

METHODS AND ORGANIZATION OF
NEW PRODUCT DEVELOPMENT:
AN INVESTIGATION IN THE UK TEXTILE AND
CLOTHING SUPPLY CHAIN

Vol. II of II

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Methods And Organization of New Product Development: An Investigation In The UK Textile And Clothing Supply Chain (Volume Two of Two)

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Appendix

Chapter Seven Data Collection Findings

7.0 Introduction

The chapter sets out the findings from the I.F. intervention projects that relate to the research questions. The chapter is organised into sections devoted to each of the case study data collection findings. Each project had a number of findings that related to the real world problem that the project team worked on during the Industry Forum intervention. A part of the findings were relevant to the research questions. In the KnitwearCo case study for example the Industry Forum intervention data findings concern mapping and description of the new product development process activities, detailing the methods used to calculate profits on new developments and the results from a supply chain needs perception survey of the management at KnitwearCo and the in house customer buyers and designers. These findings are all relevant to the research questions.

[Note: Data Collection details regarding KnitwearCo have been included in section 3.4.1 the Chapter Two Methodology.]

7.1 Findings for KnitwearCo

The KnitwearCo Industry Forum Intervention Project was concerned with a number of issues that the parent company wanted better information about. The issues were the performance of the New Product Development system, the reliability of the Costing system to cope with a high volume of new developments and the attitudes of the KnitwearCo and in house retail customer towards the new product and customer service needs of the supply chain. The findings of the data collection process are described below covering each of these issues.

7.1.1 A Description of the NPD Process at KnitwearCo

The KnitwearCo business was sent garment designs and concepts by the parent company retail division designers. The concepts were then developed into prototypes by the KnitwearCo development staff. The garments were generally fine gauge fully fashioned knitwear using cashmere or fine merino wool blends. In a typical season the KnitwearCo business would be given up to 450 new products to develop by the retail division Ladieswear and Menswear designers.

The type of knitwear garment that is produced by the manufacturing business is shown below in Figure 7.1.



Figure 7.1: KnitwearCo Garment Type.

There were a number of clear stages and gates in the KnitwearCo NPD process.

- **The Yarn Trial**
- **Concept Garment Development**
 - **Sketch and swatch**
 - **Prototype Knitting**
 - **Make Up**
 - **Fit Approval**
- **Semi-Bulk Prototype Development**
- **The Buying Decision**
- **Production and Launch**

These stages are described in detail below:

The Yarn Trial

Dyed yarn is important to the fully fashioned knitwear manufacture at KnitwearCo since the yarn is virtually transformed directly to garments through knitting and very little make up is required to produce the garment. Make up of the fully fashioned knitwear takes place when shaped knitted panels are joined together through the interlacing (linking) of stitches with yarn. (This contrasts with circular weft knitting or weaving where a much longer process of fabric dyeing, fabric cutting, make up and sewing takes place. The cutting and sewing process is lengthy and panel shaping takes place during the cutting out process). At KnitwearCo fully fashioned knitwear the panels are produced at knitting that are then linked together to produce a particular design and size of garment. The knitwear production at KnitwearCo used dyed yarns that are transformed into knitted panels that are then taken through a partial make up assembly process to create the parts for a coloured garment. The partial garment parts are then sent for a short scouring (washing) and softening at an external dye business before returning to KnitwearCo for final assembly and packing. Yarn is a key aspect of the NPD process and much of the aesthetic of the final garment at KnitwearCo lies in the choice of the fineness of the yarns, the fibre components used in the yarns and the colour of the yarn. There are clothing retail selling two seasons each year (Autumn/Winter and Spring/Summer) and for each season the KnitwearCo Designers (Ladies and Menswear) attend the Italian Pitti Filati Yarn Trade Fairs in Florence. The Yarn Developer from KnitwearCo manufacturing also attends the Florence shows with the retail division designers and samples are selected by the designer for trials at KnitwearCo. The yarn show is the venue for yarn businesses to show the latest trends in yarn blends, colours and textures. Garment and Fabric Designers attend the shows to discover yarn trends and to be inspired in terms of what is possible from the point of view of raw materials and to order small quantities of samples of new yarn ideas. A few weeks after the Trade Shows the small samples arrive at directly at KnitwearCo or via the retail division London Office. Yarn samples are generally of colours that are not necessarily those required by the Designer but will give an idea of the concept garment since they yarn aesthetics will

nevertheless be demonstrated in the garment. Once the samples arrive at KnitwearCo they are knitted into a small section of knitted fabric (without any shape other than a rectangle) that is appropriate to the type of yarn and this is submitted to the Designer who then can see the type of knitting stitch look that can be achieved. The sample knitting also gives the manufacturer an opportunity to discover how well the raw material will perform in the knitting operation. The success rate for yarn types that eventually proceed to the commercial launch of products is typically about one in six. However success in this case is achieving the delivery of a commercial sample to the retail division who then place an order that may be for only a few garments.

Concept Garment Development

Concept garment development has a number of sub stages. These are broadly described below, and a more detailed explanation follows.

Sketch and swatch

After the Designers for Ladieswear and Menswear select certain yarns for development they receive the knitted swatches produced in the yarn trial.

Sketches of concept garments are then created by the Ladieswear and Menswear Designers and then sent to KnitwearCo. The sketches have styling details, colour, garment shape and sometimes a swatch of the fabric (or sometimes simply a yarn) sent back that has been created at the Yarn Trial stage. The Designers make decisions regarding generation of new product concept designs over a period of a two months as part of a wider 'Critical Path Plan' that aims to have various ranges of new season products available for a senior management review date. The Critical Path allows the various retail ranges of Knitwear and Formalwear to be developed into a co-ordinated collection ready for launch in Autumn/Winter or Spring/Summer in the UK retail stores and department store concession outlets and the international markets including Japan and the USA. The rate of new product designs issued to KnitwearCo by Ladieswear is about 45 designs per week over this two month period. This has the effect of

Details from the knitting statement on yarn usage and number of rows of stitches are passed to the Costing department for use in the manufacturing costing build up. Once the sketch and swatch and desired garment colour has been received samples of dyed yarn can be ordered and once it arrives and the knitting statement is ready the prototype knitted panels can be knitted. The prototypes knitted panels are knitted on standard production machinery when the right gauge machine is available at a change of production type. The knitting machine has first to be set up with the correct yarn and the knitting computer design pattern disk.

The knitting machine room can be seen in the photograph in Figure 7.3 below.



Figure 7.3: KnitwearCo Knitting Room.

There is a dedicated Make Up sample line that is used exclusively for assembling the prototypes prior to sending to the dyer for processing. Part of the Make Up process takes place before the partially completed garments are sent out to be scoured and softened at the dyer. Detailed notes on the method of assembly at Make Up are made by the specialist development sample line staff for use when the product goes into full production. These notes regarding production method are also sent to the Costing department for inclusion in the costing. Upon return from the dyer the balance of the

garment Make Up can be completed and garments checked by the development against the desired design, size, colour, handle of the fabric and specification prior to despatch to the retail product group Designer concerned. The scour and softening dyer's costs are recorded for inclusion in the costing. A price for the garment is also sent to the Designer using the costing information that has been built up during the prototype production, standard overheads, processing times for each step in manufacture, pay rates, machine speeds and standard profit margins. The sample line make up department is shown in the photograph (Figure 7.4) below.



Figure 7.4: KnitwearCo Sample Line.

The retail product group Designer will assess the finished garment, its fit, handle, styling details, colour and price and make a decision about inclusion in the range. Fit is tested on a size 12 model. Even if the garment is acceptable for fit the designer will usually want some change to the interpretation of the concept and suggest some changes to the prototype design and request a second prototype. The second prototype goes through all the stages described above since even a small change in garment dimensions or garment shade means that the garment has to be knitted all over again from new yarn.

Once the buyer is satisfied with the prototype it will be used as part of a range presentation to senior management who have to decide on the mix of products for the next season's collections. However the Designer is most likely to put the prototype forward for review with some small changes still needing to be carried out. There are two more opportunities for these changes. Firstly the semi-bulk prototype stage provides an opportunity for changes and secondly at the full order production stage. The senior management meeting will then approve a garment for the range and agree an order quantity. An order for some of the season's expected sales will be sent by the retail buyer to KnitwearCo along with a supplemental order for an immediate small semi-bulk production batch. The semi-bulk batch (Travellers Samples) will be used by sales staff at the retail division to try and generate more sales amongst concession stores. The level of success in developments is fair with half prototypes then adopted for commercial sales purposes.

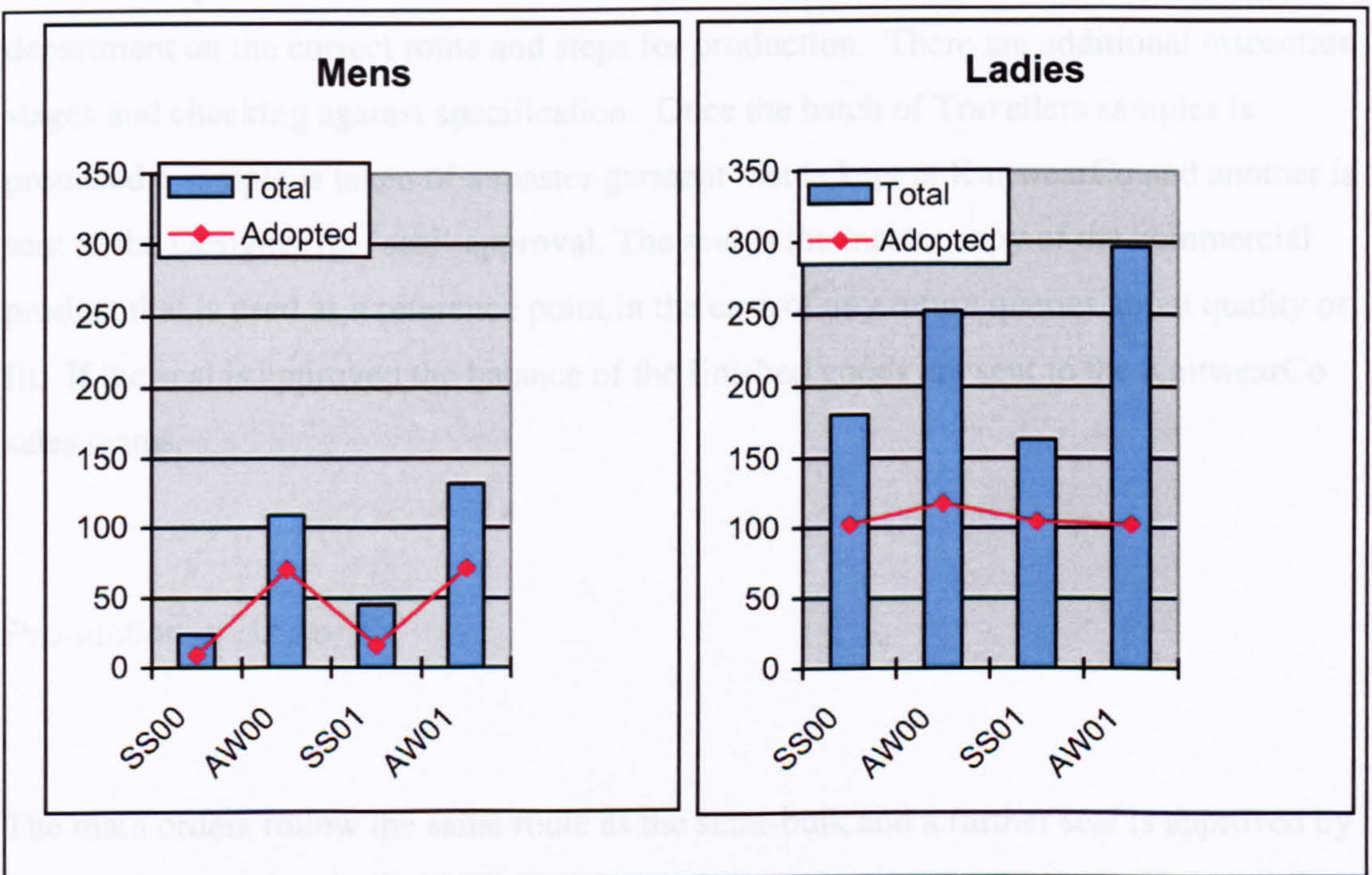


Figure 7.5: KnitwearCo New Product Adoption Rate

The charts (Figure 7.5) show the level of demand for prototypes and the success rate each season.

In Autumn/Winter 01 season KnitwearCo Ladies had 300 samples made and adopted about a third of them. KnitwearCo Menswear had 135 samples made and adopted 75. Adoption meant that an order was placed. This order could however be for only a few dozen garments.

Semi-bulk Prototype Development

The semi-bulk Travellers Sample batch tends to go through the same stages described above for the prototype although the main production route, equipment and staff will be used at all stages. More yarn is required to be ordered and any further design changes are taken care of with a new knitting specification design and computer disk. A Bill of Materials is produced and a works order is generated that instructs each production department on the correct route and steps for production. There are additional inspection stages and checking against specification. Once the batch of Travellers samples is produced a sample is taken of a master garment that is kept at KnitwearCo and another is sent to the Designer for 'seal' approval. The seal is the master copy of the commercial product that is used as a reference point in the case of any future queries about quality or fit. If the seal is approved the balance of the finished goods are sent to the KnitwearCo sales teams.

Production and Launch

The main orders follow the same route as the semi-bulk and a further seal is approved by the buying department. On this occasion the finished goods are sent to the KnitwearCo warehouse for distribution to the stores. A main production department is shown in the photograph (Figure 7.6) below.



Figure 7.6: KnitwearCo Make Up Department.

Detailed Process Stages Chart

Part of the Case Study intervention was designed to seek improvements in the NPD process and a more detailed process chart and stage descriptions were produced with suggestions about areas for improvement. A total process chart (Figure 7.7) is shown below. A part of the detailed mapping and analysis chart for the I.F. intervention project as then shown in Figure 7.8).

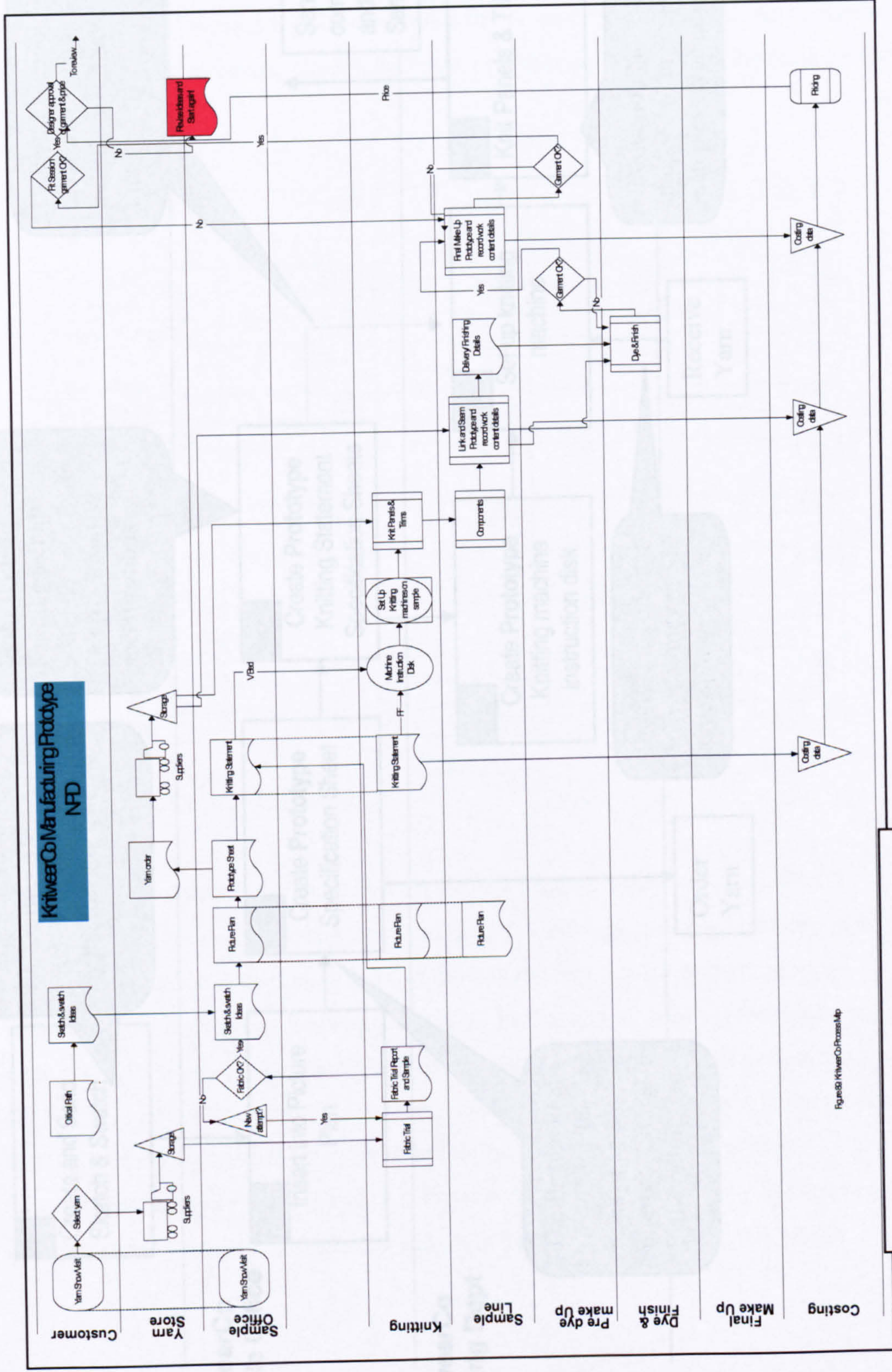
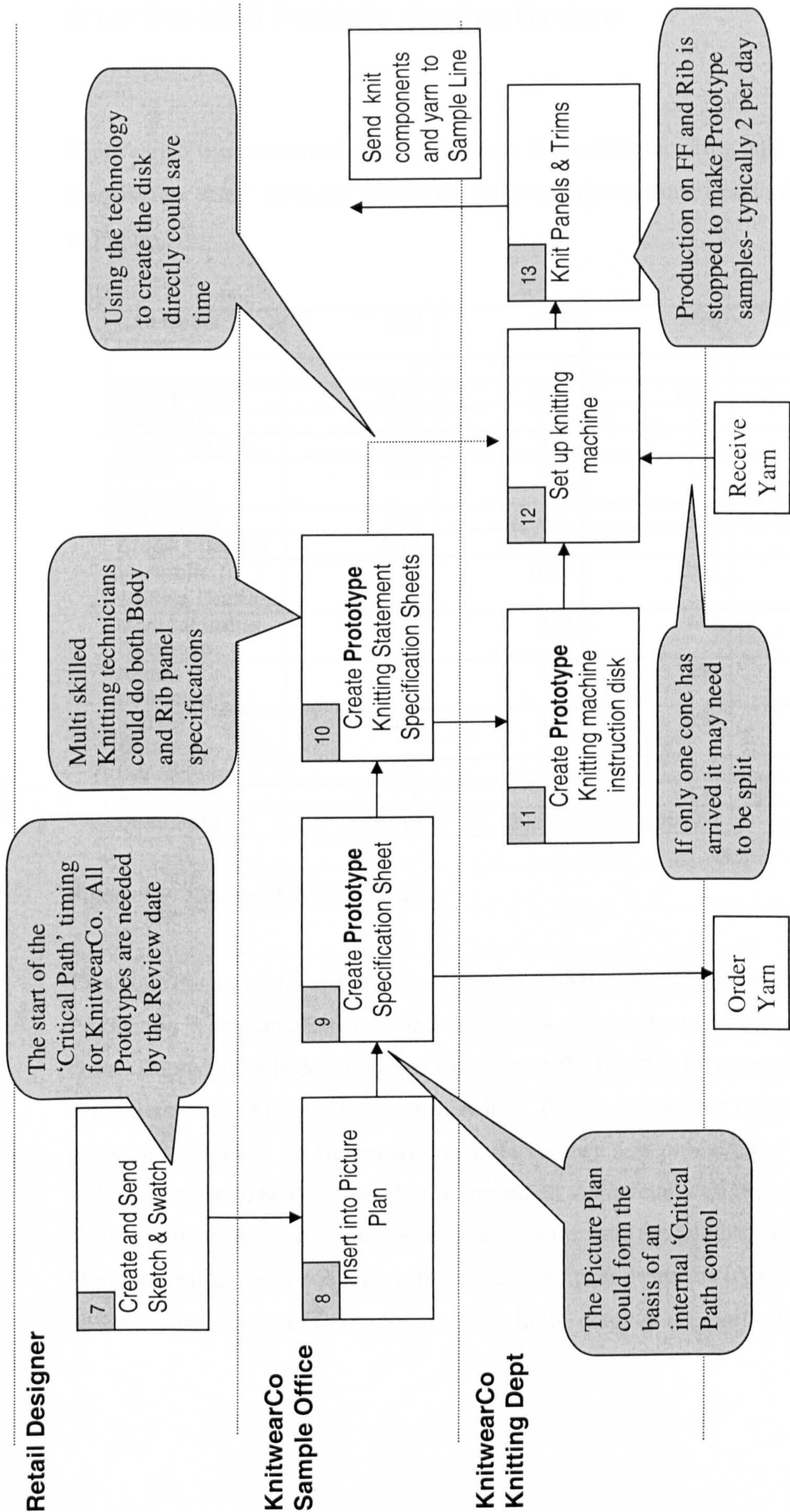


Figure 80 KnitwearCo Process Map

Figure 7.7: KnitwearCo Process Map

Figure 7.8: KnitwearCo Detailed Process mapping

The prototype knitting process



7.1.2 The NPD Portfolio Costing System

KnitwearCo was concerned about cost trends in the manufacturing unit. An analysis of the past few years' accounts yielded the following data summarised in the table below in Figure 7.9.

Unit Costs £/Unit	1998	1999	2000	2001 Q2L.E.
	£	£	£	£
Selling Price	27.29	25.02	23.88	27.26
Materials	8.24	7.74	5.54	10.20
Direct Wages	7.69	6.94	6.86	7.21
Direct Expenses	2.21	1.83	1.90	1.96
Purchases	0.37	0.31	0.53	0.22
Stock change	0.11	0.38	0.88	-0.14
Variable selling Costs	0.86	0.73	0.41	0.78
Manufacturing Overhead	4.61	3.92	4.04	4.14
Admin Overhead	1.58	1.06	0.91	0.80
Selling Overhead	0.80	0.86	0.65	0.69
Depreciation	0.82	0.76	0.69	0.65
Profit	0	0.48	1.47	1.37
Units Sold	408,017	420,899	440,364	438,537

Figure 7.9: KnitwearCo Unit Costs.

This table demonstrates the main cost drivers are Materials (Dyed Yarns), Direct Production Wages and Expenses and Overheads. Materials are a high proportion of the costs. Depreciation is declining and this mirrors the fact that investment in new equipment and technology has been very low. Profits can be seen to have improved from the 1998 level. At KnitwearCo manufacturing a new product was costed so that a selling price could be determined to be passed on to the retail designer. However the costing took no account of batch sizes and unfortunately the number of New Product Development samples was high with in house designer designers trying to back every possible style. The size of batches is shown in the diagram (Figure 7.10) below.

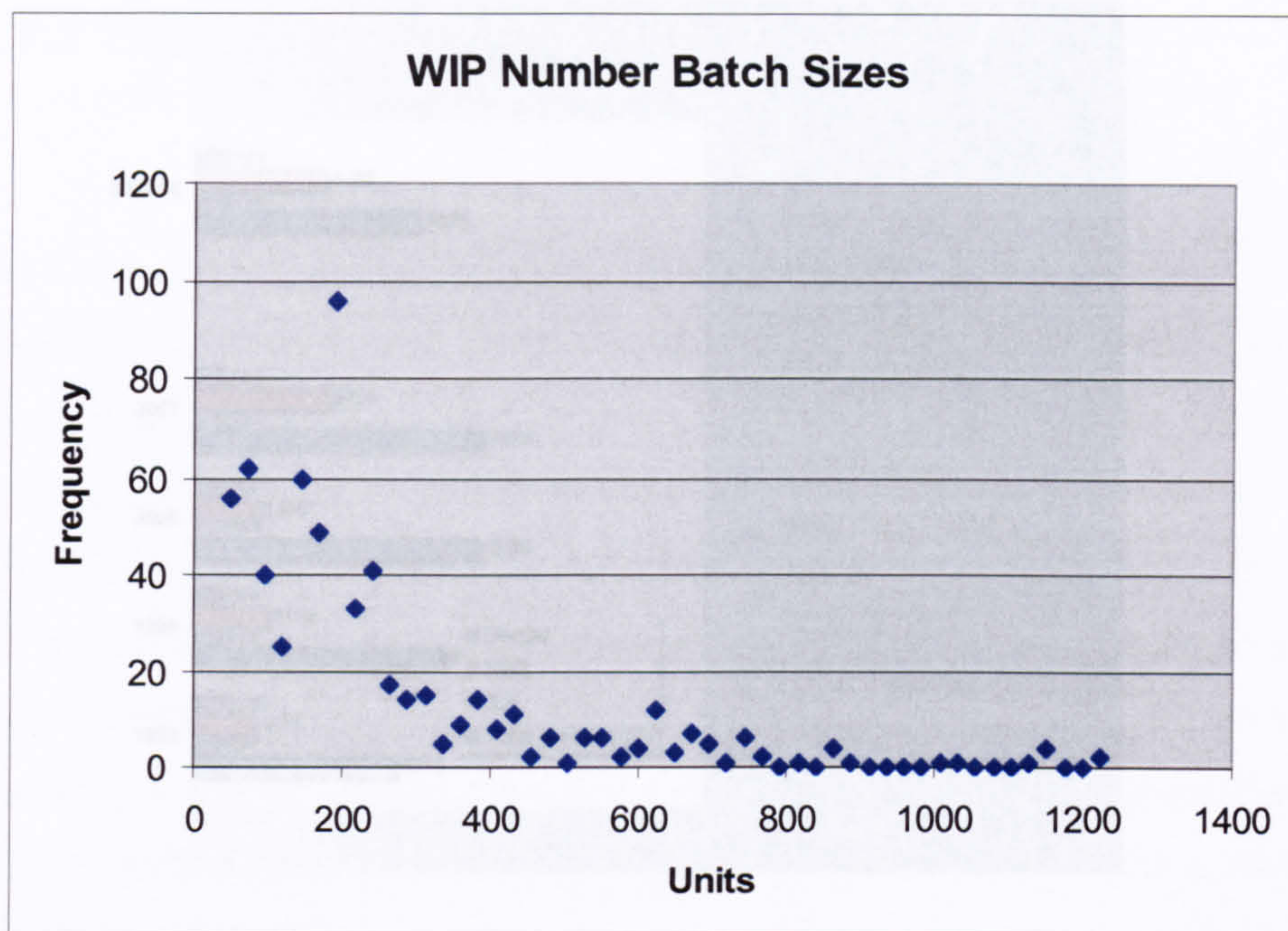


Figure 7.10: KnitwearCo Batch Sizes

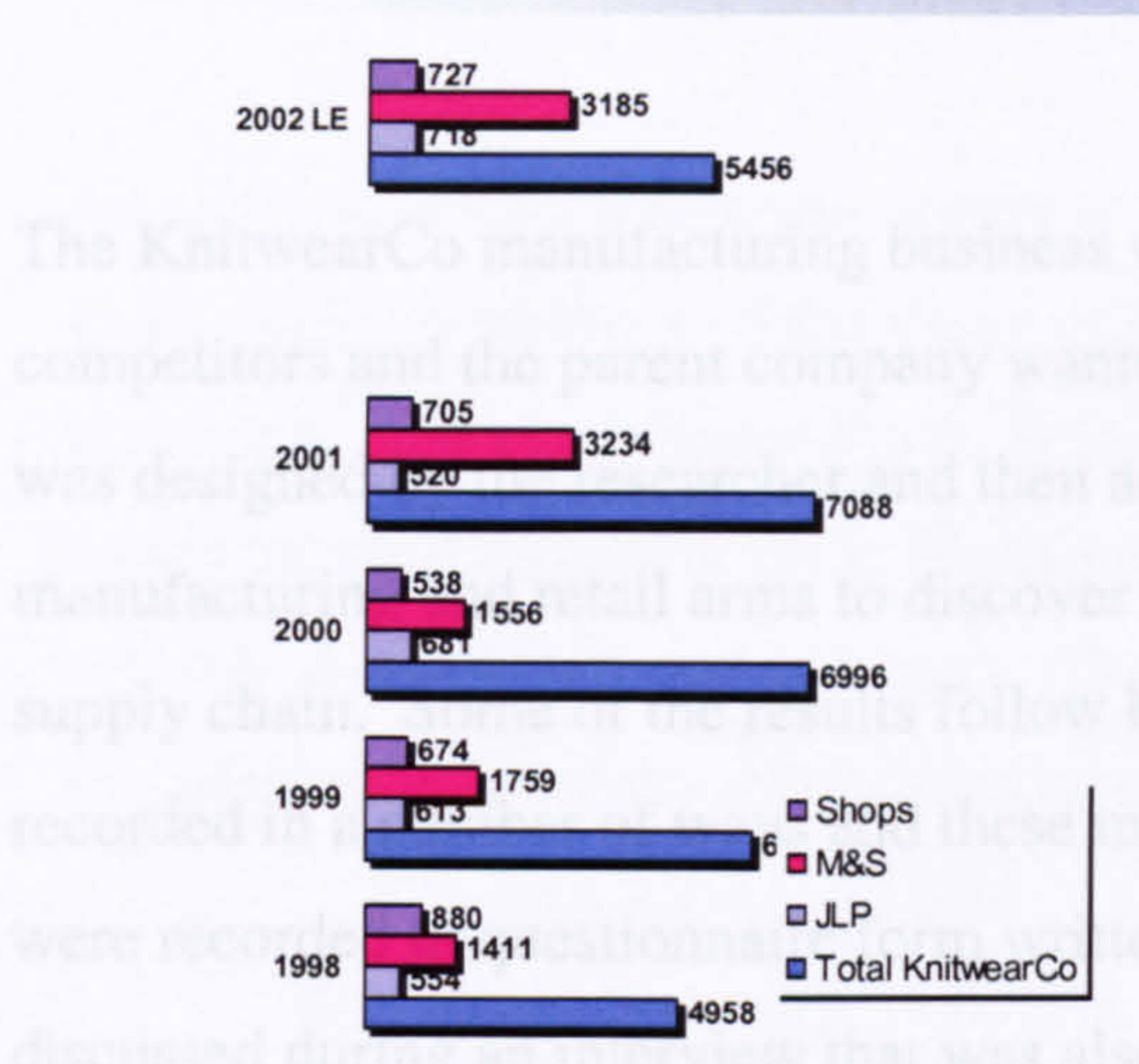
Figure 7.10: KnitwearCo Batch Sizes

A revised costing system was required that took account of the likely batch sizes of new

The diagram shows that only a few of the batches were large (1000). These large orders came from outside the KnitwearCo organisation from Marks and Spencer and the concern in the business was that the existing cost structure did not give any benefit to the large order where long production runs would benefit the business. In fact the profit margins using the current costing for the M&S business were quite low compared to the in house business. The existing costing system took no account of the size of the development orders. On the existing costing system the larger orders for Marks & Spencer showed a low margin. These larger orders were very sparing in terms of using the product development resources. With the average cost of a new development of £258, this then means that an M&S batch of 1080 garments costs 24p per garment. With an in house Designer garment where the order size was 148 garments the cost was 174p per garment. The system in use charged all orders the same rate. KnitwearCo manufacturing was nevertheless trying to grow the M&S business as the chart below (Figure 7.11) shows since it was felt that the margins were not accurate with the existing apportioning of development costs.

Figure 7.11: KnitwearCo Margins

7.1.3 The Management Sales £K



- KnitwearCo are now falling back sharply in 2002
- M&S has become much more significant
- John Lewis static

Figure 7.11: KnitwearCo markets.

A revised costing system was required that took account of the likely batch sizes of new products. A new costing method was developed and presented by the researcher and the effect of this was to make the M&S and in house profit margins more comparable. This is shown in the table below (Figure 7.12).

Batch Size	148	148	1080
	KnitwearCo Ladies	KnitwearCo Men's	M&S
	£	£	£
Selling Price	28.24	27.48	43.00
Contribution	9.32	9.07	9.89
% Contribution	33	33	23
Business Cost	18.92	18.41	33.11
Reduction to Base Cost without Developments	-1.22	-1.22	-1.22
Addition for batch of £258.34	1.75	1.75	0.24
New Business Cost	19.45	18.94	32.13
Contribution	8.79	8.54	10.87
New Margin %	31%	31%	25.2%

Figure 7.12: KnitwearCo Margins

7.1.3 The Management Survey

The KnitwearCo manufacturing business was losing in house sales to Italian competitors and the parent company wanted to understand why. A perception survey was designed by the researcher and then administered by the research team at both the manufacturing and retail arms to discover the views about the needs of a knitwear retail supply chain. Some of the results follow below. The management perceptions were recorded in a number of ways and these methods are reflected in the findings. Views were recorded in questionnaire form written answers, the questionnaire answers were discussed during an interview that was also tape recorded. A typical question is shown below with two types of answer with a Likert type scale. How important is it that customers can order small quantities?

Importance

- ☐ 1 very unimportant
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5 very important

Comments.....
.....

How do you rate KnitwearCo in this respect?

Rating

- ☐ 1 very poor
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5 very good

The first part of the question asks about the importance of a particular customer service issue whereas the second part asks about the level of performance of KnitwearCo. Respondents were asked to fill in the questionnaire and then their responses were discussed in an interview when they were asked to elaborate about the thinking behind their scores. Comments were taped and notes taken during the interview. For each

question in the survey the views were taken of the managers in the manufacturing business and also for the managers in the retail business.

An analysis of the results was presented to the KnitwearCo managers as a series of charts and comparisons of the views of the manufacturing managers and the retail managers. The chart below shows the views in terms of average ratings of manufacturing managers about the importance and performance of a cluster of several associated customer service factors. The views of the retail teams were presented to the manufacturing team at a workshop presentation by the Industry Forum project team.

Develop to customer's exact specification

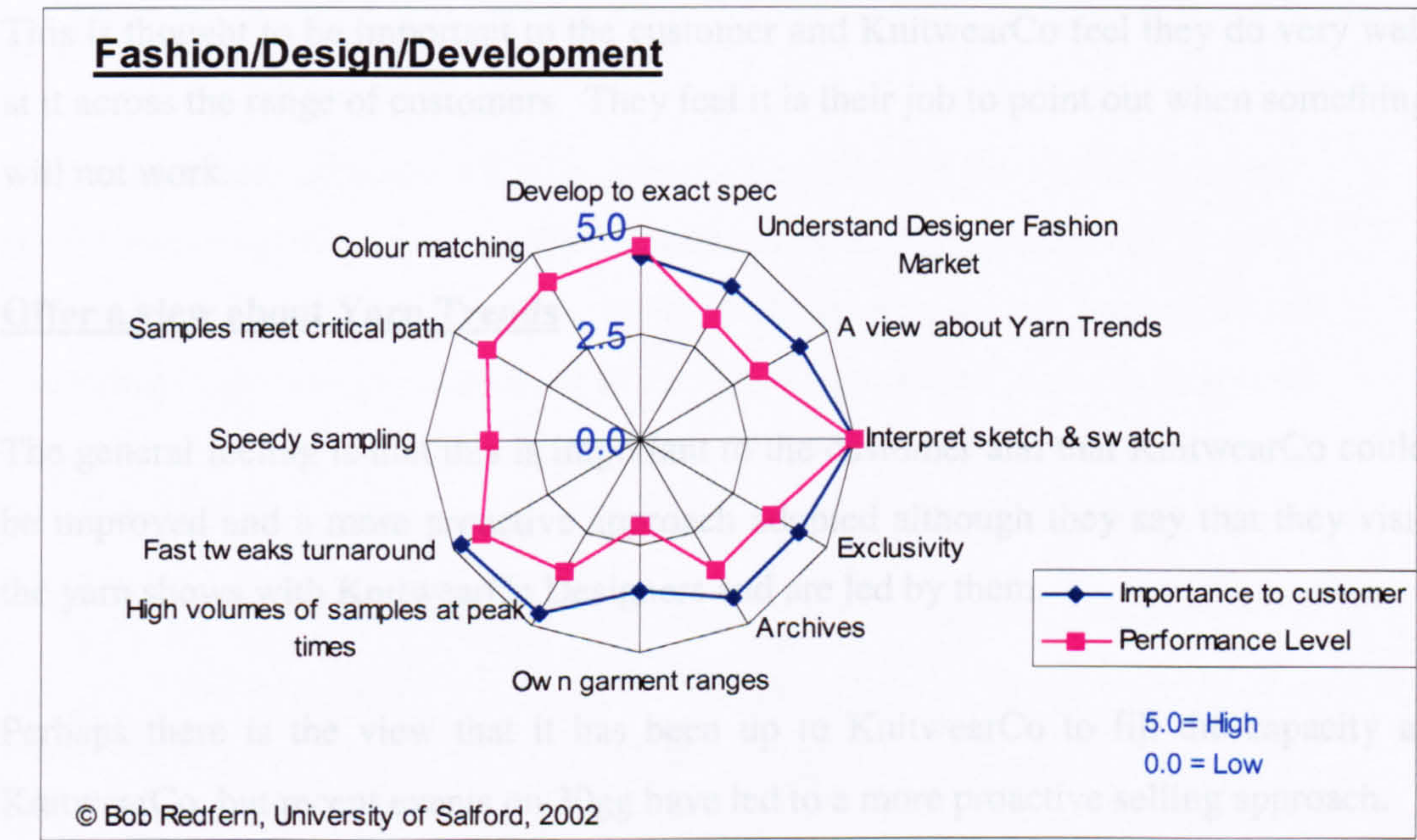


Figure 7.13: KnitwearCo Customer Perceptions

In the chart (Figure 7.13) above we can deduce that the manufacturing managers consider that developing their own garment ranges was of low interest to customers and that KnitwearCo was poor in their performance of this aspect. This aspect of the study was quantitative. The interview comments added some qualitative data. The interview comments from managers allowed a view to be built up of management attitudes that were behind the average results shown in the charts. These attitudes and views are

discussed below for the area of fashion/design/development with some key quotes in bold.

Understanding the Designer Fashion market

This was felt to be important to the customer but not something KnitwearCo feel confident about across the team, although they believe Karen has a good appreciation.

Develop to customers exact specification

This is thought to be important to the customer and KnitwearCo feel they do very well at it across the range of customers. They feel it is their job to point out when something will not work.

Offer a view about Yarn Trends

The general feeling is that this is important to the customer and that KnitwearCo could be improved and a more proactive approach adopted although they say that they visit the yarn shows with KnitwearCo Designers and are led by them.

Perhaps there is the view that it has been up to KnitwearCo to fill the capacity at KnitwearCo, but recent events on 30gg have led to a more proactive selling approach.

**“Designers know what they want and we are happy to leave it to them.
Where we need to we are developing our own range of yarns now on 30gg.”**

KnitwearCo survey respondent

Interpret Sketch & Swatch

This is thought to be very important for customers and KnitwearCo feel they are very good at it. This is their strongest suit.

Own garment ranges

By contrast the development of own ranges is not thought to fit in with the present way the business with KnitwearCo is structured. This is rated as not wanted by the customer and not done by KnitwearCo.

“We are too busy doing samples and we have no sample machines. If it was my business I would do it.”

“This does not apply to our KnitwearCo business.”

KnitwearCo survey respondent

Use of Product Archives

KnitwearCo have archives of a wide variety of fabrics that show stitch and yarn combinations but they are generally commented on as a major asset that gives an advantage wanted by customers. However archives are considered important to customers in the ratings but those at KnitwearCo are not seen as anything special although they may give confidence of the ability to do certain knit structures. Garments are not kept due to space reasons. They are not photographed with images stored on CD with a swatch in the archives.

Exclusivity

Similar comments to archives. Comments that this does not really apply since Designers have their own ideas which are co-developed.

Speed of response on sampling

Customers are thought to be only moderately happy with the speed from KnitwearCo since they tend to quote offshore response times as being quicker. This is thought to be due to offshore suppliers having hand flat sampling machines, whereas KnitwearCo have to wait for automatic production machines to become available. KnitwearCo feel they try very hard but are not appreciated.

“They ought to be satisfied.”
KnitwearCo survey respondent

High volumes of samples at peak times

This is assessed as being very important to customers and KnitwearCo think that customers are moderately happy with the service.

Samples meet critical path

KnitwearCo think they do a very good job but that the customers may not appreciate it.

“We do get there. Karen jumps through absolute hoops and gets them there on time.”

“They should be satisfied, since we generally meet the targets.”

KnitwearCo survey respondent

Fast tweaks

There is a feeling at KnitwearCo that the development process is an iterative process to and fro with the designers often to alter the fit with every sample garment needing some further work to get it just right. This is rated as very important for customers but KnitwearCo feel that in spite of fast turnaround they are told they are not as good as Asia Pacific suppliers, possibly due to the lack of dedicated development machines. Knitting is more difficult to change than make up.

“We can tweak at the make up stage quickly (in 24hrs) but knitting is longer since we do not have development machines.”

KnitwearCo survey respondent

Colour matching

This is not thought to be a problem area and KnitwearCo think that they perform well, although acknowledge they are in the hands of the spinners and that the problem is not helped by going off the standard spinner shade card.

KnitwearCo Findings Conclusions

At KnitwearCo the Industry Forum intervention project was designed to independently collect facts for the business managers and suggest improvements rather than implement them. The areas of investigation included the methods use in NPD, the costing arrangements for New Products that were used in decisions about the future of development projects by retail customers and the perceptions of managers in the manufacturing and retail arms of the business about the needs of the supply chain. All these aspects gave findings that could help to answer the research questions about how a clothing manufacturer part of the supply chain works with retailers on developing new products.

7.2 Findings for RetailCo

7.2.1 Data collection

As discussed in the section above regarding methodology the data collected for each case study base case from the Industry Forum intervention projects gave rise to findings that were relevant for the analysis of the research propositions. The section below deals with the data collection methods used at RetailCo. The following discussion concerns:

- the organizational situation encountered during the research
- the real world problem the organization client wished to improve
- the problem solving intervention
- an account of the data gathering for the problem solving intervention

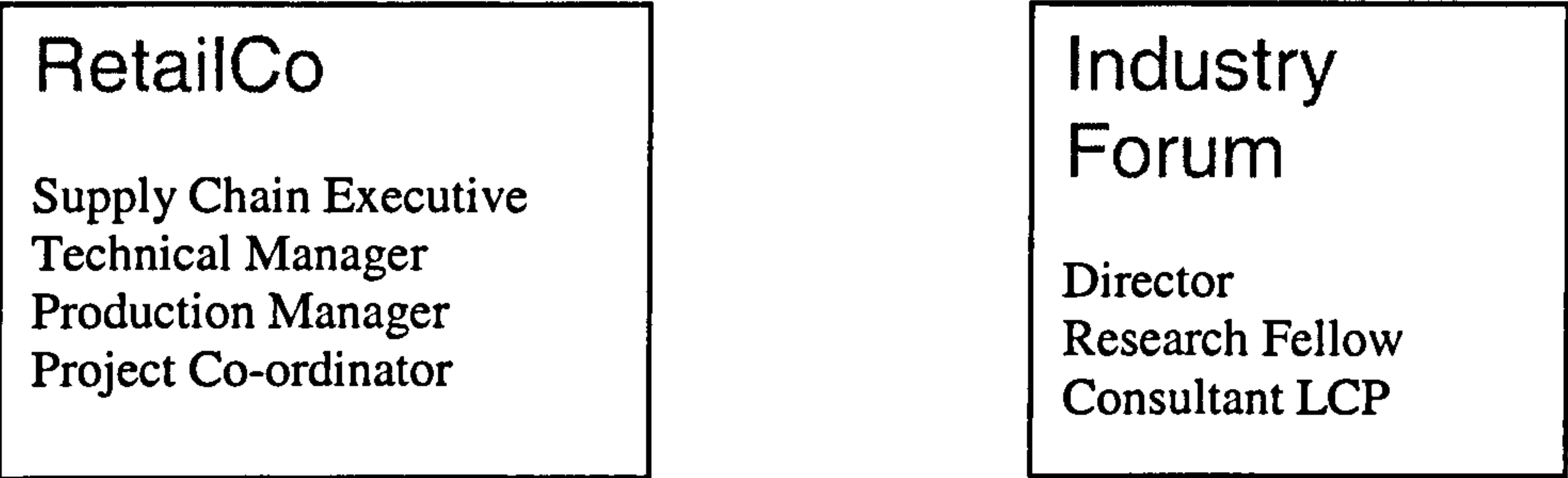
The I.F. project intervention took place at the Planning Office of a leading UK retailer and was primarily concerned with improving the performance of the retail supply chain that involved the retailer's UK Midlands based Planning Office, a nearby Cut/Make/Trim (CMT) manufacturer and the buying teams at the retail Head Office some 200 miles away.

RetailCo had a real world problem of the speed of the new product development cycle in casualwear via the Planning Office and independent CMT manufacturer. The real world problem required development of a process map of the supply chain NPD system, measurement of the development cycle time and work to improve the quality and cycle time of the new products developed. Again this case offers the opportunity to investigate NPD methods in a retail supply chain with a garment maker involved.

The Planning Office staff included a manager, a garment designer, two sample machinists, and a pattern grader and administration staff. The manufacturing factory across the street from the Planning Office employed 180 machinists and was run by the owner and his wife who also employed two quality assurance supervisors. The Head Office housed a large distribution centre and the buying teams for various categories of garments serving 380 UK stores.

The RetailCo Head Office Supply Chain Executive and Technical Manager had asked the Industry Forum to work with the Planning Office and the CMT plant to try and improve the speed of product development and the level of garment quality.

An initial meeting took place in November 2001 at the RetailCo Production Office involving the following staff from the Industry Forum and the RetailCo project team:



The discussion focussed on the key issues facing the supply chain with CMT Manufacturer. These are summarised in the box (Figure 7.14) below.

- Buy in from the buying teams at RetailCo Head Office
- Difficulty of loading the CMT Manufacturer factory in quiet periods
- Perception by RetailCo Buying Departments that the CMT Manufacturer factory delivers inconsistent quality
- Cost of the Planning Office staff operation (excepting design which is allocated to the design department in Head Office) is not currently allocated specifically into the CMT manufacturing costs
- Cultural difficulties of team building across cultural and language barriers
- Difficulties of obtaining 'buy in' from the CMT Manufacturer management
- The CMT Manufacturing operation needs to reduce costs to maintain competitiveness
- Reluctance of CMT Manufacturer to make complex garments

Figure 7.14: Key RetailCo Issues

There were therefore two main areas that needed to be investigated and improved. These were quality (with complexity) and total NPD cycle time. Two objectives were developed for the intervention project:

1. Introduction of an Effective Quality Assurance system which will support consistent quality in the production of a cost-competitive garment
2. Development of an effective quick response manufacturing facility to improve flexibility and reduce product lead times.

7.2.2 Planning the problem solving activity

An Industry Forum project formal proposal was presented to RetailCo and included the process by which the project would be organised including gathering data, agreement over the problems and objectives, measuring current performance, trying an improvement action, measuring the results, providing feedback to management and writing up the story as a industry Case Study. Extracts from the formal proposal are shown in the boxes (Figures 7.15-7.17) below:

- Problem statement definition**

Either through a joint workshop with the parties involved or through individual interviews and data gathering at RetailCo and the CMT plant, build a detailed picture of the particular issues behind the current concerns and the aspirations of those involved at RetailCo and the CMT plant.

Develop and agreed specific and measurable target objectives relating to the issues of quick response and competence with more complex products.

Agree the project objective statement, timings, resources, the project team and their responsibilities in the project.

Figure 7.15: RetailCo Industry Forum Proposal Box I

- **Fact Finding**

Either at a joint workshop or through individual interviews and data gathering at RetailCo and CMT Manufacturer build a detailed database of the sources of information on current performance level in terms of 'manufacturing lead time' or 'time to market' and product complexity. Agree the responsibilities for providing the required information and meeting timings.

- **Process Mapping and 'As Is' Performance Measurement**

Mapping - Through meetings at RetailCo and factory observations gather information about the current processes from concept, design, prototyping, ordering fabric and processing capacity, production and delivery from the factory gate. Mapping and process timing Information will include key activities, activity timings and variability of timings, key decision points and identification of process critical activities.

Performance – Through information gathering at RetailCo and CMT supplier determine the 'As is' performance of the business partnership in lead-time across a representative selection of garment lines and recent history.

Figure 7.16: RetailCo Industry Forum Proposal Box II

- **Analysis and Improvements**

The Industry Forum to propose, agree with all the parties and then implement an improved and cost effective process model that will significantly reduce time to market. We will undertake a trial project that can be rolled out across the business. In particular the improved process will have the ability to react positively to changing demand and allow the re-buy of fast selling lines within the season.

The proposed process to take account of the potential up-skilling of trainers and operatives to enable more complex styles to be manufactured and the need to increase multiple product capability.

- **Performance Measurement of the Improved Process**

Put in place and monitor the effectiveness of the improved methods and the achievement of the project objectives.

- **Feedback session to RetailCo/CMT MANUFACTURER**

Give account of the project and its results to the senior management.

- **Write up the case study**

Figure 7.17: RetailCo Industry Forum Proposal Box III

The client formally signed the proposal and agreed to the timescale, action steps and the resources that would be made available. The proposal also included the detailed steps and resources needed from the Industry Forum researcher personnel and the RetailCo/CMT Manufacturer organizations.

Gathering data regarding the current NPD practices and quality performance in the company involved the following methods

- Site Visits
- Interviews
- Observation
- Artefact examination

- Documentation collection
- Archival analysis

In building up a picture of the NPD process it has been possible to use the information gleaned from the original interviews, conversations, observations and documents. As the project progressed the following additional steps allowed a notional model of the NPD process to be built and presented to management.

- Evaluation and analysis of NPD process and building of NPD Process Map
- Measuring the current NPD cycle time
- Jointly developing a revised NPD process
- Experimenting with the revised NPD process
- Measuring the revised NPD cycle time
- Documenting the intervention process

The model process map (see Figure 7.18 below) was presented to management and then the time to reach twenty three points of the various NPD stages was measured over a three month period for 67 new products covering 100,000 units that were then manufactured. The ability of the notional model to allow accurate measurement provided further validity of the understanding of the NPD process.

Additionally by introducing changes to the actual system of new product development process that were then used by the company to improve the performance provided further ‘triangulation’ and added validity to the original process model that had been developed and shown to the company.

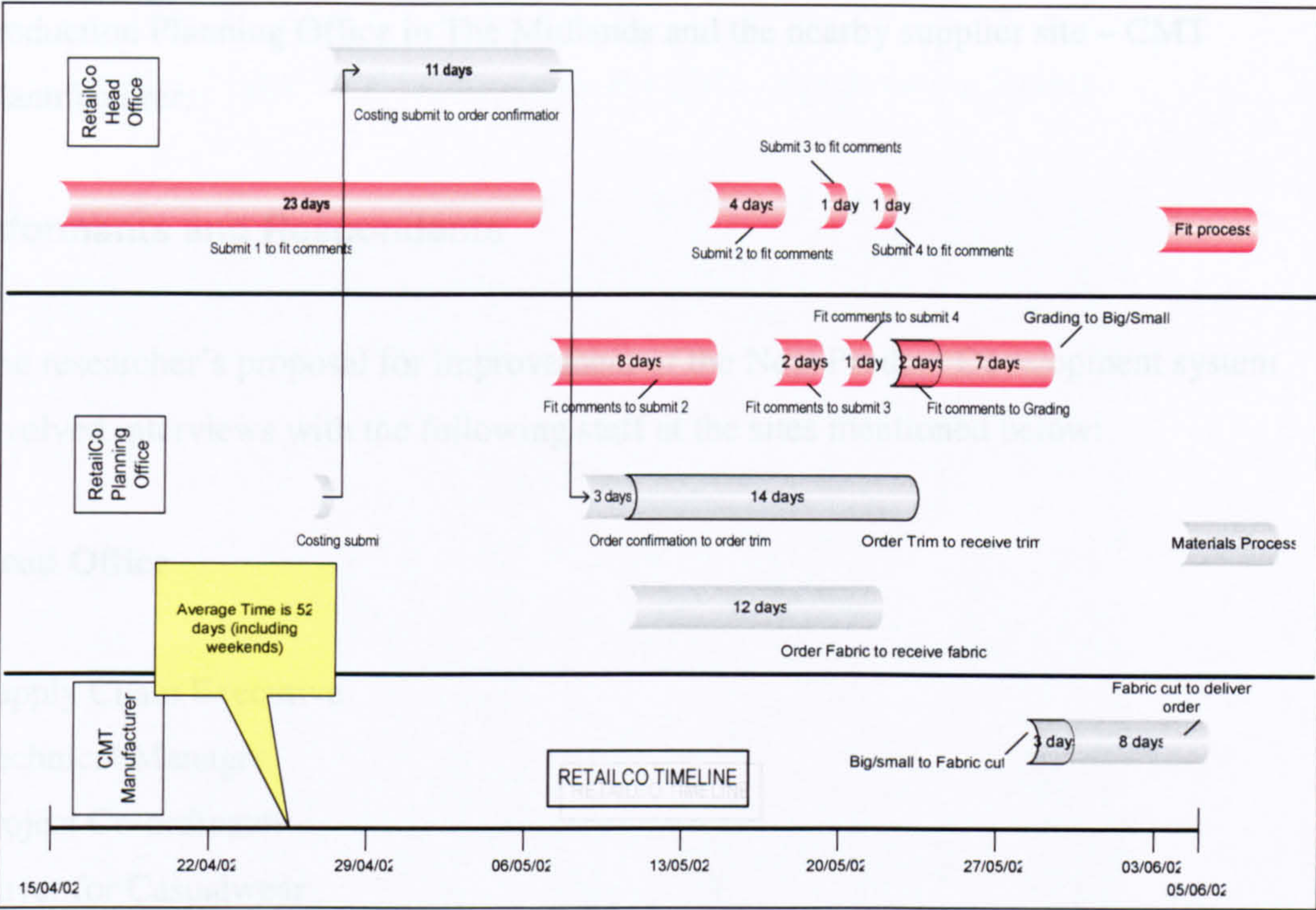


Figure 7.18: RetailCo Process Map

7.2.3 Data Collection Methods in Practice

This section discusses how various data collection aspects were addressed including site access, informants and respondents, detailed data collection types and methods and summaries of the data collected.

Site Visits

As discussed above the researchers presented a formal proposal document to RetailCo Supply Chain management that was then agreed by RetailCo.

This proposal for working on the RetailCo NPD problem solving project allowed access to the sites and staff involved, including RetailCo Head Office, RetailCo

production Planning Office in The Midlands and the nearby supplier site – CMT Manufacturer.

Informants and Respondents

The researcher's proposal for improvement of the New Product Development system involved interviews with the following staff at the sites mentioned below:

Head Office

Supply Chain Executive
Technical Manager
Project Co-ordinator
Buyer for Casualwear
Buyer for Girls Range
Buyer for Outsize (Sizes 16+) Range
Technologist for Girls
Technologist for Outsize
Fabric Technologist
Distribution Centre QC Supervisor

Planning Office

Production Manager
Assistant Designer
Pattern Designer
Sample machinists

CMT Manufacturer

Owner
Fabric Supervisor
Quality Assurance Supervisors

The picture (Figure 7.19) below shows the CMT manufacturing facility.



Figure 7.19: RetailCo CMT Manufacturer

It was important to interview all the different departmental staff involved in the New Product Development system at RetailCo and its CMT supplier in order to build a comprehensive and valid view.

Data Collection Types and Methods

Site visits to the production Planning Office and the CMT factory were made almost every week for four months. The data collection took place over this period using informal interviews and open ended conversations, observations, document and archive collection plus artefact examination. The result was a gradual building up and cross checking of the ways that NPD was carried out and development of a process model that is shown below. The conversations were recorded with note taking by the

researcher. A summary copy of these notes was submitted to the project team members for checking after each visit. The NPD process model was also submitted to the project team. The observations were recorded through note taking and digital photography. Data from documentation and archives was recorded through note taking, photocopying and through emailing and computer disk storage of the documents. The site visits to the Head Office were not as intensive as those at the Planning Office or at the CMT plant, since the NPD project was based at the Planning Office and plant where methods were being changed, and moreover the Head Office took ten hours to get to from the University. Obtaining the buyers' time for interviews had to be planned carefully at the Head Office where access to buyers was difficult since they travelled much of the time. To make best use of the time available the data collection method used at Head Office was formal, semi-structured focussed interviews with the buyers and technologists. This was supplemented with observation, document and artefact examination in the Buying Office, QA department and the Distribution Centre (DC). The interviews with the buyers and technologists were tape-recorded. Other conversations were recorded through note taking.

Gathering Data for the NPD Mapping Process

The NPD Process was mapped through collecting data through a variety of methods. The aim was to gather information from various sources along the new product development chain from the Design studio to the Distribution Centre. Interviews were typically open ended and informal, and were guided conversations rather than structured interviews. The researcher was trying to build a picture from a variety of data sources about the way that NPD is carried out within the RetailCo supply organisation. Whilst interviews were unstructured they were nevertheless not general conversations but aimed at finding out what each participant did in their part of the NPD process.

The interviews at the Head Office took place in a more formal setting and were semi-structured interviews since the discussions were centred on an initial model of the process with timings. The conversations with the buying department staff were taped and to an extent the differences between different buying departments were more

evident. The interviews were recorded through the use of notes in the main although the interviews at the Head Office were tape-recorded and this gave the opportunity to analyse them repeatedly to ensure the correct interpretation of conversations. These site visits were all written up and these visit reports sent back to the sites for checking within two weeks of each visit.

A total of fifteen site visits were carried out between April 2002 and September 2002 covering the three sites. Seventy seven respondent interviews and discussions took place. There were thirteen site visits to Planning Office and CMT plant and two site visits to Head Office.

Site visit reports were circulated to the RetailCo project team. The following site visit report (Figure 7.20) demonstrates the type of information gathered from the Head Office.

Figure 7.20: Example of RetailCo site visit report

<div> <h1>Industry Forum</h1><p>Improving the textile & clothing supply chain from concept to customer</p></div>	
IF Collaborator Meeting RetailCo Prepared by RR on 15/11/02	
Meetings with	Production Manager Supply Base Manager DC Quality Control Supervisor Fabric Technologist Girls Jerseywear Buyer Girls Garment Technologist Girls Assistant Garment Technologist Formal Jersey Buyer Outsize Buyer
Date:	15 th September 2002
IF Team Members	Bob Redfern – Project Leader, Industry Forum
Location:	RetailCo Head Office
Focus of Meeting	Discussions with Buying Departments

Distribution Centre and Quality Checks

Anita, the Supply Chain manager showed me round the Distribution Centre (DC).

The DC is part of the RetailCo Head Office. Here deliveries arrive from the suppliers at home and abroad either hanging (20%) or flat packed in two sizes of carton. The goods are stored in warehouse locations. The hanging garments are held on a rail system that allows automatic transfer to the loading bays for delivery to each store every other day. The flat pack cartons are stored in bays of racking and have perforated ends that allow the pickers to access individual packed garments that are then put into plastic boxes for the stores.

The DC is moving gradually to the more modern automated rail hanging systems which are very much less labour intensive and leave the garments in a better condition for going directly to the stores.

Quality Control (QC) checks

Pat the DC Quality Supervisor explained the system that is designed to randomly check incoming batches according to a statistically based AQL method that has further checks if the initial check is out of the limits.

In practice the QC has a limited amount of staff and time and can manage 20 checks a day since the move on to a single day shift operation. Each check covers between 30 and 60 garments depending on the batch size.

The check involves measuring some of the specification measurements and is carried out by hand. [There are automated measuring systems and databases on the market that use a computer system with a mouse like instrument).

From the 20 or so measurements on the specification the QC check about 5 to 8 of the main ones. The checks that are within specification are not recorded and if the first 5 garments in a size are Ok then the remaining 5 will not be measured. Those that are coming off spec will be recorded on a sheet.

Beyond measurements there is no specific check protocol laid out. The staffs are experienced and it is up to them to check for the sort of problems that can arise on a wide variety of garment types. They usually have a sample garment to compare against and are then looking out for poor sewing, incorrect fibre composition or care labels and poor or make up. The AQL has limits for Major faults and Minor faults but in practice the checkers do not count or record the actual numbers of Major or Minor faults but make comments on the general appearance and make up standard on a form. Those that are rejected will be notified to the buying department technologist who will make a decision about the batch. Stitching and buttonholes are the main things looked at.

Once a garment sample has been checked it is packed up again and returned to stock.

The batches that are due in each day are listed from the computer system. The specific batches that need to be checked are allocated by the Buying Departments. This means that with 200,000 garments arriving each day the QC can perform checks on about 1200 or 0.6%.

The number of hanging garments on the daily intake sheet was just under half the intake at 94,000 with flat packed at 100,000. Pat gets copies of collection notes from suppliers so she knows what has arrived.

The fact that the buying departments decide on what to check with no co-ordination means that some days there are too many to do and some days too few. When there are too many, Pat adds what she considers to be checks on the priority styles. The level of priority of a style is indicated on the incoming goods list. Those that are destined for store window displays and Best Buys are top priorities. New styles may also be checked or styles that the buying department technologist is concerned about.

If there are too few styles selected by the buying departments the QC then make up the difference to 20 checks per day by selecting some randomly themselves. Checks take various amounts of time since it takes longer to check a coat than a casual top. Sometimes the order that is out of spec will be permitted on the understanding that the next batch will be to specification.

The records are kept in files and we were able to check the UK CMT Manufacturer files for the past few weeks. There were very few major problems recently with any out of specification being 'Permitted' by the technologists. The CMT Manufacturer was not seen as a poor supplier.

[It is worth noting that the Actual Quality Level batch check sheets that are carried out at the CMT plant are sent to the Head Office DC QC department but they do not do anything with the information since they find it hard to work out which order it relates to.]

Fabric Checks

Lynn is in charge of fabric checking. I did not see the department but was given a brief summary by Lynn.

Fabric checks comprise the sending away of samples of base fabrics to testing houses. Once a base fabric has been checked the individual dyed or printed batches are checked by the suppliers themselves who provides test certificates. Having all suppliers with accredited test facilities of their own is the ultimate aim. I get the impression that base fabrics that have been used before are checked fairly infrequently and they are assumed to be ok.

I enquired about the method for finding out about the quality of fabric that is being received by CMT suppliers like the one in the Case Study. Lynn expects Stephen (Production Manager) to let her know if there are any problems, but there are no routine methods of letting the fabric manager know what the ongoing quality is like.

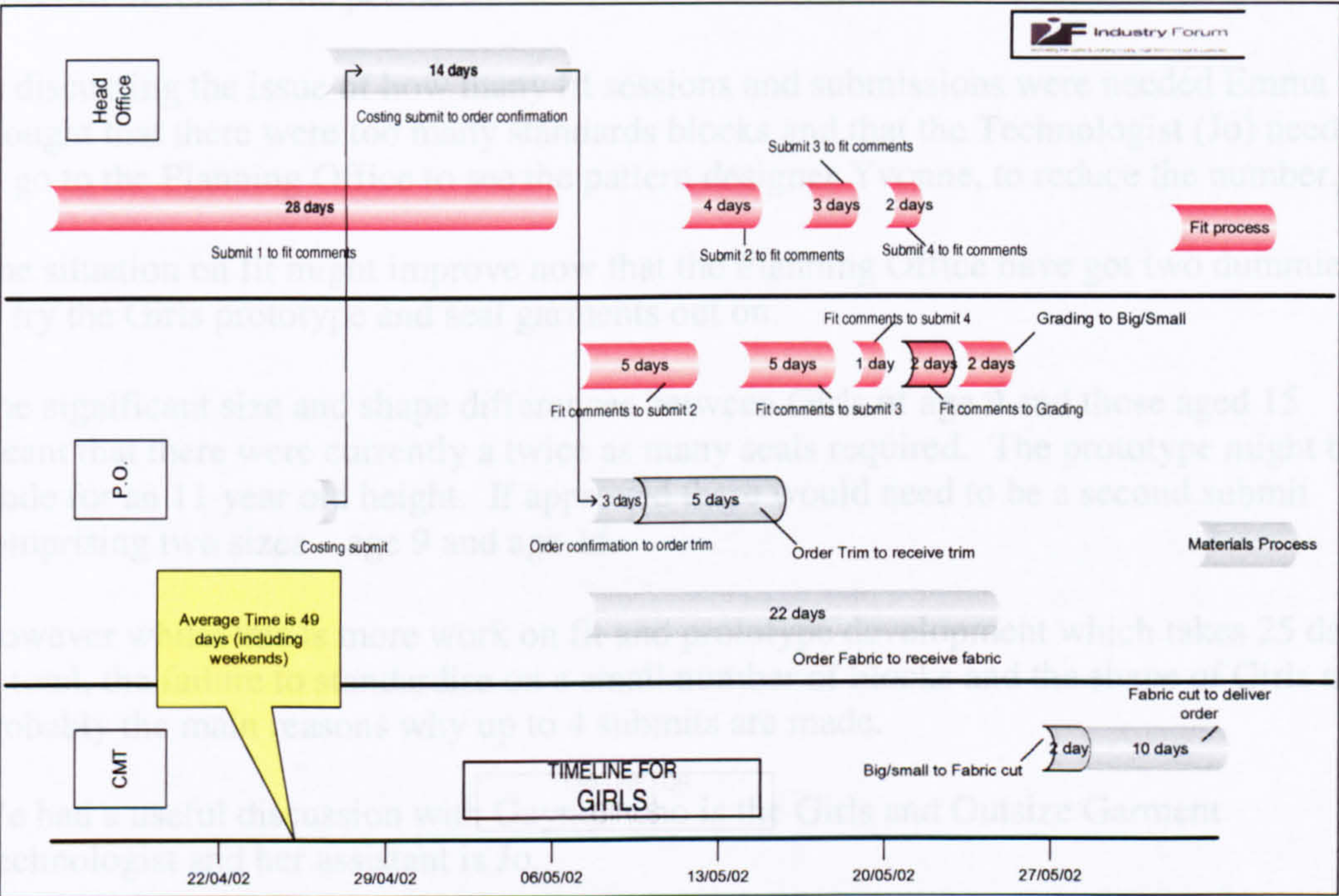
Buying Departments

The main reason for the visit was to find out what happens to the prototype development samples and sealer fit samples that Buying departments get from the Designer and Pattern Designer at Planning Office.

The discussions centred round the Timeline for each department.

Girls Jerseywear

Emma was the buyer.



The chart above shows that Girls is about average for time at exactly 7 weeks. As we see below this timing is not a co-incidence but a result of the review cycle. Girls is characterised by the high number of seal attempts before a fit is agreed and the short time to get trims.

Emma is working to a 7 week cycle. If it is now week 29 Emma is planning week 36. Emma gets the prototypes each week during this period from Karen the Designer at the Planning Office. The effect of this cycle is that in effect the prototypes are arriving each week from the Designer and there is no real reason for Emma to choose any particular styles from the many sent in since she has 7 weeks to think about it.

During that period unless Emma is keen to get a particular style that she has discussed with Karen to fill a perceived gap (competitors may have a better offer) then it is to her advantage to wait and see if Karen comes up with anything better than her attempts earlier in the period. The prototypes are also useful to put in the mock shop to see if there is range coherence with other styles and submits from other suppliers.

There are PR (Profit Review)/ range selection meetings at the end of each cycle to review with the other buyers the look of the overall collections and how sales are going. Karen, the Designer attends these meetings too.

With many different suppliers and various buying departments there is an evolution of which garments fit into the range of a department and the overall ranges proposed for the next cycle period.

Emma thought that nevertheless the time to give an order to the Planning Office could be reduced from the present 28 days. This would speed up fabric and trim orders.

However her ability to place orders was also affected by the 'open to buy' amount that the department had left to be able to commit to new styles and she was generally booking closer to the end of the period.

In discussing the issue of how many fit sessions and submissions were needed Emma thought that there were too many standards blocks and that the Technologist (Jo) needed to go to the Planning Office to see the pattern designer Yvonne, to reduce the number.

The situation on fit might improve now that the Planning Office have got two dummies to try the Girls prototype and seal garments out on.

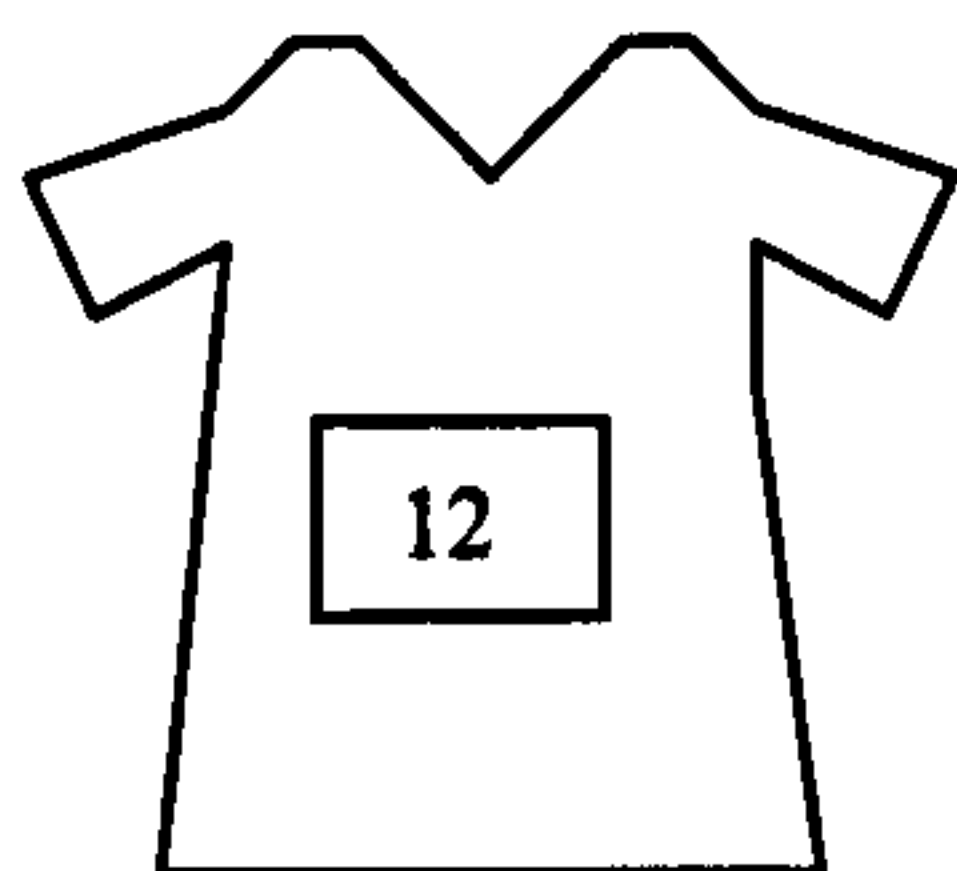
The significant size and shape differences between Girls of age 9 and those aged 15 meant that there were currently a twice as many seals required. The prototype might be made for an 11 year old height. If approved there would need to be a second submit comprising two sizes – age 9 and age 15.

However whilst this is more work on fit and prototype development which takes 25 days in total, the failure to standardise on a small number of blocks and the shape of Girls are probably the main reasons why up to 4 submits are made.

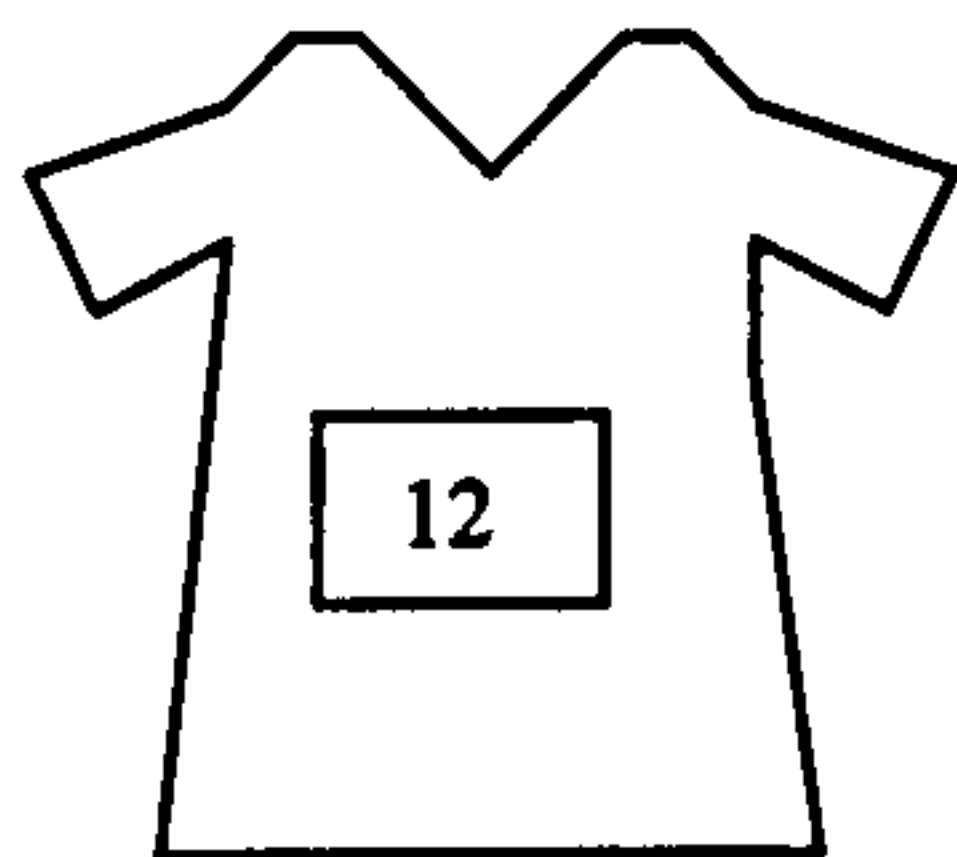
We had a useful discussion with Gaynor who is the Girls and Outsize Garment Technologist and her assistant is Jo.

Once the buyer has decided that a prototype has been selected or is needed for checking urgently Gaynor or Jo get involved in agreeing that wash care label instructions are correct for fabric that is bought in by the Planning Office who sends samples of core fabric to Lynn for external laboratory wash tests. Gaynor or Jo organise fit checks on models or dummies to check how well the garment looks in general. (Buyers like to attend the first fit sessions). Technologists also measure each of the 20 specified measurements against those on the standard block initially on the mid size height (152-158cm) prototype on a style that the buyer has selected. The technologists fill in the specification forms with any comments in the amendments column about changes in measurements that are needed, possibly with sketches to illustrate so that Yvonne can

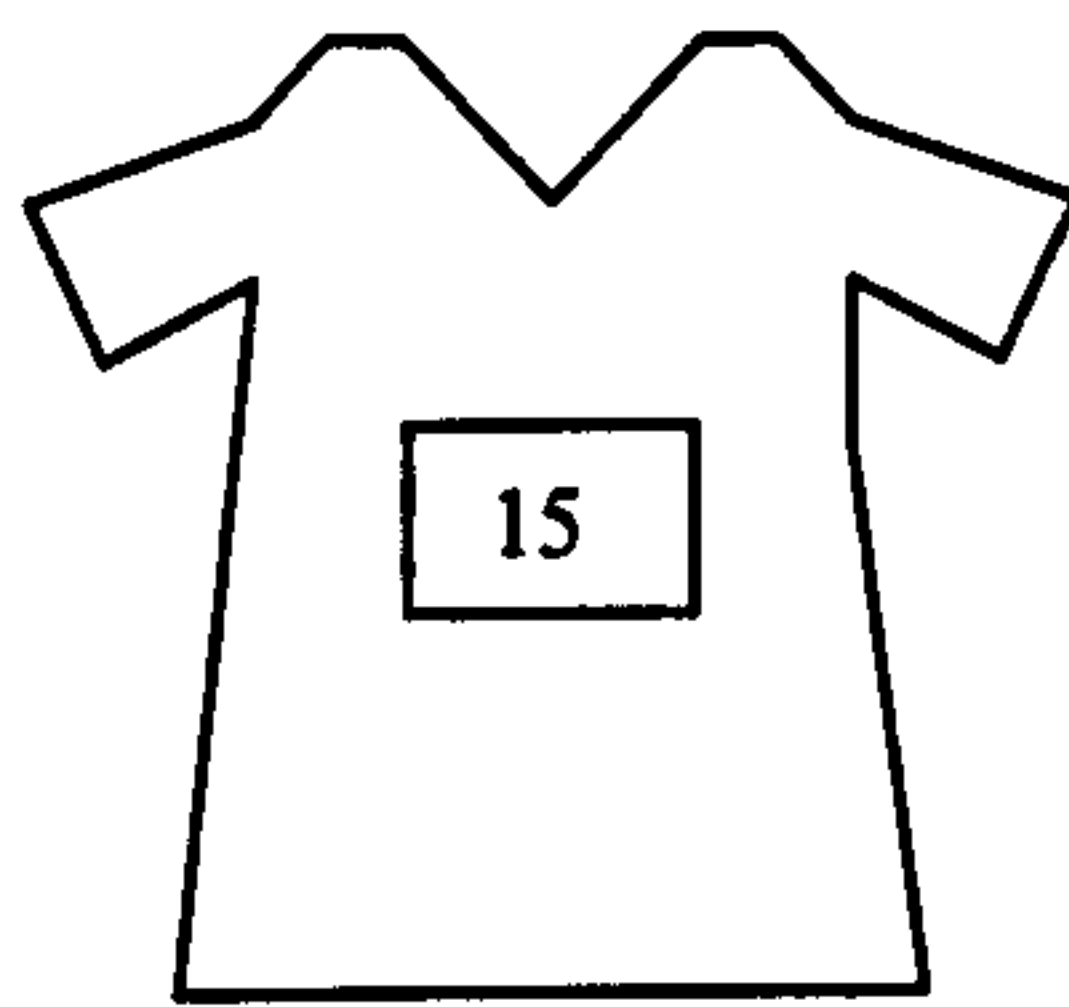
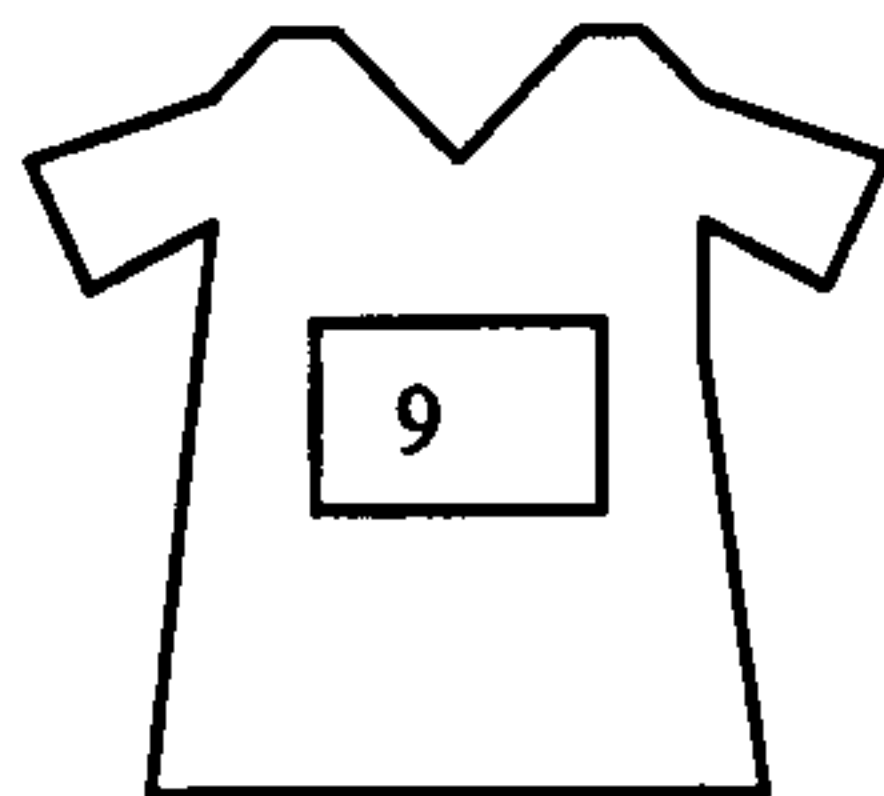
produce a new submit that meets the requirements of the buying team



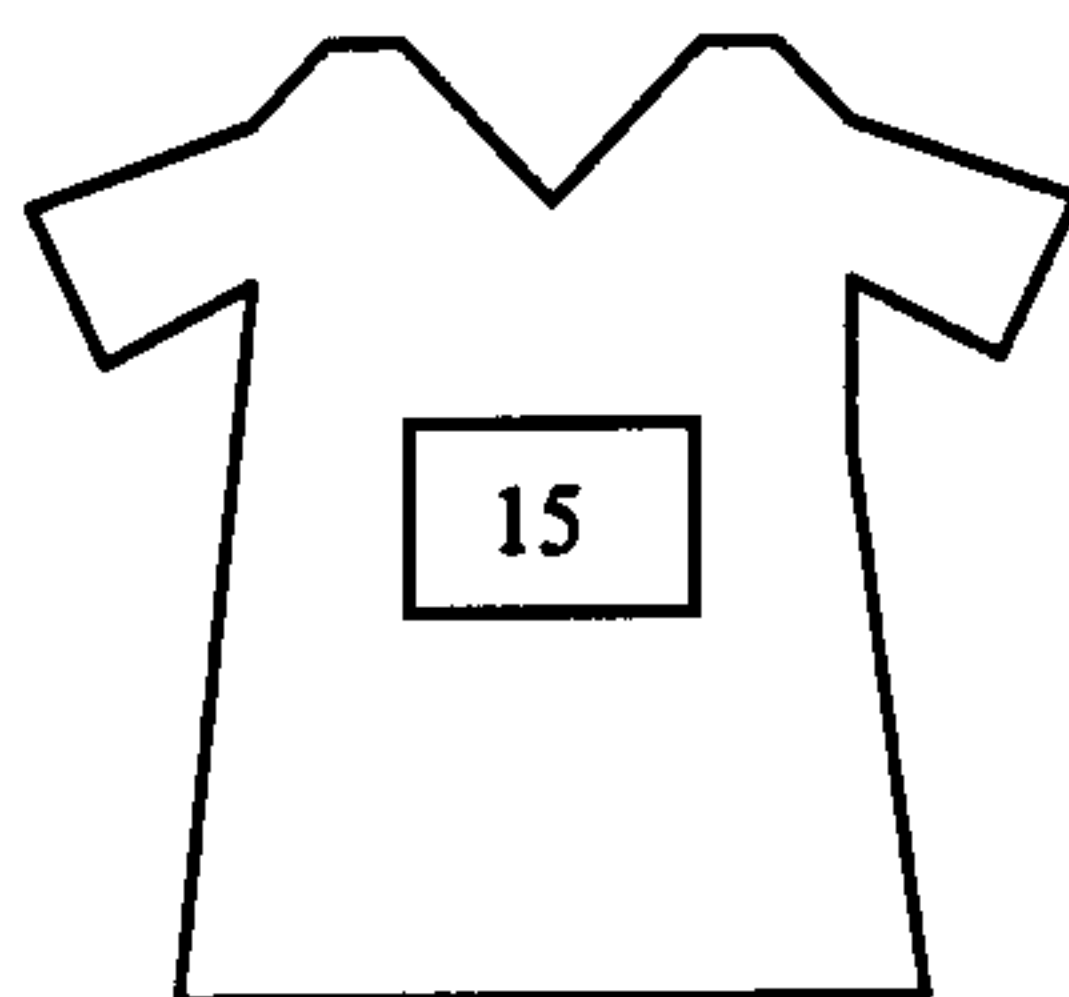
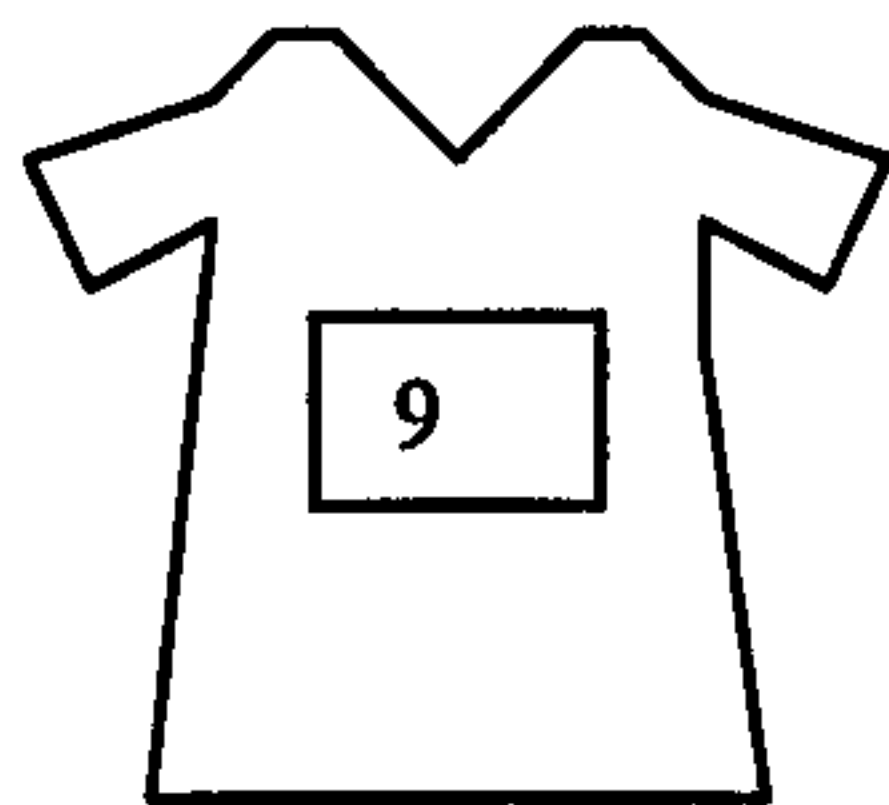
First Prototype
from Designer



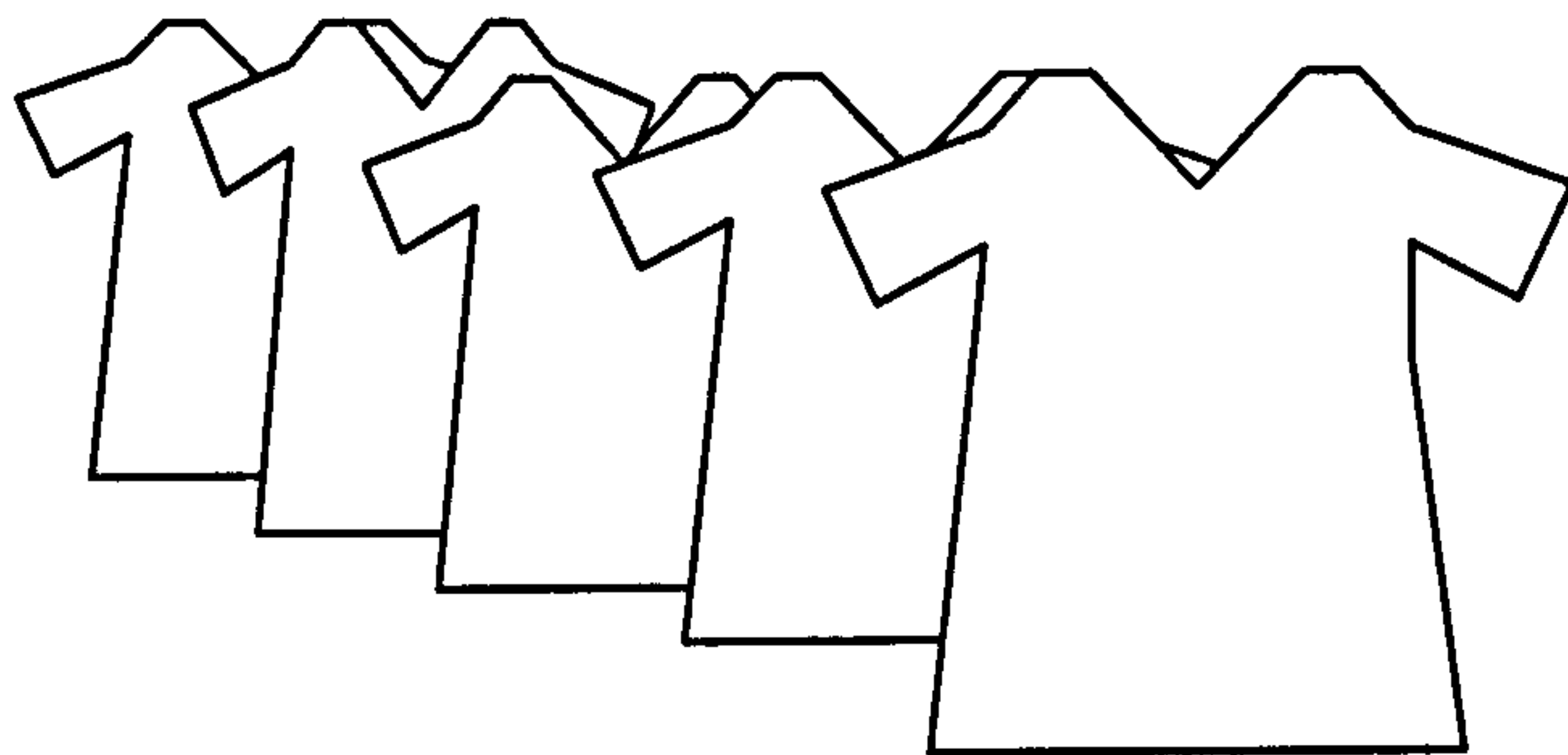
Second submit -- getting
the style right



Third submit --
getting the fit
right at both ends
of the size scale



Fourth submit -
getting the fit
right at both ends
of the size scale



Grading -- rules
for getting the fit
right for every
size

Sometimes the buyer thinks the prototype is not quite right in terms of style and changes may be requested in terms of sleeve lengths or neck shape, so this will extend the time. Having new printed designs also adds to the time. The specification amendment sheets are then sent to the buyer for checking, then it is sent to administration to enter it on the computer 'critical path' system with the dates that it has been first fitted. In theory this could be used to chase the next submit but rarely is.

Shape seems to be an issue in this range of Girls that has an impact on the number of submits and fit checks that are needed. A first prototype will be aimed at say a 12 year old. If this is accepted then a second submit is made with garments for both 9 and 15 year olds. It sounds as if the difficulty is that grading from one end of the size range to the other does not really happen in a straight line as it does on core Womenswear for example. So whereas in women's casualwear there are clear grading scales that will see the specification of say the measurement around the waist go up and down in 1.5 cm steps from the size 12, this is harder to do for girls who change shape dramatically between age 9 and 15. Fit checking takes place on a variety of girl models who seem to vary in shape and arm lengths in spite of being the same height. Using the dummies may help but the technologists do not have faith in the dummies reflecting the true shape of children. This issue of getting the rules for fit is shown in the Figure above.

One way around the issue might be for the Planning Office to submit the garment in a small and big size at the outset and then these can be fitted and comments obtained on the first fit for both ends of the size range. It was generally agreed that more contact between the Girls Technologists and the Planning Office pattern maker with discussions about the best way to move from the mid size to every size via the big and small.

Stephen suggested that he would bring Yvonne down to the Head Office so that there could be some work with the technologists to reduce the number of standard blocks and look at the size/gradings issues.

The selection of garment deliveries for checking by the DC for quality tended to stem from how well the fit had gone. If there were problems with fit sessions then Gaynor would ask for the DC to check the incoming delivery. If a certain supplier had a lot of problems then they would be checked more. Jo thought that particular styles where trims were problems would be checked more at the DC.

There had been few problems with the UK CMT Manufacturer. Stephen usually notifies the technologists if there is a problem (with say a measurement being slightly out of specification) to get agreement on the action, before it leaves the factory. One recent problem in the last few months was with the cowl neck Lucci garment with problems with the arm holes on a stretch fabric (+2) where Yvonne had been off and someone else did the patterns and although Yvonne did the Big/Small the production then was off spec. Trish the CMT QA had spoken to Head Office before the delivery.

The Head Office technologists did not see the Actual Quality Level sheets that were filled in before delivery by the QA at the CMT plant although Jo thought they only got them from some suppliers. Whilst Pat gets them faxed through she does not take any action. It was agreed that they could be copied to the technologists in future from the UK CMT plant.

The main role of the technologists was to get the fit right. They also sort out the care labels because the fabric technologist does not see garments, but sees rolls of fabric. If a garment has a lace tie then the care label may be changed to say the tie needs to be untied prior to wash. There are standard care labels. Gaynor asked for copies of these from Stephen.

Delays were sometimes due to the need for lab tests on new printed fabrics. Base fabrics such as Viscose were only tested every six months. The care labels cannot be done without the test results. It is difficult to chase up what is late since there are so many tests. They are chased up every week.

The new fit forms could have a date on them by the Planning Office to say that this garment has to be sealed by a particular date if the factory is going to make the due delivery date. This was then agreed as a procedure where Stephen would in future get Yvonne to put on the fit form when the target seal was needed by. This could always be a conditional approval subject to small changes in the production.

Jo had a lot of problems due to the developments not always being based on the right block. Stephen thought that if Yvonne and Jo got together to sort out the main standard blocks and bin the rest. Stephen thought that the constant changing of girl models led to a proliferation of blocks. There should be that some standards should be agreed and the aim be then to stick to them. This would give confidence to the buyers. Child models who had very long arms or hollow backs should not lead to a new block.

Gaynor did not think that the new dummies were a good approximation to real girls, particularly for the 'bottoms' garments since the dummies had no legs. Jo thought the dummies were good for necks but not so good for shoulders so that a garment that looked fine on a dummy then could look bad on a live girl model.

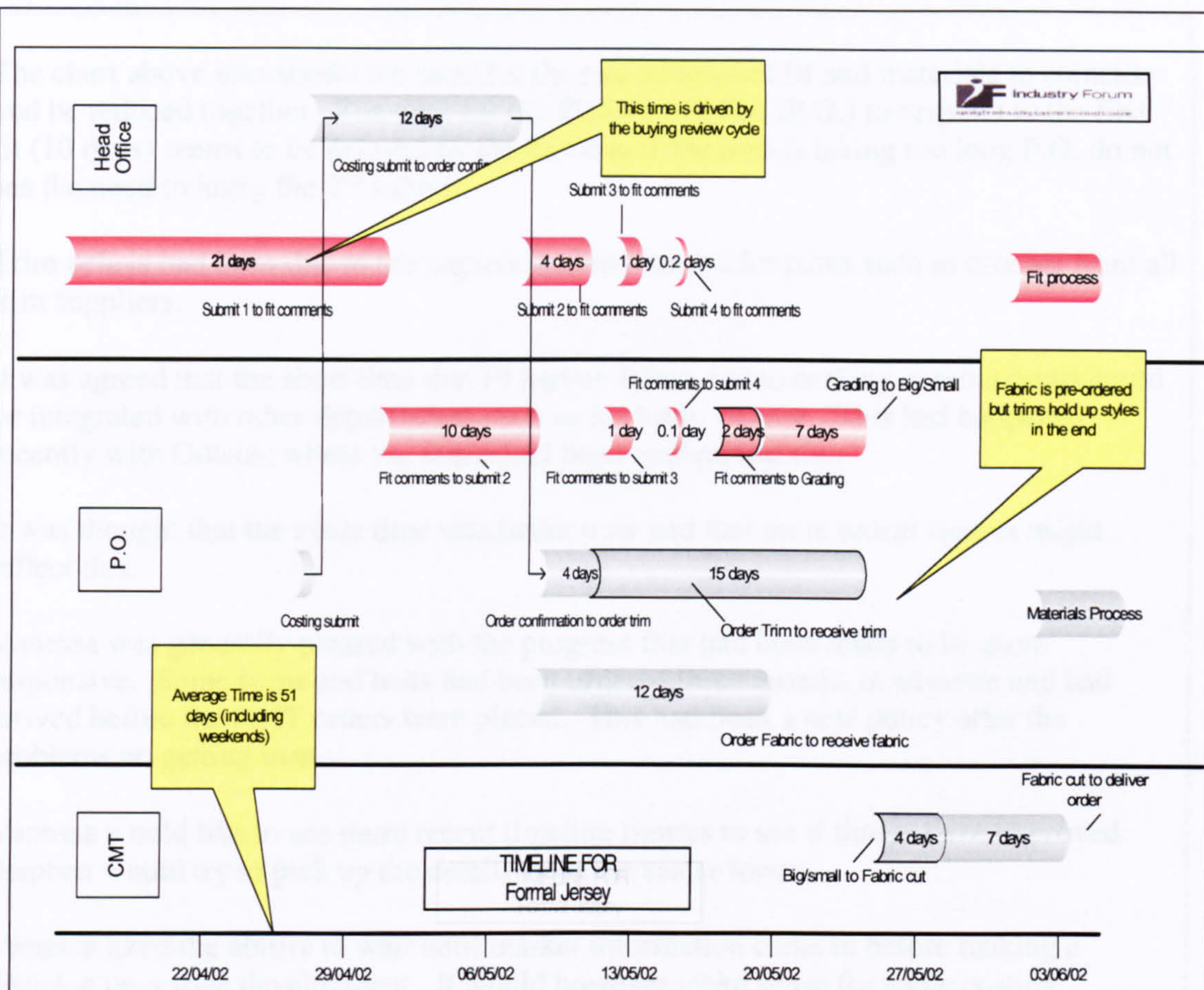
The technologists did not feel they had personal control over the level of quality that came out of the CMT plant, but they did have targets to improve although when pressed there were no specific details of what the levels were for rejects at D&R or at the DC or returns from the consumers to stores.

Formal Jersey

Vanessa is the Buyer. Discussion centred around the cycle time chart shown below.

Vanessa thought that the reason it took two weeks for the formal order to get to the Planning Office was partly due to orders always being signed on Tuesdays by the buyers. This means that a sample that arrives on a Wednesday will not get signed until the following Tuesday. The internal order had then to go to the merchandisers to do the ratios and then to admin who put it on the system before the order went to Stephen.

Costings from Stephen might not get back to Vanessa in time for her to make the decision and put the order in for signing by the Tuesday. Vanessa argued that if she was on a quick turnaround department that the order should be delivered within 4 weeks of placing the order. The effect was that Vanessa would present her range to a P&R meeting 10 weeks before the garments are due in the stores.



This meant that she feels that she does not have to make a decision for six weeks on garment development submits before presenting to the board. Karen will send in 10 samples per week for six weeks and Vanessa is getting samples from other suppliers and market trends are changing. Therefore so long as Vanessa has the samples she can leave the decisions. In any case the fabric has been booked and so the decision can be left.

The current system in Vanessa's view gives her the flexibility to make changes as late as possible.

The general feeling was that the total time depended on the need to meet the needs of the reviews.

It remains the case that the capability to reduce the time to market for Formal Jersey (FJ) seems to depend less on the fit process but more on the time to make a decision about which style to go with and get the costing and order through the system. This reflects the time that has been spent getting FJ basic blocks agreed.

The chart above also shows the need for the two streams of fit and materials to coincide and be reduced together. The time for the Planning Office (P.O.) to respond to the first fit (10 days) seems to be delayed by the fact that if the trim is taking too long P.O. do not see the need to hurry the 2nd submit.

Trim delays had been due to the unprecedented demand for trims such as crochet from all trim suppliers.

It was agreed that the short time that FJ had on fabric due to making commitments could be integrated with other departments such as for basic viscose. This had happened recently with Outsize where the fabric had been booked together.

It was thought that the cycle time was better now and that more recent figures might reflect this.

Vanessa was generally pleased with the progress that had been made to be more responsive. Some trims and belts had been ordered three months in advance and had arrived before the CMT orders were placed. This had been a new policy after the problems on getting trim.

Vanessa would like to see more recent timeline figures to see if things have improved. Stephen would try to pick up the details from the sealer forms.

Vanessa liked the ability to wait until market information came in before making a decision on a style development. It would however make sense for some costing requests to be put through early and even fit sessions carried out on developments that were more likely to be picked.

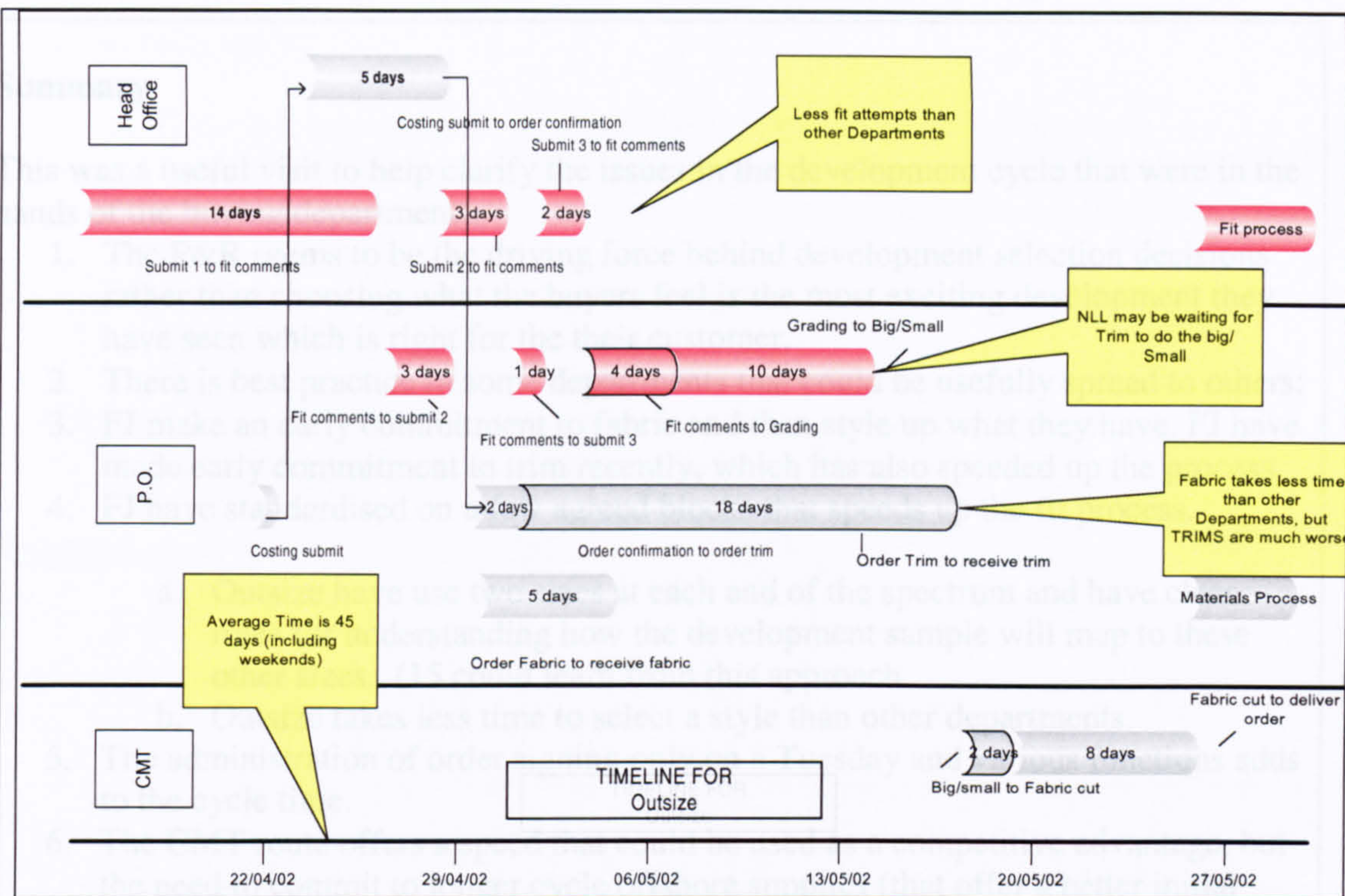
Outsize

Anna was the buyer, but was new to the role and had yet to have any experience of the CMT plant orders.

Anna gets together with Karen at the P.O. and then gets samples well in advance of the date for delivery. She felt there was no need to make a decision on early samples in the period since there would always be more that might be better from Karen or other suppliers. Also a commitment meant that there was less 'open to buy' money left.

The shorter lead times on UK jersey meant that the decisions could be made as late as possible. Once everything was in the decision about what fits in to the range and is the best on offer can be made. [Comment by RR: Does this mean that the 'open to buy' is in effect already spent on the long lead time items].

Having agreed basic blocks mean in Outsize that there is less time needed on fit and then once the styling detail was agreed the product was ready to go.



Outsize did have two fit models according to Anna, but they know what the main differences are and take this into account when fitting. [Comment by RR: having these type of rules could help on the Girls situation above].

The timeline above showed a long time for trim but Stephen thought this was down to two styles where the cotton crochet needed to be dyed to match the body fabric. The Big/small cannot be made until the trim is available.

Commitment to trim as per Formal Jersey recently might have helped.

It does not seem to take Inspire as long to make a decision to select a development, but Anna thought that they might be getting their development samples later because the large sizes take longer to develop and so there was in effect less time to make the decision in during the cycle.

Summary

This was a useful visit to help clarify the issues in the development cycle that were in the hands of the buying departments.

1. The P&R seems to be the driving force behind development selection decisions rather than choosing what the buyers feel is the most exciting development they have seen which is right for the their customer.
2. There is best practice in some departments that could be usefully spread to others:
3. FJ make an early commitment to fabric and then style up what they have. FJ have made early commitment to trim recently, which has also speeded up the process.
4. FJ have standardised on a few agreed blocks that speeds up the fit process.
 - a. Outsize have use two sizes at each end of the spectrum and have clear rules for understanding how the development sample will map to these other sizes. (15 could learn from this approach.
 - b. Outsize takes less time to select a style than other departments.
5. The administration of order signing only on a Tuesday and various functions adds to the cycle time.
6. The CMT route offers a speed that could be used as a competitive advantage, but the need to commit to longer cycle offshore supplies (that offer a better initial margin?) may well mean there is less 'open to buy' left for the UK CMT.
7. The system has about two weeks of slack in it whilst the development samples are mulled over by the buyers before the P&R reviews. Most buyers did not feel under any pressure to make a decision on development samples.
8. The Quality system can be improved by using the data supplied by the CMT plant on AQL checks at the factory.
9. The fabric quality manager at Head Office and the buyers needs to be made aware of the level of quality being received each week by manufacturers like CMT once the 'base' fabric has been tested.
10. Staffing cuts at the DC QA have reduce the level of real checking of incoming quality to below the published agreed levels.
11. Where there is more confidence in an early submit of a development a costing should be requested. This will reduce the lead time.

What has been agreed:

- 1) Girls will meet with Yvonne and try to reduce the number of blocks.
- 2) Stephen will put dates on the sealer forms saying when the seal needs to be approved by to meet the due date for requested. This will reduce the lead time for delivery.
- 3) Stephen would try to update the timing figures so that FJ could see if they were any better.
- 4) The AQL sheets would be faxed to the technologists as well as the DC QA. Stephen would send Gaynor the care label standards for main fabrics.
- 5) FJ would try to integrate fabric buying with other departments.

Bob Redfern

After each site visit a summary report was produced by the researcher and forwarded to the project team members.

Documentation

Documentation was also collected at the Planning Office and at the CMT site.

Documents examined and details collected included:

Order Book Spreadsheet

Ordered but not complete Spreadsheet

Production Output report

Cutting Confirmation Record

Order Stage dates spreadsheet

Fabric colour continuity record sheet

Supplier complaint form

Fabric Control Procedure

Order Confirmation Summary Spreadsheet

Key Performance Indicators summary

On time delivery

Quality Assurance results – failure rates, permitted, returns

Head Office Quality Report Summary

Costs
Prices
Margins
Reject rates
Quality Assurance Procedures at both the factory and DC
Quality Assurance Reports – Final Inspection report AQL (Actual Quality Level) sheets at the CMT factory
AQL test results at the DC
Seconds summary charts
Distribution Centre QC summary report
Prototype Specifications
Sealer Prototype Approvals
Delivery Promises Spreadsheet
Delivery Actual summary
Seasonal Trend Pack
Wash Care details
Labelling details
Timing of process steps spreadsheet

Archive Material

The main archive material examined was quality records over the past six months at both the factory and the Distribution Centre. The factory sheets AQL for the past ten weeks were photocopied. In addition the RetailCo corporate Suppliers Quality Manual was examined and certain relevant data sheets and specifications copied.

Observations also took place at the Planning Office, Head Office Distribution Centre and the CMT manufacturing facility. Some of the observations were also recorded with digital photographs. The sample prototype and production ramp up and manufacturing processes were observed on most visits to the CMT plant and the Planning Office. Methods of fabric inspection, fabric cutting, garment assembly and quality inspections were observed. Quality checking routines at the CMT factory and Distribution Centre were also observed.

Artefact Examination

The raw materials, trims, fabric faults, concept products, new product prototypes and versions, patterns, correct and faulty garments, markers, gradings, get up (labels, hangars, etc), manufacturing machinery and equipment were examined. When the new quality checking systems were introduced (designed by the researcher) the fabric colour continuity and samples for stability were examined.

Management Reports and Presentations

In addition to the site visit reports that provided feedback to RetailCo on the project data gathering activity there were a number of management workshops where the researcher presented the conclusions of the data gathering and analysis of the data along with proposals for improvements for discussion and approval. All presentations were also distributed to management as a formal document. Again this provided a sense check that the data being collected was valid and reliable.

The data collected provided sufficient information to form a view regarding the methods used by RetailCo on new products through the Planning Office and CMT supply chain organizations.

7.2.4 Relevance of the Data Collection to the research questions

The RetailCo Case Study offered good levels of data collection that was also extremely relevant to answering the research propositions. There were two main elements to the findings:

The NPD Process

The analysis of the NPD process at RetailCo was considered from the viewpoint of the Planning Office and that way that it interacted both with the Head Office and the garment CMT manufacturer. The Planning Office designed garments for manufacture by both the UK CMT manufacturer and sometimes offshore suppliers. The ranges involved were those that used certain types of mostly knitted jersey fabrics that had been ordered by the Head Office. The ranges were for specific Buying Teams in RetailCo including Casual Jersey, Formal Jersey, Outsize (sizes 16 upwards) and Girls. There were a number of clear stages and gates in the RetailCo NPD process.

- **Trend Analysis**
- **Concept Garment Development**
- **The Buying Decision**
- **Product Development**
- **Production and Launch**

These stages are described in detail below:

- **Trend Analysis**

The first stage in the process involving the Planning Office was the collection of trend information about fashion influences. This could take place in two ways. Firstly the Design Studio in the Planning Office would receive the seasonal brief pack of trend information from the Head Office. This booklet showed the sort of international couture designer influences that were key for this seasons 'Looks' and the phasing (in weeks) of the launch of various looks along the season for each buying department so that for example the Girls wear range did not always have the same 'looks' as the main Women's wear Casual Jersey range .

The seasonal trend pack contains typical designer catwalk images from for example Dolce & Gabanna and these trends were also then interpreted in the booklet into details

for colours, silhouettes, garment shapes, looks and styling tips. The pack provided inspiration for the Planning Office based designer to work on concept garments for the coming season. Secondly the designer would carry out her own research by looking at magazines, carry out competitor shopping and obtain ideas from fabric and trim suppliers for using their latest products.

There are some limitations to the range of product concepts that the designer can develop:

- Each of the product area Buying Departments at Head Office such as Casual Jersey, Formal Jersey, Girls and Outsize have purchased their own fabric for the ranges to be developed from at the start of the season. Whilst base fabric is purchased it will be later coloured up into the shade needed. With fabric taking up to 16 weeks to obtain from the Asia Pacific region, this early purchasing of undyed fabric gained valuable response time for the group.
- There are clear price points used include entry prices such as £9.99 and fixed higher retail prices such as £14.99 and £18.99. Garments have to be designed to fit in these price ranges and therefore this limits the complexity of the garment at the lower price levels.
- Margins at RetailCo are fixed so that the selling price by the Planning Office into the Head Office Distribution Centre is a fixed percentage of the final retail selling price. This affects the cost that a garment can bear and still fit into the price point.
- As mentioned above the Buying Departments do not all feature the same looks so that for example 'Military Girl' or 'Mafia Widow' might be two looks that could be developed for Casual Jersey women's but not for Girls. The 'look's' take into consideration the consumer.
- Each Buying department has a set of basic garment shapes called blocks. Whilst some departments have hundreds of blocks the basic idea is to have a

limited fixed set of basic garment shapes that can be adapted. So to make for example a ladies casual top the Designer begins with garment panels paper patterns for a top and changes the sleeves or neckline to suit the latest 'mafia widow' look and perhaps adds some lace and uses the shade black.

- Concept garments are always produced in a particular size for example size 12. This means that the paper block patterns used are for a size 12 and the garment can then be given a set of size specifications for the various dimensions of the garment including length and width and the garment can then be tried out by a size 12 model at the Head Office.

The concept trend input ideas are not then fixed for the 26 week seasonal Spring/Summer or Autumn/Winter period. At the regular seven week cycle meetings in Head Office there is a dialogue about the sales of the recent period, new fabric and trim ideas from suppliers, the latest competitor offerings and what is happening in the media and press. There is a constant dialogue between the category Buyer and the Planning Office based Designer.

- **Concept Garment Development**

The Designer will cut out fabric and produce a mock up concept garment. This garment is then sewn up using sample lengths of fabric, thread and trims (in any colour available) by the Planning Office based sample machinists and the prototype is then sent to the Buyer in Head Office for whom it is intended. The Designer in the Planning Office produced about 30 to 40 new concept garments per week. At the Head Office the buyer gets a number of new garment ideas from both the Planning Office based designer and offshore manufacturers and the prototypes are mulled over for a period by the buyer. There is a mock up of a RetailCo shop at the Head Office and the Category Buyer will place the new concept developments in the shop along side existing products (perhaps matching a concept casual top with a pair of trousers or shorts) and other competing manufacturers' product ideas in order to try and judge how well the product fits in to the range and portrays the desired 'look'. The concept garment is also tried

for fit. This takes place at a 'fit' session with an exact size 12 model for example and the Buying Department Technologist and Buyer attend in order to decide if the garment suits the customer type, fits the model and is correct in its appearance. If the 'look' for example is casual and baggy then the garment must feel baggy and not fit too tightly. They may decide that the sleeves are too short or the trim or neckline is wrong. At the end of the process of deciding if the concept garment is of interest the Buyer will initiate an enquiry about the manufacturing cost if she likes the concept. The costing is produced by the Production manager at the Planning Office. He basically works out the cost of the fabric, trims and 'get up' (the buttons, zips, neck labels, coat hangers). The cost of manufacture is discussed with the owner of the CMT manufacturer, although at this stage he has not had an opportunity to see the garment.

- **The Buying Decision**

If the Department Buyer is happy with the garment style, fit and costing and if the Buyer has enough money left in the budget for the season, she will decide on a colour and place an order with the Planning Office for a quantity of garments to be delivered into the Head Office Distribution Centre by a specific date. At this stage the order is conditional on the garment being exactly what the Buyer wants from the point of view of quality, size fit, delivered on time and there will generally be some changes that are required from the first prototype to the styling or the size measurements. These 'comments' are fed back to the Planning Office.

- **Product Development**

Now that there is an order with a specification and quantities required for a particular date the real work begins on developing the product. Some sample fabric is ordered so that some more samples can be made to get the fit and styling right. The bulk fabric needed for the order is worked out by the Production Manager and is 'called off' from the supplier and the shade specified. The trims quantities are ordered. Garment neck and side labels plus swing tickets can be ordered. Sometimes the bulk fabric is the only

fabric available say for a small order of only 300 garments as a trial sell. In this case work on the new samples has to wait for the bulk fabric and trims to arrive. The 'comments' from the prototype feedback are also acted upon. This generally entails the production of another sample for submission to the Buyer who will then concentrate on deciding if the fit is right and if the styling details are what are wanted. This process of 'fit' goes through a number of cycles. Some departments are better than others in the time the development cycle takes. Children's was an area that struggled with fit. Eventually the development garment sample version is correct in every respect and the 'seal' is signed by the technologist and the buyer. The seal is in effect the 'master' version of the garment. This is the exact version of the garment that must then be produced in bulk and sent in to the Distribution Centre to satisfy the order. The process can be illustrated in the flow charts shown below in Figures 7.21, 7.22 and 7.23.

The sampling process

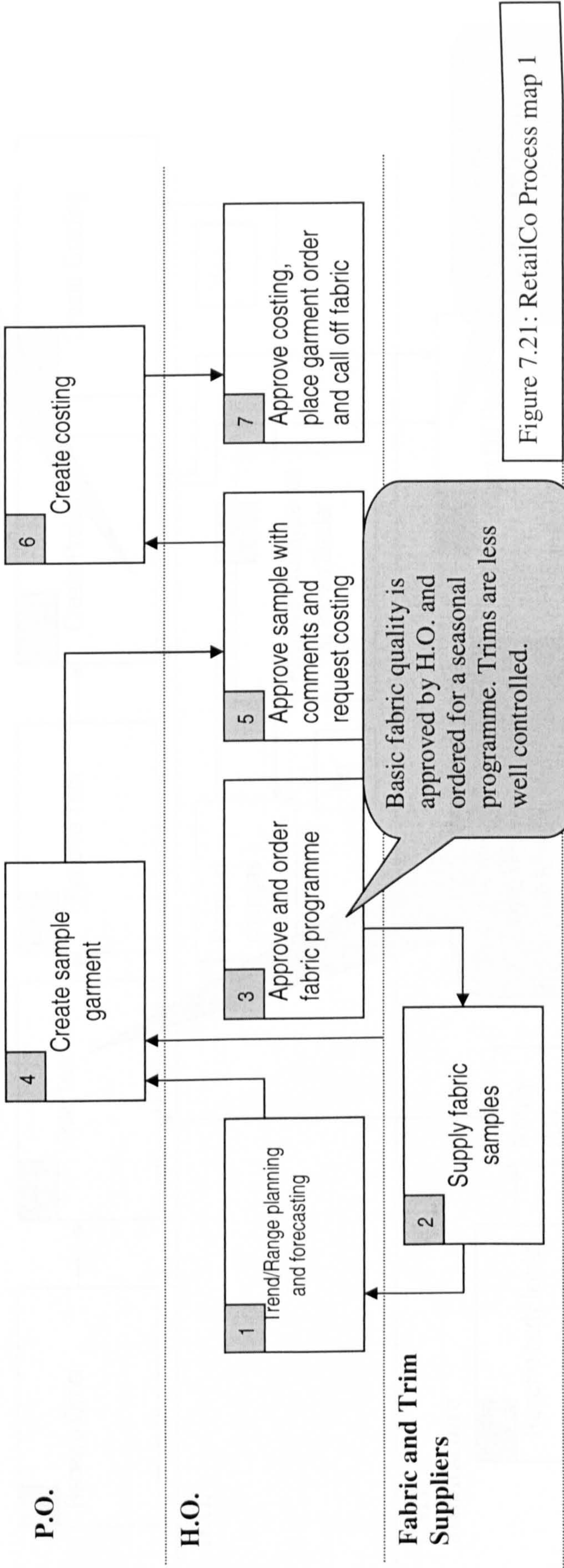
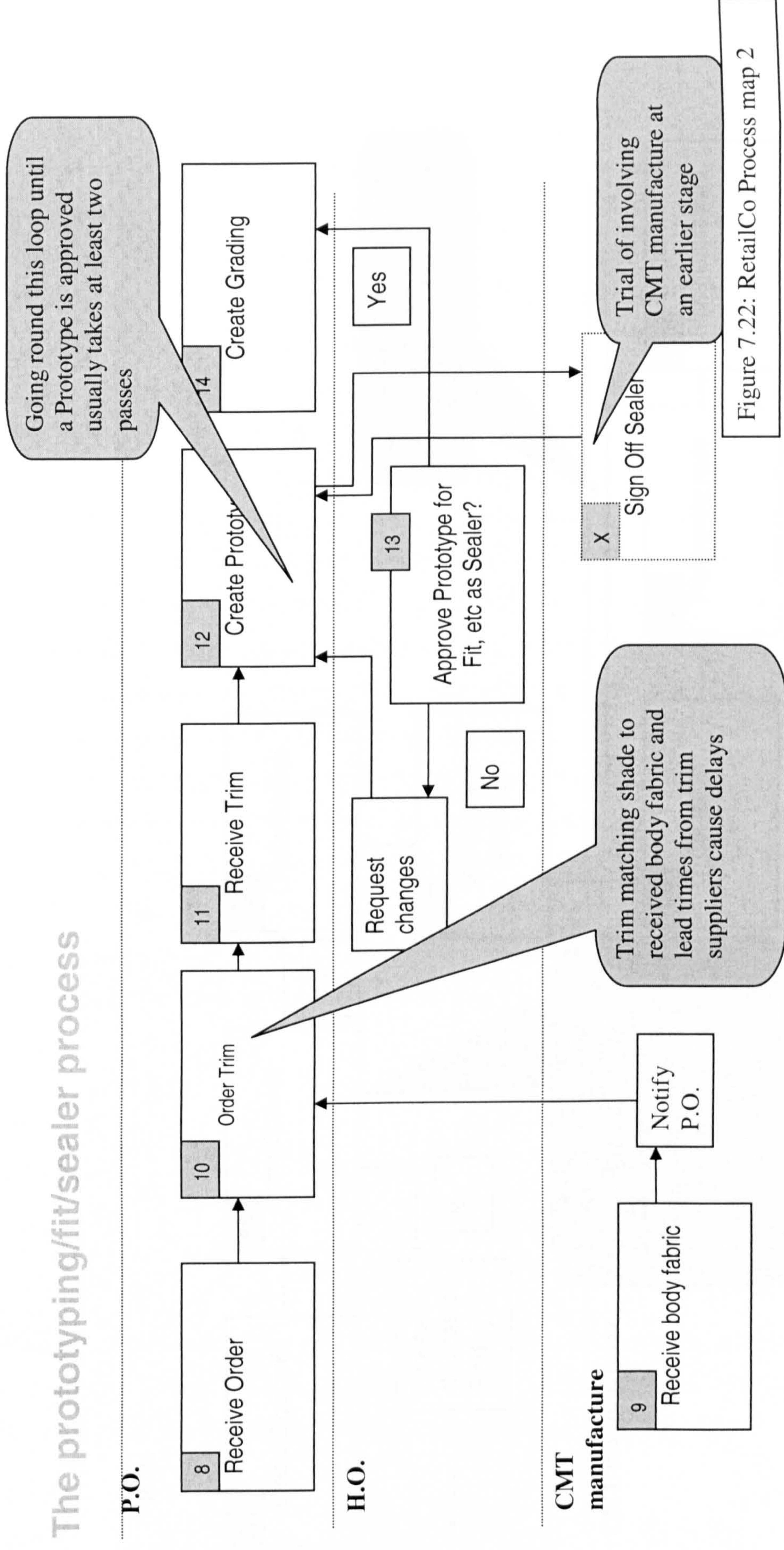


Figure 7.21: RetailCo Process map 1

Analysis methodology: Process mapping

The prototyping/fit/sealer process



Set up to manufacture

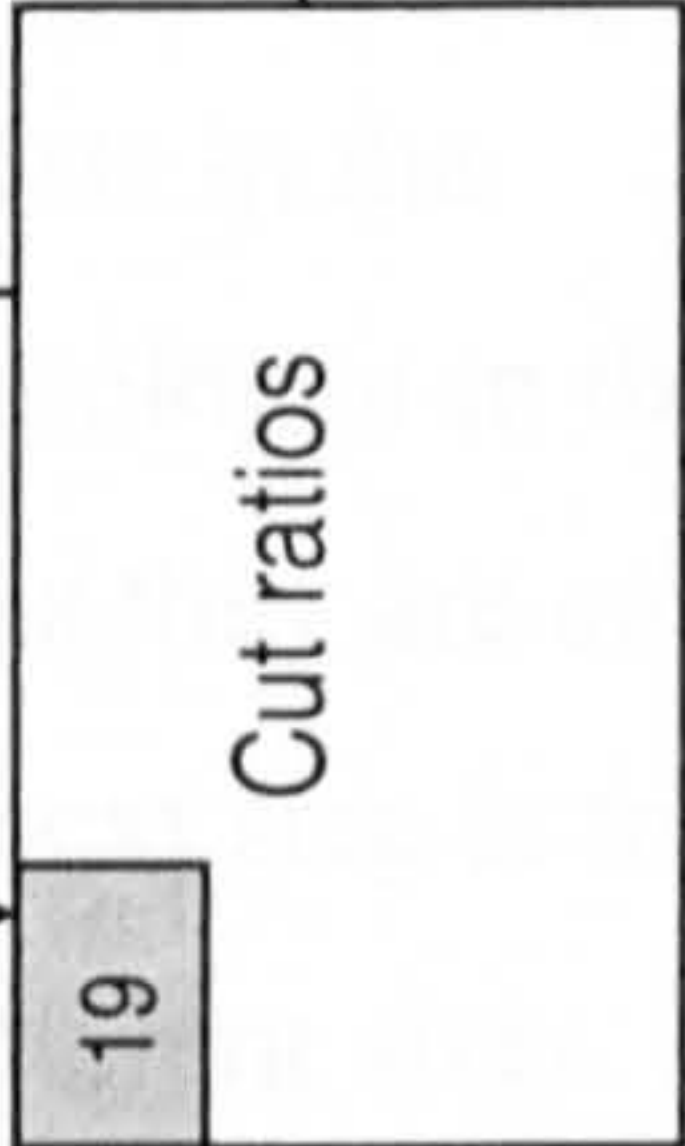
P.O.



Yes

No

Request changes to Grading



Manufacture often starts with no agreed sewing route

Big/small is an opportunity to get the manufacturing details right but the P.O. sample machinists do it and there is no creation of the best sewing route

CMT manufacturer

Figure 7.23: RetailCo Process map 3

- **Production and Launch**

Once the ‘seal’ has been approved the garment can be made, provided the bulk raw material fabric and trims have arrived in the correct shade. Sometimes there is a delay while the trims are dyed to match the fabric shade. The ‘seal’ is the first time that the CMT factory gets to see the development of the new style. The Quality Assurance supervisor in the CMT plant now starts to plan the way that the garment will be made, which production route will be required through the factory, the order in which the component panels and trims will be assembled. The Planning Office have a pattern drawing computer system for automatically making the patterns for all the sizes from 10 to 16 once the size 12 garment has been approved. The machine draws the panel sizes out on paper that corresponds to the rules that the business uses for the different measurements between sizes. Once the ‘gradings’ have been made and if the raw materials have arrived for the bulk work can begin to make the pre-production samples. The ‘pre-production’ samples are new versions of the approved garment but in the smallest and largest sizes in the Buying order. So for example in Casual Jersey a size 10 and a size 16 are made. These are produced by the sample machinists in the Planning Office using the gradings patterns and submitted to the Technologist in the Buying Department for approval. Once the ‘Big and Small’ samples as they are called have been approved and the decision given to the planning office the next step is to make up a pattern ‘marker’ sheet that will be used to cut out all the different sizes required in the order. A Buying Department will have its own ‘ratios’ that are the percentage of each size required of the total order quantity, for example:

Size 10	15%
Size 12	35%
Size 14	40%
Size 16	20%

The production process then begins with fabric cutting, sewing, pressing, inspection, and hanging, before garments are despatched to the Distribution Centre (DC) who again check the quality before allocating and sending out the products to the stores.

The whole NPD development process from the first concept garment being sent in to the Buyer to the delivery into the DC takes on average 52 days.

7.2.5 The Development Cycle Time Improvement Project

The process of NPD was investigated at RetailCo to try and improve the time it took for the cycle to be completed. This real world problem intervention was concerned with the detailed timing of the development cycle and in particular where the delays were. This then required that not only was the NPD process investigated, described and mapped in detail for presentation to the RetailCo project team, but that ways be sought to measure the current process timings if it was to be improved and the improvement could then be measured as well. The chart (Figure 7.24) below shows how long each step in the cycle was taking at the start of the intervention. The new products that were developed over a period of three months were tracked to give the information for each step on 37 orders for 101,000 garments.

The NPD Process Timings Chart

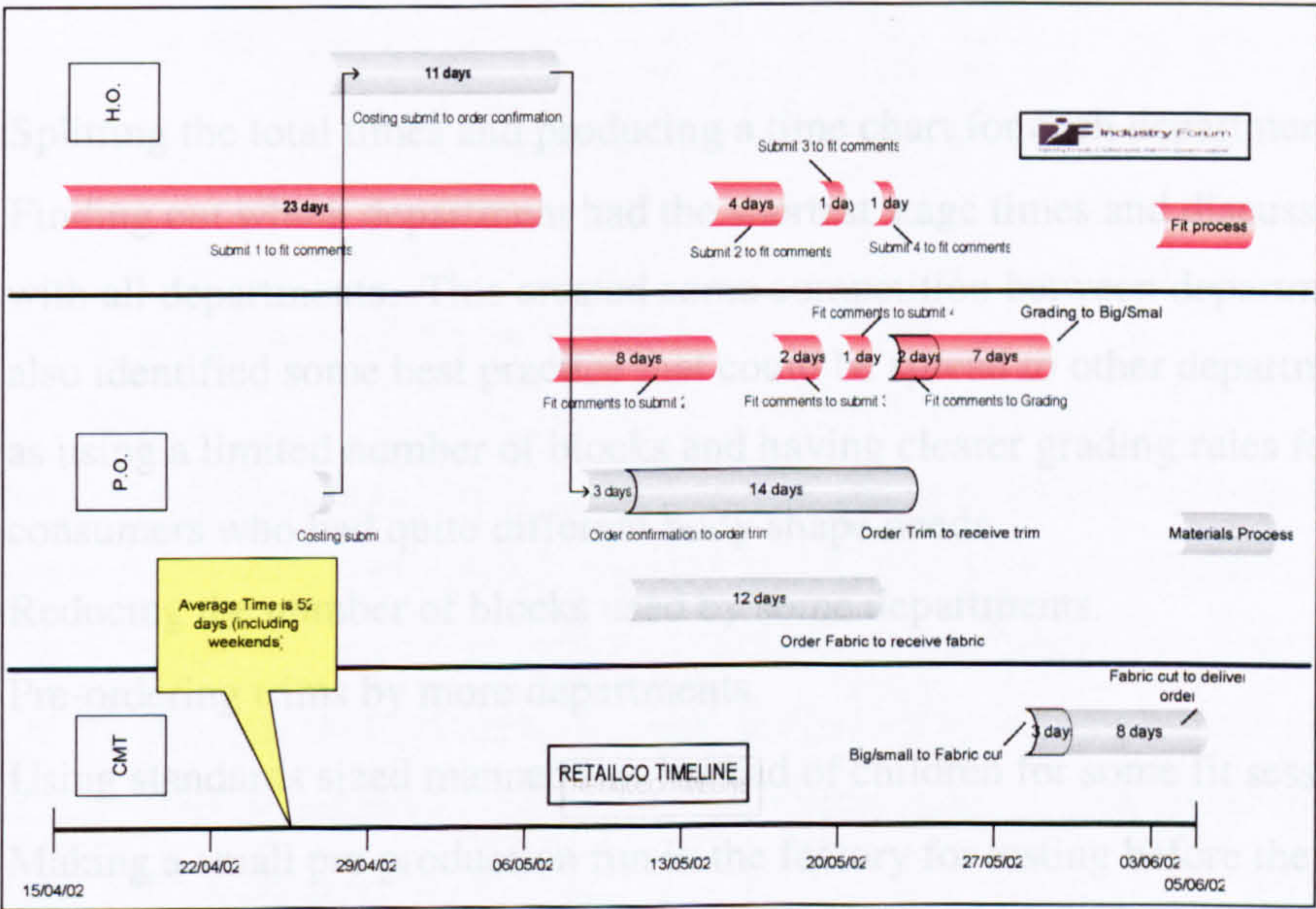


Figure 7.24 RetailCo NPD Process Timeline

The process development cycle for each new development was tracked from March until June 2002. The various steps in the process shown in the chart above had been carried out in the shortest time of 31 days and the longest time it had taken was 88 days. The detailed data showed that the process could be carried out in only 16 days if each stage was optimised and co-ordinated. The chart shows that there are various reasons why the process is delayed. The time between the concept products submits and the decision to buy being made was 25 days, half the total cycle time. What is noticeable about the chart results and what was surprising to RetailCo was the fact that the manufacture was not the main reason for the delays. The chart also illustrates the fact that there is a need for the co-ordination of the fit process and the materials procurement process since each one could then hold up the other if not completed.

Intervention and Process Cycle Improvement

The real world problem was the development cycle time and how it could be reduced. Once the data was tracked about detailed step times it was possible to start to discuss and identify areas of best practice and ideas for improvement.

A number of changes were suggested to improve the cycle time:

- Splitting the total times and producing a time chart for each department.
- Finding out which department had the shortest stage times and discussing why with all departments. This created some competition between departments and also identified some best practice that could be spread to other departments such as using a limited number of blocks and having clearer grading rules for consumers who had quite different body shape needs.
- Reducing the number of blocks used by some departments.
- Pre-ordering trims by more departments.
- Using standards sized mannequins instead of children for some fit sessions
- Making a small pre production run in the factory for testing before the main volume started up. This had the effect of making the factory try out the production route before commitment to bulk and then fewer mistakes were made ramping up the production.

The researcher was involved at the manufacturing facility and planning office and in particular in working on trying to get a small pre production run introduced. A few months later another tracking of the NPD cycle times was carried out. There were some clear improvements in the timings. Even though no formal attempt had been made to change the way the Buyers made decisions about the concept garments there was a clear reduction in the time it now took to get to the order stage. The chart (Figure 7.25) below shows the trend for the Formal Jersey Department who was the largest user of the Planning Office CMT NPD route. The period covered was June 2002 onwards.

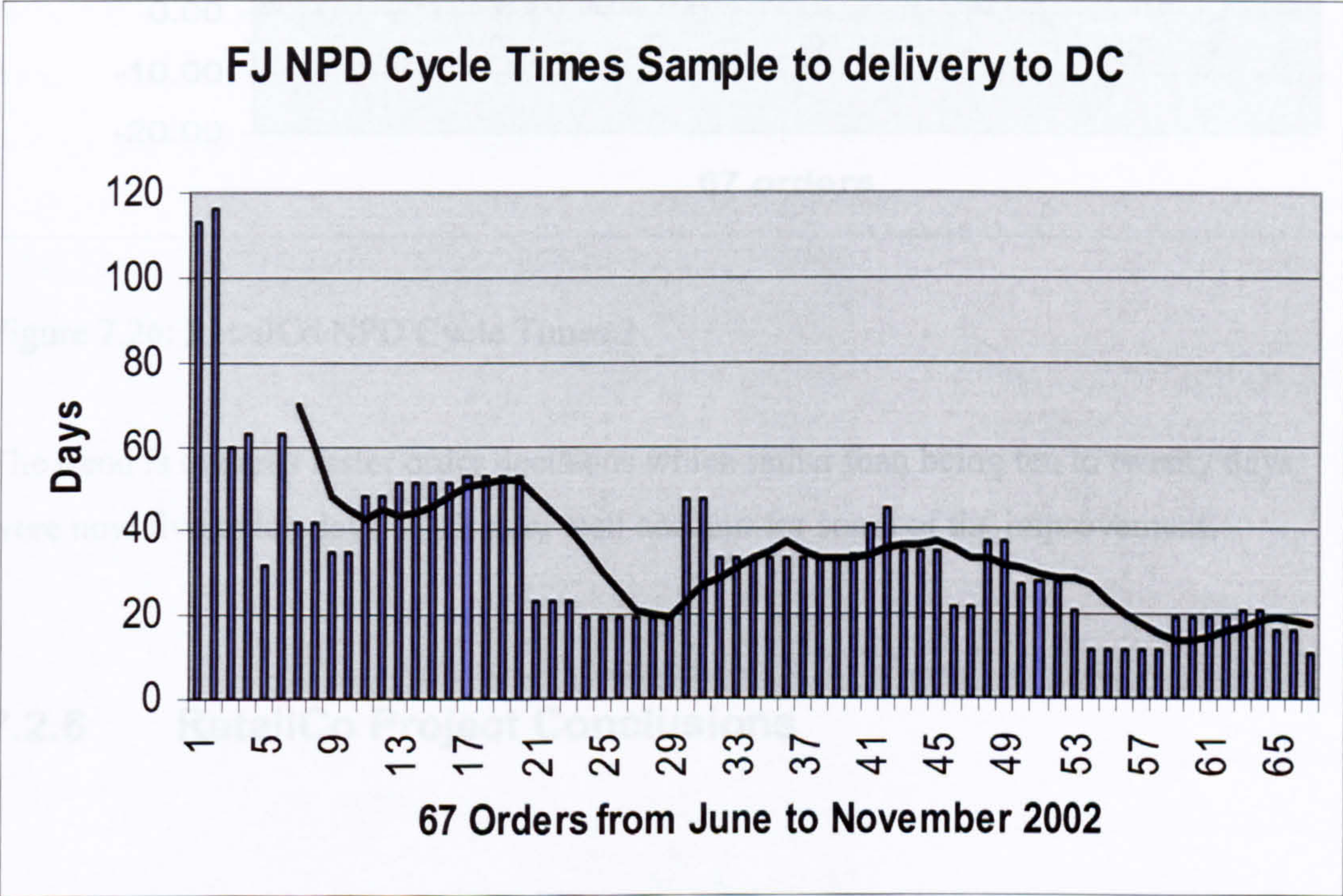


Figure 7.25: RetailCo NPD Cycle Times 1

The trend is towards a faster NPD cycle time with the time for Formal Jersey to move from the concept sample to the delivery into the DC now less than 20 days. More work would be required to explore exactly what was behind this improvement and which of the changes was having an impact. It does seem that the decisions are being made faster. The chart below (Figure 7.26) shows an improving trend for the time for the buyer to place an order.

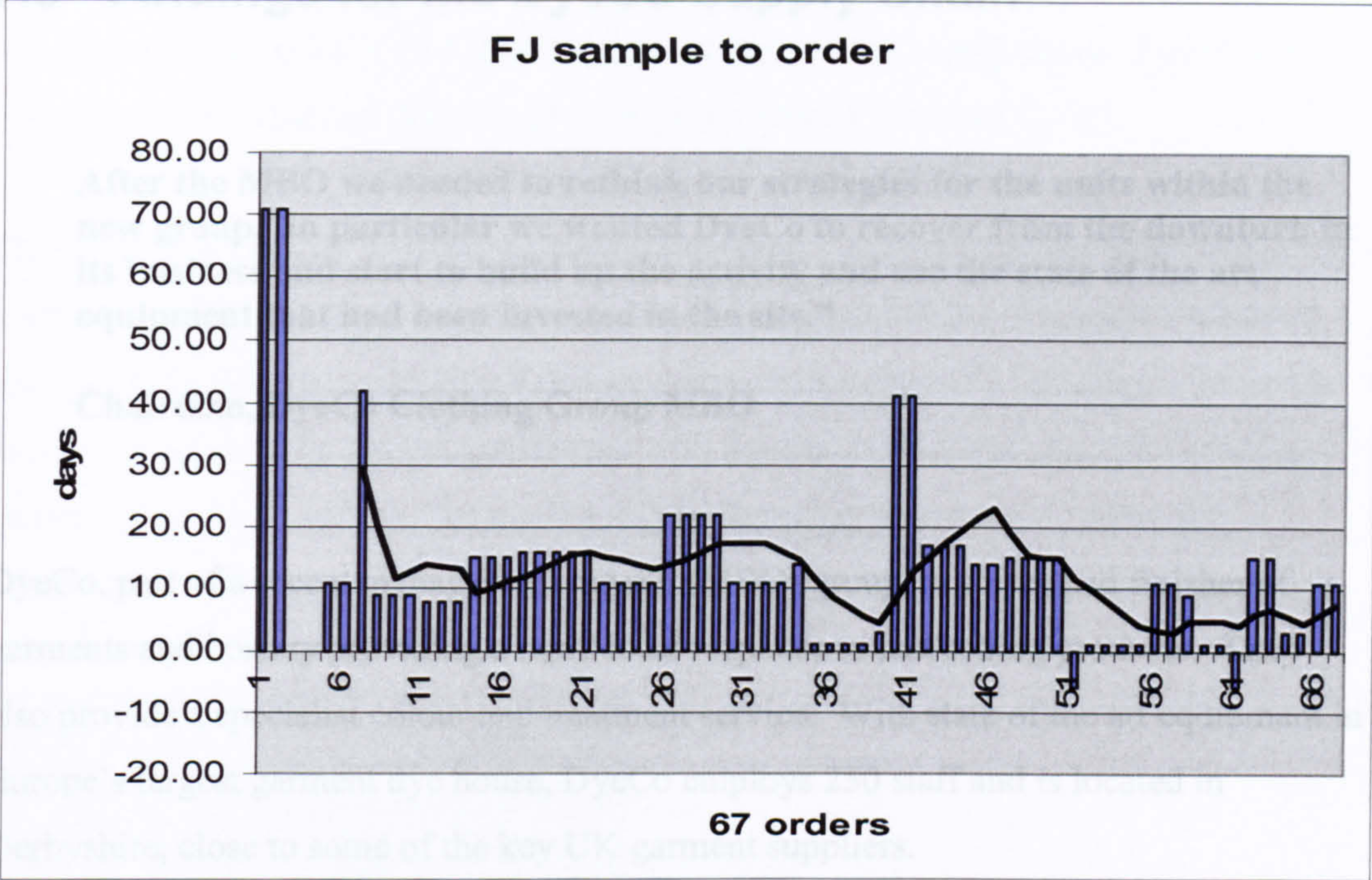


Figure 7.26: RetailCo NPD Cycle Times 2

The trend is towards faster order decisions which rather than being ten to twenty days were now five to ten days. This may well account for some of the improvement.

7.2.6 RetailCo Project Conclusions

The RetailCo management wanted to develop an effective quick response manufacturing facility to improve flexibility and reduce product lead times. The intervention discovered that the main causes of delay were the buying decisions and the technology department fit sessions. The manufacturer did have problems of quality consistency and this was tackled by involving the manufacturer earlier in the product validation process.

7.3 Findings for the DyeCo Supply Chain

After the MBO we needed to rethink our strategies for the units within the new group. In particular we wanted DyeCo to recover from the downturn in its business and start to build up the activity and use the state of the art equipment that had been invested in the site.”

Chairman, DyeCo Clothing Group MBO

DyeCo, part of a recent management buyout (MBO) group, is a dyer and finisher of garments and hosiery providing a rapid local response to fast selling products. They also provide a specialist colour and treatment service. With state of the art equipment in Europe’s largest garment dye house, DyeCo employs 250 staff and is located in Derbyshire, close to some of the key UK garment suppliers.

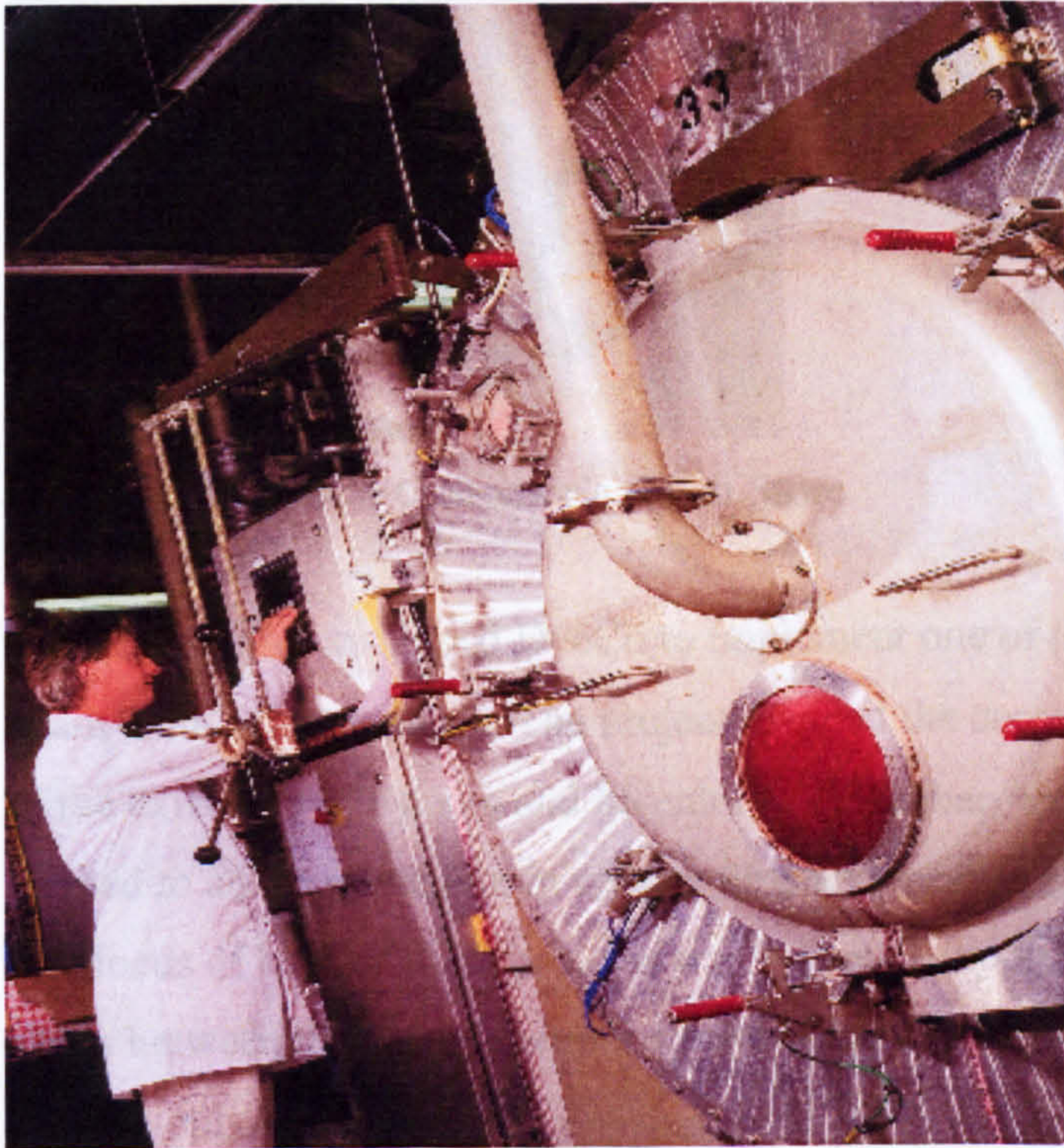


Figure 7.27: A dyeing machine at DyeCo

DyeCo’s challenge was to move away from the previous culture of being part of an integrated group, develop a more market focussed approach and aim to help downstream retail customers understand the benefits of using a local quick response route and an added value processor.

The management at DyeCo enlisted the support of the Industry Forum in two projects that related to the risks of new product development in the supply chain. Fashion is a volatile area with sales difficult to predict (Warburton & Stratton, 2002).

The first project helped DyeCo managers to develop a problem definition regarding the marketing of DyeCo services, carry out a retail store inventory and markdown survey and then to build a cost model that demonstrated the benefits of a local quick response route to retailers. The project culminated with a presentation of the benefits of quick response to a major UK retailer's (Figure 7.28) category management team, the development of a new added value service and the generation of significant new business opportunities for DyeCo.



Figure 7.28: DyeCo Customer's Retail Store

The second project helped DyeCo to implement one of the key features of a lean supply chain – a Kanban system. The project mapped the current process and provided details of the existing cycle times and inventory. A Kanban was designed and implemented and led to an improvement in service time and marked reduction in inventory.

The focus of both of these projects was the retail supply chain and the trade off that exists between the use of cheaper slower offshore supply and local more expensive and faster supply.

7.3.1 DyeCo Industry Forum Projects Definition

"DyeCo is convinced that both the Industry Forum projects have delivered real benefits. They have transformed the business in areas of quick response, flexibility and service to our customers. This has made a positive impact on our bottom line."

Managing Director, DyeCo, I.F. Case Study Report, 2003

Managing Director

Production Director

Financial Controller

Sales Manager

The Industry Forum was involved initially with the senior DyeCo Parent Group management at a meeting in 2001. The following people attended the meeting.

<u>DyeCo Parent Group</u>
Chairman
Chief Executive
Product Development Manager
Project Co-ordinator

<u>Industry Forum</u>
Senior Research Fellow - Salford
Senior Research Fellow - Cranfield

The discussion focussed on the key issues facing the new company. These are summarised in the box below.

- DyeCo
 - What ancillary new product services could be added to the DyeCo product portfolio to make best use of the investment in equipment?
 - How can the system be improved to improve throughput time?
 - How can the capabilities be marketed better?
 - How can the profile of DyeCo be raised?
 - How can customer focus be improved?

These were the views of senior management. The project would be carried out at the DyeCo factory and the views of the local management team were important if they were to participate actively in the project.

It was agreed that a workshop Creative Problem Solving meeting at DyeCo’s factory in Derbyshire would be the start of the intervention process. The Industry Forum would then present back to the company a formal project proposal that focussed on the issues raised in the Workshop.

7.3.1 DyeCo Industry Forum Projects Definition

The projects started with a workshop meeting of the project team at DyeCo. The Creative Problem Solving Workshop involved the following staff:

Managing Director	Production Director
Financial Controller	Sales Manager

Dye House Manager

Quality Manager

Planning Manager

Personnel Manager

The process of Creative Problem Solving uses a technique of progressive divergent and convergent thinking (Van Gundy, 1988) where managers are encouraged to first widen the scope of their thinking in a divergent brainstorming session by listing personal thoughts and concerns about the business prompted by the following statements:

Wouldn't it be nice if?

And

Wouldn't it be awful if?

This activity generated approximately 150 concern statements from the small project team. The next step in Creative Problem Solving was the convergent phase of finding themes amongst the concern statements. The themes led to the development of several problem statements:

1. How to encourage team working
2. How to help customers to understand the benefits of using DyeCo and offshore undyed garments on profit margins
3. How to improve morale and job security
4. How to reduce costs and improve profits
5. How to maintain the current level of business
6. How to improve service to customers
7. How to improve planning
8. How to improve quality and delivery on time

These problem statements were prioritised and a leading candidate problem statement was developed that would be the focus of the local management project activity, helped by the research team. Examination of these problem statements above led to a vote that the second (No 2) was considered a top priority and the solution of which might help many of the other problems.

The real world problem that needed to be solved initially is set out below:

Problem statement definition

The objective of this work is for DyeCo to help their customers to understand the benefits of using DyeCo to process their product in order to achieve quality, flexibility and competitive net margins.

A further project team Workshop facilitated by the researchers helped the project team to identify a list of data that would need to be collected to better understand the issues surrounding this objective.

The data required was:

Retail Sales lost due to non-availability of products

Costs of offshore competitor dyers

Details of UK competitors

Details of offshore competitors

Growth areas

Benefits of using DyeCo including Lead Time, Flexibility and Actual Margin

Sales possible with Quick Response

Offshore Lead times

It was therefore agreed to collect the data listed above to help in the problem solving process. The likely areas for sourcing each data element were discussed amongst the project team and researchers. It was felt that the best way to convince retailers and their suppliers about the economic benefits of using DyeCo was to try and build a picture of the costs and incomes that the customers had relative to the supply and sales of coloured garments. The underlying rationale was to establish the benefits of a Quick Response supply chain. The management at DyeCo felt that retailers were losing sales and profits through the existing use of offshore yarn dyed garments with long lead times. For example a retailer might order some fashion colours with a sixteen week lead-time from an offshore supplier. However if the market changed in the sixteen weeks before the

products arrived in the UK and the choice of fashion colours did not match consumer buying habits then the retailer might be left with stocks of poorly selling colours. What DyeCo did not know and could only guess at was the exact accuracy of the colour forecasts and the impact of low sales on the selling prices to consumers. It was thought that a trade off might exist where a local dye house could give a Quick Response service that allowed colour decisions to be made later. This might lead to better colour forecasts, lower stocks of poor selling colours and better selling prices for retailers. What was needed was an accurate and credible cost model of the competing offshore supply long lead-time and local Quick Response situations. One main link in the cost model was the rate at which garment forecasting was missing the level of interest by consumers in the colours that buyers had ordered. One way to assess this was to discover the level of stock outs by colour and the availability of colours in retail stores. The research team could, as an independent industry sponsored third party, examine store inventories and discover how well stocks of garment colours were matching consumer demand. It was also accepted that DyeCo would need to offer more services to retailers since at present the company was more focussed on an historic supply method that produced garments that had in the past been sent back to the garment maker for final processing including pressing, labelling and packing. If DyeCo were to offer a Quick Response service based on undyed offshore garments that would be sent directly to the retail distribution centre they would also need to offer these added value services.

A formal proposal for collecting the data, establishing the performance at DyeCo, developing a retailer's cost model and carrying out a store survey was presented by the Industry Forum researchers to DyeCo management.

The proposal included the following steps for the Project One intervention.

1. Store survey to investigate stock levels by colour.
2. Development of cost model
3. Development of retailer presentation of survey and cost model results
4. Organisation and presentation of results to a leading retailer

Project Two activities involved the following steps.

1. Process route modelling
2. Development of improvement proposals to improve customer service
3. Implementation of a Kanban

The Project Two proposal objective was summarised as:

To provide a detailed map of product development, production and associated order enquiry, costing, quotation, planning and delivery processes within DyeCo. The mapping exercise will then lead to a critical examination of the systems with the aim of improving them to better meet customer needs

7.3.2 DyeCo Data Gathering Process

Gathering data regarding the customer cost model, the store survey, current product development and mapping and improving processing practices involved the following methods:

- Site Visits
- Store visits
- Interviews
- Management Workshops
- Experiments
- Observation
- Computer system interrogation and file transfer
- Artefact examination
- Documentation collection
- Archival analysis

This section discusses how various data collection aspects were addressed including site access, informants and respondents, detailed data collection types and methods.

Site Visits

Regular site visits were paid to the DyeCo factory in Derbyshire. For all Phases a total of twenty visits were made to the factory. In addition five visits were made to the Retailer Head Office in London and visits to ten retail stores.

Informants and Respondents

The phases involved interviews and meetings with the following managers:

DyeCo

Managing Director	Production Director
Technical Director	Planning and Special Projects Executive
Dye House Manager	Quality Executive
Factory Accountant	I.T. Manager
Human Resources Manager	Customer Services Manager
Development Manager	Costing Manager
Dye house I.T. Supervisors	Planning Supervisor
Project Manager	Preparation Supervisor

DyeCo Partner Retailer - Head Office London

Industry Specialist Managers

- Knitwear & Hosiery
- Footwear
- Knitted Garments
- Tailoring
- Cotton
- Lingerie

Category Manager - Knitwear

Industry Manager - Dyeing & Finishing

Specialist Technologist - Dyeing & Finishing

Costing Manager

Component Procurement Manager

Data Collection Types and Methods

Site visits to the DyeCo site in Derbyshire were carried out over a twelve month period in 2001 and 2002. The data collection took place over this period using workshop presentations, group creative problem solving exercises, discussions, informal interviews, open ended conversations, observations, document and archive collection plus artefact examination. The meetings at the Retailer Head Office in London were individual interviews, group presentations and discussions. Each of the projects had a different focus. The initial project examined the attitudes of managers to the issues facing the business and also involved a series of workshop discussions on a broad model of the business stages, a retail store survey and a group discussion about a model of the likely costs to the customer of poor forecasting. This project also involved discussions of the cost model with the retailer's buying management in a workshop presentation and discussion.

The second project involved building a detailed picture of the process model and collecting details about the performance of the existing process. A feedback of results was made to management and discussions of methods to improve performance. The project later involved some training of managers in Just in Time techniques, agreement on a trial proposal and a large scale experiment of a new Kanban method with monitoring and adjustments.

The observations were recorded through note taking and digital photography. Data from documentation and archives was recorded through note taking, photocopying and through emailing and computer disk storage of the documents. Data about cycle times and delivery performance was acquired from the company computer system through

interrogation of the database and printing out of records or through direct transfer of database data.

The detailed DyeCo NPD Process was mapped through collecting data through a variety of methods, including interviews, observations, document examination and artefact examination. The DyeCo NPD process was supported by data regarding the Retailer and Garment maker NPD systems from unpublished research data from Salford University.

Interviews were typically open ended and informal, and were guided conversations rather than structured interviews. The researcher was trying to build a picture from a variety of data sources about the way that NPD is carried out within the DyeCo business. Whilst interviews were unstructured they were nevertheless not general conversations but aimed at finding out what each participant did in their part of the NPD process. The interviews were recorded through the use of notes. These site visit findings were all written up and these typed formal visit reports sent back to the sites for checking within two weeks of each visit. Workshops with the project team members were also sources of data concerning the management of New Product Development. Flip Charts and Post It Notes were collected from each workshop and written up as a report and submitted to the management.

Documentation

Documentation was also collected at the DyeCo factory.

Documents examined and details collected included:

New Quality Notification Sheet
Hosiery Turn Round report
Work In Progress Lots List
Dye Setup Batch Report
Van Delivery Sheet
Recipe Sheet
Work In Progress Lot Enquiry Printout

Organization Charts
Lot Enquiry Printout
Cost Matrix Sheet
Knitwear Finishing Cost Matrix Sheet
Weekly Departmental Labour Analysis
Customer Flow Requirement Summary
Customer Packaging List
Weekly Labour Hours report
Employees Report
Manned Capacity Forecast
Plan Loading Forecast
Style Loadings Forecast
Machine Loadings Forecast
Customer Order Summary
Business Process Model
New business areas email

Additional information collected from the Internet that helped in the construction of the Cost Model included:

Piece Dye v Garment Dye Cost Analysis
Undyed Yarn Prices in China and India
Dyed Yarn Prices in Turkey, India and Germany

Archive Material

The main source of archive material was the Sales Order Processing Computer Database at DyeCo. Further unpublished archive material from the University was used to build an understanding of the retail and garment NPD methods.

Observations took place at the DyeCo Derbyshire factory. Some of the observations were also recorded with digital photographs. The sample and bulk processing methods were observed during most of the visits to DyeCo. Methods of garment receipt, storage, preparation, and dyeing, drying, testing, packing and quality inspections were observed.

Artefact Examination

The undyed garments, dye machinery, drying machinery, new product prototypes and versions, patterns, correct and faulty garments, and testing equipment were examined.

When the new Just in Time processing method was introduced the control cards and reports were examined.

Store Visits

The researcher visited the Retailers stores in three towns and observed, inspected and counted the garments on display and the prices of garments over a three month period. Further store garment counting checks were carried out by RetailCo staff and also by researchers at Cranfield University. The summary information of the stock in store by size and by colour was obtained from these additional sources.

Management Reports and Presentations

In addition to the site visit reports that provided feedback to DyeCo on the project data gathering activity there were a number of management workshops where the researcher carried out exercises designed to capture management ideas and attitudes.

The results of the process mapping, process performance and Creative Problem Solving Workshops were presented in management workshops to DyeCo and the parent company. All presentations were also distributed to management as a formal document. This provided a sense check that the data being collected was valid and reliable. The data collected provided sufficient information to form a view regarding the methods used by DyeCo and the supply chain to develop and process new products.

7.3.3 Example Site Visit Report for DyeCo

<div><div>Industry Forum</div><p>Improving the textile & clothing supply chain from concept to customer</p></div>	
IF Collaborator Meeting DyeCo Prepared by RR 21/06/01	
Workshop with	Operations Director, Accountant, Planning & Projects Executive, Quality & Process Executive, Customer Services Manager, [HR Manager, Development Manager, Dyehouse Manager, Technical Director, Management Trainee.
Date:	20/06/01
IF Team Members	Senior Research Fellow - Cranfield University, Bob Redfern – The Salford University
Location:	DyeCo, Derbyshire
Focus of Workshop	Development of Customer Development Project Presentation

This Workshop followed on from the Creative Problem Solving Workshop and the development of a list of data that would help the project team to solve the problem statement that had been developed as the project focus:

- **In what ways might we help customers understand the benefits of using DyeCo to process their product; embracing lower cost offshore manufacturing and yet achieving quality, flexibility and competitive net margins?**

Some of the DyeCo project team had attended the Business Link presentation in Rochdale or the Industry Forum Steering Group Meeting in London. At these presentations Professor Roger Warburton, from Griffin Manufacturing in the USA had put forward a powerful case for combining low cost offshore manufacturing with domestic Quick Response processing to give customers superior performance. Roger is a Professor in the University of Massachusetts in the Department of Textile Sciences and is the principle investigator on a National Textile Center funded project entitled “When is Domestic Manufacturing Competitive?”

Many of the points raised by Roger seemed to echo the same issues that the DyeCo Project Team felt could be made to their own customers:

- Domestic garment dyers were seen as more expensive than an offshore manufacturing route due to lower labour costs offshore.
- Domestic garment dyers were used by the supply chain to put right mistakes in offshore production, often saving retailers from very expensive mistakes and range or collection shortages.
- Retailers engage in forecasting and those using offshore manufacturing place orders many months in advance of the selling season. If the ordered styles and colours do not sell well they have to be disposed of at reduced prices.
- On the other hand if sales take off the retailer runs out of stock and is left with unsatisfied customer demand and unhappy customers.
- A model can be developed that shows the effects of different levels of forecasting errors on the net margins of retailers.
- A Domestic garment dyer could not survive on the ‘serendipity’ of mistakes by offshore manufacturers and needed to have a more steady level of work to stay in business.
- If Domestic garment dyers did not survive then key technical skills would be lost to the Industry.
- In the USA retailers are aiming to get forecasting error down below 30%.

The team looked in detail at how it might use the 'bones' of Roger's presentation as the basis for the case for using DyeCo to be presented to customers in order to answer the defined problem statement above.

An Offshore Garment Example

A formula for calculating the retail margin loss in the event of a forecasting error was agreed:

$$\text{Actual Sales } S = (F-E) \times SP + E \times L$$

$$\text{Cost } C = F \times W$$

$$\text{Target Margin } M = (S-W) / W$$

Where F = forecast sales level

E = error in forecast

SP = full retail price (excluding VAT)

L = liquidation price (excluding VAT)

W = cost of garment to the retailer

An example of 50,000 dozen Ladies Wool Knitwear Jumpers Retailing at £40 including VAT. The Retailers gross margin is thought to be 55%. The liquidation price is assumed to be half the normal retail price.

The calculation of a 30% error in forecasting is used as an example:

Putting the example figures in:

$$\text{Forecast Volume } F = 600,000$$

$$\text{Error in Sales Volume } E = 600,000 \times 30/100 = 180,000$$

$$\text{Full Retail Price per garment } SP = 40/1.175 = \text{£}34.04$$

$$\text{Margin per garment} = 34.04 \times 55/100 = \text{£}18.72$$

$$\text{Cost of Garment to retailer } W = 34.04 \times 45/100 = \text{£}15.32$$

$$\text{Liquidation Price } L = 0.5 \times (40/1.175) = \text{£}17.02$$

$$\text{Target Sales (without Vat) are then } \text{£}34.04 \times 600,000 = \text{£}20.424 \text{ Million}$$

$$\text{Target Margin at 55\% is then } \text{£}20.424 \text{ Million} \times 55/100 = \text{£}11.223 \text{ Million}$$

$$\text{Target Cost} = 600,000 \times 15.32 = \text{£}9.192 \text{ Million}$$

$$\text{Actual Sales } S = (600,000 - 180,000) \times 34.04 + 17.02 \times 180,000 = \text{£}17.360 \text{ Million}$$

The cost W remains $600,000 \times 15.32 = \text{£}9.192$ Million

The actual margin has thus become $17.360 - 9.192 = \text{£}8.168$ Million

The loss of profit for the Retailer is $11.233 - 8.168 = \text{£}3.065$ Million

Thus if forecasting error is typically 30%, the net retailer margin is now only 40% not the 55% expected.

The Domestic Route

Rough figures were discussed during the Workshop. These are set out more precisely below:

Comparing this offshore route with a DyeCo dyed route.

We assume that the sales are now correctly supplied at the actual level and a new forecast is targeted at the 420,000 level with a total sales target of:

$420,000 \times \text{£}34.04 = \text{£}14.297$ Million.

These 420,000 garments are purchased at 80% offshore (i.e. 336,000) with a margin still of $\text{£}18.72$.

Then 20% is purchased in the domestic market with an assumed $\text{£}1$ more expensive route. The margin on these 84,000 garments is now $\text{£}17.72$.

The total margin is now $336,000 \times \text{£}18.72 + 84,000 \times \text{£}17.72 = \text{£}7.778$ Million.

The margin is now therefore 54.4%.

Clearly there is a strong case for the use of domestic supply not only to improve the level of reducing the downside but for reacting to better sales.

Advantages for retailer include:

- Restoration of margins.
- No Cannibalisation of sales caused by consumers expecting 30% of garments to be sold at liquidated prices.
- Opportunity to react to increased demand through quick response via the domestic route

Next Steps

- The level of stock inaccuracy would now be investigated in the stores through monitoring by the project team.
 - Stroke number of a knitwear garment would be supplied. **Action: Mike**
 - Project team will visit target retailer stores and check size and colour availability. **Action: All.**
- The Next plc Order was already using the DyeCo route. Illustrative garments and orders lead-time information would be tracked to provide a case study for the eventual presentation to customers and the target retailer. **Action: DyeCo.**
- The Gross Margins, Selling Prices, Liquidation Prices and volumes of a Knitwear order using both offshore yarn dyed and domestic garment dyed would be estimated and the details fed into a calculation similar to the above. **Action: DyeCo.**
- A check on industry liquidation levels would be made in Drapers Record. **Action: Bob.**
- Richard (Retailer Procurement) had been contacted by Graham and was interested in Roger Warburton doing his presentation to staff in the target retailer. **Action: Bob Redfern would follow this up with Ken and Richard.**
- DyeCo to prepare a presentation by the next meeting ready for customers that would answer the statement:

In what ways might we help customers understand the benefits of using DyeCo to process their product; embracing lower cost offshore manufacturing and yet achieving quality, flexibility and competitive net margins?

- Industry Forum to look at potential garment making partners such as Desmonds or Courtaulds who would need to be convinced of the route's benefits too. **Action: Tracy.**
- Gordon was asked to consider helping Tencel in its project to get a garment dyed route. Two garments were left with Gordon who was going to see David of Tencel the next day. **Action: Gordon.**

Next Meeting Date: Tuesday 17th July 1pm start. Action: All.

7.3.4 Relevance of the Data Collection to the research questions

In this case study report we see that DyeCo management are interested in influencing the retailers in the supply chain and recognize that retailers are driven by a number of possible success factors in developing the new season's ranges. Gross margin is driving UK retailers to source more from offshore sources. On the other hand there are risks of the long offshore supply chain in that margins will be eroded by slow sales of some garments and the eventual reduction in prices needed to quit the inventory.

DyeCo need to really understand the needs of the downstream customer in detail and develop an understanding of the margin calculations of the customer. The Case Study offers good levels of data collection that was also extremely relevant to answering the research propositions. For example there is an indication in the visit report that the managers believe there is a pull model of new product demand in place since the company are thinking in terms of influencing not their direct garment making customer but the downstream retail supply chain customer in the fundamental choice of the structure of the supply chain for new products.

7.3.5 The Retail Product Development Process

The projects concern a retail supply chain and the decision process that governs the structure of the supply for new products. In particular the retailer manages the development of a range of garments for the stores from a clothing supply chain with stages that are shown in the diagram below, Figure 7.29.

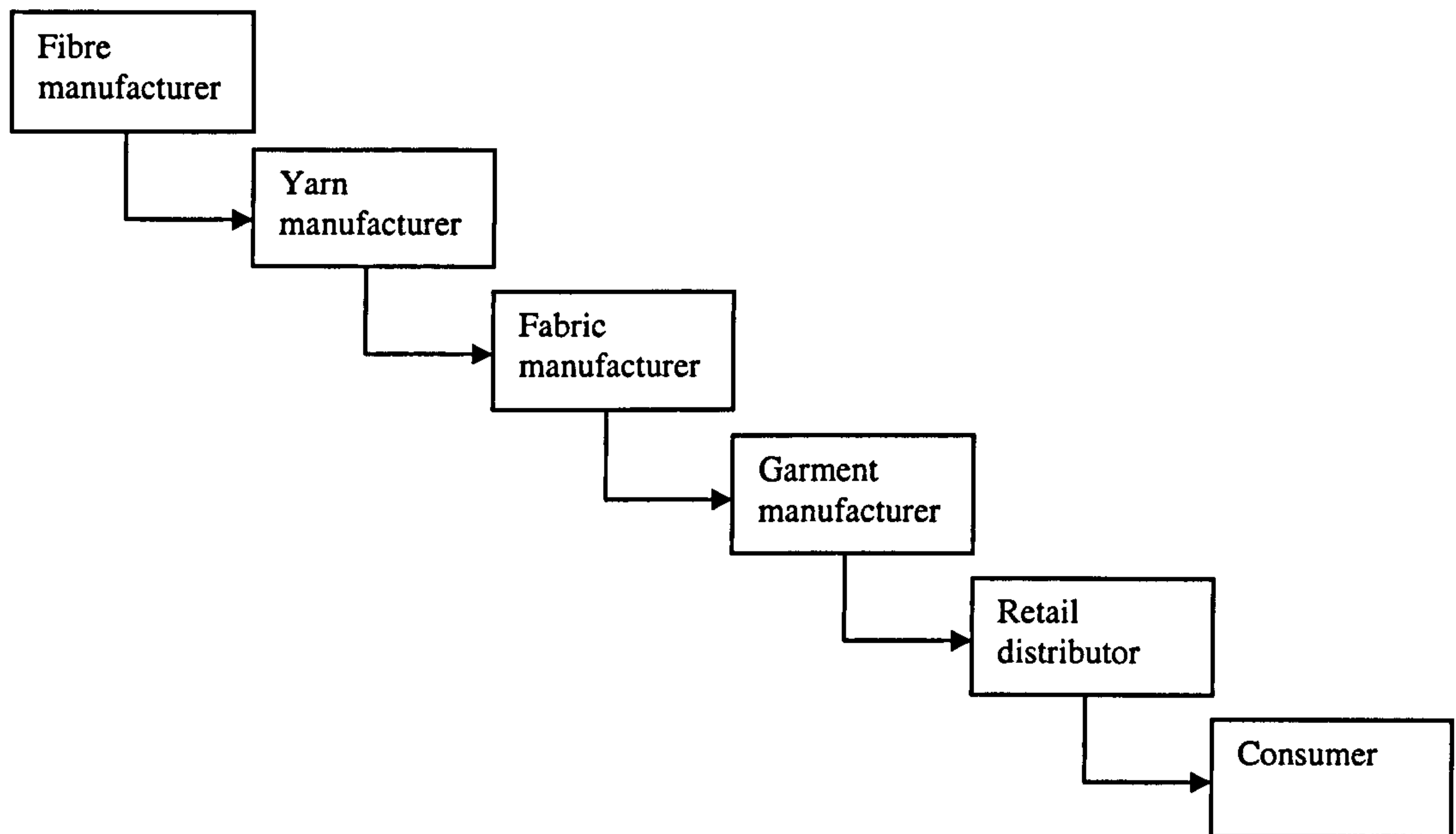


Figure 7.29– Stages in the apparel supply chain

The development of these ranges for the DyeCo target retailer is managed through a series of planned steps each season that involve the supply chain manufacturers and processors starting with a strategy review presentation to suppliers by a particular retail garment category department.

For example the items covered in a target retailer 2000 Ladies Casualwear Category review were:

Last Season's Performance

Financial performance comparing the budget and actual sales and the range of stores where ranges are offered for example being restricted to the top 170 stores rather than all 370 stores. Major price action to cut prices in order to reduce pipeline stocks.

Buying performance and the outcome of where the department may have bought by fabric rather than silhouette and may have committed early to fabrics such as velour where lead times were long. The proportion of the buy at the start and later in the season and how this worked.

Launch performance where dates and the impact of availability of garments for the launch date across stores are considered.

Products performance and what worked well or not. For example what was driving sales including styling details such as neck shapes, prices and perceived values, fashion looks such as velour, competition with other Ladieswear departments offers.

Colours performance including what had been successful and what had not sold well.

Store Layout performance including the impact of how stores had classified products and related them to other garment areas, for example selling casual tops close to suits as an undersuit garment.

Missed opportunities including poor sellers (over-forecasting) and a lack of inventory to support sales in some areas due to under-forecasting or over zealous cutting back of programmes.

Market share estimates

Competitor performance and departmental performance are evaluated and compared in specific garment areas and growth or decline in market share reported.

A Comparative Shop

The recent season offerings of competitors are compared with the products in the previous range and any differences in value and gaps or strengths in the range compared.

Forward Strategy

The buying teams visit all the trade fairs for yarns and fabrics and take account of the catwalk fashion trends and the offerings of retailers in New York, Paris and Milan. The strategy starts with the plans regarding the garment types that will be built up. In the 1999/2000 season for example this included for Ladies Tops Department the following commitments:

- Continue to buy ranges by fabrics
- Build on the casualwear range
- Offer true casual fabrics in authentic shapes
- Build on the success of the undersuit range

- Offer two ranges for undersuit
 - Classic
 - Seasonal newness
- Re-establish tunics
- Offer an ultimate occasionwear range, exploiting newness and embellishment
- Introduce garments with luxury yarns for Top stores e.g. wool/cashmere

The departments also focus on Trend directions which seem to be important to the range. The selectors' ideas are shared with suppliers in the briefing including:

- Core garment key Fabrics, Fibres and Yarns across the various garment types such as viscose jersey and cotton jersey for undersuit tops or velour for occasionwear
- Directional styling including neck shapes, sleeve length and key styling details such as prints, darts, hoods and colour blocking
- Silhouettes for specific garments – easy fit or more slim fit and tailored
- Fabric Strategy for growth areas – seeking newness in fabric as the key for example sueding, marl mixes, high fashion wool blends and washed down casual looks. Critical path and the importance of focussing on new fabric developments early in the critical path timetable to ensure that validation of product suitability is carried out early
- Garment Strategy – in 2000 in Ladies Tops this included:
 - Workshops to identify opportunities built in to the Critical Path
 - Stronger links with Designers and machinery suppliers
 - Maintain quality by distributing standards garment shapes books to garment makers
 - Review the fit process
 - Build on individual supplier strengths e.g. embroidery
 - Develop more offshore supply
 - Target a 3 week from concept to prototype cycle time

- Reduce the initial buy to increase flexibility
- React to sales within the season
- Plan store layout with tops next to knitwear and undersuit next to suits
- Exploit Store Magazine

Garment makers are expected to take this strategy review information and with the addition of their own fashion trend assessments develop new products for the exclusive review and selection by the target retailer buying teams.

Retailer Seasonal Development Activities

There are a total of nineteen steps in the departmental retailer seasonal development activity. The table in Figure 7.30 below shows the timings for the Autumn/Winter 2001 ranges.

Date	Key Activity
November	Initial Thoughts
November	Supplier Strategy Briefing
December 2000	Initial Design
January 2001	Design Brief/Buying Brief
February	Executive Strategy
February	Suppliers Concepts
February	Concept Plan/Review
March	Executive Concept Review
March	Senior Selectors Meeting
April	Final Garments
May	Departmental Review
May	Executive Review
June	Phase 1 White Seals
June	Phase 1 Green Seals
July	Phase 1 Production
July	Phase 1 Store Launch
August	Phase 2 Department Review
September	Phase 2 Executive Update
September	Phase 1 White Seals
September	Phase 1 Green Seals
October	Phase 2 Production
December 2001	Phase 2 Store Launch

Figure 7.33: Seasonal Development Activities

The stages in the Retailer plan include a design brief although the main design effort then takes place in the various supplying garment making businesses. Much of what then follows at the retailer is a series of selection and review processes where garments that have been designed by the garment manufacturers are considered by the selectors and department management teams and subsequently selected garments are included in the ranges by the retailer. Once ranges are put together they are set before successive departmental and management review meetings. The White Seals and Green Seals are garment validation stages where a master copy of the prototype developed by the garment maker and first manufactured production are signed off as meeting the agreed quality and technical standards by the retailer. The seals are signed off by the retailer technologists for fit and colour standards if acceptable. It can be seen that launch takes place in two phases with a chance to review sales reaction.

Much of the work of developing products is in the hands of the garment makers who have their own New Product Development systems. Garment makers and others in the supply chain are working to enable the submission of sample fabrics and garments to fit in with the seasonal timing plans of the retail store group. The timing is designed to enable the various ranges to be selected and assembled and then developed, tested and approved in time to be sent to the stores for the launch of the new fashion season. The retail timing ‘critical path’ leads to each supplier in the chain having their own timing for submissions to the store group. The retail critical path timings are set out in the Figure 7.31 below.

The Critical Path has the following timings, activity stages and people involved at the retailer. The table below shows the Critical Path for a Ladieswear Department in the first seven months of the run up to the launch of the Autumn/Winter 2000 ranges in the stores. Work begins almost a year ahead of the selling season to consumers.

Month	Meeting/Visit/Information	Personnel Attending
September	Development of departmental strategy	Senior selectors Merchandise managers Technology managers Merchandisers Range selectors Selectors Technologists
	Brief suppliers on process	Senior selectors Merchandise managers Merchandisers Selectors Technologists
	Individual supply base meetings Discussions on the process by area	Selectors Merchandisers Technologists
	Introduction to Key Performance Indicators (KPI's)	Senior selectors Merchandise managers Merchandisers Selectors Technologists
October	Agree Fabric workshop structure and fabric trigger dates (i.e. Core/Planned/Unplanned)	Selectors Merchandisers Technologists
	Core Health Check (re Product life cycle growth/decline – Market share Consumer profile Price positioning Fabric Flow Plan Agree Core Strategy	Selectors Merchandisers Technologists
	Review and Feedback KPI's to supply base	Senior selectors Merchandise managers Merchandisers Selectors Technologists
	Internal planning Ways plan Initial budget estimates Target pricing	Merchandisers Selectors Technologists
December	Supplier workshops Discuss product brief	Selectors Merchandisers Technologists Suppliers
January	Issue individual garment briefs Supplier Story Boards Presentations CAD/Storyboards Fabric Swatches Costings Country of origin	Selectors
March	Final Range Construction Pre-contract Seal meetings	Selectors Merchandisers Technologists
	Sign off range Contract seal	Senior selectors Merchandise Managers Selectors Merchandisers Technologists

Figure 7.31: Retailer Critical Path

It can be seen that there is the use of a development team who are all involved at various stages in the range development. For DyeCo the key dates are the September individual supplier briefings. It is at this stage that a potential supply chain and manufacturing route is planned. It is this stage that crucially decides whether a new product will be dyed at the fibre, yarn, fabric or garment stage. For DyeCo, a garment dyer, the best opportunity to be involved in the new range development is to ensure that the retailer is aware of the benefits of local garment dyeing. DyeCo therefore needed to market their services to the retailer and fit in with the garment manufacturer's product development and launch process.

7.3.6 The Garment Manufacturer NPD Process

A detailed analysis of the previous (Pre Management Buyout) company knitwear seasonal design development programme has been recently mapped by an earlier research programme at Salford University.

These stages are described below:

Market Trends Analysis

This stage concerns yarn and design strategy, market trend research and the customer (Retailer) brief. The process begins with visits to the Yarns Shows that are held in Paris and Florence where ideas about yarn and colour fashion trends are collected by visiting the Stands of spinners who show their latest developments including new fibre blends and colour choices. Samples of yarns that are of interest are ordered or asked for from the spinners. Directional shopping also takes place where garments are purchased for inspiration regarding styling and silhouette trends. Designers collect trend information and using the information about yarns and from the directional shopping trips make up 'Story Boards' that illustrate the direction of fashion trends including yarns, colours and styling details. The retailer briefing described above is attended and the information added to the data being collected. The key garment styles for the product range are decided and core colours selected at a series of planning and project meetings.

Design Development

At this stage some validation of materials is carried out with some sample knitting followed by tests including colourfastness and wash tests. Designers and sales staff work on the development of the garment styles into coherent ranges of garments. Work continues to develop the Story Boards, colour palettes are confirmed and sketch and swatch ideas are developed. Any lab reports on the colourfastness and wash tests impact on the range selection since a failure will halt any development until the matter is resolved. The sketch and swatch ideas are transformed into specifications for prototype knitting of garments using Computer Aided Design. Sample prototypes are then produced and costs estimated. An assessment of the potential and risks of each range is made. An internal review meeting is held to finalize the range ideas.

Present Ideas to Customers

The stage in the retailer seasonal development activity timetable called Supplier Concepts is represented by the activity for the garment maker of presenting ideas to customers. The meetings are concerned with the way that the manufacturer has interpreted the retail brief. A range of garments, fabric samples and the associated 'Story Board' inspirations are presented to the retailer buying department. Discussions ensue regarding possible adoption of specific ranges, potential purchase volumes, manufacturing capacity and price bargaining begins. Once the retailer has absorbed the ideas from a number of competing suppliers the purchase intentions are finalised with order indications given to the selected supplier who may also request minor changes in the product.

Final Sampling and Costing

Any changes that have been requested are implemented and samples submitted to the retail buying departments for approval. Once the complete range in a line has been completed there is a final presentation of the definitive products to the retailer buying teams. By this stage all the details of laboratory test results; lab dye submissions (to the standard shades selected by the retailer) and successful wearer trial results are available

for approval by the retail technologist. Final buying decisions are made by the retailer in selecting garment ranges.

7.3.7 Supply Chain Product Development and Colour

As we can see above the retailer supply chain is a complex and often integrated development process. DyeCo are involved in this development process when part of the garment range has been selected to contain a garment dyed part to help manage the range and variety of shades needed. The garment development processes described above concern the majority of garments where the colour range of the garments sold is determined early in the garment manufacturing process when the yarn or fabric is dyed. A small proportion of garments are garment dyed and in this situation development will concern the dye house such as DyeCo. The proportion of garment dyeing has traditionally depended on the established supply route and the type of effect desired in the colour of the garment affected by fashion trends. For example a mixture look could be a new fashion trend and this was only available using a yarn coloured route since the garment dye route had limited mixture effects available. Garment (piece) dyeing was generally used for solid shaded.

Knitwear for the retailer had traditionally used a UK supply route where garment dyeing was an important part of the supply process and the option to decide on the mix of colours being sold at a later opportunity existed. The UK supply route had a good level of garment dyeing capacity that made this possible. In other countries there is less garment dye capacity and more yarn dyeing capacity. The move to more overseas (and cheaper) knitwear had led to a lower proportion of garment dyeing and more yarn dyeing. An unpublished study of part of the pre MBO knitwear business demonstrates the type of situation and trends that had adversely affected DyeCo. In 1998 the parent company provided the retailer with 500,000 men's Lambswool garments in two styles V-neck and Crew Neck. The garment was made in 17 yarn dyed colours and they were available all the year round. The colour range was increased to 35 colours with the use of garment dyeing. Only 20% of colours were classic yarn dyed shades such as Black and Navy that continued from year to year. In the previous year 80% of production was garment dyed with 20% yarn dyed. In 1998 through a combination of more offshore supply and fashion trends left only 10% of the requirement was for garment dye. In 1999 only 5% of product was garment dyed.

We can see that DyeCo had been badly affected by the move to offshore sourcing by the retailer over the past few years when it was part of the pre MBO group. When a range is to be garment dyed then DyeCo are involved in the process development for the new seasons fashion colours. Existing classic shades have of course been developed in earlier years.

Having described the supply chain development process at the retailer and garment maker we can now turn to the Case Study intervention and the process mapping at DyeCo where the objective was to understand how the process worked and performed.

7.3.8 DyeCo Product Development Process

There are a number of broad stages in the DyeCo development process.

Shade Sampling

The DyeCo involvement in the development of new shades begins with contact with the garment making customer by a Customer Services Manager. Regular visits are made by Customer Services Managers to the garment makers to ensure that shade palette information and garment samples are obtained during the garment maker's critical path process. When the garment maker knows the palette of colours that are selected by the retailer a request for a sample shade matching is made to DyeCo who will dye a sample undyed garment for the customer that matches each shade. The colour mixing system at DyeCo is shown in Figure 7.32 below.

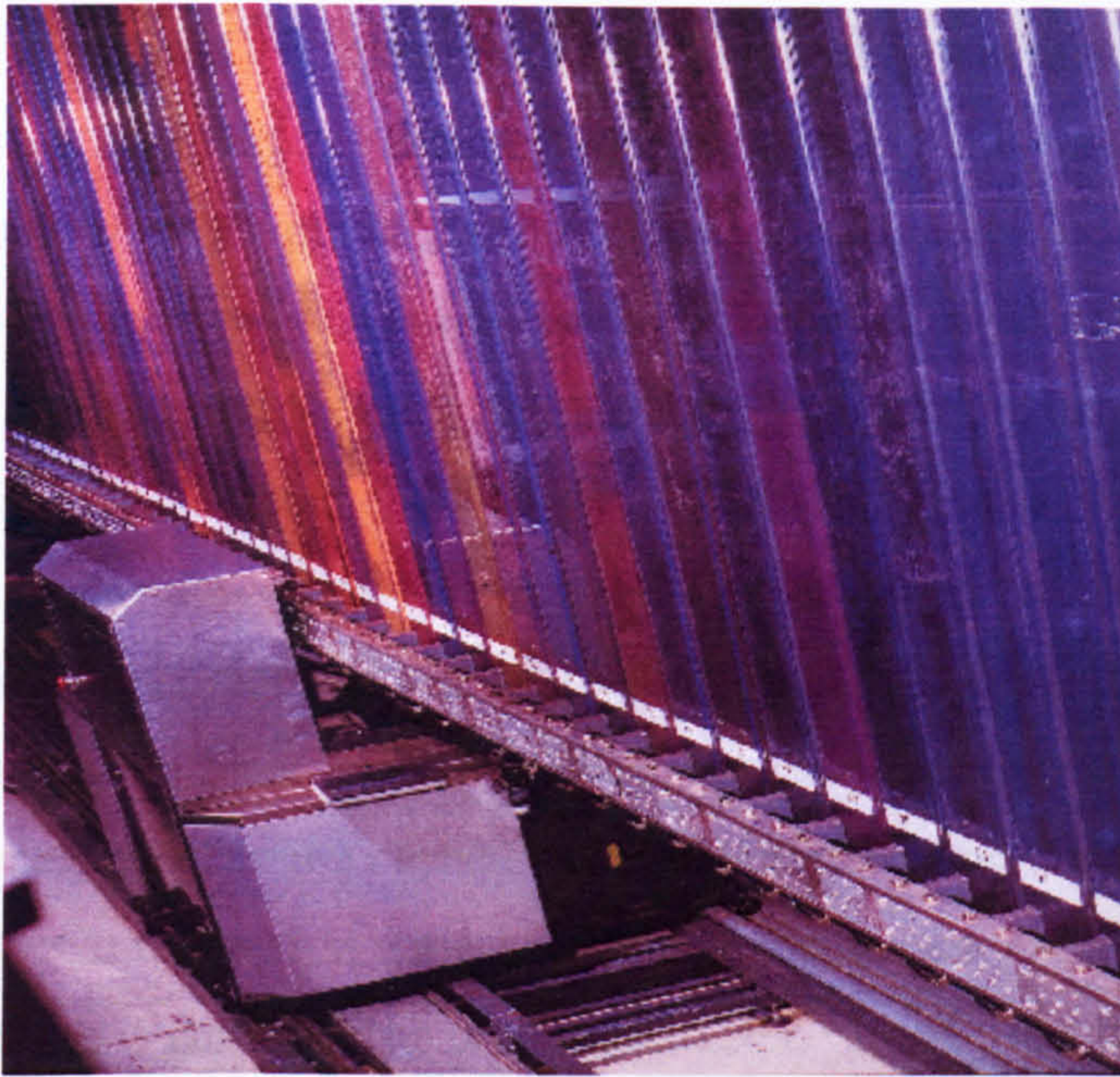


Figure 7.32: DyeCo Colour Mixing.

The shade is normally dyed (using a computer shade matching system) to match an original master colour from the customer. The computer programme calculates the required dye recipe which is then used to strike a shade in a sample dye machine. The recipe may require some minor manual adjustments. Eventually the shade is a good match as measured by the computer and this is checked by the human eye in a colour cabinet that has the required lighting that can simulate the retailer's store lighting. Colour can be different under natural lighting compared to store artificial lighting. The dye recipe will include any additional finishing steps such as softening or shrink resistance treatments. The cost of dyeing and finishing plus any framing (shaping with steam) and pressing stages is estimated. Samples are then tested for wash fastness by putting them through a washing programme that is similar to a domestic laundry wash. Colour fastness to rubbing, perspiration and contact with other fabrics is checked. Fabric shrinkage is also measured after washing. The tests vary dependent on the retailer with some retailers having published their own test comprehensive regimes. The test laboratory services at DyeCo have to be certified by a retailer appointed assessor each year. DyeCo have a range of possible fabric types and shades to dye. Often the garment is constructed using the kind of materials such as Lambs wool or Cotton from an existing customer that DyeCo have a great deal of previous experience with. The shade may be a classic such as Black or Navy where the recipe is already known. On the other hand the material may be a new mixture of fibres such as Wool/Tencel or the customer may be a new

business to DyeCo and the shade may well be a new fashion colour. In this case more work is required to establish the process route and contact and feedback of information and samples with the customer is required to ascertain the exact customer requirements both technically and aesthetically. Cost is an important consideration and whilst DyeCo have a standards cost matrix for light, medium and dark shades negotiations take place with the customer about likely programme volumes, delivery dates and prices. DyeCo examine the capacity requirements of each order relative to the amount of machinery and labour required week by week of the programmes that are required by all the customers for a season. However the forward order book is quite short at only a few weeks so planning capacity of labour normally requires the use of overtime. The DyeCo factory has a great deal of dye equipment capacity of various types and so labour is generally the bottleneck factor. If overtime is required this affects the costing. If all goes well an order is normally forthcoming from the customer and the next phase of the critical path will eventually start where the garment maker has started production of the first commercial quantities of undyed garments – the pre-production stage.

Pre- Production

Here small quantities are put through the main dyeing and finishing process rather than through the small lab dye sample machines. At this stage a full range of garment sizes are put through. Changes in the dye recipe or process route timings may become necessary as the ramp up to bulk takes place. Testing again takes place and samples are again submitted to the customer. Costs may change as the route or recipe changes. The real capacity requirements begin to be appreciated and any processing problems that occur that require additional process steps or chemical additions are noted so that the process route can be established.

First Bulk

Depending on the amount of previous experience with the garment type and customer the first bulk orders are either put through immediately or a small pilot lot is tried where there is little prior experience.

Programme Deliveries and Production

If all goes well the programme of dyeing then moves into a bulk stage where the mix of shades dyed will change each week depending on the actual sales in the retail stores. Output is ramped up and more dye machines and staff are devoted to the programme. The undyed garments arrive from the garment maker and then move into the dye process once the shade mix is established. Any new shades go through a sample and approval process.

7.3.9 Supply Chain Development Summary

The findings above show a variety of views and timings of the Retailer UK garment supply chain seen from both the retailer and supplier perspectives.

The process of new product development contains elements of concept generation, strategy reviews, new product development, and validation and range decisions. These process activities take place in a timed sequence that suits the retail calendar and the activities are shared between the retailer and suppliers. The retailer makes the concept and buying decisions and the supplier carries out the design, development and testing operations.

7.3.10 Cost Modelling and Store Inventory Project

The management of the DyeCo business judged that an opportunity existed to grow the business. The expansion depended on developing a new product offering and selling the idea to the downstream customer base and in particular the influential retail buyers. The knitwear supply chain to the retailer had changed in the past two years and more knitwear was now being sourced from offshore suppliers as a result of the efforts of the retailer to reduce costs and improve margins. DyeCo had been part of a vertical garment supply business and had processed garments for another part of the company in the UK and then returned the garments in an unfinished form. The sequence of the flow is shown in Figure 7.33 below.

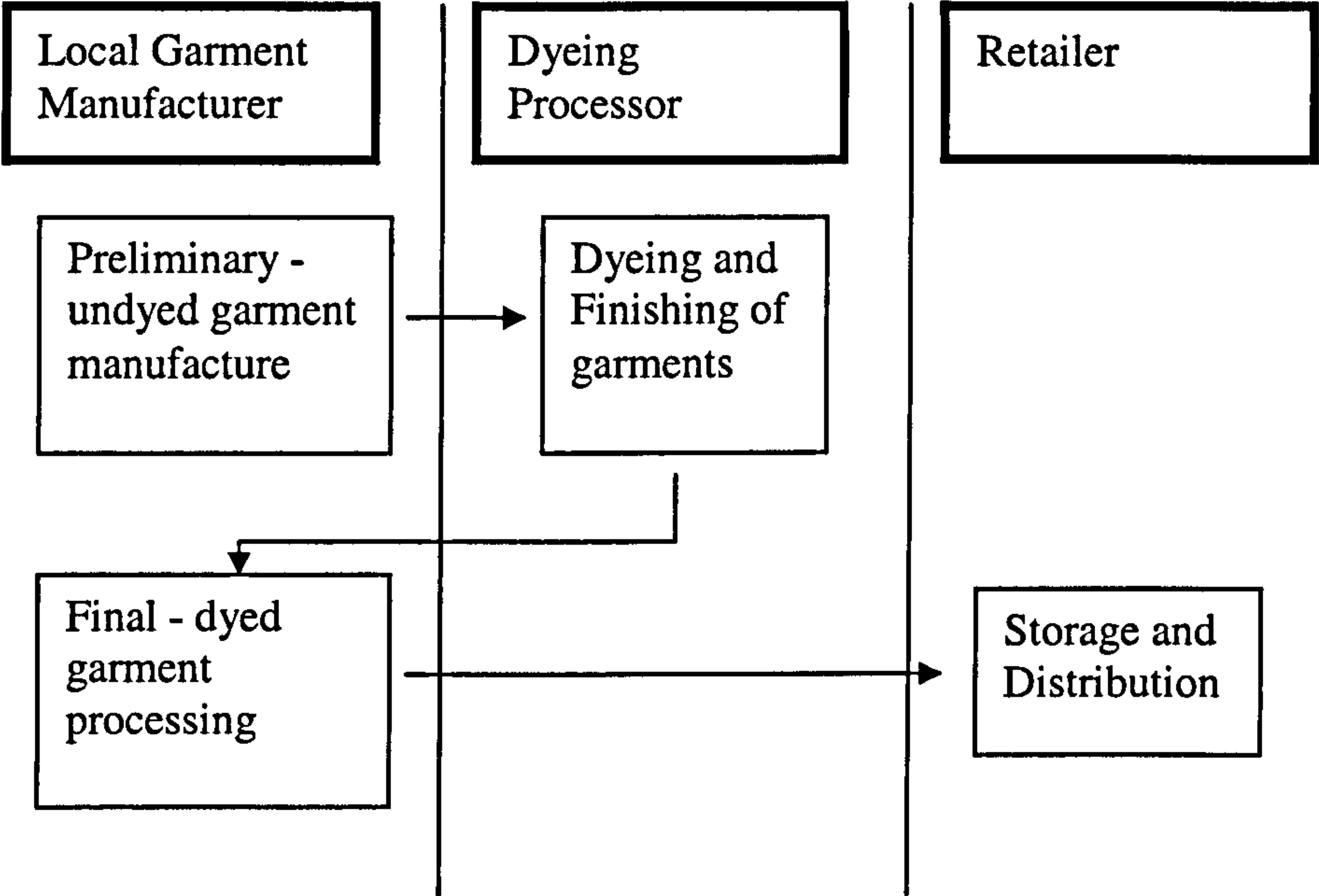


Figure 7.33: The vertical supply route

The new offshore garment suppliers had more of the Retailer business and if DyeCo could be more involved with this new supply chain then the service offering would have to have some added components whereby the garments from an offshore supplier could be completely processed at DyeCo and then sent direct to the retail Distribution Centres. The new route is shown in the Figure 7.34 below:

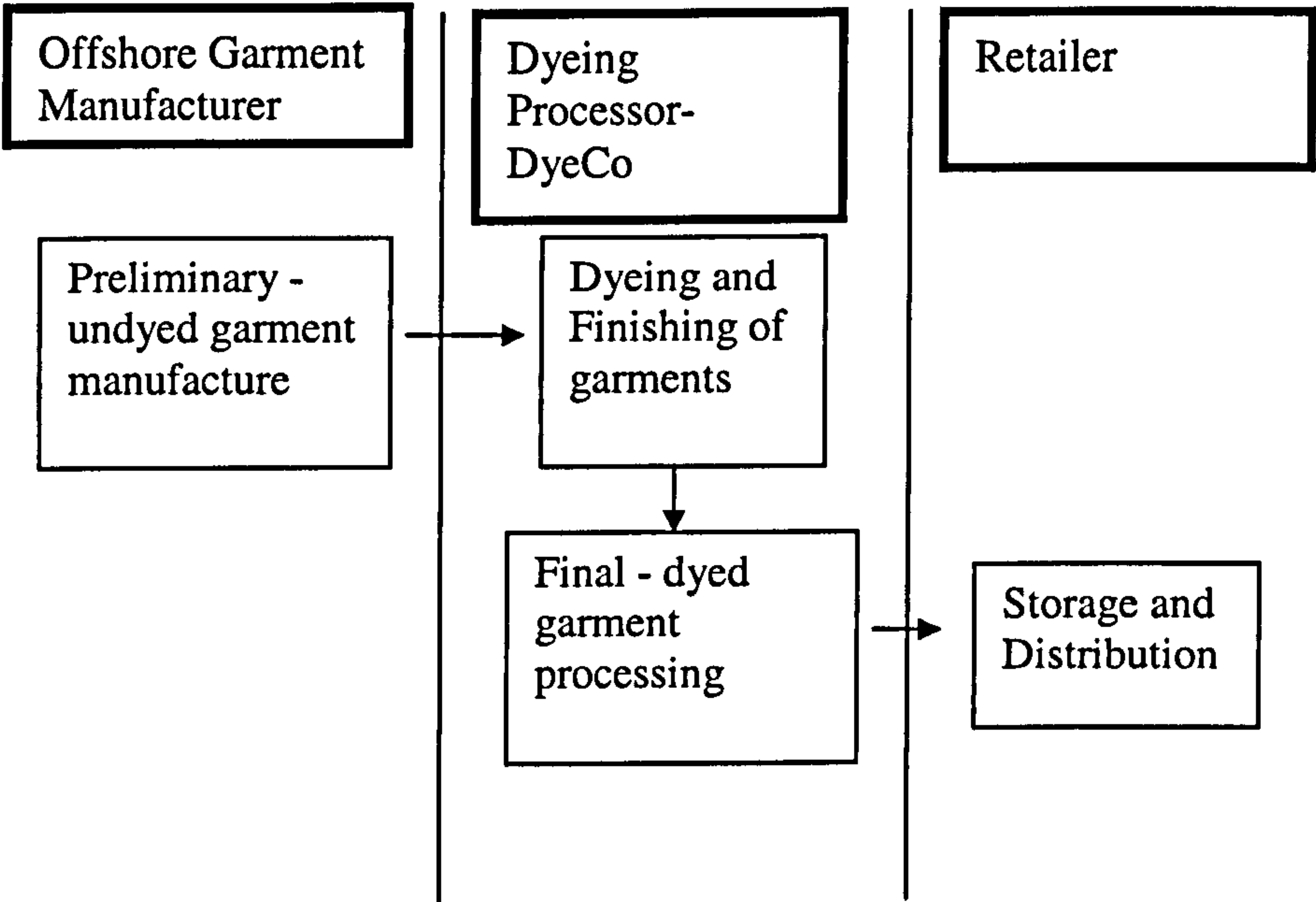


Figure 7.34: The new offshore supplier route

The new route would offer retailers the chance to combine low cost offshore supply with local fast response dyeing, provided the retailers could be persuaded that there were benefits from switching from largely yarn dyed offshore supplies to undyed offshore supplies that were the dyed at DyeCo. The Industry Forum project workshop outcomes had suggested that DyeCo needed to gather information about the costs for the retailer of offshore yarn dyed supply and the inventory risk inherent with it.

7.3.11 Development of Retail Cost Model

The project team had decided that the best way forward was to try and establish exactly how the DyeCo garment dye route compared in cost with a yarn dyed route. One of the issues involved was the level of forecast sales accuracy by retailers and the subsequent level of stocks that had to be written down and sold off at lower prices.

The Warburton Model

A model of the impact of retailer sales accuracy had recently been presented to industry managers at a local conference. Professor Roger Warburton had developed a model of the impact of retail forecasting errors. This was later published as a journal paper (Warburton & Stratton, 2002). The generic model used the fact that retail sales forecasts were inaccurate to predict the effect on margins. This model was then used as a basis for preparing a cost model for DyeCo to present to the retailer. In fact Professor Roger Warburton joined the DyeCo presentation team and gave his paper to the retailer buying managers. The chart below shows the simple Warburton Model. According to Warburton fashion retailers admit to getting forecasts on sales levels wrong by a factor of +/- 25% over a season on at least 70% of the styles. Roger thought that on the other 30% of styles the forecasts were even more inaccurate. The implications of this are that on a garment forecast of 1000 garments either sales to consumer could be only 750 garments or they might have been 1250 garments (if there had been more purchases to replenish as the store shelves as stock ran out). If the sales could have been 1250, this implies a shortage of stock and then customers might go to a competitor store to get the style in the size and colour that they wanted to buy. If the sales are on the other hand only 750 then the retailer is left with the 250 garments at the end of the season and has then to reduce the price from the full selling price in order to quit the stock. Whilst the overall margin can be calculated from the reduced margin, it is Warburton's view that

retailers do not admit to the full impact of the effect of the lost sales or the scale of the margin loss.

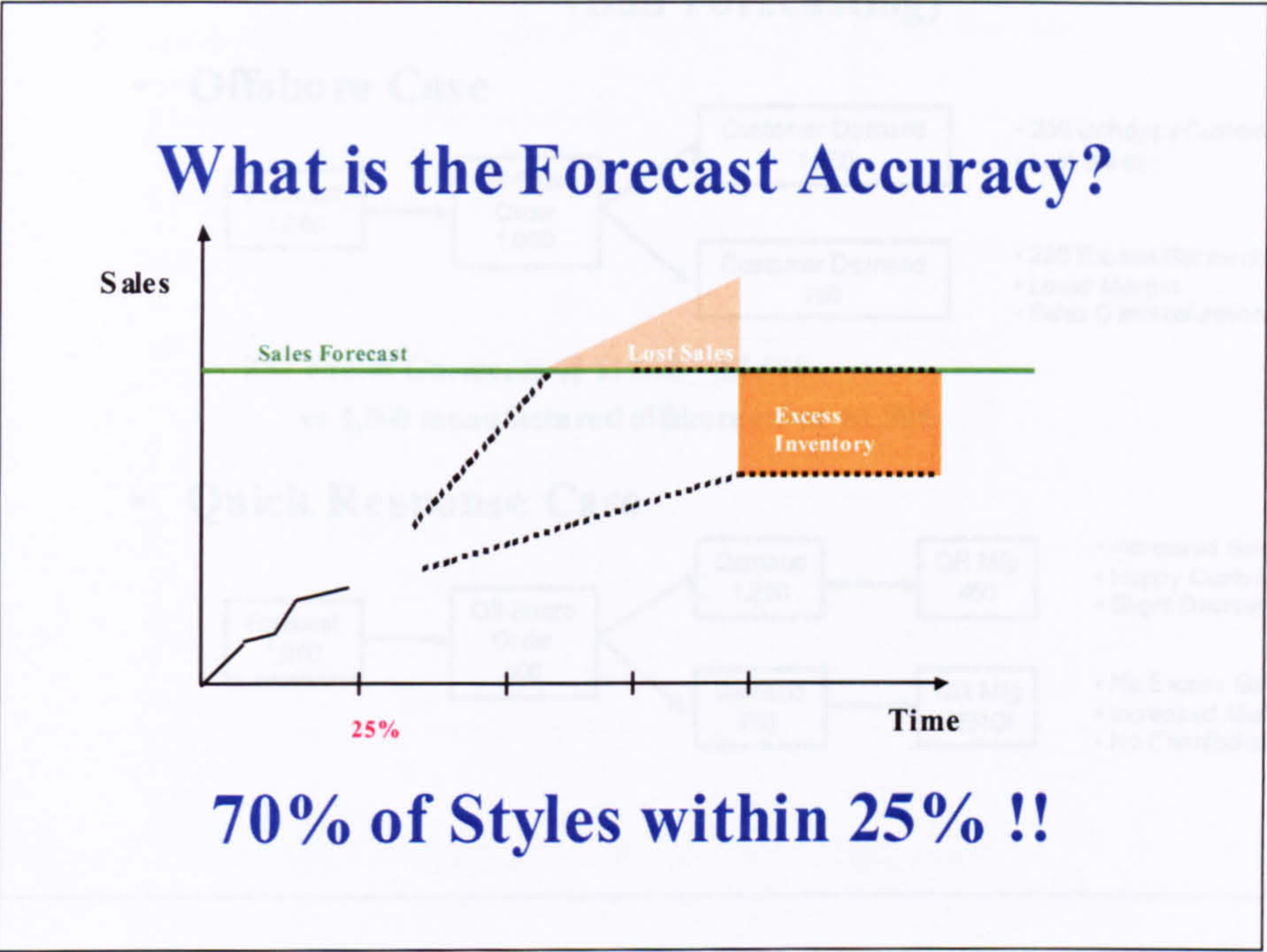


Figure 7.36: The cost of inventory. Source: Warburton, 2001

Figure 7.35: Store Sales Forecast Accuracy. Source: Warburton, 2001

Carrollisation of sales is where garments are sold off at lower prices.

The Figure 7.35 above shows how the lost sales or excess inventory arise with sales trends either above or below forecast. Part of the problem is that retailers have moved more and more purchases to cheaper offshore suppliers where the lead times are up to 16 weeks long. So whilst it may become apparent early in the selling season that sales are going to be higher than forecast the opportunity to replenish stock in the short window of the season (that is perhaps only 24 weeks long) may be limited. So whilst offshore producers may be cheaper in terms of gross margin, when the lost sales and stock write downs are taken into account the picture may be different at the net margin level. The alternative according to Warburton is to use a mix of some more expensive local garment supply that he terms Quick Response (QR) plus a higher proportion of offshore cheaper supply.

The comparison of offshore and QR is shown in Warburton’s chart below in Figure 7.36.

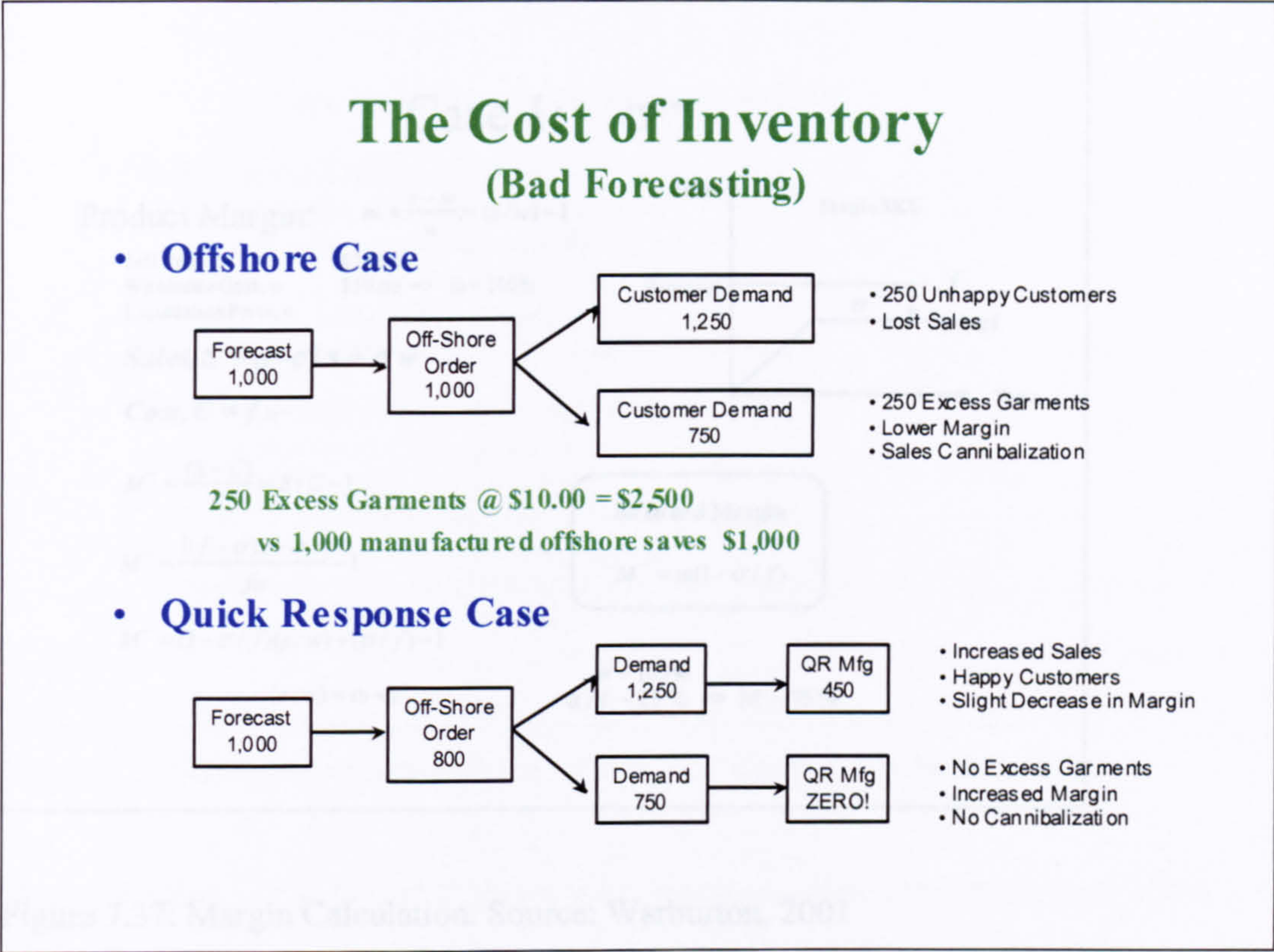


Figure 7.36: The cost of inventory. Source: Warburton, 2001

Cannibalisation of sales is where garments are sold off at lower prices.

Warburton has taken these basic concepts and developed a margin calculation model (Figure 7.37) shown below:

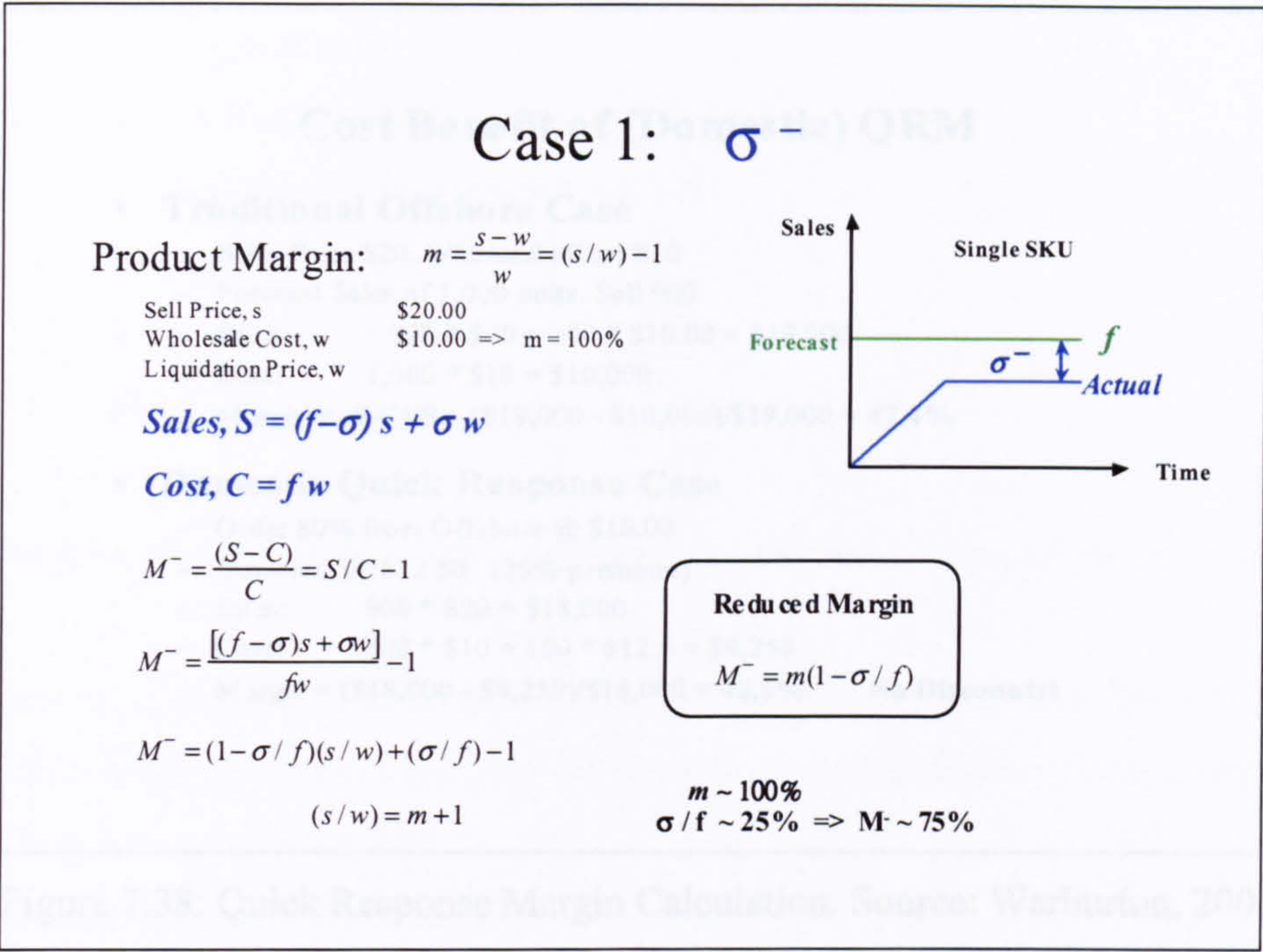


Figure 7.37: Margin Calculation. Source: Warburton, 2001

When some likely estimates of error, selling price, margin, stock write downs and purchase costs are put into this model Warburton obtains the following example (Figure 7.38) of offshore and QR domestic mix options for a 10% forecast error. The 100% offshore case is compared with a 20% split of domestic QR production.

Cost Benefit of (Domestic) QRM

- **Traditional Offshore Case**
 - Sales Price \$20, Wholesale Cost \$10
 - Forecast Sales of 1,000 units. Sell 900
 - Sales: $900 * \$20 + 100 * \$10.00 = \$19,000$
 - Cost: $1,000 * \$10 = \$10,000$
 - Margin = $(S-C)/S = (\$19,000 - \$10,000)/\$19,000 = 47.4\%$
- **Domestic Quick Response Case**
 - Order 80% from Offshore @ \$10.00
 - Domestic @ \$12.50 (25% premium)
 - Sales: $900 * \$20 = \$18,000$
 - Cost: $800 * \$10 + 100 * \$12.5 = \$9,250$
 - Margin = $(\$18,000 - \$9,250)/\$18,000 = 48.6\%$ **No Discounts!**

The DyeCo Model

$$\text{Cost } C = F \times W$$

Where F= forecast sales units

E= negative error in forecast

SP= full retail price (excluding VAT)

L= liquidation price (excluding VAT)

W= Cost to Retailer

S= Actual Sales Level

M= Target Margin

The following example roughly demonstrates the sensitivities of the formula:

Forecast sales level of 50,000 dozen Ladies Lambswool Knitwear Jumper retailing at £40 including VAT demonstrates the formula, with the retailers Gross Margin estimated at 55% and an error of 30%.

Forecast sales units $F = 600,000$

Error in Sales forecast $E = 600,000 \times 30/100 = 180,000$

Unit Costs

Full Retail Selling Price $SP = 40/1.175 = £34.04$

Margin $M = 34.04 \times 55/100 = £15.32$

Cost of garment to retailer $W = 34.04 \times 45/100 = £15.32$

Liquidation Price $L = 0.5 \times (40/1.175) = £17.02$

Total Costs

Total Target Sales income without VAT $£34.04 \times 600,000 = £20.424 \text{ Million}$

Target Margin $= 55/100 \times £20.424 \text{ Million} = £11.223 \text{ Million}$

Target Cost $= 600,000 \times 15.32 = £9.92 \text{ Million}$

Total Actual Sales $S = (600,000 - 180,000) \times 34.04 + 17.02 \times 180,000 = \text{£}17.360$ Million

Total Actual Margin $= 17.360 - 9.192 = \text{£}8.168$ Million

Total loss of profit $11.233 - 8.168 = \text{£}3.065$ Million

Thus if forecasting error was 30% the net retailer margin is then only 40% not the expected 55% with a loss of profit of £3.065 Million. In order to convince the retailer that the more expensive local garments were worth the potential of the rise in net margin the likely cost of a domestic alternative was estimated.

For example if the Quick Response domestic route was used for 20% of the product line but this cost say £1 more per garment. If the QR route allowed perfect response to sales demand then the sales would now be at the target 600,000 with all garments sold at the full price. The costs are now as follows:

- Actual sales income excluding VAT is $600,000 \times \text{£}34.04 = \text{£}20.424$ Million
- Actual Costs are now $80/100 \times 600,000 \times 15.32 + 20/100 \times 600,000 \times 16.32 = \text{£}9.312$ Million
- Margin is now $20.424 - 9.312 = \text{£}1,112$ Million

In percentage terms the margin is then $1112/20423 = 54.4\%$ which is very close to the existing offshore retailers target gross margin of 55%. The project team agreed that the model was sufficiently interesting to develop. The rough figures needed more accurate confirmation regarding the actual levels of store target margins, forecast inaccuracy, inventory write downs and costs of the different offshore and local routes.

Information was then gathered by various members of the Industry Forum and project team to assist in the development of the costing model. The Managing Director of DyeCo obtained information from the retailer about a garment currently being sold. The amount of the garment line purchased by the store group was 10,000 dozens or 120,000 garments. The purchase was across six colour ways and across seven ladies sizes from size 8 to 20. The garments were a knitwear keyhole neck three quarter sleeve. The research and project team visited a number of the retailer stores in June 2001 and counted the number of garments in store in the various sizes and colours. The

chart below (Figure 7.39) shows the number of garments by colour and size across the eleven stores.

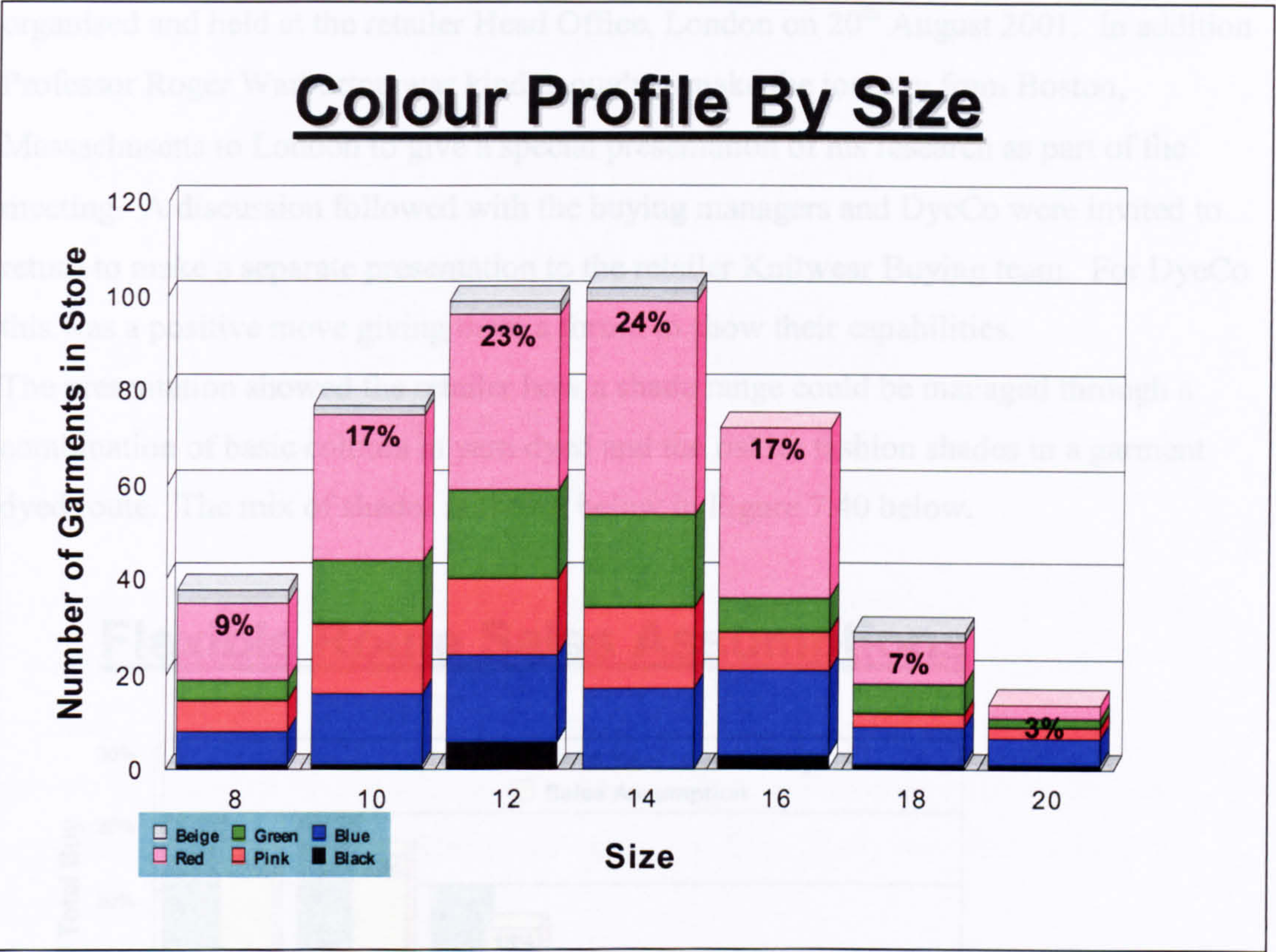


Figure 7.39: Store Inventory By Garment Colour.

The stores had clearly run out of the beige and black colour ways in most sizes and had many of the pink garments left in stock. The store was selling the garment for £30 in the period February to June 2001 and had a gross margin of 55%. The store started to quit the residual stock in July 2001 and reduced the retail price first to £20 and later to £15. Further supplies of the black and beige colour ways had been ordered from the offshore supplier but as a consequence of the extended lead times they arrived in store just as the other colour ways were being reduced in price in the store July sales. This led to the somewhat difficult situation of the garment being priced at both £30 and £20 in the same stores.

The project team worked on the cost model and a presentation for a meeting with the retail buying managers across a range of product categories. The meeting was organised and held at the retailer Head Office, London on 20th August 2001. In addition Professor Roger Warburton was kind enough to make the journey from Boston, Massachusetts to London to give a special presentation of his research as part of the meeting. A discussion followed with the buying managers and DyeCo were invited to return to make a separate presentation to the retailer Knitwear Buying team. For DyeCo this was a positive move giving them a forum to show their capabilities. The presentation showed the retailer how a shade range could be managed through a combination of basic colours in yarn dyed and the riskier fashion shades in a garment dyed route. The mix of shades is shown below in Figure 7.40 below.

Flexible Route Sales Assumptions

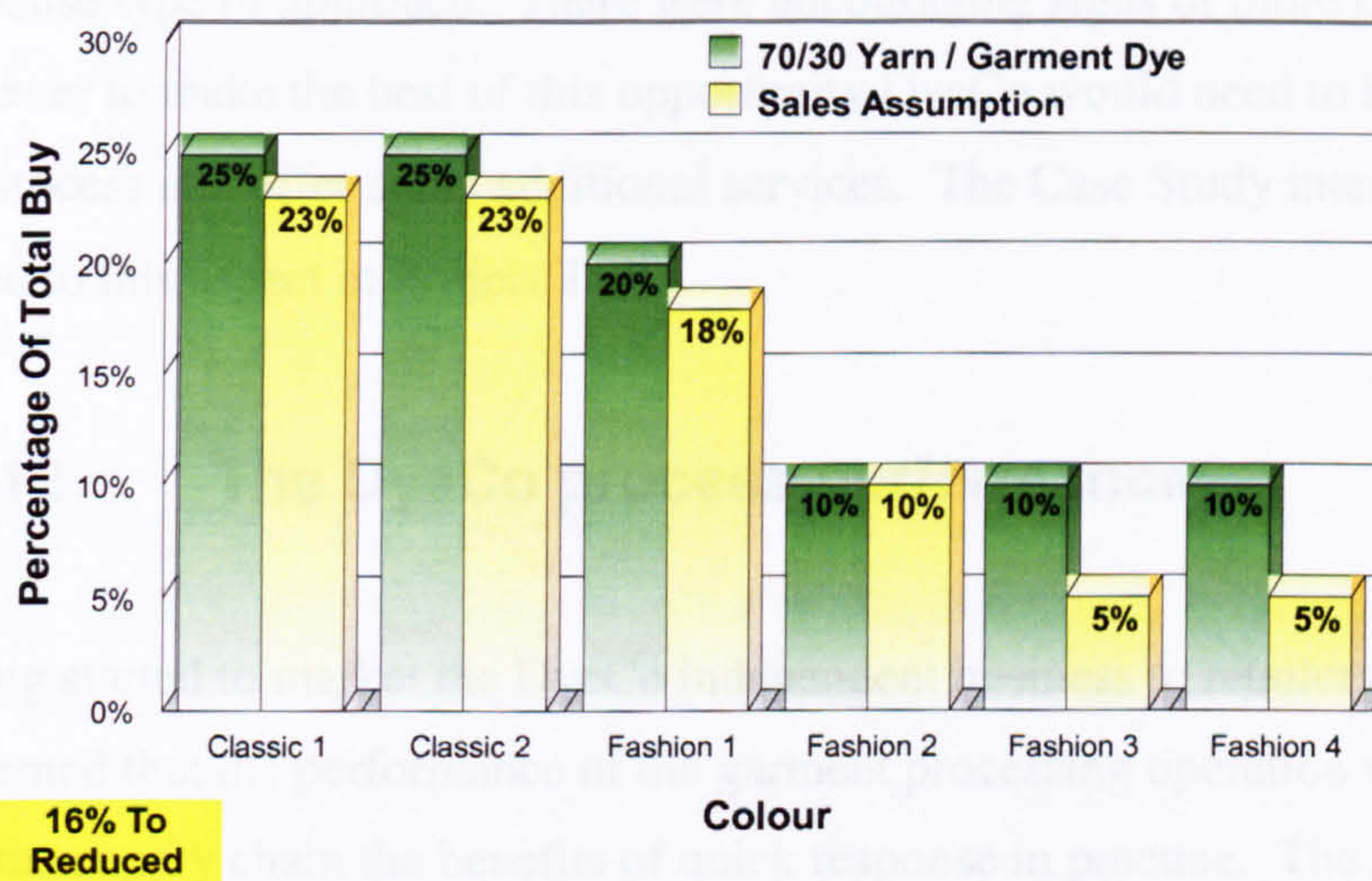


Figure 7.40: Retail Quick Response Colour Breakdown.

Once the presentation had been carried out to the major UK retailer DyeCo were able to use the store survey and cost model presentation material to market the firm to other retail supply chains. This work began to bear fruit in a short time. At a later meeting of the project team in September 2001 the DyeCo management gave details of encouraging news about a number of new potential orders and enquiries using the local garment dye route of offshore garments to offer Quick Response on colour:

- Menswear leisurewear sweatshirt tops and jogger bottoms using undyed garments manufactured in Turkey
- Ladies knitwear acrylic jumpers with garments from Poland
- Ladies knitwear cotton jumpers with garments from Cambodia and Latvia
- Ladies cotton and Lambswool jumpers from Hong Kong for the world's largest knitwear supplier with an output of 42 million pieces per annum
- Mens knitwear Lambswool slipover and Ladies Merino Wool jumpers from Turkey
- Ladies dresses from Cyprus
- Ladies knitwear cotton jumpers from China and Thailand
- Ladies Knitwear jumper from Hong Kong
- Lambswool stripe and intarsia Ladies Jumper from Turkey

Project one of the Case Studies intervention had ended with DyeCo having made some progress towards persuading the retailer that there were some merits in a Quick Response type of approach. There were encouraging signs of more offshore business. However to make the best of this opportunity DyeCo would need to have an efficient dye process and offer some additional services. The Case Study intervention project turned to this aspect in Project Two.

7.3.12 The DyeCo process performance

Having started to market the DyeCo independent business to retailers the firm were concerned that the performance of the garment processing operation was fast enough to give the supply chain the benefits of quick response in practice. The Industry Forum carried out a project to measure the performance of the product processing route at DyeCo and then implemented a trial using a Just in Time method called a Kanban.

The DyeCo Product Process Route

The main steps in the process are as follows:

Planning

Preparation

Dyeing

Testing

Drying

Trimming

Packing

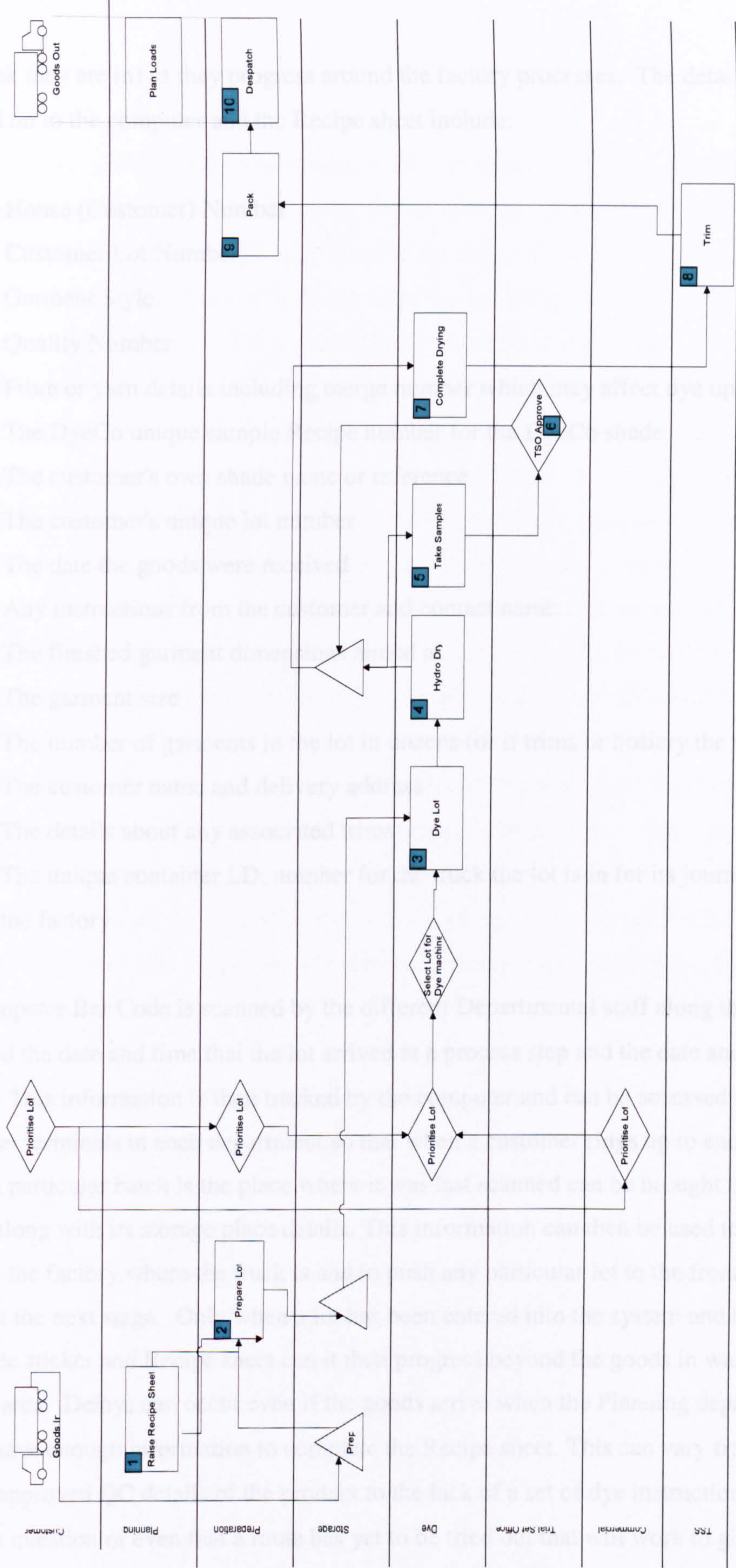
Despatch

Whilst a process map with decision points has been produced (see Figure 7.41 below), it is clear that the amount of time that an order lot spends in the system has little to do with the actual process time of for example the dye machine and more to do with the way that lots are prioritised and get stuck in the system between processes.

Planning

Planning does not mean the traditional word for organising production. This step in the process would more accurately be called Works Order Raising. Here at Planning when the customer sends in a delivery for processing [or one of the DyeCo' lorries make a daily pick up] of trucks or boxes of garments in lots of various garment sizes to be dyed various colours (or finished), these lots are entered into the Planning Computer along with information about the goods. The computer system then generates a unique Bar Code label and prints off a Works Order called a RECIPE sheet (see appendix) with a white front copy and yellow, orange, pink and blue copies for different departments. Planning get to know about an inbound delivery either from the customer who may fax the delivery note details before the shipment arrives or by the delivery note being collected and brought to the Planning department when drivers arrive with the goods. The lot details that are entered at Planning do not take long and most lots that arrive during the day have their details entered by the end of the day or early the next day. The details on the printed recipe sheet (and copies) are then attached to the goods (or at least

Figure 7.41: DyeCo Process Map



the truck they are in) as they progress around the factory processes. The details that are entered on to the computer and the Recipe sheet include:

1. House (Customer) Number
2. Customer Lot Number
3. Garment Style
4. Quality Number
5. Fibre or yarn details including merge number which may affect dye uptake
6. The DyeCo unique sample Recipe number for the DyeCo shade
7. The customer's own shade name or reference
8. The customer's unique lot number
9. The date the goods were received
10. Any instructions from the customer and contact name
11. The finished garment dimensions aimed at
12. The garment size
13. The number of garments in the lot in dozens (or if trims or hosiery the weight)
14. The customer name and delivery address
15. The details about any associated trims
16. The unique container I.D. number for the truck the lot is in for its journey round the factory

The computer Bar Code is scanned by the different Departmental staff along the factory to record the date and time that the lot arrived at a process step and the date and time it left too. This information is then tracked by the computer and can be accessed at dumb computer terminals in each department so that when a customer rings up to enquire where a particular batch is the place where it was last scanned can be brought up on the screen along with its storage place details. This information can then be used to find the place in the factory where the truck is and to push any particular lot to the front of the queue at the next stage. Only when a lot has been entered into the system and has got a Bar Code sticker and Recipe sheet can it then progress beyond the goods in warehouse storage area. Delays can occur even if the goods arrive when the Planning department do not have enough information to complete the Recipe sheet. This can vary from not having approved QC details of the product to the lack of a set of dye instructions for the shade in question or even that a route has yet to be tried out that will work to give the required shade in an initial sample garment or hose.

Preparation

This is the first added value stage in the process and largely involves counting the goods or weighing them to ensure that the customer has sent the right amount of each size that agrees with the delivery note details. Goods either arrive in trucks (owned by DyeCo) or in cartons. Once the Preparation Department get the Recipe Sheet with Bar Code sticker they can scan the Bar Code and begin the counting of the goods.

Hosiery goods of a particular size (e.g. large or medium) are generally sent in by the customer in a gauze bag where each bag has a colour coded thread running along its edge denoting the size of the hosiery in each bag. (e.g. Yellow for small). Shortages of any significance are reported and investigated and batches are usually made up of garments or hosiery that are to be dyed the same shade covering a number of trucks that will also include any trims such as collars that need to be dyed the same shade.

Counting 30 to 40 dozen knitwear garments into a truck is usually carried out by a single operator and takes about an hour. Some garments need a process before dyeing. For example for garments of thermosetting fibres such as Trevira (Polyesters) are pressed to avoid cockle to a standard size and shape with steam on a wire frame (First Press). Pressing a garment takes about 7 standard minutes per dozen. Some garments need turning inside out before they are dyed to avoid pilling. Those that need these extra turning processes are sent off to the trimming department in their trucks and return ready to be weighed and bagged prior to dyeing. Turning, Straightening and Sorting (TSS) takes one person about an hour for a lot of 30 dozen. Tidying up of trims such as collars also takes place in the Preparation Department where draw threads are snipped off. Once lots are counted they are stored awaiting bagging for garments (and weighed if necessary) which is carried out to ensure the garments can safely get through the dye process with no creasing or tangling. After bagging the lots are stored in trucks in the Pre-Dye storage area which has numbered locations that are entered into the accompanying Recipe sheet. Pre-Dye storage contains about 3 days of stock. This is a major area of queuing delay when one considers that the dye process takes 8 to 12 hours. This queue of trucks is largely brought about through the early processing of lots, the pushing of lots to the front of the queue and by the overproduction rates of Preparation compared to Dyeing.

Dyeing

Assuming that a batch of goods has a dye instruction (Recipe) for the required shade it will be dyed in date order. This short term scheduling is carried out by the use of a set of pigeon holes on a board in the Dye Office. Here the Recipe sheets are put in to a slot that corresponds to each dye machine. The shift dye supervisor and the operator of that dye machine will look in the pigeon hole to find out which lot should be dyed next on his allocated machine.

The photo (Figure 7.42) below shows a typical dye machine:

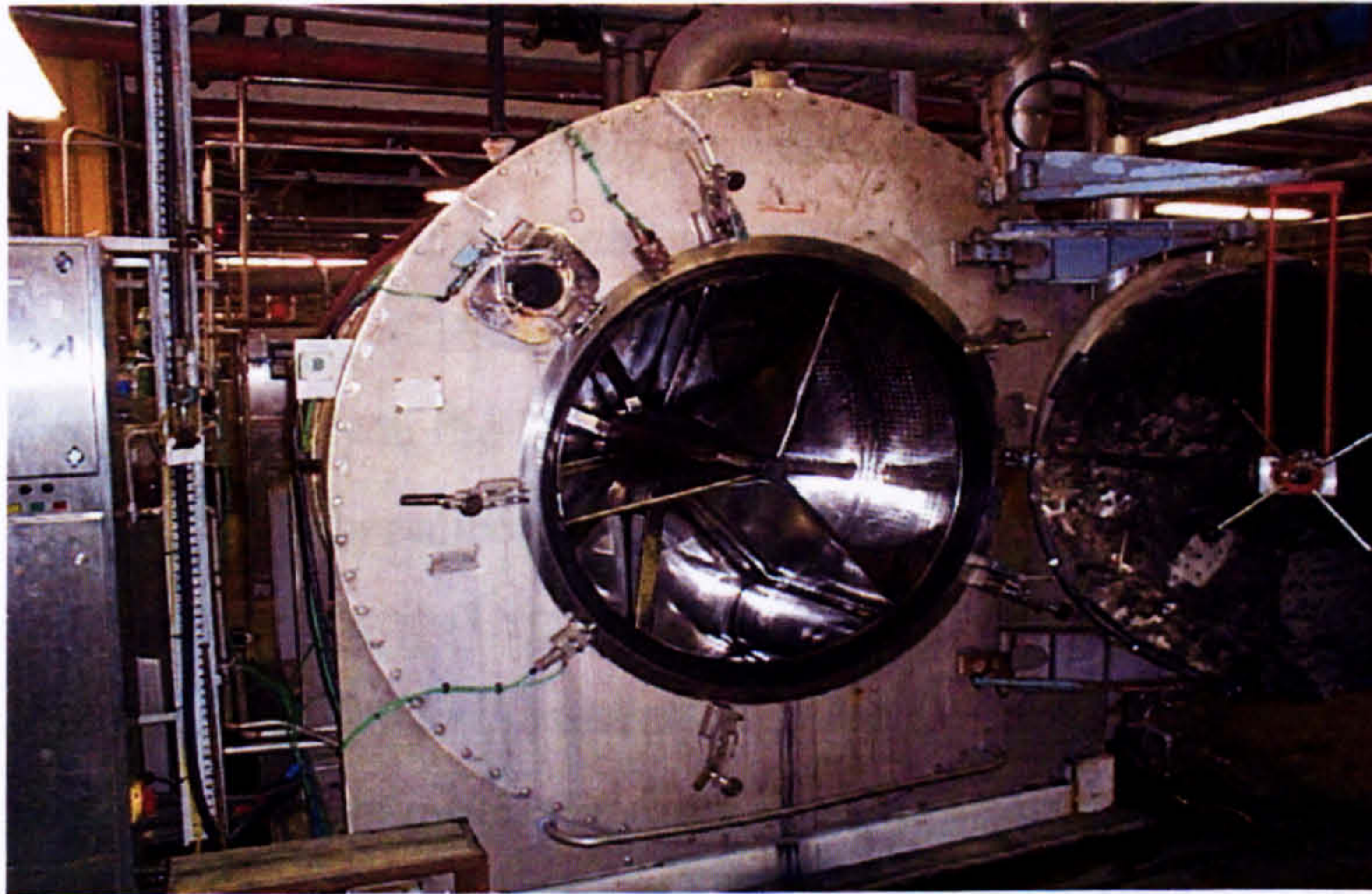


Figure 7.42: Typical Dye Machine

Dyeing Priorities

The priority of the dyeing is therefore critically dependent on the order in which the Recipe Sheets are organised in the Dye Office pigeon hole boards as shown in the photograph in Figure 7.43 below:



Figure 7.43: DyeCo Dye house Plan Board

The manager responsible for a specific area such as Hosiery will normally decide the order in which Recipe Sheets are arranged in the slots. If a customer is chasing a particular batch of Hosiery he (or she) will ring up and the batch can be progress chased through quickly at the Dyeing process by putting the Recipe Sheet for that batch the front of any other sheets in the slot. In order to highlight the urgency of the batch it is the practice to write Urgent in fluorescent highlighter on the top of the Recipe Sheet to bring the urgency to the attention of the Dyehouse. In practice the Recipe Sheets are re-organised by a number of people including commercial staff, production staff, etc. Many customers send in weekly or even daily lists of priorities and indeed are encouraged to do so. This has the effect of allowing the delivery date in to be less of a guide as to the priority for the dyehouse. The issue of delays depends to a great extent on the way the dyehouse is prioritised on a day to day basis. Dyeing is a fairly long process compared to the others and can take between 3 and 10 hours. The dye house runs three shifts on normal weekdays. In practice a long cycle time lot will not start dyeing on a Friday if will not be finished by the end of the shift. Dyers run about 4 machines each and they try to minimise cleaning by the way that colours are planned. There is no blind dyeing so the colour is checked before the end of the process and 50% of the time dye additions are made to bring the batch on shade. Re-dyes happen about 10% of the time. There may be a number of dye addition attempts made to get on shade. There is a very sophisticated automatic dye dispensing system. Usually there will have been some experience gained from the stage at which samples have been dyed in the Sample Dye lab for a customer before bulk arrives. In any case the first bulk is carefully monitored since it can provide a guide to speed future batches through.

Hydro Drying

Once dyed most batches are spun dry in the Hydro Machines. Some batches need more drying depending on the fibre type.

Take Samples

After the Hydro stage 8 garment samples are taken at random from each batch for Testing at the Trial Set Office (TSO) along with a copy of the Recipe Sheet and the bar code.

The TSO work two shifts and check the samples for level dye both within and between the samples. The shade is checked against the standard pattern at least visually in a light cabinet or instrumentally depending on the customer needs. A sample is taken for checking against previous batches and stapled to a continuity card for checking future of future batches for colour drift.

TSO Approve

Testing continues with dry rub test and wash tests for fastness. There are few delays as a consequence of the time it takes to actually carry out the tests and even the wash tests are finished within the day. Once a batch has passed the tests the Recipe Sheet Copy Bar code is scanned and the production areas can look up on the system if the batch can proceed. Once passed for colour a batch continues through the system but cannot be despatched unless it has passed all the tests. The schedule of tests depends on the specific customer. The Test Lab is accredited by the various Retailers, including BHS, M&S, Next. Some customers need copies of the test results. There are about 300 lots dyed per week. Unfortunately not all batches pass the tests and may need to be reprocessed in some way. This may mean a new dye recipe or more seriously a rethink on the whole process with sampling of the new process. The re-dye process is a cause of major delays for a few batches.

Complete Drying

Once passed by the TSO the batch can proceed to drying either in the Radio Frequency Dryer or Tunnel Oven (for Hairnets) or in a Tumble Dryer. This process takes about 1 to 2 hours.

Pressing/Trimming

Knitwear garments are pressed (trimmed) into the right shape on wire frames of the appropriate type for the garment style and size being processed. Some fibres require a First Press before dye to take cockle out. After dyeing and drying knitwear garments are pressed. This only takes a few seconds per garment.

Turning and Sorting

Some garments have to be dyed inside out and are turned before dye and again back the right way after dye. This only takes a few seconds per garment.

Packing

Packing of Hosiery is a question of putting a batch back in a truck with the sizes identified and then letting the planning office know that the batch is ready for despatch in a temporary storage area by sending the Recipe Sheet to the Planning Department.

Despatch

The planning department will make up lists of items for despatch and then the drivers will pick up the correct trucks and deliver them to the customer. The planning department make copies of the delivery note details and these used to bill the customer.

Product Process Organization

The diagram in Figure 7.41 shows the process map of how each department was involved in the processing. The main issues of the existing process was that orders were being re-prioritised on an almost hourly basis and this did not help the efficiency of the dye house or the level of stock in the system. As the diagram in Figure 7.41 shows there were a number of departments that seemed to have the ability to change the dye house priorities. Another concern was the need for DyeCo to address the issue of additional services to the process route. The changes that were made during the Case Study are briefly described in the following section.

7.3.14 DyeCo Added Services

The new offshore market required that DyeCo develop the added services required that would enable the offshore supplies of garments to arrive undyed at DyeCo and then be dyed and made ready for delivery direct to the retailer. The additional stages added by DyeCo were:

Mending

Minor fabric faults such as holes or seams that needed mending were attended to by a sewing machinist.

Examination

Garments were examined for quality, so that any faulty products could be returned to the garment manufacturer.

Kimball (Store Security Tag)

Attachment of the special security tags that will set off an alarm at the door of a retail store. This deters theft.

Label Sewing

White Labels such as the Next or St Michael Brand and Size neck label and the side seam Care Label needed to be sewn in after dyeing otherwise they would be dyed the same shade as the garment.

Hanging

Garments were put on the correct size labelled coat hangar and stored on rails for delivery to the Distribution Centre.

Bagging and Sealing

Hung garments were sealed in a polythene bag for protection during transit.

The new services added a significant cost and income stream to the DyeCo basic dyeing operation. Where the dye only route cost about £21 per dozen garments (where for example a garment weighed 6 kilos per dozen) the added services cost £18 per dozen. The Case Study Intervention was more concerned with the performance of the DyeCo Dye processing within the supply chain. In particular the main concern was the time that it took to process garments. The intervention study findings regarding performance are summarised below.

The Process Performance

The process mapping and performance measurement led to the collection of data about the way the business performed in terms of Quick Response. Whilst DyeCo gave a TURN ROUND (Lead Time) of 8 to 10 days to customers the actual time was longer for many batches. The charts below (Figure 7.44 and 7.45) show a typical distribution of Lead Times.

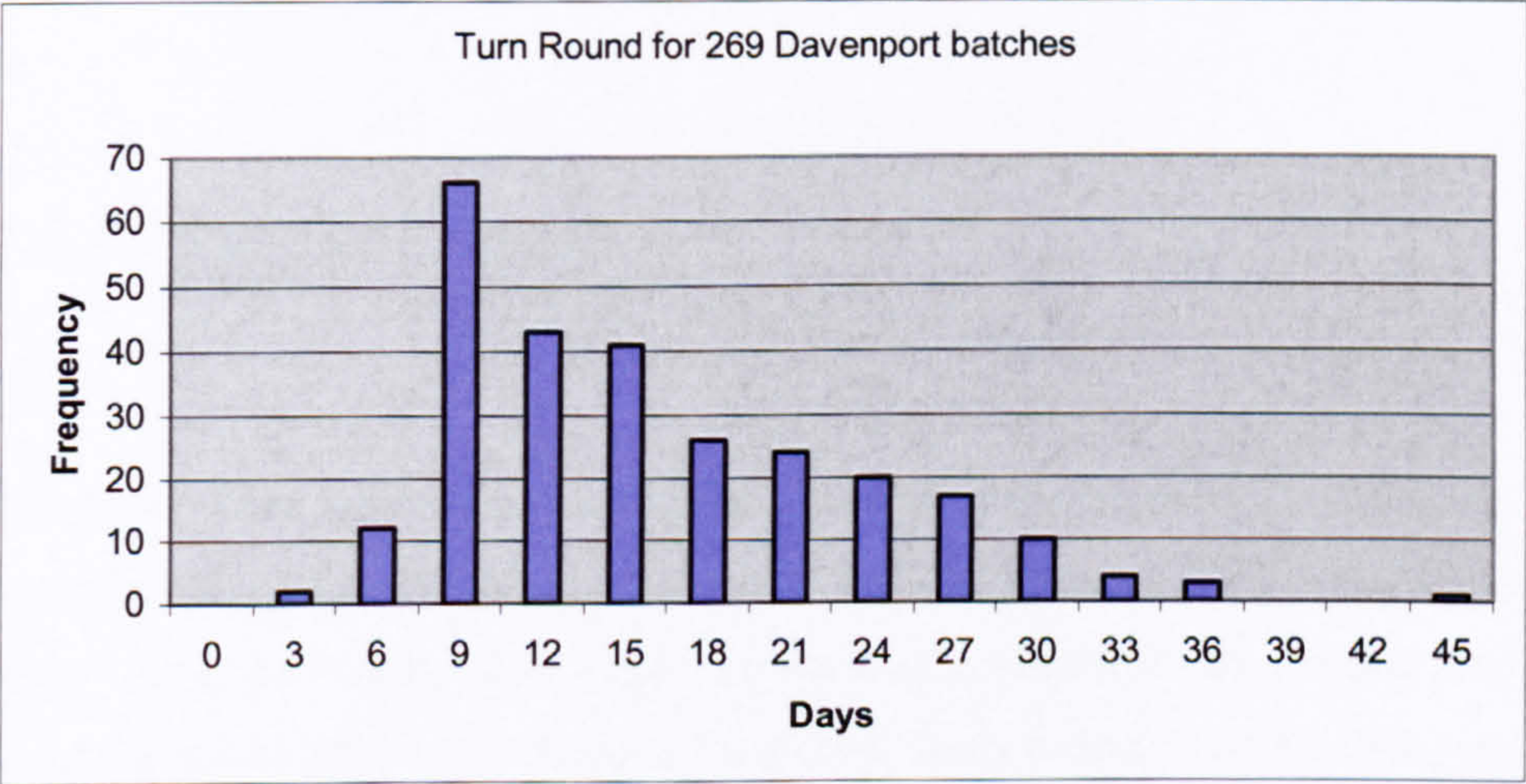


Figure 7.44: DyeCo Lead Times I

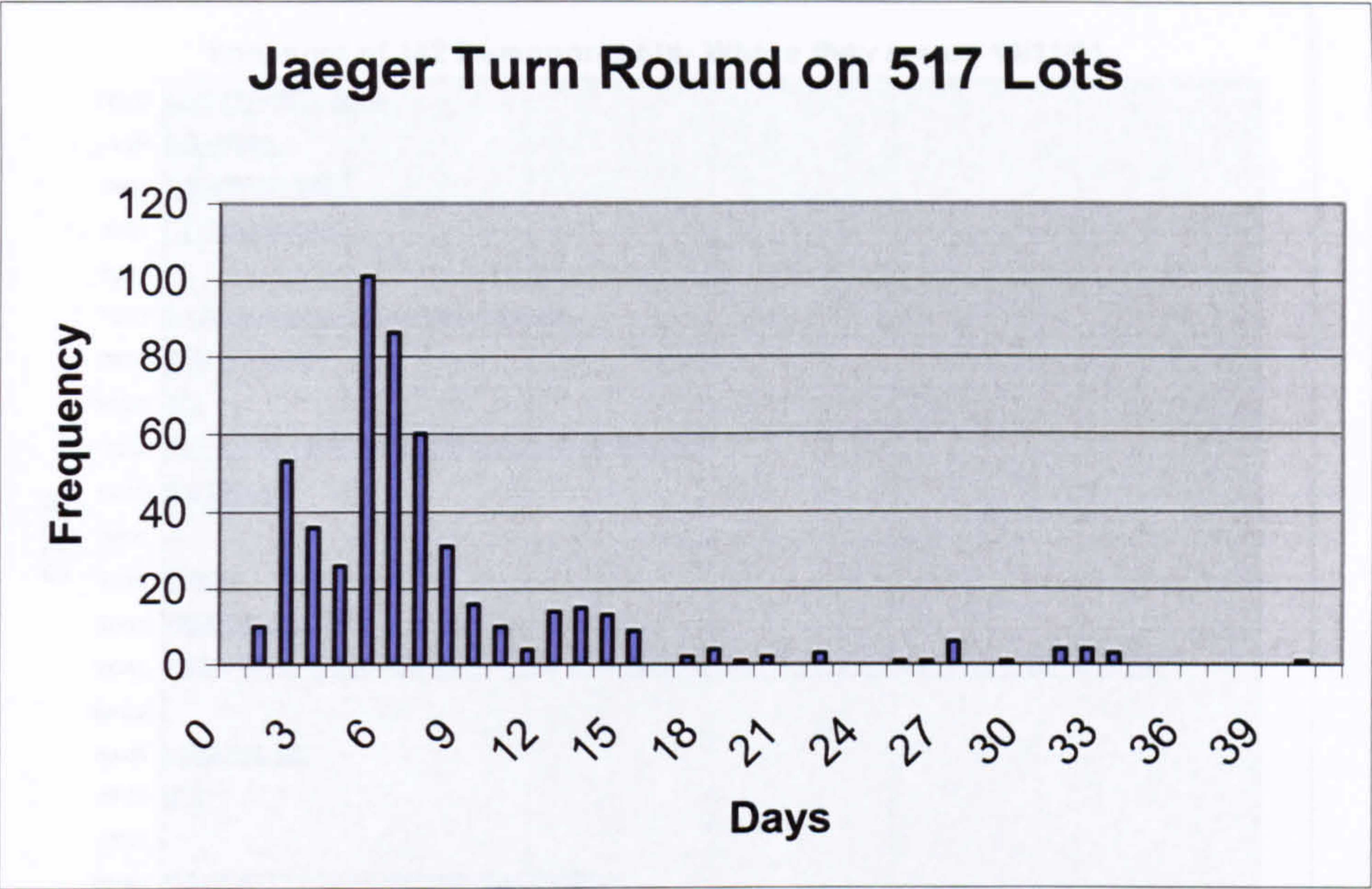


Figure 7.45: DyeCo Lead Times II

The organisation of a First In First Out system was not working since (as the process chart shows) there were various departments that could change priorities. In addition there was too much stock waiting in the system. The peaks areas are shown below in the chart in Figure 7.46 below:

The SKAL area is the warehouse holding area in front of the Dyeing process.

7.3.15 Kanban Project

The Case Study intervention instigated a new system of Just in Time Kanban manufacturing on a trial basis for some Marks and Spencer Menswear Rugby Shirts that were knitted in Turkey. The whole project Kanban background, method and results were communicated to DyeCo in a final Case Study report. The Kanban system involved the Dye House calling on the preparation area only when it needed more stock to keep the dye machines busy. This was a change from the earlier system where the Preparation area sent batches when it had prepared them. A card is used to call stock from the previous process, i.e. Preparation. The photo in Figure 7.47 below shows how the Kanban Cards were used to identify lots in the Dye House.

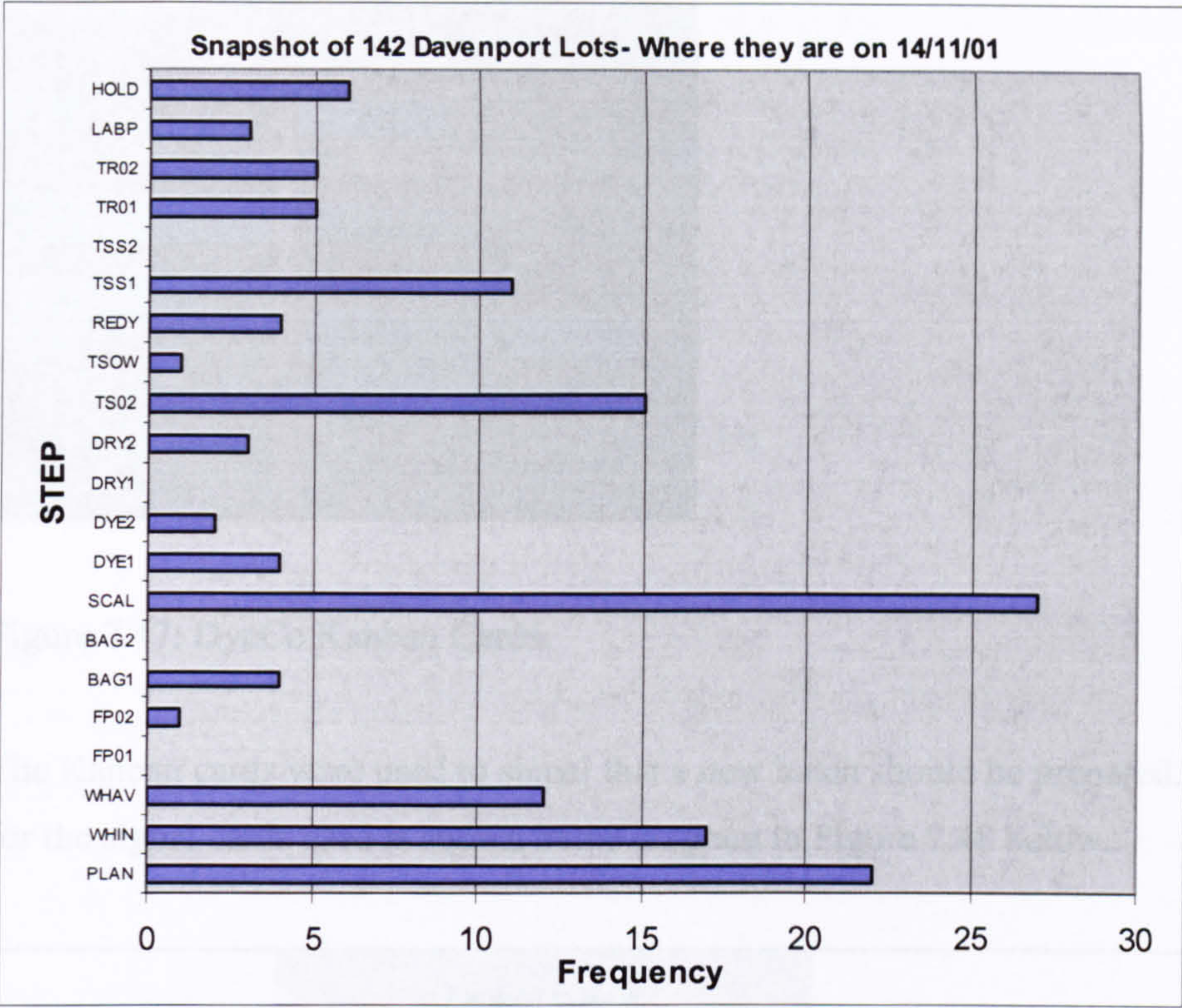


Figure 7.46: DyeCo Inventory Bottlenecks

The SCAL area is the warehouse holding area in front of the Dyeing process.

7.3.15 Kanban Project

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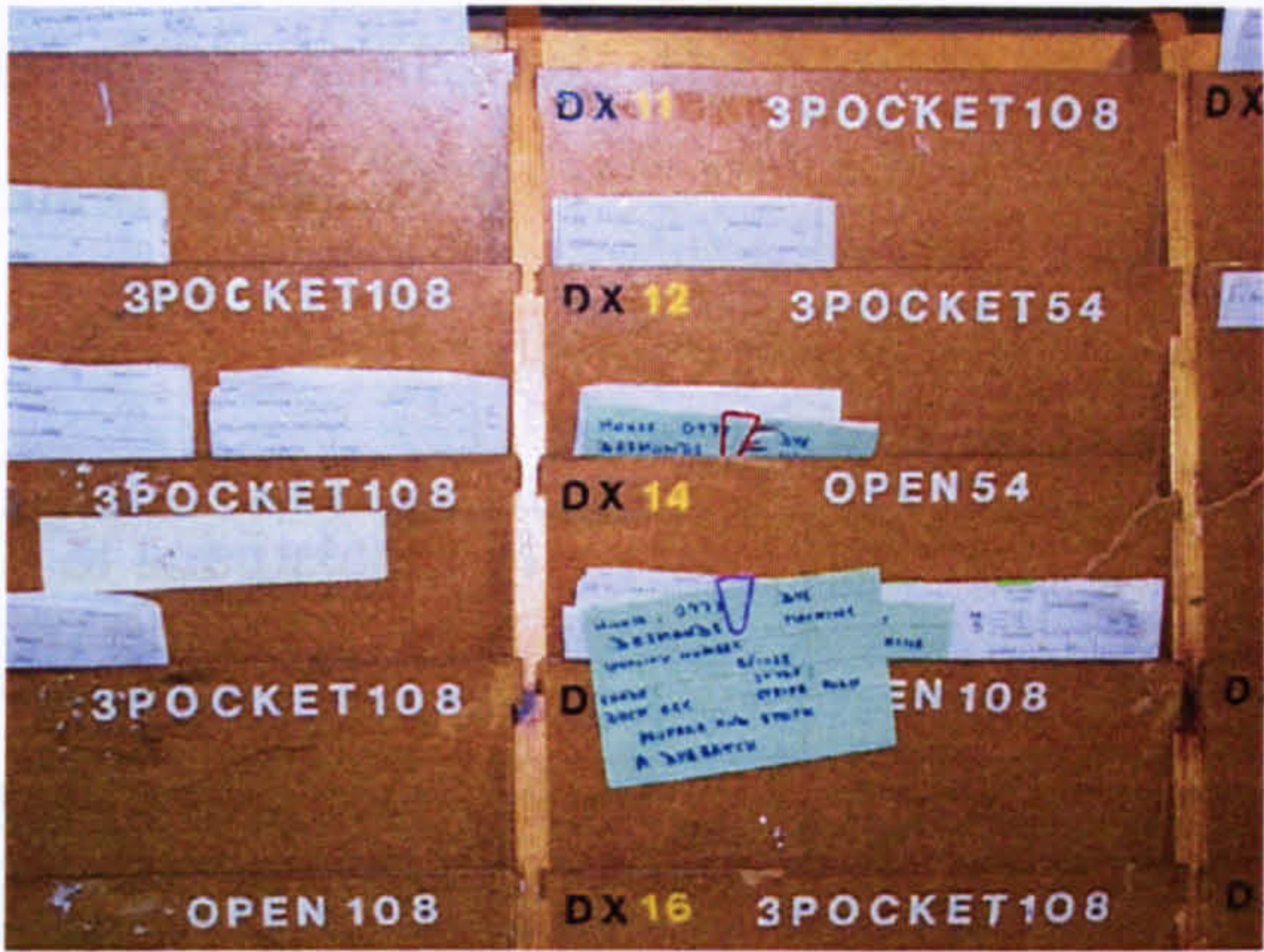


Figure 7.47: DyeCo Kanban Cards.

The Kanban cards were used to signal that a new batch should be prepared. The scheme for the signal cards used is shown in the diagram in Figure 7.48 below.

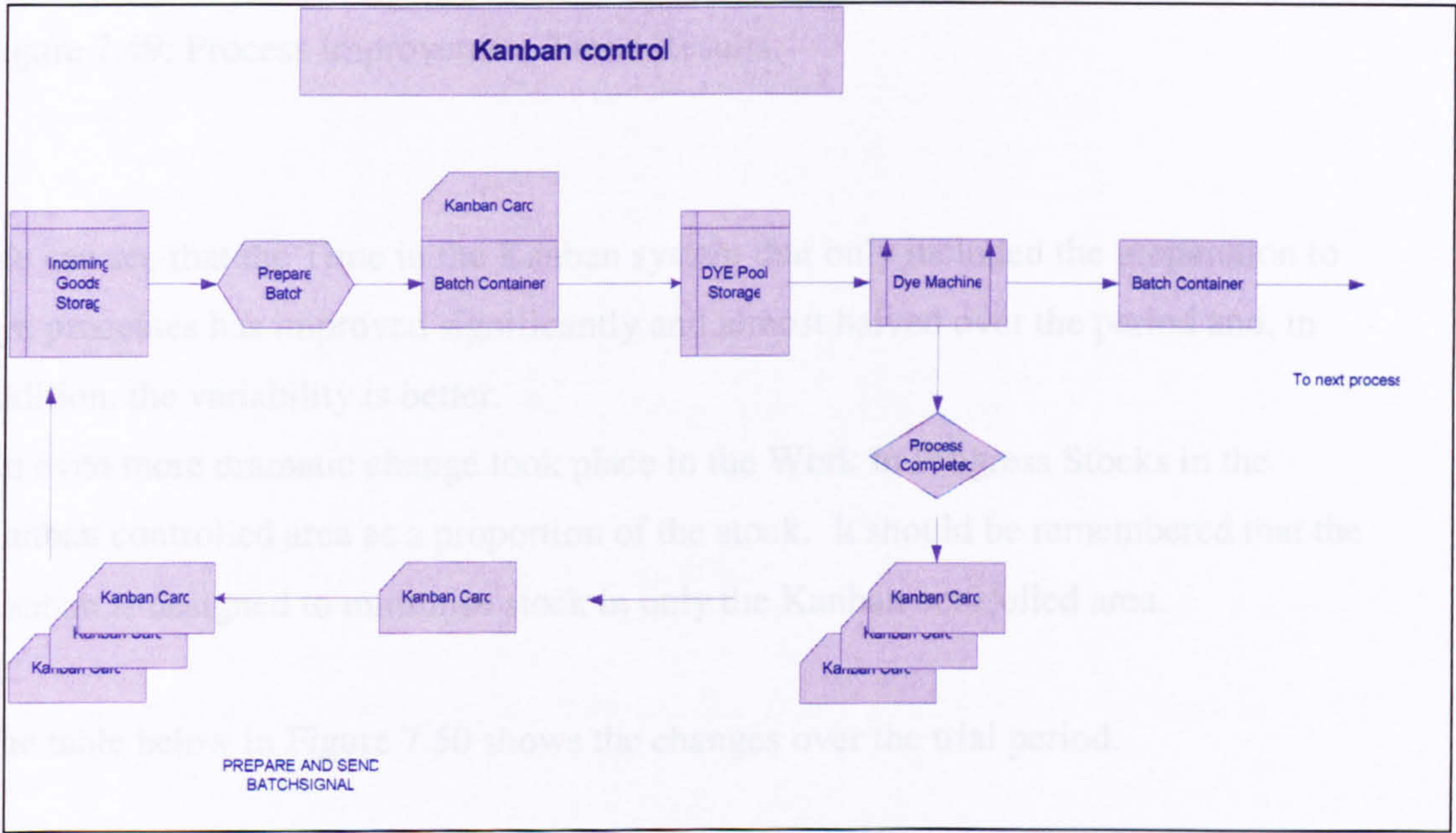


Figure 7.48: DyeCo Kanban Control Schematic

Process Improvement Results

The Kanban Trial had a significant effect on the time in the process and the Work In Progress stock levels on the retailer’s orders. The table below in Figure 7.49 shows the improvement in lead time as the system was examined each month. The pre Kanban

period was April 2002. The Kanban started in May and was refined and improved in June and July 2002.

No of sub batches in sample→	41	41	31	52
Month →	April	May	June	July
Time arrival to complete dye	9.95	5.29	5.71	5.02
Standard Deviation	6.27	6.60	3.1	2.05
Minimum Turn Round Days	2	0	1	1
Maximum Turn Round Days	26	40	13	8

Figure 7.49: Process Improvement Trend Results.

We can see that the Time in the Kanban system that only included the preparation to dye processes has improved significantly and almost halved over the period and, in addition, the variability is better.

An even more dramatic change took place in the Work In Progress Stocks in the Kanban controlled area as a proportion of the stock. It should be remembered that the Kanban is designed to minimise stock in only the Kanban controlled area.

The table below in Figure 7.50 shows the changes over the trial period.

Date→	18 th April	22 nd May	13 th June	27 th June	4 th July	9 th July	13 th August
	Number of sub batches at position						
Position in process							
PLANNED	20	23	1	10	4	0	30
W/H WAITING FOR PREP	0	80	59	1	28	12	0
W/H PREP COMPLETE	12	20	0	0	0	0	1
DYEHOUSE/ POOL STOCK	39	12	12	0	4	3	8
WORK IN DYE	4	8	0	0	4	4	1
WORK DRYED	2	8	0	0	1	0	0
OUT OF DRY	8	1	5	0	0	0	2
TSO PASSED	4	46	61	85	86	68	123
ON HOLD	0	0	1	0	0	0	0
TOTAL	89	116	139	96	127	87	165
WIP BETWEEN KANBAN STAGES	55	22	12	0	8	7	10
% OF TOTAL WIP	61%	19%	9%	0%	6%	6%	6%

Figure 7.50: DyeCo Kanban Inventory Reduction.

The amount of stock in the Kanban controlled area fell from 61% of the work in progress to only 6%.

Future

It is worth noting that the Kanban was designed only to prove that a Just In Time system could work on a small scale. The Case Study intervention process used to implement the Kanban was written up in to a report that was submitted to DyeCo and this would allow the firm to expand the Kanban system in future.

7.4 FibreCo Case Study Findings

"The results of this project have exceeded our expectations, but the real value has been that we have also learned how to do it. Identifying the delighters in our product leads to a much better understanding of its value"

Fabric Development Manager, FibreCo, 2002

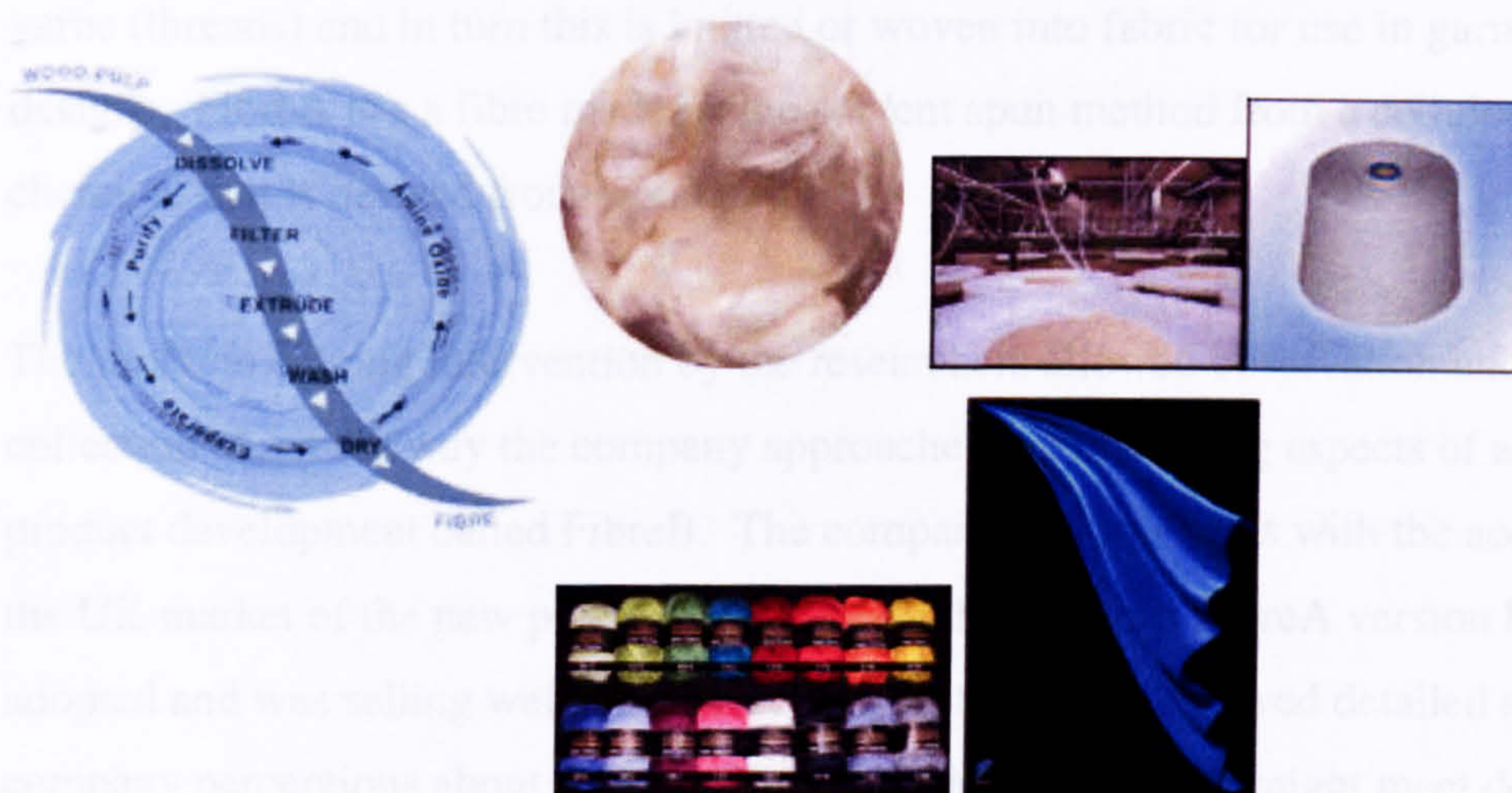


Figure 7.51: FibreCo supply chain products. Source: Google, 2004.

FibreCo products have a long journey in various supply chains before they reach the consumer (Figure 7.51). Starting with wood pulp and the chemical production extrusion process a series of transformations take place first into staple fibre, then into yarn, fabrics and garments before the retailer sells the clothes in stores. Understanding exactly what the consumer attributes to the fibre when purchasing a garment helps the fibre producer to focus marketing efforts to meeting consumer needs.

The discussion below concerns the base data collection methods and findings for the Industry Forum project intervention at FibreCo:

- The organizational situation encountered during the research
- The real world problem the organization wanted solving
- The problem solving intervention
- An account of the data gathering for the problem intervention

The I.F. project took place at a firm positioned at the start of the Textile and Clothing Supply Chain, at FibreCo who manufacture and market staple and continuous filament fibres. FibreCo Head Office was situated in the Midlands. FibreCo is part of larger fibre group who are the world's largest dedicated producer of man-made fibres. The group was recently sold to an investment trust for \$877 million. FibreCo are at the start of the textile and clothing supply chain. Spinners process FibreCo staple fibre into yarns (threads) and in turn this is knitted or woven into fabric for use in garment designs. FibreA is a fibre made by the solvent spun method from a cellulose base chemical that is derived from wood pulp.

The problem solving intervention by the researchers allowed observation and data collection about the way the company approached the marketing aspects of a new product development called FibreB. The company had problems with the acceptance in the UK market of the new product even though the previous FibreA version had been adopted and was selling well worldwide. The intervention allowed detailed study of the company perceptions about the new FibreB product and how it might meet downstream supply chain customer needs including those of consumers. The intervention also included market research and examined consumer attitudes to garment properties that can be met by fibre attributes. The general new product development process at FibreCo has been described by an earlier researcher and this unpublished information; together with the data collected during the current intervention allowed a description of the start of the UK Textile and Clothing Supply Chain to be developed and comparisons can then be made with the NPD research literature findings. The FibreCo Head Office is based in the Midlands and there are manufacturing plants in the North East and in Texas. The company was originally a spin off from a UK company fibre division. The Company's work on new fibres led to the development of a totally new fibre code named Genesis. This fibre had unique properties that did not exist in any other products anywhere in the world. After pilot plant development the fibre was renamed FibreA and new fibre plants were built to manufacture the new fibre in bulk in the USA and in the UK. Worldwide success for FibreA followed and it marketed through the world

through regional sales offices. In total world fibre consumption terms the share of FibreA in the market is currently very small at less than 1%. There is therefore in theory a great deal of scope for market penetration of new product from FibreCo.

FibreCo have recently developed a new version of FibreA, referred to here as FibreB. The new fibre is quite different to the standard FibreA product in many respects and customers in the Textile and Clothing Supply Chain have yet to adopt the new fibre in commercial quantities.

World Fibre production in 2000 was 57.7 million tonnes (International Fibre Journal, 2001). The world is steadily using more fibre. Comparing the year 2000 with 1995 the world consumption of fibre rose from 8.5kg per head to 9.5 kg per head. There are more people in the world as populations grow. There are now 6.08 billion people in the world, up from 5.69 billion in 1995. Natural fibres have been static in production terms at 22 million tonnes p.a. since 1980. Around this time man made fibres production overtook natural fibres and have now reached 35 million tonnes p.a.

This growth in textile fibre consumption is possible due to increases in the production of man made fibres to supplement the natural cotton, wool, silk, flax, hemp, jute, sisal and coir fibres. The main generic man made fibres are polyester (with half the market), acrylic, polypropylene, and cellulosic.

7.4.1 The FibreCo Problem Situation

FibreCo management were concerned about the poor level of adoption of the new product FibreA. The company confessed to not understanding the reasons for the poor adoption. The Industry Forum research team, were asked to assist in improving the level of understanding with a view to using the information to improve the adoption of FibreB by a UK retailer. A number of meetings were held with FibreCo staff and the Industry Forum research staff to explore the general problem and define it. Following these exploratory meetings a formal proposal (IF, 2001a) was submitted to the FibreCo project leader Tom. The proposal set out a plan of activities that would be carried out. At this stage the emphasis was on a workshop based programme within FibreCo to establish perceptions of the issues. In addition a proposed questionnaire would be developed to ascertain the needs of consumers.

Planning the problem solving activity

The proposal sent to FibreCo set out the following plan of activities with timings in 2001:

June/July Fact Finding

- Industry Forum team to carry out preliminary work on gathering information about FibreA and use this to compile a company workshop set of activities and consumer questionnaires.

July/August Understanding customer requirements workshops

- Two workshops centred upon building a collective understanding of the key attributes of FibreB.

July Develop Customer Focussed Questionnaire

- The research team would design and develop a questionnaire to hear the ‘voice of the customer’.

August Administer Customer Survey

- The research team to administer the questionnaires.

September Review Meeting

- Research team to analyse the results of the questionnaire and present findings to the FibreCo project team.

The intervention activity and findings are discussed in a later section below.

7.4.2 The Base Data Gathering Process

Gathering data regarding the current NPD practices and performance in the company involved the following methods

- Site Visits to FibreCo
- Site visit to KnitwearCo
- Interviews
- Site Workshop discussions
- Site Workshop activities results
- Internet searching
- Artefact examination of fabrics and garments
- Market Research Questionnaire administration and analysis

- Archive record examination of unpublished research

Data Collection Methods in Practice

This section discusses how various data collection aspects were addressed including site access, informants and respondents, detailed data collection types and methods and summaries of the data collected.

Site Visits

As discussed above the researchers presented a formal proposal document to FibreCo management that was then accepted. This proposal for working on the FibreCo problem solving project allowed access to the sites and staff involved, including FibreCo Sales Office in London and FibreCo Head Office.

Informants and Respondents

The proposal for improvement of the marketing of FibreB involved interviews with the following staff at the sites mentioned below:

Sales Office London

Technical Director

Head Office

Technical Director

Technical Services Manager

Retail Account Manger)

Dyeing and Finishing Development Manager

Knits Development Manager

Data Collection Types and Methods

Internet search

An internet search was used to gather information about the existing perceptions of downstream supply chain customers of the existing and new FibreCo products.

Workshops

The main data collection method with the respondents was through the use of participatory workshops with the FibreCo project team. The project described in the proposal took place over a period of several months in 2001. After initial meetings and interviews with FibreCo staff there followed a reconnaissance by the researcher using a desk based Internet search. Further discussions took place with the senior management to agree the timing of a number of project team workshops.

The workshops involved:

- Formal presentations of the research data investigation results
- Project team activities that captured the project team perceptions
 - Downstream customer needs
 - FibreB product attributes
- Broad Mapping of FibreB attributes
 - Customer satisfaction
 - Product performance
- Questionnaire on product attributes and satisfaction
- Guided discussion about
 - the project activities
 - Current marketing and development activities
 - Development fabrics and garments
 - Development partners such as KnitwearCo
- Presentation by FibreCo development staff about development activities
- Feedback of consumer market research results to FibreCo

The workshop data was captured using various methods of a semi-structured nature.

The workshops started with a presentation by the researchers about market focus aspects of NPD. The project team were then involved in activities that tested their perceptions

about the FibreB product. The perceptions were gathered on activity forms, on flip charts and in notes taken by the researchers. The results of group discussions were also recorded on flip charts. Each workshop was summarised in a written visit report that was circulated to the project team. Questionnaire results from project team workshop respondents were recorded on forms and the group results recorded on flip charts.

7.4.3 FibreCo Site Visit Notes Example

The example below shows an example of the feedback notes circulated to the FibreCo project manager. The example covers one of the workshop sessions.

<div><div><div>Industry Forum</div></div><div>Improving the textile & clothing supply chain from concept to customer</div></div>	
Meeting with	Fabric Development manager Knits Development manager Retail Account manager Dyeing and Finishing Development manager
IF Team Members	Research Fellow, Cranfield University Research Fellow, Salford University Research Assistant, Cranfield
Location:	FibreCo Head Office
Focus of Workshop	Project Start-up

Agenda Items:

- Introduction by Fabric Development manager
- Group Activity led by Research Fellow 'What are Stakeholders looking for'
- Presentation 'Tools & Techniques for Product Development & Market development'
- Individual Activity 'Using the KANO model to understand Customer requirements'
- Feedback to rest of group
- Presentation 'Separating NPD winners from losers'

Objectives:

To improve the adoption rate of FibreB through encouraging current Knitwear fabric/garment developments into volume commercial applications in the UK.

Introduction:

Tom envisaged that the workshop activity would result in a collective understanding of what FibreCo products, specifically FibreB into knits, have to offer and correlate this understanding to the customer's perceptions of FibreB. Taking forward a project that would enable the team to focus on getting the FibreB into knits and to influence the market in the UK. FibreCo have approached a number of companies already regarding the adoption of FibreB into knitwear, but they believe that the message is not being understood. Tools & techniques supplied by the I.F. are to be adopted in order for the team to gain a different perspective, which in turn can be used to approach other partners in the IF, e.g. KnitwearCo.

FibreCo see the outcome of this workshop as a guide into helping them make the decision of whom they are going to approach to work with, build upon a more thorough understanding of what the customer wants, resulting in visibility for the product at the right time.

Activity _01 'What are the Stakeholders looking for'

Using the form provided each member of the team was asked to list the specific needs of each of the downstream customers that could be satisfied by the product they buy. They were asked to fill in the needs in relation to a generic product e.g. Yarn, knitted fabric or golf shirt. Each team member was asked to feedback to the group in order to identify the key needs for each category.

Listed below (Figure 7.52) are the key needs identified by the team for a retailer.

Needs	<i>Retailer</i>
Purpose	Generate profit Garment that will sell at right price Product fits with the overall image of the retailer stock in store appealing to their customer base Trouble free supply chain To be seen to innovate- keep one step ahead of the competition
Physical	No returns - minimum returns No display problems- arrive ready to display Looks good in store Meets performance specs Fit for purpose- what they thought they wanted Absorbency- moisture handling
Cognitive	Understand specific requirements of garment Understand features & how to sell it - communication issue Value for money understand properties of raw material- part of selling point Trying to meet consumer need
Aesthetics	Appeal to customers Distinction on shop floor meets the anticipated need/ purchase criteria Colour Brand Consistency in colour & handle so consumer doesn't see wide variation
Emotional	Feel that the garment fits their house style & image Feel good factor' solid sales generating customer loyalty Trust in suppliers

Figure 7.52: FibreCo Customer Needs.

Following the first activity Annette gave an overview of some of the tools and techniques used for product & market development and introduced the KANO model. This presentation forms the basis of the two following activities.

Activity_02 ‘What advantage does our new FibreB have?’

Using the form provided each member of the team were asked to individually to decide where FibreB scores better or worse for product attributes against the other fibres where appropriate (Using a score of 9 for the best, 3 for the middle range & 1 for worst). The team was also asked to add any new features/attributes if they knew of any & score accordingly.

Feedback of the key advantages of FibreB was presented to the group.

The team felt that FibreB scored highly for the following attributes, giving it an advantage over the other fibres evaluated.

Depth of colour

Fluidity & movement

Easy colouring

High wet & dry break strength

Moisture absorbency

Superior dye uptake & retention

Laundering- better on colour fastness & pilling

Luxury handle

Natural in origin

‘Completely bio-degradable

Value for money

Doesn’t shrink

Activity_03 ‘Fitting FibreB’s Features to a Kano Model’

Thinking specifically of FibreB into Knits the team was asked to map the above attributes onto a KANO model (Figure 7.53) to identify which product features fit into the three distinct categories of *must-be attributes*, *linear attributes* & *delighter attributes*.

<i>Must-be attributes</i>	<i>Linear attributes</i>	<i>Delighted attributes</i>
Doesn't shrink Moisture absorbency Excellent laundering	natural in origin easy to dye value for money	Depth of colour superior uptake & retention completely bio-degradable Luxury handle

Figure 7.53: FibreCo Kano Mapping.

Interestingly the four ‘delighter’ functions are the features of FibreA that have been used previously to promote the FibreB.

Next Steps

Very positive feedback on workshop content and structure, providing to date a better analysis of the attributes of FibreB. Some concerns raised that the story of the package is recognised, - but how do they really get the message across to their customers & to what extent do they believe their customers will arrive at the same conclusions. The IF proposes to draft a KANO questionnaire based on some of the key attributes highlighted above. FibreCo are to determine which of the partners of the IF they would like us to approach by the next meeting, scheduled for 18/12/01. Caroline to present current product promotional tools at this meeting.

Other Activities for Exploration

- IF team to put forward a proposal to run focus groups aimed at understanding the voice of the consumer.

- IF to review the potential use of REPORATORY GRID analysis in order to clarify product differentiation
- Determine correlation between attributes and adoption in Business to Business environment.

Appendices to visit report

1. Activity 1 Form
2. Activity 2 Form
3. Activity 3 Form
4. Kano Chart (Figure 7.57.)

Activity1

Activity: Buyers Needs

Synthesised Stakeholder Needs

Individually spend the next 15 minutes filling in the forms (Figures 7.57, 7.58 & 7.59) below. Write in each box what you think are the possible needs of each of the Stakeholders in the product they buy.

Fill in the needs for different stakeholders in relation to products from the following stakeholders:

- ☐ Fabrics Inc who dye and finish Knitted Fabric in their own dye facility.
Product they buy is Yarn that they have knitted on commission.
- ☐ GolfCo who make and sell cut and sew golf shirts. Product they buy is dyed Knitted Fabric.
- ☐ M'n'S who are a retail seller of Golf Shirts. Product they buy is Knitted Shirt.
- ☐ You. A consumer who plays golf and wants to buy a golf shirt. Product you buy is a golf shirt.

Fill in the boxes of needs in relation to a generic product e.g. Yarn, Knitted Fabric or Golf Shirt made from any fibre or mix.

User-→	Fabrics In Knitting and Dyeing	GolfCo Sewing, logo print and Embroidery	M'n'S Retailer	You Golfer
Needs				
Purpose	e.g. Raw material for fabric production			e.g. Keeps body and arms warm and dry
Physical	e.g. Strong enough to knit with low end breaks and few holes to mend			e.g. Does not shrink
Cognitive				e.g. Understand care label instructions on how to wash correctly
Aesthetics	e.g. Soft garment required			e.g. Design or colour is appealing
Emotional	e.g. Feel comfortable in knowledge about how to process the yarn and fabric easily			e.g. Feel stylish in company of other players on the course or in the clubhouse

Figure 7.54: FibreCo Stakeholder Needs.

Activity 2: Please rate FibreB against the other Fibres in terms of attributes.

Product Attributes	Fibre B	Cotton	Modal	Wool
100% natural cellulose				
Moisture absorbing				
High dry and wet breaking strength				
Low shrinkage during finishing and washing				
Completely biodegradable				
Circular cross sections and a smooth fibre surface				
Easy colouring using traditional cellulosic dyestuffs				
Natural in origin				
Depth of colour				
Softness and drape				
Pronounced stitch definition in knits				
Luxurious handle				
Fluidity and movement				
Breathability and comfort				
Discrete lustre				
Durable				
Garments machine washable				
Suppleness				
Excellent laundering performance				
High burst strength in knits				
Superior dye uptake and retention				
High tear strength in wovens				
Retention of 3D character in wash and wear				
Full soft handle				
Deep clear colour				
Excellent print definition				
Durable garment pressing				
Fibrillation free fabric surface				
Fabrics for garment processing				
Piece dyed fabrics				
Yam dyed fabrics				
Price				
Availability				
Reliability				
Conformance				
Serviceability				
Durability				
Aesthetics				
Performance				
Other Features				

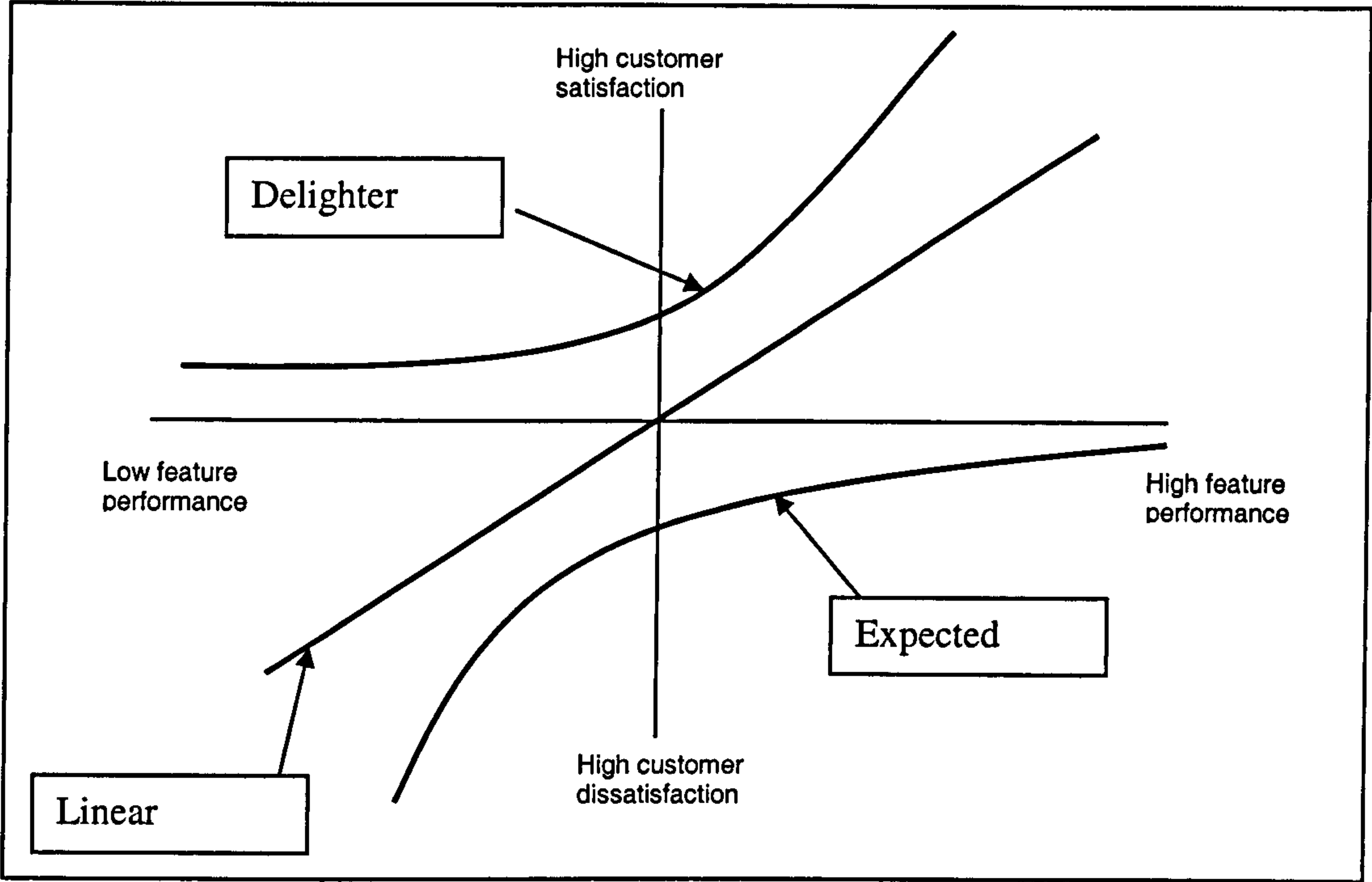
Figure 7.55: FibreCo Competitor Comparison.

Activity 3: Please place the FibreB attributes against the three Kano Model Choices with particular reference to the knits market.

Fibre B	Must Be	Linear Quality	Delighter
100% natural cellulose			
Moisture absorbing			
High dry and wet breaking strength			
Low shrinkage during finishing and washing			
Completely biodegradable			
Circular cross sections and a smooth fibre surface			
Easy colouring using traditional cellulosic dyestuffs			
Natural in origin			
Depth of colour			
Softness and drape			
Pronounced stitch definition in knits			
Luxurious handle			
Fluidity and movement			
Breathability and comfort			
Discrete lustre			
Durable			
Garments machine washable			
Suppleness			
Excellent laundering performance			
High burst strength in knits			
Superior dye uptake and retention			
High tear strength in wovens			
Retention of 3D character in wash and wear			
Full soft handle			
Deep clear colour			
Excellent print definition			
Durable garment pressing			
Fibrillation free fabric surface			
Fabrics for garment processing			
Piece dyed fabrics			
Yam dyed fabrics			
Price			
Availability			
Reliability			
Conformance			
Serviceability			
Durability			
Aesthetics			
Performance			

Figure 7.56: FibreCo Product Attribute Mapping

Figure 7.57: Kano Chart



Market Research

The study also involved a market research pilot study capturing the opinions about clothing attributes of a small convenience sample of consumers. Questionnaires forms were distributed to 30 administrative and research staff at two universities. Responses were available and collected from half those staff and the data entered into an Excel spreadsheet for analysis and then mapped on to the Kano Model (Figure 7.57). Notes were taken of all meetings and these were summarised and issued to FibreCo.

Supply Chain Manufacturers

An interview took place at a target knitwear manufacturer (KnitwearCo) to investigate existing opinions about the brand and to organise a trial of the new product Development alongside competing products. An interview took place at a target knitwear dyer (DyeCo) to investigate the possibility of developing the FibreB product as a garment dyed product.

Management Review

A FibreCo management project review took place and the findings of the project intervention including consumer market research were presented by the researchers.

Documentation

Documents collected included:

Exploratory discussion meetings minutes circulated by the researcher to the management

Project proposal

Website HTML files for supply chain product users

Workshop activity forms and flipcharts

- Supply Chain Stakeholder needs

- Product competitive advantages and attributes

- Mapping product attributes to customer satisfaction

- Mapping Customer needs to products attributes

Emails from FibreCo

Emails to FibreCo

Workshop notes

Questionnaire responses from FibreCo project team

Questionnaire responses from consumer pilot study

FibreCo presentation at Industry Forum Annual Conference

Archive Material

Unpublished Salford University research document on FibreCo development

NPD chart

NPD activity timetable

Observations

Observations took place at the workshops about project team discussions and activities. Observations also took place at the FibreCo Workshops of the FibreCo Product Development Presentation. The recording method used was through researcher's notes.

Artefact Examination

Garments constructed using FibreA and FibreB

Fabrics constructed using FibreA and FibreB

FibreCo promotional material booklets

Management Reports and Presentations

In addition to the site visit reports a Workshop was held with the project team and a FibreCo senior manager where the results of the intervention process and consumer research were presented. The FibreCo Project Team champion gave a presentation at the Industry Forum Annual Conference.

7.4.4 Relevance of the Data Collection to the research questions

The FibreCo Case Study intervention offered good levels of data collection about the opinions of the management of the company about the market focus aspects of the New Product Development process. In addition the web sites of downstream users were analysed and finally consumer market research was carried out to determine the general product attributes that consumers valued. An overall view of the methods used for NPD has been produced with an emphasis on the way that developers can fit the needs of a supply chain and consumers.

7.4.5 Intervention Project Findings

This Case Study has largely concerned examining the different ‘voices’ in the supply chain concerned with the production and use of FibreB. FibreCo had developed a marketing approach over many years for the original FibreA product. However this approach was not working for the new product FibreB. Downstream, along the supply chain, there were other views about FibreCo products. The Project team was encouraged to explore these varying perceptions in two workshops. Consumer views were also investigated for comparison purposes and to ensure that the project focus was on the market and the consumer. The NPD process at FibreCo has been mapped in previous unpublished research and this is used to help understanding of the issues surrounding a technology push system that FibreCo use. The results of the Case Study data collection follows and covers the following main topic areas:

- Marketing at FibreCo
- Supply Chain Stakeholder Perceptions regarding FibreCo products
- Project Team Perceptions of supply chain needs and FibreB attributes
- Consumer Perceptions regarding garment attributes performance and feelings of satisfaction
- The FibreCo NPD Process

These areas are discussed in turn below.

Marketing at FibreCo

At the first meeting in the parent group London Office, representatives of the Industry Forum Project management met with the FibreCo Technical Director, who outlined a ‘wish list’ of potential New Product Development areas. He explained that the world market for FibreA was currently suffering a downturn following a swing to a more formal fashion look. FibreA was a fibre more suited to casual fashion trends. Sales of FibreA fibre were 40% below those of last year. He went on to announce that FibreCo marketing staffs were being re-organised and the global strategy was to have small

regional teams. He was shortly moving to Hong Kong to look after the Asia Pacific region and he would be replaced. The central technical service team would remain based at Coventry led his successor with a new Brand Director. Before he went to the Far East he would brief his team at the FibreCo Head Office including the Fabric Development Manager who was responsible for knitwear development and the manager who looked after jersey developments and was based at the London office. He thought FibreA was “an ingredient brand not a consumer brand”. About 30% of FibreA went into garments with the FibreCo Brand name swing tags. On another 25% of garments FibreA shared the garment label with the retailer as for example with Marks & Spencer and Next.

The discussion identified a number of possible issues:

1. Retail Pull

FibreCo needed to get closer to clothing brands and high street retailers. There were already 30 projects globally trying to get FibreA products in stores, but the process tended to work with individual yarn spinners at the start of the supply chain on particular FibreA yarn blends. FibreCo felt that the focus should be more garment specific, (e.g. ladies trousers), and driven more by the other end of the supply chain with retailers like Next and Marks & Spencer in the UK who were part of the Industry Forum.

“We need to get ourselves in a better position to have an influence on the supply chain. We need to get further up the supply chain,” Technical Director, FibreCo

2. New Fabric Product Push

FibreCo also needed to work further along the supply chain (past the spinners) with fabric producers. One example was Chilton (a knitted jersey fabric producer in Scotland supplying Marks & Spencer garment makers) who was an Industry Forum member. A knitted jersey mix of FibreA and Lycra had already been very successful in the USA in ladies casual top garments sold by the Banana Republic (part of Gap) retail group. The new fabric product was a heavyweight stretch jersey rib that had been

produced with a competitive price point. It would be useful to be able to develop a similar fabric with Chilton for the Marks & Spencer UK casual wear consumer.

3. New Fibre Development

FibreCo had a new fibre version called FibreA that offered new characteristics and benefits. The new fibre was unfortunately not getting into commercial programmes quickly enough and there was little feedback from the market about it.

FibreB had some unique product features:

- It was especially suited to knit fabrics.
- It did not fibrillate like standard FibreA.
- It could achieve very good depth of shade compared to other fibres.
- Dye uptake for a particular depth of shade was more efficient with less dyeing time needed, less dyestuff used and less water consumed in washing off.
- Colour was long lasting so that when garments were washed the colour did not fade. This was a good selling point for dark shade garments such as black.
- Colours were brighter.

However the FibreB product did have many similarities with a competitor fibre called Modal and there was a need to differentiate FibreB.

4. Customer Perceptions of FibreA Processing

FibreA had a reputation as a niche product that was difficult to get into the larger more commodity markets. It was seen as technically difficult to dye and finish by downstream customers. Given these areas of opportunity and concern outlined by FibreCo, a number of potential projects in the knitted fabric sector with Industry Forum partners were suggested:

- Knitwear

Earlier work with an Industry Forum partner DyeCo (A management buyout) had been started on blends of FibreA with Cashmere before the buyout. It might be possible to restart this for the retailer Next or Marks and Spencer who were both involved in the earlier trials.

- Jersey

There was potential to work with Pringle following some success with a similar fabric development for the retailer Banana Republic in the USA in men's golf shirts. Some work had been carried out by the FibreCo technical staff to produce sample fabrics that could be shown to potential customers. The meeting concluded with an agreement that FibreCo staff would meet internally to prioritise the potential projects and agree the necessary time and staff resources. The Industry Forum would contact Pringle, Chilton and Textured Jersey to determine their level of interest and carry out some preliminary investigations

A more detailed meeting was arranged shortly afterwards at the FibreCo Head Office. The potential projects were further discussed with the researcher.

- Jersey Knits in FibreA

It was thought that DyeCo would be a useful partner [An Industry Forum Case Study associate]. Next Retail were already interested in the development of a FibreA Lycra mix of 28 gauge Double Jersey fabric. There would need to be an intermediate garment maker identified.

There was also perhaps potential to work with DyeCo on seam free FibreA garments.

- Knitwear

The issue here was about targeting the right segment of the market since designer knitwear brands such as Lyle and Scott and Pringle see FibreB as both an opportunity and a problem. FibreB is an opportunity when blended with Cashmere in Branded Knitwear since it is cheaper than Cashmere and performs better. On the other hand the target consumer who buys Cashmere Knitwear probably does not care much about the price or the performance. FibreCo thought that there was an opportunity to work with Lyle and Scott on a possible co-ordinated range of FibreB Knitwear, FibreB Jersey Polo shirts and FibreA woven Chino trousers. Some contact had already been made with Lyle and Scott.

Globally FibreB had been successful in knitwear in China amongst high earning consumers who also appreciate the cheaper blends of FibreB with Cashmere and the softness, drape and vibrant colours of the garments.

- Banana Republic Jersey based FibreB Garment

An example of the garment was obtained that was constructed from 28 gauge Knitted single jersey fabric of 92% FibreB and 8% Lycra. Some product development had taken place with Long Eaton Fabrics but they were not a volume supplier who could meet the capacity needs of a retailer such as Marks & Spencer. It was interesting to know which fabric supply routes M&S and Next would prefer. Price was likely to be an issue. The Banana Republic brand offered premium prices and this was not likely through a mass-market retailer like M&S. The product had been running for a number of seasons with the Banana Republic. The main problem according to FibreCo is one of supply chain customer perceptions about FibreB being too expensive. Whilst the fibre was more expensive than Modal fibre it does have some cost benefits:

- FibreB takes less dye to get the same shade. This is demonstrated on the small fabric samples that compare FibreB with Modal and Cotton dyed at the same time. FibreB is much deeper in shade.

- Wash Performance is better than other fibres in terms of less fading. This is shown with samples of FibreB fabric dyed black that have been washed 20 times with no loss of colour compared to before they are washed.
- FibreB can be dyed to exceptionally strong and vibrant colours. Examples were shown in black (above) and candy pink.
- FibreB is less prone to creasing than viscose fibre and needs less scouring after dye giving better levels of first quality product.
- FibreB is ecologically kind in terms of its fibre production route. FibreB is also made from natural materials (wood pulp).

Overall FibreCo management felt that there was a perception along the downstream supply chain that the fibre is technically difficult and requires a premium sales margin. The latter makes costing in for major consumer garment very difficult. FibreB had shown the cost advantages listed above in small-scale product development trials but needed an opportunity to prove these with larger scale trials.

FibreA is the first new fibre for 30 years and was by definition new and innovative. However FibreCo were finding it difficult to get FibreA past the development stage and in to volume in the UK in spite of volume success elsewhere. Potential partners were Marks and Spencer with garment makers such as Martin International and jersey fabric producers such as Chilton or Textured Jersey. It was agreed that the challenge for FibreCo is first to understand the perceptions and requirements of the stakeholders in the supply chain and then to work with supply chain members to develop fabrics and garments that satisfy those needs. The FibreCo team were keen to learn some new techniques that can help in this process of understanding customer needs. FibreCo also wanted to get some feedback via Industry Forum partners about their perceptions about the product. The next step however required that the researcher gathered information about the views of external stakeholder along the supply chain.

Supply Chain Stakeholder Perceptions regarding FibreCo products

In order to structure the workshop meetings with the FibreCo project team some reconnaissance was necessary by the researcher to better understand some of the issues surrounding the product and brand FibreCo. In particular there was a need to gain an appreciation of those product features important to product users. Data was gathered through secondary research and started with an investigation of the FibreCo brand by examining the FibreCo web site to gain an understanding of the way that FibreCo viewed the company products.

To find out what downstream stakeholders views were, the Internet research was widened by using search words of FibreCo. FibreA, FibreB and FibreA Knitwear with Meta search engines called Vivisimo.com and Webferret.com. These Meta engines combine the usual yahoo, google, etc search engine results.

Results of Internet search

The FibreCo Brand name is known to some consumers through the brand Logo

FibreCo use the following descriptions of FibreA on their web site:

Fluid, flowing drapes in soft gentle folds

Fabrics caress the contours with an ease of motion that says its luxury

There is colour. And then there is FibreA colour – different, denser and more dramatic

FibreA was engineered to accept colour more readily. The colour goes deep down into the fibre

FibreA can be engineered to wash down to create an assortment of hues and shades. From the palest tints, through medium tones, to vibrant, deep darks

The range of fabric types that can be created with FibreA is extraordinary: from crepes and twills to chambrays, poplins and more.

Blended with other fibres, FibreA enhances drape, comfort, absorption and strength

FibreA holds colour so it won't fade even after repeated washing. Next time you want a perfect black T- shirt, look for FibreA. It dyes to a really deep colour and stays that way

If it is mixed with cotton, it feels like cotton but you can also feel a relaxed softness. When you've worn it for a while you'll understand what we are talking about

With FibreA you have a garment that is as comfortable as if you'd had it for years but still looks new

FibreB has its own marketed attributes. Below are some of the straplines used by FibreCo:

Smooth lustrous FibreB, the other type, will not make a peachskin fabric. It is very silky and lustrous. This shows off the richness of the colour, which will not fade. Both types are very soft and strong

Clear, vibrant colours without fading are possible

Brilliant dyed colours in cost-saving fabrics are available

Clean finishes without any stiffness or inferior comfort are attainable

FibreB extends the FibreCo portfolio to offer even more possibilities in knitted, jersey and woven applications

Sweater knits benefit too, not only from the extra benefits and simple production techniques required for the yarn, but also from the minimal susceptibility to pilling

The Internet search continued and some of the opinions of downstream customers about FibreA can be found on the web sites listed below. There were 500 hits using Vivisimo.com

Name of stakeholder	Position in supply chain	Website address	Access date
Ge-Ray Fabrics	Knitter	www.geray.com	6/07/01
Tianello	Knitter	www.tianello.com	6/07/01
Jeffrey Scott	Shirt Retailer	www.jeffreyscott.com	6/07/01
Ecofashion	Apparel Retailer	www.underthecanopy.com	6/07/01
Silk Road	Fabric Merchant	www.srfabrics.com	30/08/01
Milinea		www.thebensolgroup.com	30/08/01
Lucire	Fashion Magazine	www.lucire.com	30/08/01
Inner Harbor	Golf Shirt Retailer	www.aaaspec.com	30/08/01
Woodwise	Consumer Guide Group	www.	30/08/01
Moxy	Golf Shirt Retailer	www.moxytrucks.com	30/08/01
Bowlingindex.com	Shirt Retailer	www.bowlingindex.com	31/08/01
Corporateboyz.com	Corporate apparel retailer	www.Corporateboyz.com	31/08/01
Union House	Golf Shirt Retailer	www.unionmadeinusa.com	31/08/01
Business Images	Corporate Gifts Retailer	www.b-images.com	31/08/01
Banana Republic	Apparel Retailer	www.bananarepublic.com	31/08/01
Golfing Gals	Golf Shirt Retailer	www.golfngals.com	6/07/01
Nebfacts	University Dept of Agriculture	www.ianr.unl.edu	6/07/01
Nordstrom	Apparel Retailer	http://store.nordstrom.com	6/07/01
Eartheasy	Environmental group	www.eartheasy.com	6/07/01
LLBean	Apparel Retailer	www.llbean.com	30/08/01
De Licacy Co Ltd	Fabric Retailer	www.tsfa.com	30/08/01
Jonathan Cory	Garment Retailer	www.jonathoncorey.com	31/08/01
Golfers Choice	Corporate Gifts Retailer	www.outsourcepromo.com	31/08/01
Rock International Textiles	Fabric manufacturer	www.rockinterantional.com	6/07/01
Sportswear America	Sportswear retailer	www.sportswear-america.com	31/08/01
Strictly Corporate	Corporate Gifts Retailer	www.strictlycorporate.com	31/08/01

Typical FibreA features mentioned on the www by some downstream users, commentators and supply chain members are:

Example 1 – Weaver

- Strength – Dry or Wet, FibreA is an incredibly strong fibre
- Touch – Soft and delicate touch
- Drape – Refinement and elegance
- Sharp colouring of high standard
- It's a natural fibre and is 100% biodegradable
- Used in blends with cotton, nylon and polyester

Example 2 – Corporate Golfwear

- A unique touch with a soft handle and drape
- Breathability
- Light weight comfort
- Easy care
- Wrinkle resistant
- Low shrinkage

Example 3 – University Agriculture Department Fact File

- FibreA is made from natural cellulose found in trees
- As trees are harvested, new trees are planted (This claim is refuted elsewhere)
- FibreA has many of the desirable properties of rayon, including comfort, absorbency, excellent drape and abrasion resistance. It excels rayon in that it has these additional characteristics; High wet strength, resistance to shrinkage, easy care
- FibreA is more costly to produce than rayon, cotton and polyester. Garments will cost more in retail stores
- Some garments may have a dry clean label because of the way they have been constructed and finished

[The rest of the facts are a straight quote from the FibreCo literature]

Example 4 – International Textile Mail Order Retailer

- With its rich feel and drape of an expensive silk, you'd never suspect that FibreA is manufactured from natural wood pulp cellulose
- A man made and biodegradable fabric, FibreA looks attractive in skirts and dressy trousers in the workplace as it does in casual shorts by the poolside
- Easy to care for it wrinkles less than cotton and yet is softer and stronger
- When blended with cotton, FibreA adds wrinkle resistance and the luxurious feel of silk
- Similar in strength and durability to a synthetic fibre
- Worry-free – wrinkle resistant, shrink resistant and static resistant
- Little ironing required

Example 5 – Ecology Group

- Soft, fluid, natural
- FibreA is known for its “drape”. It flatters the human form
- The look is luxurious and refined
- The new fibre represents a milestone in the development of environmentally sustainable textiles
- The fibre is produced via an advanced ‘closed loop’ solvent spinning process, with minimal impact on the environmental and economical use of energy and water. It uses non-toxic solvent, which is continually recycled during the production process. Production plant emissions are significantly lower in comparison to other man made fibre operations
- One of the properties of FibreA is its ability to fibrillate. Fibrillation is where the wet fibre, through abrasive action, develops tiny micro-fibrils on its surface. By manipulating or controlling fibrillation, a variety of finishes may be achieved
- A more recently developed fibre. FibreB has a non-fibrillated surface finish. Developed primarily for knitwear, FibreB has a subtle surface lustre, excellent print definition and high tear and burst strength for woven and knitted fabrics. FibreB also enhances laundering performance and shape retention using this fibre

Example 6 – Knitwear supplier

- A luxurious look and feel coupled with easy care is what makes FibreA shirts and sweaters rank amongst our best selling styles
- Unique high performance, luxury fabric
- Machine washable and dryable and have low shrinkage and resistance to wrinkling
- A new natural fibre that creates fabrics with a soft silk like handle and easy drape
- Due to the inherent silky properties of FibreA it is more susceptible to pills

Example 7 – Wood Ecology Pressure Group

- Turning wood into rayon is wasteful and dirty, because lots of water and chemicals are needed to extract *usable fibres from trees*. *Only about a third of* the pulp from a tree ends up in finished rayon thread and the resulting fabric will usually require dry cleaning, which is an environmental concern
- Much of our rayon comes from developing countries where environmental and labour laws are weak
- There is mounting evidence that rayon manufacturing contributes to significant forest destruction and pollution
- FibreA is made using a newer closed-loop process that is more efficient and much less polluting
- FibreA fabric would be an even better environmental choice if the wood used were certified under the Forestry Stewardship Council, without which there is no guarantee that their wood comes from a sustainable source

Example 8 – Clothing retailer

- To wear clothing of FibreA is to evoke a range of feelings: a sense of comfort confidence and class
- They are soft and sensuous with the indefinable touch that says quality, luxury and prestige
- Take the FibreA Touch Test. Slide your fingers across the fabrics. Feel them in the palm of your hand. It is an experience in pure pleasure

- Fluid and Flowing. FibreA drapes in soft gentle folds. Moving across the body or in harmony with it.
- FibreA is durable and wrinkles less so your clothes look better longer
- Incorporate it into your wardrobe, for work and play, here, right now!

From the above comments we can come to some fairly clear conclusions about FibreA in the eyes of those who sell the product in its various forms:

- The soft and silky feel of the fabrics made from FibreA
- The environmental credentials
- The way the product shows and holds colour.

There are also hints about some of the problems that have limited the adoption rate of FibreB, particularly in knits -

- Pilling (bobbling of fabric).
- The cost is high.
- Rayon shares many of its attributes and is cheaper.
- FibreB makes processing 'simple' by comparison to the techniques that have to be employed Standard FibreA to 'control' fibrillation.
- FibreB has lustre and this makes it less appealing to men.
- FibreB is the 'other' FibreA, the one **without** the fibrillation that makes FibreA feel luxurious with its silk like 'peachskin' touch.

Much of the commentary is couched in terms of technical jargon that is alien to many consumers:

Drape, handle, fluidity, resistance to wrinkling, burst strength, wet strength, breathability, durability, absorption, colour, biodegradable and fibrillation itself.

These are not the terms used by the average shopper for clothes.

FibreCo Project Team Perceptions

FibreCo Project Team Perceptions of supply chain needs and FibreB attributes were investigated in a series of workshops.

Workshop One

There was a short delay in the project at this stage when FibreCo underwent further re-organisation. At one stage FibreCo suggested that they withdraw from the project and a meeting had to be held with FibreCo management and the Industry Forum. Fortunately the FibreCo managers decided to carry on with the project starting with a Workshop. The research earlier outlined above had given some facts about FibreB that helped to prepare a Workshop for the FibreCo project team. The workshop was held in Derby on 29th November 2001.

The FibreCo project team was:

- Fabric Development manager
- Retail Account Manager
- Technical Supervisor
- Knits Development Manager

From the Industry Forum we had a project manager, two research fellows and a research assistant from Cranfield. The workshop was designed with three activities for the FibreCo team designed to discover the new product features that were superior to other products and how the features met stakeholder needs. In addition some NPD research background was presented including a summary of success factors for NPD from Cooper (1994), the Kano Model and Innovation Adoption.

Workshop Activity One - Synthesised Stakeholder Needs

For a fibre producer like FibreCo there is a need to appreciate the needs of those further down the Textile and Clothing Supply Chain, including spinners, fabric and garment makers, retailers and consumers. Appreciating the needs of these stakeholders requires

contact with them and the use of techniques such as interviews, questionnaires and focus groups. However in order to plan the use of these techniques it is useful to try to think like a customer first. The Project Team carried out an analysis of supposed or synthetic stakeholder needs using five categories and four downstream stakeholders in relation to FibreB and a cut and sew golf shirt garment.

Type of Stakeholder Need
Purpose
Physical
Cognitive
Aesthetics
Emotional

Type of Supply Chain Stakeholder	Product purchased
Knitter and Dyer	Yarn
Garment maker	Fabric
Retailer	Garment
Consumer	Garment

The Project Team examined the potential needs from the product/service offering of the downstream textile and clothing supply chain and consumers through the example of a knitted golf shirt.

Results

The team were able to reach agreement about the stakeholder needs for members of the downstream supply chain, including yarn spinners, knitters, garment makers, retailers and consumers.

Tables showing the results from two stakeholders are shown below in Figures 7.58 and 7.59.

A Yarn Supplier

Needs	Yarn Supplier
Purpose	Primarily to make profit To meet fashion trends To meet the functional requirements of the fabric To have enough quantity to keep the Supply Chain happy To maintain the business cycle
Physical	The right count for the gauge and fabric weight Strong enough to knit without breakages Dyes evenly. i.e. level Consistent physical properties. E.g. evenness, count variation, RKM, stitch clarity On time delivery
Cognitive	Know capability of supplying mill Know capability of yarn in relation to fabric/products produced Know the potential of the yarn – how to get the best out of it Recognise the distinctive features of a fibre with more potential Understand knitting requirements of the yarn Understand what it is about the product that makes it desirable Understand and have confidence about the dyeing/knitting requirements of the fabric Understand what leads customers to make a repeat purchase Understand what customers like about the product How to target different parts of the supply chain Know how to get feedback from the supply chain
Aesthetics	Understand what the market needs are for aesthetics for the seasonal fashions A range of textures Reasonable cost Versatile yarn – able to offer more variety of product A base level yarn – capable of producing the required aesthetics of the garment The needs of the end user (consumer) of the garment
Emotional	Confidence and trust in the supplier Trust in the suppliers quality and delivery performance Concern about price stability from season to season Feel trusted as a supplier Confidence that yarn and constituents are right to achieve the desired end product Confidence that the product is right for the application

Figure 7.58: Customer Stakeholder Needs I

A Retailer

<i>Needs</i>	<i>Retailer</i>
<i>Purpose</i>	Generate profit Garments that will sell at the right price Product fits with the overall image of the retailer stock in store appealing to their customer base Trouble free supply chain To be seen to innovate- keep one step ahead of the competition
<i>Physical</i>	No returns - minimum returns No display problems- arrive ready to display Looks good in store Meets performance specs Fit for purpose- what they thought they wanted Absorbency- moisture handling
<i>Cognitive</i>	Understand specific requirements of garment Understand features & how to sell it - communication issue Value for money understand properties of raw material- part of selling point Trying to meet consumer need
<i>Aesthetics</i>	Appeal to customers Distinction on shop floor Meets the anticipated need/ purchase criteria Colour Brand Consistency in colour & handle so consumer doesn't see wide variation
<i>Emotional</i>	Feel that the garment fits their house style & image Feel good factor Trust in suppliers Solid sales generating customer loyalty

Figure 7.59: Customer Stakeholder Needs II

Different stakeholders have very different needs and that there are some tangible and some less tangible needs that need to be met by the product/service offering. So for example the purpose of a fibre, fabric, yarn or garment is different, and a retailer has a different need from a garment than a consumer. For a textile raw material supplier these different needs should be taken into account. As far as FibreB is concerned we need to

explore the product attributes and try to decide how each might satisfy different stakeholder needs. The issue for the fibre manufacturer is how to meet these needs and work out which product/service features matters more or less to customers and stakeholder.

Workshop Activity Two - Product Competitive Advantages

The Project team examined the various attributes that FibreB had compared to other fibres such as Cotton, Modal and Wool. The table (Figure 7.60) below shows the total scores in terms of ranking with high numbers for top rankings. The attributes in bold are the ones that FibreB scored top for that attribute by most respondents:

Product Attributes	FibreB	Cotton	Modal	Wool
100% natural cellulose	12	12	8	4
<i>Moisture absorbing</i>	11	6	4	7
High dry and wet breaking strength	14	7	4	5
Low shrinkage during finishing and washing	8	8	5	5
Completely biodegradable	4	3	3	4
Circular cross sections and a smooth fibre surface	11	4	8	4
Easy colouring using traditional cellulosic Dyestuffs	9	9	8	3
Natural in origin	7	9	4	10
Depth of colour	12	4	4	8
Softness and drape	14	5	12	4
Pronounced stitch definition in knits	13	5	6	4
Luxurious handle	14	4	10	8
Fluidity and movement	11	4	9	4
Breathability and comfort	10	7	6	8
Discrete lustre	14	5	11	5
Durable	9	6	3	9
Garments machine washable	9	9	6	4
<i>Suppleness</i>	14	5	10	4
<i>Excellent laundering performance</i>	13	6	6	6
High burst strength in knits	5	6	2	1
<i>Superior dye uptake and retention</i>	14	4	4	8
Retention of 3D character in wash and wear	14	6	4	9
Full soft handle	16	5	12	8
<i>Deep clear colour</i>	15	4	6	7
Excellent print definition	9	5	5	2
Durable garment pressing	5	5	3	3
Fibrillation free fabric surface	11	7	6	6
Fabrics for garment processing	4	4	1	5
Piece dyed fabrics	5	5	3	4
Yarn dyed fabrics	3	5	2	5

Figure 7.60: Comparisons scores for related products

It is worth noting that the Price of FibreB is a weakness compared to other fibres. The project team thought that FibreB represented good value for the attributes it possessed. The key attributes where FibreB is best in a knitted Polo Shirt are considered to be:

- 100% natural cellulose*
- Moisture absorbing*
- High dry and wet breaking strength*
- Circular cross sections and a smooth fibre surface*
- Depth of colour*
- Softness and drape*
- Pronounced stitch definition in knits*
- Luxurious handle*
- Fluidity and movement*
- Suppleness*
- Excellent laundering performance*
- Superior dye uptake and retention*
- Retention of 3D character in wash and wear*
- Full soft handle*
- Deep clear colour*

The workshop team also tried to map the key FibreB attributes on to the Kano model. [This Kano model is described in more detail in the section that follows]. The table in Figure 7.61 below shows the general consensus about the key attributes:

<i>Must-be attributes</i>	<i>Linear attributes</i>	<i>Delighter attributes</i>
Doesn't shrink Moisture absorbency Excellent laundering	Natural in origin Easy to dye Value for money	Depth of colour Superior dye uptake & retention Completely bio-degradable Luxury handle

Figure 7.61: FibreCo Product Attributes

The quick 'ad hoc' mappings of attributes on to the Kano dimensions shows that the Delighter attributes are those that FibreCo have been using previously to promote FibreB. FibreCo were interested to know how the consumer feels about FibreB and this requires a more robust questionnaire procedure for exact mapping of attributes on to the Kano dimensions.

A first version of a Kano Questionnaire was presented. A typical type of question is presented as both a positive question and a negative version in the following example:

Q1. If your garment shows no signs of wear and pilling after a few washes, how do you feel?

- ☐ I would be delighted
- ☐ I expect it to be like that
- ☐ I do not feel anything
- ☐ I would live with it
- ☐ I would not like it

Q2. If your garment has signs of wear or pilling after a few washes, how do you feel?

- ☐ I would be delighted
- ☐ I expect it to be like that
- ☐ I do not feel anything
- ☐ I would live with it
- ☐ I would not like it

It was agreed that we would run another workshop where we would plan how the questionnaire would be administered and the possible use of consumer focus groups and wearer trials. In the meantime a revised Kano questionnaire would be designed that reflected the key attributes that the team thought were important. The questionnaire would be circulated for to the FibreCo team.

Workshop Two

The second workshop continued the theme of developing the customer focus.

Activities included:

- The revised Kano questionnaire was tried out by the whole project team
- Some of the questionnaire results were analysed using to illustrate how the delighter scoring of a Kano questionnaire worked
- Customer satisfaction indices were explained
- The pilot study Kano questionnaires, wearer trials and focus groups were planned
- The garments for the pilot study wearer trials and focus group were planned by FibreCo

The Project Team had been helped to develop a clear view about how the stakeholders in the market might view products manufactured from FibreB. Those attributes of FibreB that the project team considered were important were:

- Depth of colour
- Superior dye uptake & retention
- Completely bio-degradable
- Luxury handle

These attributes may not be perceived as important by consumers and the next stage was to carry out market research to discover any differences.

Consumer Perceptions regarding garment attributes performance and feelings of satisfaction

One suggested questionnaire technique (Matzler & Hinterhuber, 1998) uses the Kano Model to discover which product features are 'delighters', which are linear attributes and which are 'must-be' features. The Kano Model is a structured method of obtaining feedback from customers (Shen *et al*, 2000) that draws on the notion of delighters. Developed by N. Kano in Japan in the mid eighties, the model maps customer satisfaction with key product feature performance and categorises product features in three ways:

Firstly, expected features, where the customer dislikes an absence of the feature and is also neither delighted by it nor dislikes it when it is present.

Expected features are only mentioned by customers when they are missing or poorly executed and are recognised through collecting data about complaints and returns.

Secondly, delighter features, which are those where the customer is delighted if the feature is present but does not actively dislike it when the feature is absent and is (clearly) not delighted by its absence.

Delighter features are more likely to be the type that separates products from their competitors in terms of product uniqueness. Delighters are hard to find through traditional market research.

Thirdly, linear features, which are more straightforward in that they cause delight when present and dislike when absent.

Linear features are generally of a technical nature and can be easily measured by the customer. Linear features can be determined by traditional market research techniques.

The Kano Model Diagram

The three types of feature can be mapped on to a two dimensional chart (Figure 7.62).

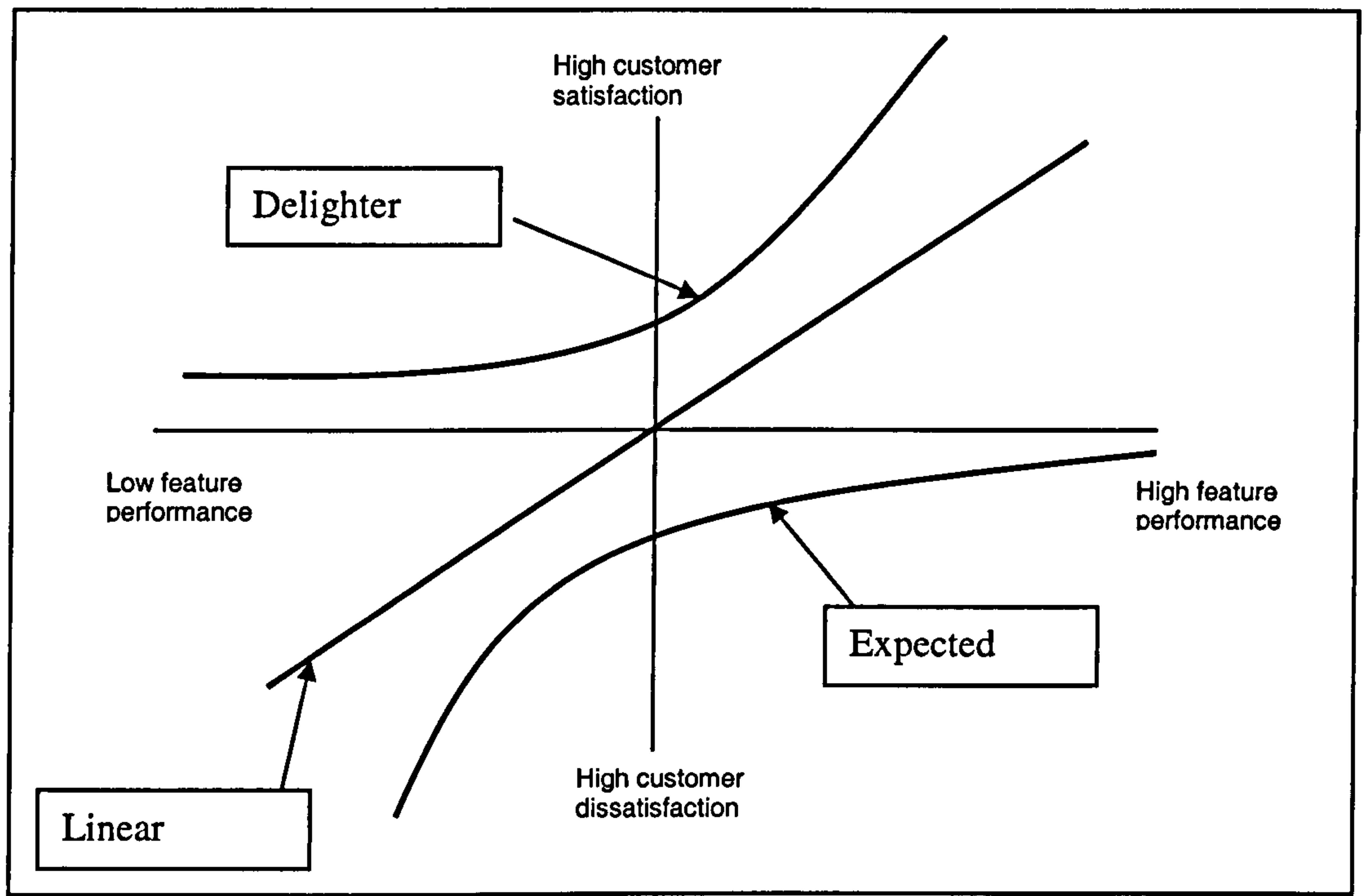


Figure 7.62: The Kano Model

The value of the Kano Model over traditional attitude surveys is that the data provides a richer understanding of attitudes to product features than a scale where answers range from 'Highly Important to Highly Unimportant'.

Information from a Kano survey can give new product developers detailed feedback on the relationship between a product feature and customer satisfaction. This information is particularly useful at the initial stage of the new product development process.

The Results of the Kano Questionnaires - Analysis of Results

Each pair of questions about the same feature are linked and analysed together. A matrix of the 25 possible answers and the relevant Kano types answers and Indifference answers is shown in the Figure 7.63 below.

		Negative Question Version				
		<i>Delighted</i>	<i>Expect it</i>	<i>Neutral</i>	<i>Live With</i>	<i>Dislike</i>
Positive Question Version	<i>Delighted</i>	N/A	Delighter	Delighter	Delighter	Linear
	<i>Expect it</i>	N/A	Indifferent	Indifferent	Indifferent	Expected
	<i>Neutral</i>	N/A	Indifferent	Indifferent	Indifferent	Expected
	<i>Live With</i>	N/A	Indifferent	Indifferent	Indifferent	Expected
	<i>Dislike</i>	N/A	N/A	N/A	N/A	N/A

Figure 7.63: Kano Answers Matrix

Figure 7.64 below shows the level of agreement amongst respondents about garment ownership features and the majority view Kano category.

Product Feature	Delighter	Linear	Expected	Indifferent	Category
Beautiful soft feel	92.3%	7.7%	0.0%	0.0%	Delighter
Luxury feel at a lower price	76.9%	15.4%	0.0%	7.7%	Delighter
Luxury Feel	76.9%	0.0%	7.7%	15.4%	Delighter
Wash Performance - Creasing	53.9%	46.2%	0.0%	0.0%	Delighter
I feel stylish	46.2%	38.5%	0.0%	15.4%	Delighter
I look good	7.7%	76.9%	15.4%	0.0%	Linear
I feel good	0.0%	69.2%	15.4%	15.4%	Linear
Fits well	30.8%	46.2%	23.1%	0.0%	Linear
Hardwearing and kept looks	38.5%	38.5%	23.1%	0.0%	Linear
Wash Performance - Shrinkage	0.0%	7.7%	92.3%	0.0%	Expected
Wash Performance - Pilling	30.8%	0.0%	61.5%	7.7%	Expected
Wash Performance - Colour retention	7.7%	0.0%	61.5%	30.8%	Expected
A branded Raw Material	7.7%	0.0%	0.0%	92.3%	Indifferent
Biodegradable Raw material	23.1%	7.7%	0.0%	69.2%	Indifferent
Bright fashion colour	0.0%	38.5%	0.0%	61.5%	Indifferent
Soft and flexible drape	0.0%	38.5%	0.0%	61.5%	Indifferent
Keeps me feeling dry and cool	7.7%	0.0%	30.8%	61.5%	Indifferent

Figure 7.64: Kano Survey Results

Delighter Features

Delighters amongst the small pilot sample of participants were:

- Beautiful soft feel
- Luxury feel at a lower price
- Luxury feel
- Low creasing in wash performance
- Feeling stylish

Linear Features

Looking good was a linear feature for a clear majority of participants who judged that they would like it if they looked good in a garment and dislike it if they did not look good. Feeling good in a garment, fitting well and durability were also linear features.

Expected Features

The other wash performance features were expected by consumers who would be dissatisfied with poor performance, particularly on shrinkage.

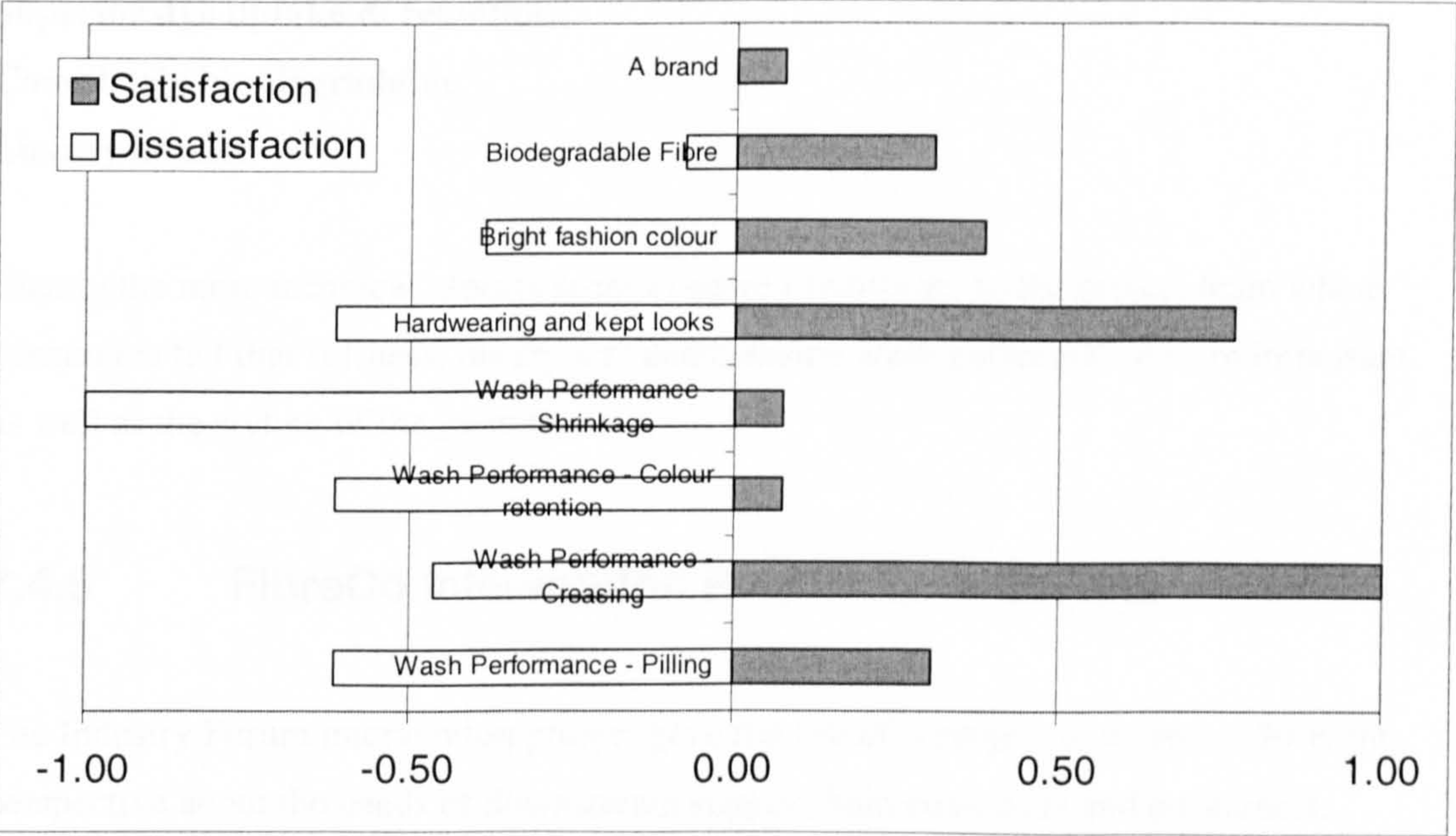


Figure 7.65: Satisfaction Index Results.

When the dissatisfaction and satisfaction results for product features are considered together use is made of more of the data from the Kano questionnaire and core product features that can cause dissatisfaction to a proportion of consumers if poorly executed can be pinpointed. The Figure 7.65 illustrates some of the satisfaction results. Wash performance on creasing can be seen to cause dissatisfaction for some respondents.

Summary

The consumer results demonstrate that the key delighters are different from those that the project team thought were important.

Consumers consider that the following are delighters:

Beautiful soft feel

A luxury feel at a lower price

Luxury feel

Low creasing in wash performance

Feeling stylish

The Project Team considered the following were Kano delighters:

Depth of colour

Superior dye uptake & retention

Completely bio-degradable

Luxury handle

Clearly the more technical aspects seem of more importance to the project team where consumers felt that softness, luxury feel and creasing wash performance were important as well as the styling of the garment.

7.4.6 FibreCo Intervention Project Conclusions

The Industry Forum intervention project gave the FibreCo project managers a different perspective about the needs of downstream supply chain customers and consumers. Consumers were less interested in the technical aspects of the new FibreB product. The project was followed by garment wearer trials involving consumers where comparison

garments in FibreB and a competing fibre were manufactured for FibreCo by another I.F. partner KnitwearCo. Consumers were given garments to wear and comment on in this blind test.

The data collected during the Industry Forum project and the earlier unpublished findings gave some useful information regarding management perceptions, product attributes and the issues surrounding a new innovation that has attributes of uncertain benefits to downstream users. The FibreCo development of new product samples of fabric is also interesting in that it shows the need to work with products that the customer will be familiar with in order to demonstrate raw material properties.

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