of the assortment for fashion template one month after the beginning of the internship. It was not known the state of the template and no documentation was incorporated. The only documentation available was a sketch of the clustering algorithm explanation and a pre-sales draft presentation about the features of the new template.

4.1.2. Approach to the problem

The internee approach to the problem was based on the perspectives of the stakeholders of this solution: Enabler's perspective, Enabler's Customer perspective and a shared perspective of both stakeholders. After appropriate consulting of the company and gathering of information about CRP goals, methodologies and typical customer questions, the internee put together the following question list:

Enabler's perspective

Internal information

- Which approach to assortment did Oracle take?
- Is the template following the best practises?
- Overview of the functionalities.
- Explain in detail major assortment steps (clustering).

Usefulness of the template

- Is the template functional to use in CRP?
 - o Which steps are capable to perform in a CRP?
 - o Is there any functionality that can't be shown?
- Can the template be used for development?

Programmer friendly

- Is the configuration well documented?

Enabler's Customer perspective

Forgiveness of the user errors

- How long does it take for the user to recognise its errors (input errors)?

User friendly

- Is it intuitive?
- Is the measures' information useful?
- Flexibility – how flexible is the template related to the client's processes?

Shared perspective

Customization degree - what does it take to customise the template

- What is the level of specificity of the functionalities?
- Is there a close dependency between functionalities?

Customization information

- Which found ideas can be explored?
- Is there any space for improvement?

Integration with other modules

- How this template integrates with other applications?

The goal was to be able to answer each stakeholder questions by the end of the internship.

Based on the questions gathered, the internee defined the domain of the research needed to be done; after that, sub-domains of research were defined and ordered by level of detail needed to address the problem. The internee then drew a step-by-step approach to cover the whole research and analysis domain:

- o Step 1 – Business Overview
Goal: understand the retail business
 - Analyse evolution of the retail business
 - Analyse present state of the retail business
 - Analyse best practices at the retail business
 - Analyse state-of-the-art solutions for planning
 - Analyse Oracle's position
 - (Repeat step 1 with fashion retail mindset)
- o Step 2 – Assortment Process
Goal: understand the assortment process
 - Analyse basic assortment process and history
 - Analyse tendency and present/future trend of the assortment process
 - Analyse patents and state-of-the-art of assortment proposals
 - Analyse the assortment interaction with the other retail processes
 - Consolidation of assortment ideas and difficulties
 - (Repeat step 2 with fashion retail mindset)
- o Step 3 – Analyse Solution
Goal: be able to go through the whole assortment process
 - RPAS consolidation of knowledge
 - Analysis of the template's configuration
 - Trial and error of the template's interface at the Client Tool (analyse intuitiveness)
 - Map best practises with functionalities available
 - Template walkthrough with a Subject Matter Expert (SME)

The second chapter and the third chapter of this report summarize the research highlighted at the 1st and 2nd steps. The second chapter abridges the main concepts of the retail industry in general, which are relevant to introduce the specificity and different needs of the fashion retail industry. The fashion retail industry present state, challenges, predictions and tendencies were also studied and reported. This research provided a better support to understand the state-of-the art solutions for the planning processes and the difficulty in finding best practises. This helped the internee to become more aware of the complexity around assortment, recognizing its innovative substance and acquiring consciousness on this hot modern theme. An in-depth analysis of assortment was done and compiled in chapter 2.5., based on the research underlined before. Following a line of investigation on assortment evolution, tendencies, state-of-the-art approaches and difficulties found in the past proved to be very fruitful in understanding the trends, conjectures and investment put in assortment. Since there was no standard approach to assortment, several and different approaches were gathered and thoroughly assembled in a possible complete merchandise management (Figure 22) to better output the knowledge collected. To be able to proceed with the analysis, this whole awareness needed to be put together with an understanding about Oracle's

strategy. By understanding Oracle's position and what hole would this template fill in Oracle Solutions footprint, it would be easier to recognize and anticipate the template's functionalities. This analysis was underlined in chapter 3. By the end of the 2nd and 3rd steps, the internee was, like expected, more aware of the possibilities and likely approaches to assortment present in the template. This solid knowledge would help to uncover and map the functionalities of the template.

Proceeding with step 3, the output of the analysis would provide the internee with some knowledge about the state of the template. The internee would conclude either if the template was functional or not.

If the template was functional (i.e. it was possible to conclude the walkthrough and do a complete assortment process), the following steps would be executed:

- o Step 4 – Documentation
 - Goal: document and outline next steps
 - Requirements documentation
 - Developer documentation (about rules, measures, etc.)
 - Analyse customization and possible improvements
 - Write test documentation
- o Step 5 – Consolidate information
 - Goal: be able to answer each question; the internee should make sure that the knowledge transfer is done at the proper level of detail
 - Report documentation elaboration (output must be able to support CRP's)

If the template proves to be not fully functional (i.e. if the walkthrough cannot be concluded), the following steps would else be executed:

- o Step 4 – Analyse future use of the template
 - Goal: identification of usefulness of the template
 - Analyse and document available functionalities
 - Analyse customization
 - Analyse space for improvements
- o Step 5 – Consolidate information
 - Goal: be able to answer each question; the internee should make sure that the knowledge transfer is done at the proper level of detail
 - Report documentation elaboration (output must be able to support CRP's)

Next is an overview of the 3rd step, explaining each task and difficulties found along the path.

4.1.3. 3rd Step – Analyse Solution

The 3rd step evidently started with a knowledge consolidation about the tool; several trainings were done, not only on the Configuration Tool, but also on the Client Tool. The internee then proceeded with a first view at the template's configuration. It had:

- o 8 workbooks
- o 64 worksheets
- o 427 measure's minor components
- o 790 realized measures
- o 68 external measures (the correspondent database files were defined, but weren't available)
- o 54 rule groups

- o 1736 expressions

Some of them had available and detailed descriptions, other had no descriptions whatsoever. It became clear that the internee would not be able to understand all the ideas embedded in this template in the time available.

Next, the internee would analyse the client interface on a trial and error base, which not only would help to understand its intuitiveness from the clients perspective, but also to clear path to a possible first mapping of functionalities, based on the knowledge previously gathered in the previous steps. It was very difficult to understand what each measure represented, because there were no standard names or nomenclatures to the many financial, KPMs and specific retail industry metrics. Nonetheless, it was done an outline of the workbooks, tabs and worksheets available and ordered by what appeared to be a workflow [see APPENDIX A – Workflow]. This workflow served as starting point for the walkthrough task. Next is described the walkthrough task and the problems found.

- **Walkthrough task**

The walkthrough was done in three weeks with a SME. By first analysing the template with the SME, it became clear that it was at a mid stage of development. The first steps of the assortment process were very detailed and could be concluded with success, but the latest steps were having some crashes.

The template didn't have any historical data; this was a major problem. The store clustering, as explained previously, is done based on several attributes. The algorithm of the store clustering present on this template was based on the store's historical performance; with no historical data, this was a major issue. Though, the template had a workbook called "Data Creation"; this appeared to be a workbook to build simulated performance data, however, it wasn't functional. There was a need to change the configuration and fix this functionality to be able to insert historical data into the workbook. This needed change in the configuration would result in the loss of formatting at the Client Tool, since the domain would need to be re-built. This was thought not to be a major problem. Although, after building the new domain, it was found that the workbooks at the Client Tool had a completely different format than the one that was specified at the configuration; this proved that Oracle did a lot of the formatting at the Client Tool, and thus, that formatting was lost at that domain. This resulted that, at a time, the internee was working with two versions of a development version, side by side: the alter version that was functional enough to keep the walkthrough (but didn't have Oracle's custom formatting and thus, was harder to understand the default view), and another version that wasn't functional but had the Oracle's formatting to better understand how their idea was.

After being able to input simulated historical performance data, the Store Clustering step was tried to be executed. New data was found to be missing, data was set, and the store clustering was finally executed with success. The next steps were proving to be very confused to understand Oracle's idea. Plus, the internee was stuck again with the need of more historical data at several levels of the hierarchies that would need to be heterogeneous enough to be able to see the clustering performance. After appropriate discussions with the SME, it was concluded that the building of the historical data would be too much time consuming. It was decided that the walkthrough would tried to be concluded with no visibility of the results, but instead, trying to understand what was the overall process and functionalities supposedly apparent in the template. Some errors and exceptions also appeared, which only diffculted the process. Nonetheless, the workflow and general ideas were being further consolidated.

4.1.4. New available information

By 9th May of the present year, the Assortment Planning template officially went to Oracle's price list with status 'Priced in advance of availability'. By the same time, it was possible to get access to a video presentation of the latest version of the template (in a stage more resembled to a release candidate). This presentation will be further referred to as simply "presentation". Six months of development separated these two versions.

Although they shared similar general ideas, they had diverse orientations and were at different versions of RPAS. The first accessed version (further referenced as "development version") was at RPAS version 12.0.3 whereas the latest version showed at the presentation was at 12.1. By going through the presentation, it was obvious that the latest version was more consistent and focused than the development version.

The development version started with general ideas at the first steps of the assortment process, aiming to reach many types of retailers, but, as the internee moved forward through the steps, it was clear that there was a need to focus. This latest version available was definitely more focused on a specific type of fashion retailer and its business process. Since the official version of the template was planned to be released this year, the internee thought that there was no need to extensively describe the functionalities of an old version, even more so it being a completely different approach compared to the actual version that was coming out.

Due to these facts, and after appropriate discussions with the SME and exposure to Enabler's Planning area responsible, the internee decided to shift the analysis plan into a comparison between the two versions instead of a detailed functionality overview. This way, it was possible to gather the good ideas from each version and provide a comparison between the two different approaches. The internee believes that the output of this analysis is more useful for future reference, giving space for improvements and helping to achieve a better custom solution to address different retailers' requirements. This analysis is also believed to provide a better information support for CRP documentation. Even more, it was also believed that this would provide Enabler with more in-depth of how the version of the template's official release was going to be.

The steps outlined were then revised and resulted in the following:

- o Step 4 – Analyse the solution's evolution
 - Goal: prospects and opportunities' identification
 - RPAS new version functionalities
 - Analyse the template's evolution
 - Analyse customization and possible improvements
- o Step 5 – Consolidate information
 - Goal: be able to answer each question; the internee should make sure that the knowledge transfer is done at the proper level of detail
 - Report documentation elaboration (output must be able to support CRP's)

Following, a detailed functionality's analysis is done based on the functionalities that were able to be concluded in the walkthrough. Next, is going to be presented the analysis' coverage from each of the stakeholder's perspectives, more focused on improvements and updating with the template's latest version new functionalities. An overview of Enabler's opportunities found is also included.

4.2. Detailed Functionality's Analysis

In order to deliver the knowledge gathered, this following chapter is organized by going through the only steps of the template's assortment process that were functional.

The main feature available and functional at the development version of the template is the Store Clustering workbook. For this feature it was done an outline of the main functionalities (without going through much detail), including relevant remarks about some of the small functionalities available in this workbook. The Business Administration workbook is also presented to understand how the information needed in the Store Clustering is set. When available and pertinent, an update of new functionalities seen on the last version of the template is also presented.

4.2.1. Store Clustering Workbook

• Overview

This workbook consists on the clustering of stores. It operates at a combination of product's class/category level at a specific buying window (e.g. buying period for the autumn/winter collection) at calendar level.

o Summary of the Clustering Algorithm

The clustering algorithm is based on breakpoints; breakpoints are calculated based on a "Combined Index to Average" (further called CIA) measure. For the calculation of this CIA measure, five performance metrics are used:

- Sales Units
- Sales Dollars (in Retail Dollars)
- Sales AUR
- POS Margin \$
- POS Margin %

Some of these measures are simply restatements of each other (e.g. Sales AUR = Sales \$ / Sales Units). The assumption here is that these five measures will not be used all together, but instead, each business will chose the Key Performance Measures (KPM) that best differentiate the store's performance at a given department (and at a specific period of time).

For each of the chosen measures an "Index to Average" measure is calculated for each store; then the indexes are combined and weighted with the user inputs into the CIA measure. CIA measures from all stores are then used to calculate the breakpoints for the number of clusters set by the user. Each store's CIA measure is forward used to assign stores to clusters.

• Main Functionalities

The main functionalities of this workbook are the following:

- set store's performance
 - o assign like stores
- override the weights set at the Business Administration
- set maximum number of clusters and automatically calculate breakpoints
- override breakpoints
- roll-up clusters by Channel, Performance Group and Size

- analyse store information and:
 - o Roll-up stores by Region (further to Channel, Banner or Chain), Climate, Status, Store Type and Lifestyle
 - o override the assigned clusters for each store (set a different cluster than the one assigned automatically)
 - o set the size of the product's department for each store
- Approve set of clusters

- **Remarks**

- o ***Recommended number of Clusters***

The template does not calculate the optimal number of clusters. Although former Profitlogic¹² has been able to calculate an optimal number of clusters¹³, Oracle decided not to contemplate this calculation in the template due to the time consuming, cost of the operation and the need for extensive business data (which varies considerable across retailers).

There are many studies on the calculation of the optimal number of clusters, like [LT'05], [RLW'06], [Kum'06] and [TH'07], all requiring different data for the analysis and using different approaches. Setting an optimal number of clusters is then possible, but it depends on the quality and depth of the data available. From a template point of view, Oracle's decision may make sense due to the variation of data availability across retailers; however, from a custom solution perspective, there is space for improvement. State of the art research shows that a maximum of five or six clusters are advised depending on the number of stores the retailer has and the homogeneity of them [Mar'08; OC'08b]. Having more than 5 or 6 clusters is proved to be inefficient as we start to lose the benefits of the clustering. The template follows this best practise having a maximum of 8 clusters defined: 5 clusters named "A", "B", "C", "D" and "E", 2 others named "Other 1" and "Other 2", and an eighth one named "Z". The first 5 clusters are used to simply cluster the stores as the user sets the number he wants. The two "Other X" clusters can be used if the user wants to have a cluster with some particular stores falling on it (e.g. if a retailer has a store that outperforms the average of the other stores, it should be better for him to assign it to an "Other X" cluster, because the CIA measure – as it is calculated based on a performance average – could be affected by this out performance; a test store can also be applied to one of these clusters, as it will have a different kind of treatment and assortment). The "Z" cluster is for stores that the retailer don't want to fall in any cluster; can be special stores (e.g. stores that make their own assortment) or simply new stores (since they are new, the retailer doesn't have any kind of data that can be analysed to calculate a performance).

- o ***Roll-up Stores by Clusters***

As said before, a store can be assigned to different clusters. In this case, the retailer will cluster stores for a specific class/category of products, which means he will have only one cluster assigned for each store for that class/category of product. However, since

¹² Profitlogic was acquired by Oracle in 2005

¹³ ProfitLogic's Store Clustering Optimization Analytic InSight Solution (in market at 2003) was able to recommend a number of clusters. In [Pro'0?] it can be read "Store Clustering Optimization determines the optimal grouping of stores based on store sales data and the key merchandising decisions that a retailer wants to improve. This InSight analyzes behavior at class level to determine the optimal number of store groups, the basis of the grouping, and identifies which stores are assigned to each group. All of this can be used to inform how to price, purchase and allocate merchandise."

stores have many products, the retailer will end up with stores assigned to as many clusters as the products he set.

The template does not support the roll-up of stores by Clusters, which means, it isn't possible to see how stores fall in the different types of clusters. To see this, the user would have to view for each store's class/category of product (at specific buying window) which cluster it is set to.

- **Last version updates**

- ***Seed Sister Stores***

This new feature is the same idea as the "Seed Like Stores" from the previous version, although, it has some developments. In the previous version, it was possible to seed a store with no performance (e.g. a new store) with data from another store; which is the same as saying, the two stores have the same performances. In the new version however, it got unrestrictive to just a single store, opening the possibility to set the performance of one store based on a maximum of 3 stores. This is done by defining one up to three "sister"(similar) stores and weighting their performance (e.g. a new store performance can be estimated by being 60% of store's A and 40% of stores B performances); this way it is possible to have a better approximated performance, as it will be based on a combination of performances.

- ***Cluster Selection***

In this version it is possible to cluster stores based on one or two user-defined store attributes. These attributes are for instance Climate, Lifestyle, Region, Space, Store Format, Store Size, etc. and are defined at the Setup workbook (Step 1). If the user specifies that he wants the store clustering to include attributes Climate and Region for instance, the result is a combination of Cluster /Attribute 1/Attribute 2 (e.g. Cluster A / Hot / Southwest).

- ***Grade***

The presentation mentions that the Grade algorithm is being used in the calculation of the clusters. In [OC'05] is stated that Grade has two methods of calculating clusters: by breakpoints (which was the algorithm used in the older version of the template) and the BaNG¹⁴ algorithm - which appears in the latest version as "Perf Group (Bang!)" measure; this represents another form of a Performance Group measure that outputs the cluster assigned to each store based on the BaNG algorithm. This algorithm has drawbacks: the clusters that it outputs don't have an order (whether the clustering based on breakpoints outputs clusters are ordered by the breakpoints) and it isn't possible to change them (it isn't possible to set a different boundary/breakpoint of a cluster).

Oracle has also available an O-Cluster algorithm in Oracle Data Mining (ODM)¹⁵ that can be used to cluster very large high dimensional data sets [MC'02]. It wasn't considered relevant to perform an extensive research about these algorithms, but future reading of data mining techniques [Ber'02] can be useful for future implementations.

- ***Dimension Splitting***

The latest version of the template is at version 12.1, which has the "dimension splitting" feature available. This featured enables the user to split a dimension based on an attribute, re-organizing the data elements in the hierarchical organization [Mor'07]. This

¹⁴ Batch Neural Gas Algorithm; possibly related to The Bang-Clustering System mentioned in [SE'97].

¹⁵ an option to Oracle Database 10g Enterprise Edition

is useful if the user, for instance, wants to view the information by each attribute of a measure. As an example, if the user has a measure “Climate” that can be set to “hot” or “cold”, and he wants to view all the stores that have Climate measure set to “hot”, with this feature that is now possible. This enables a better analysis of the information, as the user changes the information into a more user-friendly view, according to his needs.

4.2.2. Business Administration Workbook

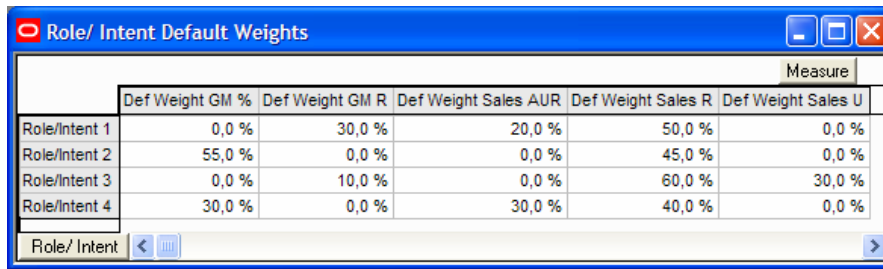
• Overview

Another step needs to be done prior to the Store Clustering in order to setup the basic information needed for the assortment process. It is necessary to set up here the five measures that are going to be used in the Store Clustering Workbook. The setup of these five measures is done by assigning a role/intent for each department. That means that the performance of every product in that department will be calculated based on that role/intent setup.

• Main Functionalities

The main functionalities of this workbook are the following:

- Set a maximum of 4 role/intent, consisting on a combination of one or more of 5 KPMs, weighted between them (see the template's interface at Figure 42).



	Def Weight GM %	Def Weight GM R	Def Weight Sales AUR	Def Weight Sales R	Def Weight Sales U
Role/Intent 1	0,0 %	30,0 %	20,0 %	50,0 %	0,0 %
Role/Intent 2	55,0 %	0,0 %	0,0 %	45,0 %	0,0 %
Role/Intent 3	0,0 %	10,0 %	0,0 %	60,0 %	30,0 %
Role/Intent 4	30,0 %	0,0 %	30,0 %	40,0 %	0,0 %

Figure 42 – Example of setup of a maximum of 4 role/intents, each one consisting on a combination of one or more of the 5 measures available, weighted between them.

- Set a role/intent for each product's department (see the template's interface at Figure 43), which will set the default weights of the KPM for that department.

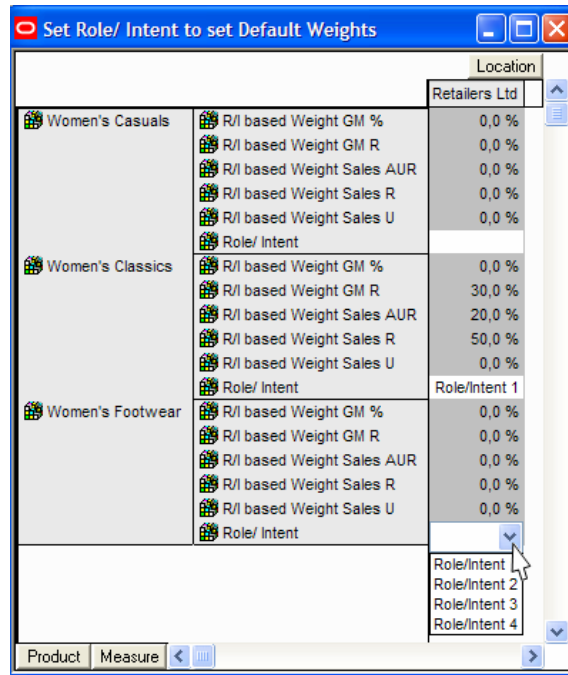


Figure 43 – Example of setup of role/intent by product's department.

- Set Price Band¹⁶ for each product's department on a Good-Better-Best¹⁷ basis.
- Set the maximum number of items allowed for each product's department.

• Remarks

o *Setup of KPM weights*

It is not possible to have different KPM than those five ones pre-defined. It is also not possible to setup more than four role/intents. Although these KPM are more commonly used among retailers, it still restricts the user on the evaluation method if he wants to perform a different performance analysis.

o *Setup of Price Band*

It is not possible to have a different price band strategy; the segmentation must be around a Good-Better-Best price tier.

4.3. Analysis' Coverage

In this chapter, the analysis covered from each of the stakeholder's perspectives is presented, based on the analysis and research that was done.

4.3.1. Enabler's perspective

• Internal information

o *Overview of Oracle's approach to Assortment*

¹⁶ Price band: a range within which a price is able to move.

¹⁷ Good-Better-Best is a traditional industry segmentation based on price tier, aiming to depict three markets; usually in retail it is "National Brand", "Store Brand" and "Generic Brand" [DS'06].

Oracle's approach to the problem was based on its strategy: they wanted to broad their range of their integrated suite. By delivering a wide collection of integrated applications for every retail industry, Oracle plans to take merchandising processes to the next level. As said before, Oracle has already an assortment solution for hard-line retailers that is based on the combination of Item Planning and Category Management. This Assortment for fashion solution aims to meet the business needs of fashion retailers by providing an End-to-End framework.

The internee's conclusion is that this assortment solution is a complete assortment management process, from planning to execution, including analysis, clustering, conceptual assortment plan, assortment plan focusing on depth and breadth, reconciliation and in-season monitoring. What is innovative about this approach is that the final version of the template has light¹⁸ functionality about Financial Planning, Item Planning and Allocation, along with an embedded Predictive Sales Demand Forecast; this is really an integrated merchandise solution for smarter and faster planning to support fashion retailers needs.

o **Best practises followed in the template**

The internee's conclusion is that the latest template version follows the best practises of assortment planning, complementing it with integrated functionality from assortment management best practises. To achieve a complete assortment management solution (as was outlined in Figure 18), the template would need to have Space Planning and Planogram functionality - which it lacks.

o **Overview of the functionalities**

The internee's conclusion is that in general, the assortment process available in the latest version of the template follows the subsequent steps:

- A. Setup
 - A.1. Business Administration
 - A.1.1. Definition of attributes and characteristics
 - A.1.2. Weight attributes
- B. Analyse
 - B.1. Pre-Plan Analysis of historical data and last year clustering
 - B.1.1. Analyzing Prior Performance
 - B.1.2. Optimized History
 - B.1.3. Business Intelligence supporting Rationalization
 - B.1.4. On-the-fly roll-ups and drilling
- C. Store Clustering
 - C.1. Generation of Store Clusters
 - C.1.1. Cluster on Plan, LY, Optimized History, Forecast
 - C.1.2. Dynamic, automated, intelligent groupings
 - C.1.3. Clusters can vary by merchandise type
- D. Define Assortment Strategy
 - D.1. Definition of Assortment Strategies
 - D.1.1. Recommend Number of Options by Product Area and Attribute
 - D.1.2. Define "Spend" by Attribute
 - D.1.3. Plan Capacity Guideline *

¹⁸ by "light functionality" it is meant that it has some of the functionalities featured in the other solutions

E. Assortment Creation

E.1. Review of Merchandise Plan Targets

E.2. Build Item List

E.2.1. Select continuous and/or basic styles

E.2.2. Select placeholders to be included as candidates in plan

E.2.3. Define Placeholders

E.2.4. Apply or edit attributes

E.3. Build Assortment Planning

E.3.1. Automated Breadth and Depth Plan

E.3.2. Automated Lifecycle Plan

E.3.3. Automated Reconciliation: Merchandise Plan target and Nr of Options

E.3.4. Like Item with Optimized History

E.4. Reconciliation and Analysis

E.4.1. Approve to CP

E.4.2. In-Season Management

E.4.3. Embedded Demand Forecast

E.4.4. Link to Markdown Optimization

E.4.5. Breadth and Depth Analysis

* Available only at the development version.

D and E correspond to the creation of Assortment Modules and Efficient Assortment accordingly, in the best practices described before at chapter 2.5.2. In the development version, an option to plan the Capacity Guideline (D.1.3.) is available: by inputting fixtures characteristics and assigning them to clusters, the solution aims to calculate the maximum and minimum number of options available by cluster based on the space constraints. In the latest version, space constraints are not considered. As one can see, this functionalities workflow is very different from the one presented at the development version, outlined at [APPENDIX A – Workflow]. This fact was a major reason to include the valuable updated information available at the presentation, since it would help Enabler to be primed for the upcoming official release of the template.

o ***Explanation of main functionalities***

The main functionality found available by the internee was the Store Clustering step. This functionality was described in detail at section 4.2.

• **Usefulness of the template**

o ***Usefulness of the template at a CRP***

One of the major goals of this analysis was to identify the template's usefulness at a CRP. The CRP methodology at Enabler consists on a series of working sessions between the relevant people from both Customer and Enabler sides, to align business model ideas and discuss technical details. The purpose is to:

- Map the Client's business processes with Oracle functionalities;
- Identify the necessary system configuration and parameterization;
- Identify and document interface, data migration and other custom specific requirements;
- Define the strategy for the implementation and roll-out phases. [WR'07]

The outcome of a CRP is used as an input for the Analysis and Design stages of a Delivery Project.

Possible uses of a template at a CRP are: demonstration of standard functionality or demonstration of possible custom functionality.

The internee's conclusion is that the development version of the template at this stage is not proper to present at a CRP. The template revealed to be at a mid development cycle, and since it's not completely functional, it is not suitable to present. Although, screenshots can be taken to provide the customer with an idea of what can be done from a custom solution perspective.

- o ***Usefulness of the template for development***

In order to understand if the template can be used for development, a detailed analysis must be done to make sure the actual functionality is working as it is supposed to. The template wasn't analysed at that level of detail. To be able to respond to this question, a detailed testing of functionalities and development of proper history data needs to be done; these tasks alone would span for an entire internship. The internee believes that a detailed analysis would be arduous since there is no documentation about this development version, and because the testing of these applications are costly (manual testing is needed – even though it can be somewhat automated, the automation effort will not reach a positive ROI in time for this analysis¹⁹). The internee's believes, from this simple analysis that it's not advisable to invest in a detailed analysis, since it is more costly than developing a similar solution from scratch. Nevertheless, functionalities that won't appear in the latest version of the template can be subject of a detailed analysis in order to include them.

- **Human Interaction analysis (from a developer point of view)**

- o ***Usefulness of the information present in the configuration***

"Members of a development team collaborate, cooperate, and learn from one another." [Mic'07]. Since this template was developed by other team, it becomes important to address how useful is the information available at the template. For instance, rules should have comments that fully explain what it does; measures should have a description that fully specifies what it defines, and so on.

The internee's conclusion is that the information available at the template is not uniform; it doesn't follow a consistent guideline. The Store Clustering workbook has very clear descriptions of its rules and measures; the other workbooks have some full descriptions of the rules and measures, but not all of them have descriptions. This is possibly due to the fact that the Store Clustering is the only workbook that appears to be fully functional, being the one that appears to be at a more matured development cycle. Also, the Analyse workbook appears to be the second better documented workbook. Because the best documented workbooks correspond to the first and second steps of the assortment (Store Clustering and Analyse history) which correspond also to the more fully functional workbooks, this supports the hypothesis that the template was at a mid development cycle.

¹⁹ the ROI of the automation of manual testing would only be reached if the analysis proved that the template was good for development; the automated manual testing, if it were to have a positive ROI, that would only happen when regression testing is to be needed

4.3.2. Enabler's Customer perspective

- **Human Interaction analysis (from a user client point of view)**

- ***Application feedback of possible user error inputs***

Although the user is the main responsible for the input data, the system may help him recognize some input errors. Since this is a business process with huge user interaction, it was considered by the internee relevant the question "Does the application support any type of input validation?" from the client's perspective.

The RPAS Client Tool application enables the creation of user-defined exceptions; these exceptions can be defined to set minimum and maximum ranges in input measures, so as setting different formats (e.g. negative values should appear in red colour). It is also possible to define specific formats and/or range of values in the Configuration Tool by the client's request, but since they are done at the Configuration Tool, the user at the Client Tool cannot change them. The internee's conclusion is that the development version has the only the default formats available in RPAS.

- ***Guarantee of the current functionalities***

Embedded input control should also be available, in fact, that's why RPAS works with rules. A typical system which interacts with humans should ensure [SJB'06]:

- Field combination control: verifies the data in one field based on data in another field or fields;
- Value limit control: identifies when a value in a field is too large or too small;
- Completeness control: ensures that all necessary fields on input forms have been entered;
- Data validation control: validates the input data for correctness and appropriateness.

The internee believes that RPAS solutions, as they have human-interaction, should ensure the above listed requirements. Although, RPAS doesn't have any form of ensuring the last two requirements: "completeness control" and "data validation control". RPAS can't distinguish, for instance, a purposely left blank cell from a blank cell that shouldn't be blank. It can't also validate the correctness of the input data, unless that correctness can be expressed by mathematical rules.

The internee's conclusion is that the solution must provide rules that make sure that it is performing accurately the spreading, aggregations and other types of calculations. To do this type of analysis, an extended testing phase would be needed. If Enabler intends to use this template for development, a testing phase has to be done in order to audit if the current functionalities and calculations are performing in the way it is supposed to.

- ***Usability analysis and change management***

The appliance of these applications in the client's company will have impact in its business processes, and on the people. In order to manage more effectively this organizational change, usually, the application should be most resembled to the client's processes[FC'06], should have the same measure names, roles names, processes names and should be intuitive to its final users. Analysing intuitiveness doesn't make sense if the client's final users are not in mind; only they know what intuitive means to them.

It is important at a CRP to make sure that the client management personnel follow their responsibilities:

- Manage the changes in the Company, based on the decisions from the CRP;
- The change management process must be assumed by all as a continuous process;

- This process must be sponsored by the top management;
- The changes resultant from this CRP will not only affect the IT/IS professionals but also will change business processes, and therefore must be dealt as a business change. [WR'07]

The internee believes that a usability analysis based on the client final user perspective needs to be done, in order to understand if the way information is presented is intuitive enough for him. As the template didn't have a specific client in mind, the usability analysis that was done was based on standard processes among retailers and best practises. It was checked if the template:

- has standard measure and hierarchy names;
- uses best practise processes steps and according names;
- has appropriate information comments available in measure information;
- has descriptive menu option names.

As said before, it was noticed that the template was at a mid development cycle. Some of the measures didn't have any information (e.g. it took some time to find out that the DP version plan was supposed to be the initials of "Dummy Plan" used in the calculation of an intermediate step) and some rules were also lacking description; this was mainly seen at the latest steps of the assortment process functionalities.

The internee's conclusions are that the template (at his latest version available) follows general best practises processes steps and uses standard names for the assortment steps. Even though the template is called an "assortment planning" solution, it is more resembled to an assortment management, since it has ideas from execution processes; that is the only inconsistency, but it may well have been purposely left with a name that retailers are used to.

4.3.3. Shared perspective

o *Integration with other modules*

The internee's conclusion is that this template intends to be a full integrated assortment planning and execution solution for the specificity of fashion items, more resembled to the assortment management footprint presented in Figure 18. It has light functionality from Financial Planning, Item Planning and Allocation, along with an embedded Predictive Sales Demand Forecast. The only thing it lacks to be a full assortment management solution has presented in chapter 2.4.1 is to consider space planning and planograms.

o *Configuration Degree*

One of the things that must be present in Enabler's personnel at a CRP is the ability to answer client's questions related to custom configuration needs. At a CRP, it is often needed to decide whether the implementation is going to be a plain vanilla version, a vanilla version with minor custom configurations or a full custom solution. This decision is crucial, not only because the implementation is totally different, but also because it impacts on future implementations, future functionality updates integration with other applications, etc. The cost factor, time available and risk analysis are also vital inputs to decision-making in the retail industry.

The internee's conclusion is that the template is more suited to fashion retailers who buy brands, although it can be also used by retailers who manufacturer their own brands by substituting the Brand-Vendor with Own Private Label and sub-labels. Franchisees that have imposed style-assortments by their franchisers will not fully benefit from this template.

The customization degree of the latest version of the template couldn't be addressed since the internee didn't have access to the configuration; although, it is clear that Oracle tried to address only the general functionalities, giving space for the more specific functionalities that can vary among retailers due to the information available, as shall be explained next.

o **Improvements**

The internee's conclusion is that the latest version was found to be more focused on a specific type of fashion retailer and its business process than the template's development version. Although they shared similar ideas, there were some differences in both approaches; the latest version had major functionality improvements but there were also some valuable ideas from the development version that didn't make it to the final version, possibly due to the different possible implementations of a functionality that only differ in the data available (which differs heavily across retailers). These ideas can serve as breakthroughs of possible configurations. Further are the ideas gathered by the comparison of the development version versus the latest version seen in Oracle's presentation:

- Space Constraints used to determine the optimal number of options at each store

Some retailers use space constraints measures to calculate the number of options needed at each store. Although the development version of the template intends to consider space constraints to calculate the number of options recommend to the assortment (it has the functionality to assign fixtures to clusters, calculating minimum and maximum capacity units - although it wasn't proved that the functionality is operational), in the last version space constraint is not consider. In the last version, the calculation of the optimal number of options is simply based on the division of "Planned sales units / planned stores / planned weeks / planned rate of sale".

Oracle also has a separate Space Optimization application that can be used to determine the assortment breadth and optimal number of facings. It allows translating assortment plans into executable space plans, determining the most profitable use of floor space [OR'08a].

Space Planning was found by AMR Research [SG'08] as a high priority of European retailers, as they are more space constrained than North American retailers. The internee's conclusion is that Enabler would benefit from studding the integration of this functionality in the template when engaging in a CRP project with an European retailer.

- Visual merchandise

The new 13 version of RPAS has a new functionality for integrating images in the workbook. Visual merchandise was considered by AMR Research [SG'08] as one of the three "emerging functional areas when scoping the (assortment management) project and vendor list". With this new functionality, it is possible to enhance user experience in planning by allowing the planner to validate an assortment visually (e.g. validate colours or checking silhouettes). The internee's conclusion is that Enabler would benefit from studding possible implementations of this functionality and its integration in the template when engaging in a CRP project with an European retailer. An example of a state-of-the-art implementation of this kind is Visual Retailing²⁰; one of its functionalities is shown on Figure 44.

²⁰ URL: <http://www.visualretailing.com>

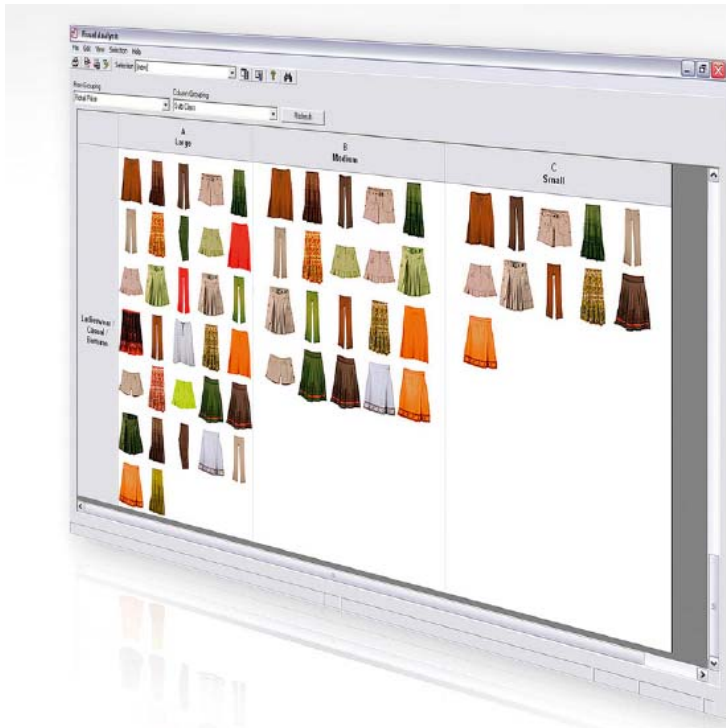


Figure 44 – Example of a Visual Merchandise Solution from the Visual Retailing company. Source: [VR'08].

Figure 45 is a prototype of how this functionality could be integrated in the template.

R_WB_ALL [Cluster]		A	B	C	D	E	Oth 1	Oth 2	Z
Women's Classics		✓	✓	✓	✓	✓	✓	✓	✓
Classic Tops		✓	✓	✓	✓	✓	✓	✓	✓
Sweaters		✓	✓	✓	✓	✓	✓	✓	✓
Cotton Cable Knit Sweater		✓	✓	✓	✓	✓	✓	✓	✓
Cotton Cable Knit Sweater Black		✓	✓	✓	✓	✓	✓	✓	✓
Cotton Cable Knit Sweater Cream		✓	✓	✓	✓	✓	✓	✓	✓
Cotton Cable Knit Sweater Hunter		✓	✓	✓	✓	✓	✓	✓	✓
Cotton Cable Knit Sweater Navy		✓	✓	✓	✓	✓	✓	✓	✓
Cotton Cable Knit Sweater Red		✓	✓	✓	✓	✓	✓	✓	✓

Figure 45 – Prototype. Integration of the display image functionality present in RPAS version 13 in the template's worksheet "Store Count and Eligibility" (from the workbook "Pre-Season Buy Plan", tab "Pre-Season – Assortment Mix" at the development version template).

- CRM data

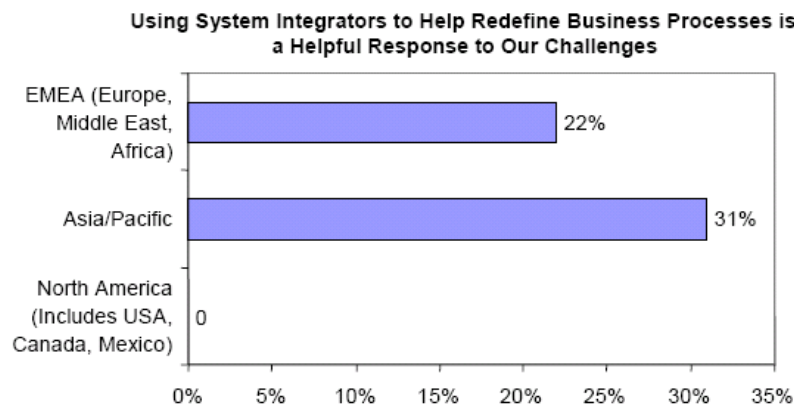
Customer-Centric Merchandise Management focus in three types of data: location data, product data and customer data. The internee's conclusion is that the template only works with location and product data. Integrating customer data in the template would bring merchandising into a higher level; thus, incorporating customer data to support assortment decisions ought to be studied. Again, as said before, customer data varies across retailers and a custom functionality to address this problem is necessary. Problems of integrating this wide range of data is the level at which is organized at a retailer; all data should have the same level of detail. (e.g. it must be possible to identify a specific customer that bought an item at one specific store at a specific time). Buying behaviour can also be integrated in assortment decisions; by understanding how customers chose their products (brand loyalty, substitute items – 2nd choice), retailers can improve their assortments. These improvements will only be useful for best-of-breed retailers who already have an assortment planning up and running for a considerable time.

4.4. Enabler's opportunities

Along the research done, there were found some facts that can be used to understand Enabler's client and forth improve its delivery. Following are the opportunities identified by the internee, believed to help Enabler improve its offer.

4.4.1. Systems integration

Back in 2005, Aberdeen Group conducted a benchmark report about The Business Benefits of Advanced Planning and Replenishment [Abe'05]. They were surprised that a relatively low number of retailers felt that "systems integrators could help them respond to the challenge of inadequate business processes". As shows in Figure 4, no North American respondents rated this as "one of their top three opportunities".



Source: [AberdeenGroup](#), December 2005

Figure 46 – Perceived Value of Systems Integrators Varies Wildly by Region. Source: [Abe'05].

Aberdeen makes an interesting remark: "Perhaps North American retailers' experience with system integrator-driven business process re-engineering in the late 1980s and 1990s was an experience they don't want to repeat. It may well be that these retailers have come to the conclusion that the value received was not equal to the expense incurred (both financially and culturally)" [Abe'05]. On the other hand, the Asia-Pacific

region stands as an opportunity since they “may be looking to system integrators to help them assimilate learnings and best practices from other parts of the world” [Abe’05]. The internee’s believes that Enabler would benefit from seeking these opportunities and keeping updated in geographical differences and history.

4.4.2. Space Constraints and Geographical differences

Although fashion retailers usually focus more on allocation of existing orders with a minimum of re-buying and re-ordering, there are still significant differences in planning process by geography. The internee’s believes that Enabler would benefit from understanding these differences and taking advantage of them.

Replenishment and Allocation have different magnitudes in Europe and North-America. The cost of real estate is extremely high in Europe, yet, because of the high density of population in small countries, the cost of distribution is relatively low. This means Europe has the possibility to ship and replenish to all their stores many times a week or even a day. This makes European retailers being less worried about replenishment or shipping; instead, they focus in demand forecast accuracy and best-of-breed technology to detect possible out-of-stock in key stores and automated re-allocation of products, if possible with no user intervention. [Abe’05]

The internee’s believes that Enabler would benefit from taking into account these differences when addressing retailers. Since the template doesn’t consider space constraints, being prepared for possible custom necessities from European retailers is also believe to be prudent.

5. Conclusions and future work

5.1. Summary of the work done

The video presentation that the internee had access by the end of the project proved to be very useful to understand Oracle's strategy and implementation decisions, so as to understand why some functionality were dropped and others were introduced. The internee's decision to shift the analysis' approach proved to be efficient since it offered the internee a bigger picture and more accurate forecast of how the final solution is going to be. It also helped to understand potential opportunities that the internee believes could help Enabler to improve its offer. Furthermore, provided a privileged view of how the template evolved and what were the main deviations in the development of this solution. These main deviations may represent some difficulties found or strategic decisions that Oracle took.

The development version of the template per se was found to be a good starting point for the gathering of ideas, for understanding its evolution and for providing possible useful implementations that won't appear in its latest version that is coming up soon.

The internee believes that the report was elaborated in a way that could be used both internally to support CRP documentation and, at the same time, attempting to be a solid academic report. The certain amount of background detail for the complex and diverse retail business industry was, hopefully, achieved. A wide coverage of the analysis was also written in a way that it's expected to better address the different needs of Enabler's personnel, from delivery to development.

The internee believes that the main functionalities were detailed, questions were acceptably answered and an overview of future trends, challenges and opportunities was thorough presented.

In short, the main conclusions and recommendations were:

- o the development version of the template it's not fully functional and thus, not proper to present in a CRP;
- o it's not properly documented (some components at the configuration don't have descriptions nor labels);
- o a more detailed analysis and testing phase has to be done in order to audit if the current functionalities and calculations are performing in the way it is supposed to;
- o the template follows general best practises in the assortment process;
- o the store clustering algorithm is the main functionality available;
- o the current trend in retail is Customer-Centric Merchandise Management, which recommends that the assortment should be a full integrated end-to-end solution from planning and execution; it should include Assortment Planning, Store Clustering, Space Planning, Size and Pack Profiling, Planogram and Allocation;
- o the assortment planning for fashion template is, in fact, an integrated solution for planning and execution processes; it includes light functionality from Financial Planning, Item Planning and Allocation; thus, more resembled to what AMR Research called in [SG'08] as Assortment Management;
- o the latest version of the template has an embedded Predictive Sales Demand Forecast;

- o the template is more suited to fashion retailers who buy brands, although it can be also used by retailers who manufacture their own brands; franchisees that have imposed style-assortments by their franchisers will not fully benefit from this template;
- o the functionalities and workflow of both development and latest versions are very different;
- o space constraint functionality available on the development version (that doesn't appear in the latest version of the template) can be subject of a detailed analysis in order to include it in custom solutions; integration of the Oracle's Space Optimization application with the template can also be studied as an alternative;
- o visual merchandise was considered by AMR Research [SG'08] as one of the three "emerging functional areas when scoping the (assortment management) project and vendor list; a prototype of a possible implementation of this functionality was done at Figure 45;
- o the Customer-Centric Merchandise Management focus in three types of data: location data, product data and customer data; the template only works with location and product data;
- o incorporating customer data to support assortment decisions should be studied.

5.2. Future work

Since the new version is coming up soon, it is Enabler's decision if it's worth to invest in a deeper testing analysis of this development version's functionalities. The internee believes, however, that a more detailed analysis of the development version approach to space constraints is considered relevant if Enabler's clients are considering investing in the customization of this functionality.

The internee also believes that the study on the relevance of visual merchandise functionality would benefit Enabler, so as the possible inclusion of CRM data to improve assortment definition.

5.3. Internship evaluation

The characteristics of this internship provided the internee with a good exposure to the RPAS tool, as it was needed to understand both the Client and Configuration Tool perspectives.

The difficulties that the internee came across during the analysis of the template were also essential to its learning. The need to change the template's configuration at the Configuration Tool and work in different formats at the Client Tool helped the internee to become more aware of the application, becoming more autonomous in its walkthrough.

During the internship, version 13 of RPAS also came out, which increased the number of versions needed to know: version 12.0 was the version of the development template, version 12.1 was the latest version that appeared in the presentation and new version 13 was also considered to evaluate possible future improvements in the template. The need

to understand variations among different versions of RPAS increased the internee's knowledge about the tool.

The organizational environment that supported the internship was an additional factor of positive heterogeneity. During the internship, the company moved its central offices from the centre of Porto to Maia; this event provided the chance to witness how a big company is able to move, almost from night to day, to another city. Nearly two month later after the transfer, the company ended the two year cycle of Wipro's acquisition, changing its name to Wipro Retail. After a period of adaptation to foreign methodologies and improvement of existing best-practices, Enabler enters in a new level in retail industry, now providing a full end-to-end implementation delivery. Being able to witness these changes, growth and organization of the company was professionally inspiring and compensating.

Overall, the opportunities for personal and technical growth, along with retail business complexity awareness, were very rewarding for the internee. The specific characteristics of this project as a whole were found to be valuable for both professional and personal improvement.

Glossary

Assortment Breath/Depth – The breadth (or width) and depth of the merchandise carried at a retailer's store. Breadth represents the product lines carried by the retailer; it can be wide or narrow. Depth represents the quantity of product variations in a product line; it can be deep or shallow. This classification also applies to Range Breath/Depth. For detailed information about the relationship of Assortment and Range see [Range].

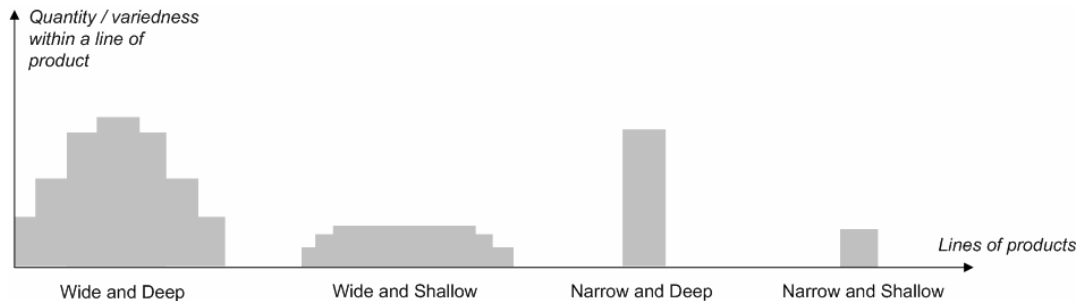


Figure 47 – Width/ Breadth (Wide/Narrow) and Depth (Deep/Shallow) of a retailer's assortment/range. Source: [Mar'08].

Best Practices – Are the methods and procedures within a given subject or field that have been proven to be the most efficient and effective in achieving the subject's goals.

Bullwhip effect – It's the oscillating phenomenon of demand magnification upstream a supply chain. Distorted information or the lack of information implicates fluctuations in orders that become larger at every step up the supply chain, from the consumer to the suppliers, as one can see in Figure 48.



Figure 48 – Bullwhip effect. Source: [Kha'08].

Buyer - Fashion buyers are responsible for selecting merchandise, planning the long-term buying strategy and negotiating contractual terms with suppliers (for example the price, delivery date, specific merchandise requirements etc.) in a retail store. [Evo'07]

Convenience goods – Goods which are purchased frequently and are easily available to consumer, without any extra effort; they are bought more according to convenience of acquisition than by 'brand' or other particular value (example: most grocery items like bread, eggs or fresh fruit).

Couture – French term for sewing or dressmaking; refers to the creation of exclusive custom-fitted fashions.

Department stores – Stores that specialize in selling a wide range of products without having a single predominant merchandise line (examples: *El Corte Ingles*).

Fast Moving Consumer Goods (FMCG) – Goods that are sold frequently at relatively low cost. Examples of FMCG products: teeth cleaning products, toiletries, cosmetics, shaving products, detergents, light bulbs, batteries, paper products and plastic goods. Examples of FMCG retailers: Nestle, Proctor & Gamble and Unilever.

Grand Couturiers – *Couturier* is a French term that means fashion/clothes designer. Grand couturiers are fashion designers that hold noteworthy influence in the fashion industry. Usually this influence spreads to all levels of the fashion industry through the trickle-down effect. [Wik'08a]

Haute-couture – Also known as high fashion. It relates to the very exclusive fashion club of big fashion designers that have a massive influence in trend-setting fashions. The term is even protected by law in France, being administered by the *Chambre de Commerce et d'Industrie de Paris*; the term can only be used by firms that meet certain highly defined standards. Every season a list of official members is published; these members present their designs at the *Haute Couture Fashion Week*.

Hypermarket – Huge stores that combine supermarket, discount and warehouse retailing; additionally to food, they carry furniture, electrical devices, apparel and many other products. Example: MCH²¹.

Micromarketing – Marketing oriented to more specific groups of consumers (or even individuals).

One-size-fits-all – appealing or answering to a wide range of tastes or needs.

Open to Buy – Is the difference between planned purchases and stock already ordered; represents the dollar amount of merchandise that a buyer can order for a particular period in order to reflect changes in sales, markdowns, etc. This method also provides the retailer with flexibility in purchasing new items while previously ordered items are sold out; this way the retailer can take advantage of special offers and product deals.

Overruns – producing more than needed; this can occur due to estimating errors, reductions in order size, or attempts to take advantage of excess materials.

Overstock – supplying too much stock than the necessary or desirable to meet demand. This is not desirable because inventory space costs money and also because the overstocked products could be being sold at another location.

Petabytes – An order of magnitude for data, information or computer storage. It represents 1000⁵ bytes.

Planogram – a map or diagram of fixtures and products that illustrates how and where retail products should be displayed.

Prêt-a-porter – also known as Ready-to-wear; is the fashion design term for clothing that can be worn on a daily basis and is sold at it's finished condition. Almost every fashion designer or fashionable *couture* house produces a ready-to-wear collection for each season; the items are usually for mass-production.

Range - Range refers to all the merchandise lines that compose an offer. The retailer's complete offer is subdivided in assortments. These assortments contain a more narrow

²¹ MCH – *Modelo e Continente Hipermarcados* is Portugal's largest supermarket chain and is the retail arm of the portuguese conglomerate *Sonae*.

focus of merchandise from the overall range. Assortments are assigned to selected stores. A range may contain goods not found in an assortment, but an assortment cannot have goods not included in the range. This relationship is best described visually at Figure 49. [Mar'08]

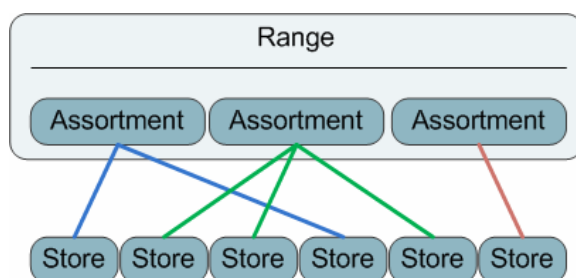


Figure 49 – The relationship between range and assortment at a retailer [Mar'08]

Shopping good – a good where more time is spent selecting (browsing) based on various parameters (such as cost, brand, style, comfort) than a quick convenience good. Examples: apparel and footwear, televisions, home furnishing, jewelleryes.

Slow Moving Consumer Goods (SMCG) – Non-perishable consumer goods; a logistical term for goods that have a low transaction frequency, that is to say, they aren't sold as frequently as other products and therefore require shelf space for a longer time.

Specialty stores – Stores that are specialized in a specific range of merchandise but can also sell basic products that are used with this basic product type; these stores carry a narrow product line with a deep assortment within that line. Example: *Parfois*²² – accessories, *IKEA*²³ – home furnishing, *Staples*²⁴ – office materials.

Subject Matter Expert (SME) - an individual who exhibits the highest level of expertise in performing a specialized job, task, or skill within an organization

Supermarket – A self-service store offering a wide variety of food and household merchandise, organized into departments. Example: *Pingo Doce*²⁵.

Superstores – A store that is twice the size of a supermarket and besides carrying the same assortment as a typical supermarket (though has a deeper depth), offers in addition services as dry cleaning, post offices, film developing, petrol forecourts or self-service car-washing.

Stockouts – Merchandise that is requested by a customer, but is temporarily unavailable; stockouts usually generates lost sales. Also referred as Out of Stocks (OOS).

Test store – Is a store that is used for the testing of new products. This is a strategy carried by a retail chain that consists on introducing “new products at a small sample of selected stores for a short period prior to the primary selling season and uses the observed sales to forecast demand for the entire chain”. [MK'00]

²² *Parfois* is a leading fashion accessories brand in Portugal. URL: <http://www.parfois.com/>

²³ *IKEA* is world's largest furniture manufacturer and retailer and is privately-held. URL: <http://www.ikea.com/>

²⁴ *Staples* (NASDAQ: SPLS) is the world's largest office supply retail store chain

²⁵ *Pingo Doce* is the largest supermarket chain in Portugal, owned by *Jerónimo Martins*. URL: <http://www.pingodoce.pt/>

Trickle-down effect – originally coined as a marketing term to describe the availability of consumer goods among socioeconomic classes. When a new highly desired product enters the market, it has an initial high price tag which only makes the product available to rich people. Over time, as the product wide spreads and becomes mundane, the price drops until it is available to the general public to purchase.

Understock – Supplying insufficient stock to cover demand; understocking usually tends to evolve to stockouts.

Vanilla version - an adjective used in IT that means plain or basic; it refers to an unfeatured version of a product. Eric Raymond, editor of The New Hacker's Dictionary, refers that the term is based on the fact that vanilla is the default ice cream.

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APPENDIX A – Workflow

GUIDE

“NAME of the step”

1. “Workbook name”
 - 1.1. “Tab name”
 - “Worksheet name”

WORKFLOW

SETUP

1. Data Creation
 - 1.1. Data Creation
 - Data Creation
2. SIA Business Administration
 - 2.1. Role/ Intent Weights
 - Role/ Intent Default Weights
 - Set Role Intent to set Default Weights
 - 2.2. Price Banding
 - Price Band Setup
 - 2.3. Max Number of Items allowed
 - Setup the Max Number of Items allowed
 - 2.4. Date Setup
 - Date Setup

ASSORTMENT PROCESS

1. Store Clustering
 - 1.1. Setup
 - Like Store Seeding
 - Weight Setup
 - 1.2. Performance Metrics
 - Performance Based Clustering
 - Breakpoints
 - Store Information
 - 1.3. Cluster Results
 - Cluster Results
 - 1.4. Approval
 - Approval
2. Analyze
 - 2.1. Analyze - Performance
 - Analyze - Performance (by Cluster)
 - Analyze - Performance (by Price Band)
 - Analyze – Square Feet Measures
 - Cluster Setup
 - CP Clusters
 - New Item Setup
 - Normalized Values
 - 2.2. Analyze – Vendor
 - Analyze – Vendor (by Cluster)
 - Analyze – Vendor (by Price Band)
 - Analyze – Square Feet Measures
 - 2.3. Analyze – Summary
 - WP Keep / Drop Summary
 - CP Keep / Drop Summary
 - Weight Setup
 - Item Scorecard
 - Keep / Drop
 - Item and Store Count Analysis
 - 2.4. Approval
 - Approval
 - Activate Assortment

3. Define Assortment Strategy
 - 3.1. Review Targets
 - Review Targets
 - 3.2. Plan Capacity Guidelines
 - Fixture Definition
 - Assign Fixtures to Clusters
 - Capacity Results
 - 3.3. Define Assortment Strategy by Vendor
 - Define Assortment Strategy by Vendor
 - 3.4. Define Assortment Strategy by Att/Price
 - Define Assortment Strategy by Att/Price
 - 3.5. Pre-Season – Assortment Mix
 - Assortment Strategy Summary
 - Assortment Strategy Summary by Vendor
 - Assortment Strategy Summary by Capacity
 - Option Count by Attribute
 - Store Count and Eligibility
 - Keep/drop Information
4. Product Attribute Management Workbook
 - 4.1. Product Attributes
 - Style-Color Attributes
 - Keep/add/Drop Information
5. Pre-Season Buy Plan
 - 5.1. Pre-Season – Assortment Mix
 - Assortment Strategy Summary
 - Assortment Strategy Summary by Vendor
 - Assortment Strategy Summary by Capacity
 - Option Count by Attribute
 - Store Count and Eligibility
 - Keep/Add/Drop Information
 - 5.2. Fashion Demand Parameters
 - Fashion Demand Parameters
 - Fashion Lifecycle Management
 - 5.3. Basic Demand Parameters
 - Basic Demand Parameters
 - Basic Lifecycle Management
 - 5.4. Review Buy Plan
 - Assortment Strategy
 - Review Receipts by Cluster
 - 5.5. Lifecycle Plan
 - Lifecycle Plan
 - 5.6. Reconcile
 - Reconcile
 - Reconcile (by Attribute)
 - Reconcile (by Vendor)
 - 5.7. Approve Plan
 - Approve Plan
 - Approved Plan
6. In-Season Trend Analysis
 - 6.1. In-Season Trend Analysis
 - In-Season Trend Analysis

APPENDIX B – Detailed Project Gantt Chart

