Production Planning in the Clothing Industry:
Failing to Plan is Planning to Fail

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HISTORY OF UK GARMENT MANUFACTURING

The apparel and textile industry is a fascinating example of manufacturing and the supply chain. This sector is under constant pressure, competition is fierce, and there are always rival firms waiting to challenge. Competition will increase still more in 2005 when countries with export quota restrictions to Europe and USA are freed from those constraints.

In the heyday of garment production in this country in the 1960s, 70s and early 80s, manufacturers named their price based on their costs plus profit. They offered ranges of garments to the retailer or wholesaler. After the latter had made their selection, they placed a firm order for a substantial quantity and expected one large delivery a few months later.

This scenario has completely changed. The retailers now drive the garment supply chain:
- they know exactly what they want in terms of actual merchandise
- they dictate price according to consumer pressure and expectations (designers must work to price points - costing is done on a price minus basis, squeezing the manufacturer’s margins)
- they decide when they want it and in what quantities - not all at once but as per a pre-determined delivery schedule, that could last over weeks, and change at any time!

The retailer wants to remain as flexible as possible, responding to consumer demand as accurately and as quickly as possible. They use technology (such as EPOS - Electronic Point of Sale) to gather this information and seek suppliers who can respond to their needs. It is the same in many other sectors such as the food chain for example.

The main problems in clothing manufacture include:
- Strong traditions, for instance in the culture of organisations, job design, work organisation, and the way operators are paid; it is the same for their suppliers
- Unresponsive and inflexible production systems
- Fabric/cloth purchasing difficulties: due to the nature of the process this takes at least two weeks to produce and often much longer.

Many companies, such as the Spanish group Inditex (who own the Zara retail chain), reduced this problem by restricting the base fabrics their designers can use. Few retailers work like this and are therefore faced with anything between 4 and 12 week lead times, immediately restricting responsiveness and flexibility. Bennetton were the first to pioneer this flexible approach with their grey state garments that were dyed. Jaeger then adopted the same approach.

The UK clothing and textiles supply chain has responded slowly to the changes demanded by retailers, especially in the fabric and clothing sectors. Domestic manufacturers offered neither a cost nor a responsiveness advantage to retailers. Not surprisingly, they took their business overseas, and the industry as a whole has suffered over the last 15-20 years.

- 1977 - 900,000 employees in the sector
- 1999 - 130,000 people employed in 4880 firms (average 27 people per firm; small manufacturers serving niche, specialised markets).

Global sourcing in the clothing industry brings cost advantages as labour costs can be drastically reduced. In an industry that is still very labour intensive and with retailers squeezing margins, this is very important. But lead times, responsiveness, and control can sometimes suffer as a consequence of distance.

The pressures in this dynamic marketplace include:
- Customers demanding more new fashions than ever before at lower prices
- More styles per season leads to fragmentation - more styles to control in smaller quantities
- Smaller order quantities lead to increased volume of orders
- Small orders need smaller sewing teams, which leads to increased management and planning
- Shorter lead times - commitment to production takes place later each season
- Changing customer requirements
- Demands for accurate order information.
As in any other industry, to remain competitive manufacturers need to:

- Deliver on time
- Improve productivity
- Respond quickly
- Reduce WIP
- Deliver to a price
- Reduce excess costs such as overhead
- Introduce best practices
- Achieve accurate and consistent information.

Fire-fighting is no longer an option. Change is essential in order to survive, and good control is fundamental. Failing to plan results in bottlenecks, unnecessary style changes, lack of prioritisation, and unclear order status. The result is loss of customer confidence and loss of future orders.

“The key word is value. How can a company create the most value for its customers and thus reap the profit growth needed to sustain the company?”

The solution is to install a systematic and detailed approach to production planning, but the textile industry is notoriously traditional. In too many businesses, departments still operate as functional ‘islands’. Managers may talk to each other but work is unco-ordinated and ineffective.

THE PLANNING PROCESS IN CLOTHING MANUFACTURE

The basic process includes the following stages:

1. Receive the order
2. Plan to check if there is available capacity in sewing to achieve the delivery date required
3. Plan to check the available capacity in non-sewing areas (cut, embroidery; print, wash and pack)
4. Plan to check sufficient lead time to order and receive fabric, trims, approve sample, carry out lab tests
5. Confirm delivery date to customer and reserve capacity
6. Communicate plan to all departments
7. Monitor progress against plan
8. Re-plan as required and return to Point 5

In an ideal world, this cycle would be carried out in a systematic way. No plan is ever perfect, but all that we have learned about total quality management reminds us that we must aim at the ideal rather than settle for ‘Acceptable Quality Levels’ that have a built-in failure rate. Although the first priority is the customer delivery date, the factory must also consider the best place to make each product, taking into account both skill and machine constraints. Production efficiency depends upon this. In the clothing industry, planning will typically focus on sewing, as it can account for up to 80% of the skill and resources required. However, the capacity constraints of supporting areas also have to be assessed. In particular, the pre-production events must be planned to ensure that production begins on schedule.

BASIC CAPACITY CALCULATIONS

In the clothing industry, most companies still work to standard minutes, which is the calculated or measured standard time to produce a garment. A basic calculation may be as follows:

- 8 working hours per day = 480 minutes
- 10 operators per team
- Capacity = 4800 minutes per day
- Standard Minutes for T-shirt style
  \[ a = 12 \text{ std min} \times 100\% \text{ efficiency} = 4800/12 = 400 \text{ pieces per day} \]

However, it may be necessary to take into account the skills and efficiency of different teams, or the ability of a team to make different products. For instance, if a team normally make woven garments, to change to a knitted T-shirt means that they are less skilled at handling that item of clothing. If they can only achieve 75% efficiency, the output is only 300 pieces per day. The impact on the production plan is huge.

Many readers will be used to volume manufacturing of widgets and know about the steady automation of their industries. The clothing industry is still very heavily dependent on human labour, despite increasing use of automated processes. Add to this the whims of the fashion market, which cause constant style changes (equivalent to the constant engineering changes that manufacturing engineers so hate), and you have huge difficulty in achieving efficiencies and optimising operator skills. If you can keep a team of operators making the same type of product as long as possible, production loss is minimised.

The plan must also consider the specialist support areas. Working back from the sewing plan, it is necessary to calculate where the loading will impact resources. The plan must then allow for post-sewing operations such as garment washing (where relevant), otherwise the sewing plan will be acceptable but WIP builds up in the other areas. Critical path analysis is a vital tool in this process – if the plan moves, so must the priorities.

COPING WITH PLANNING

Most business systems offer some capacity planning, often limited to rough cut capacity planning. Many of these systems are not graphical, are complex to use, and not user-friendly. Many use spreadsheets, which are often well-applied but they have several drawbacks:

- They are designed by one person and not transparent
- They are not visual
- They cannot be shared on a network and therefore limit co-ordination
- They do not highlight problems clearly
- They are cumbersome and difficult to manage with large numbers of orders
- They are very difficult to amend when customer requirements change.

These systems therefore do not give answers quickly enough for the dynamic world of the fashion industry. A system named Fast React
designed to overcome these problems is now used in over 25 countries world-wide. The case study described here demonstrates how the implementation of a comprehensive planning system can contribute to efficiency and productivity gains.

**CASE STUDY:**

**A MANUFACTURER OF LADIES WEAR FOR THE UK RETAIL SECTOR**

The company, which produces ladies wear for a well-known high street retailer, has 3 manufacturing sites in Scotland and 1 in Turkey. In Scotland they employ 450 direct staff and around 300 in-directs in management, design, technical, cutting room, warehouse etc. In Turkey 125 operators and 45 in-directs are employed. The company also owns a UK clothing retail chain that supplies low end of the market, factory seconds.

The continued success of this company in this country (against the trend) is largely due to the nature of their planning and control activities. These activities form the basis of a very flexible and responsive relationship with their main customer. The supply of a quality product goes without saying; you are not in the market without guaranteed quality. The company must also provide a quality service, facilitated through their commitment to planning and control issues. It is the company’s service, responsiveness and reliability that keeps them in business. Together with the factory in Turkey, it has an ideal combination:

- Turkey - for high work content, less fashionable garments, where lead times are not as crucial
- Scotland - responsive and flexible factories for the more fashionable, quick turn around garment, small orders.

**ACHIEVING SUCCESS**

In the early nineties the company underwent huge changes, responding to the changing needs of their main customer (to which they at that time sent about 70% of production), with 3 other main customers. Now they only supply one customer. The changes included:

- From flow line production to production cells, with team-working and multi-skilling
- JIT approach to inventory
- Strategic partnerships with fabric suppliers to gain shorter lead times
- Service orientation rather than product orientation
- Changed emphasis from volume of output to accuracy of output.

These changes were facilitated through increased emphasis on planning and control activities. Planning and buying activities have been merged and in 1997 Fastreact Planning Software was introduced. Lead times and margins had become even tighter, and the need for really effective control became critical.

The Planning and Control activities at this company include:

- Long term capacity planning, up to 18 months ahead
- Short term detailed planning of factory units
  1. Planning of cutting room activities
  2. Planning of sewing room activities
- Production Control
- Inventory Control - raw material purchasing, finished goods; Call off etc.
- Critical Path control.

The management structure includes a Planning Executive (PE), Merchandising Executive, 4 Factory Planners (one for each factory), and 2 Planner/Buyers in each factory. Huge amounts of human resource are devoted to planning and control activities - which is unusual in traditional manufacturing organisations.

**Duties of the Factory Planner**

- Take information from PE and loads factory appropriately, scheduling and sequencing work in line with delivery schedule
- Work closely with Factory Manager to ensure production efficiency
- Liase with main fabric suppliers to order fabric.

**Duties of Planner/Buyers (unique to this case)**

- Detailed planning of work for each line, using customer information-SMS (size management system) in store stock replenishment
- Purchasing of unique fabrics and trimmings
- Loading of cutting room (which in turn dictates the work of the sewing lines)
- Use MRP to schedule deliveries and control inventory. Hold a maximum of 2 weeks stock, which is low for the clothing industry.
- Production Control - ensure that quantities booked into warehouse match cut quantities – the cutting room is where the statement of intent becomes a reality.

**OPERATIONAL LEVELS**

- PLANNING EXECUTIVE: We need to make 1000 of style 9966 by the end of June. Which factory can do this?
- FACTORY PLANNER: We need to make 250 of style 9966 each week, for 4 weeks. Which line will we use?
- PLANNER/BUYER: This week we need to make 50 size 10s 100 size 12s etc.Is the fabric in? Are all the other accessories in? When does the cutting room need work? Did everything we cut go into the warehouse?
USING FASTREACT TO FACILITATE PRODUCTION

The most extensive use of this software is at the level of the Planning Executive and Factory Planner, where supply and demand must be reconciled. The software facilitates:
- Loading and scheduling of the factories appropriately to achieve required customer delivery
- Operator reconciliation
- Financial reporting
- Critical Path Management.

Each factory has a planning board which when loaded with styles looks like a very colourful Gantt chart, each colour giving the Planner important information (see Figure 1 [2]). Key features of the system include:
- Transparency: it is a very visual system that makes it easy to see what is going on, layout, colour
- It ties a huge amount of information together
- It is very easy to explore ‘what ifs’ with this software. By moving products around to see delivery consequences, the system supports a simulation process. Information and requests from the merchandiser (directly from customer) can be easily and quickly explored, and accurate answers can be given to the customer, after having explored the options through the simulation.

Before the introduction of this tool, planning was done using Excel Spreadsheets. This precluded the integration of information. The factory plan was separate both from the financial plan and from the operator reconciliation. Making changes and exploring ‘what if’ scenarios was a lengthy and complicated business. At the time, orders were larger, returns in general were higher, changes were less frequent, but this is certainly not the case now. A new system was essential to cope with the changes in the business.

It is very easy to make extravagant promises to customers, but at the end of the day the business still has to make a profit. To ensure customer satisfaction it is essential to know the implications of bringing production forward, stepping up production, slowing down lines and so on. If the simulation has been carried out, the customer can be given a confident answer.

SETTING UP THE SYSTEM

To set up production, certain information must be entered:
1. Product reference
2. Order reference
3. Order quantity
4. Delivery schedule required by customer- dozen garments per week
5. Selling price per dozen
6. Cost per dozen
7. Return per dozen
8. Work content- standard hours per dozen.

FIGURE 1

A typical apparel manufacturing planning board will look like the image above. All of the essential information on loading, order delivery, pre-production issues, work in progress, efficiency etc. are immediately visible to all security cleared users. A planner no longer needs to spend 50% of their time answering queries from sales, purchasing, finance or buyers, the information is clear and accessible.
This order then appears in a load list (an order book) listing the order reference and the quantity to be loaded onto the plan. The order can then be lifted from the load list and placed appropriately onto the planning board. This board is set out as per the factory i.e. line 1, 2, 3 etc., with the number of operators on each line specified. As the order is dropped onto the board, the system works out automatically the rate of production, based on the information already in the system. The strip will then turn a certain colour, giving the Planner information about the implications of their actions. If the strip colour is grey, no delivery problems are forecast. The colour changes as appropriate indicating potential late and very late schedules. The display on the board can be changed, and instead of delivery information being relayed via colour, it can be product information, or customer information for example.

Once the board is loaded up completely, an operator reconciliation is completed, showing how many operators are available against the number needed to complete the plan. A plan can then be printed, which provides the work instructions. Responsibility then devolves to the factory manager and the planner/buyer to ensure the plan is achieved.

The factory works until 11:30 on a Friday, at which time all production stops and a weekly total is calculated for each line and style. This information is then used to update the planning system. The strip size will then be reduced to take account of the previous week’s production and the whole process then starts again, responding to the ever-changing customer demands.

**MANAGEMENT OF THE CRITICAL PATH**

Before a garment can go onto a production line, there is an enormous amount of pre-production activity that must take place. This is sometimes dictated by the customers’ way of working, or by common sense and good practice.

Each activity or event is allocated to a responsible person. Only key events - things that must happen before a garment can go into production – are included. For example:
- Label Information - unique product numbers used to control products throughout the whole client system
- Quality Seals from customer (standards- aesthetics, fit, durability etc)
- Wearer trials
- Fabric approved - colour, print etc.

Each week the Planning Executive produces a ‘to do list’ for each responsible executive. This list relates exactly to where the order is on the planning board. If the order moves forward or backward, so too do the dates on the Critical Path. The anchor date is the production start date.

The first event might need to take place 4 weeks before the production start date. If the production start date is pulled forward for whatever reason, the system automatically highlights the potential problem. The Planning Executive is then required to make a decision to:
- postpone the start date
- pull strings
- rush the pre-production process along!

The difference now is, that the managers know what the decision has been. Instead of getting the production line set up; the operators trained; the fabric in; before finding that the label information is unavailable for the next 2 weeks, this total waste of effort can now be avoided. Each week the responsible executive returns the list to the Planning Executive who inputs the completed events on the system. This changes the status of the order on the planning board.

**CONCLUSION**

Only the fittest and leanest operations in this country will survive. If you are still mass manufacturing clothing in the UK, then you are doing so:
- Efficiently
- Cost effectively
- Responsively
- Flexibly
- With a huge amount of effort on Planning and Control.

The new software system contributed enormously to this particular company’s success by integrating essential information. However, it must be combined with the very real understanding the planners have of the organisation’s objectives and the customers’ requirements. It is this combination, together with a willingness to change, that has helped them to survive.

**REFERENCES**


[2] Copies of the slide are available from the authors.

**About the authors**

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