CHAPTER – VI

JUST IN TIME SYSTEMS

INTRODUCTION :

The challenge our manufacturing industry faces from offshore competition is immense. Manufacturing management must therefore change considerably in order to meet these new challenges and to ensure future visibility. Many experts are convinced that manufacturing management approaches will change more over the next 10 years than they have over the last 100 years. Central to this change is the application of Just In Time Systems.

PUSH / PULL PRODUCTION :

Basically production can be considered in two categories :

i. Produce on demand (Pull System)
ii. Produce to forecasts of demand or make to stock (Push System)

Some companies have a policy of not producing anything until a customer is found. At the other extreme, in other companies products may be made in large quantities in the hope that supply and demand can be matched by advertising and by giving high visibility to the product, as in the case of domestic products sold in supermarkets.

Between these extremes there exists a vast range of product in which the manufacturer may use a combination of both. For example, in the manufacture of wallpaper there are a number of basic materials and operations which are common to all finished products irrespective of the pattern selected by the customer. Usually, literally hundreds of different designs are offered by most leading manufacturers. Clearly, it would not be feasible to manufacture all these in vast quantities to be stocked by retailers in the hope that customers will purchase them proportionately. No one can afford to tie up that amount of money, and the risks relating to the losses from dead or slow-moving products would be inconceivable.

The usual strategy is not to supply the retailer with any stock at all. Only a pattern book. However it is essential that the manufacturer should be able to respond instantly to demand. People wishing to decorate their houses usually want the materials immediately. Suppliers who can respond most quickly will probably obtain a higher share of the market than their otherwise equal competitors.

The manufacturer normally achieves this by storing product in his warehouse at the last possible stage before it becomes dedicated to a specific design. In this way he is in best

position to respond to market demand very quickly, and at the same time optimize the capital tied up in stockholding high added value product.

The two systems referred to are generally known as push' in the case of production to forecast, but not realized, demand, and pull in the case of making to order.

The JIT company would attempt to use pull' as far into the process as it could possibly go. In the case of the wall paper factory, the virtues of using push / pull in the manner described in the example would appear to be fairly obvious good practice and the concept likely to go unchallenged. In the company where JIT thinking had become established this would not be so. In the JIT factory, the value of these part-finished goods would be regarded as a constant challenge. What could we do', the management would ask, to make successive upstream operations sufficiently responsive to demand to render the store unnecessary? Ideally, if we could avoid making anything until it is required, that would be the point of minimum cost'. There are many other examples where push / pull are combined.

In the Toyota factory, for some items the pull system applies almost all the way back through the supply chain. Vehicles on the final assembly line have the customer's name attached to the windscreen.

ADVANTAGES AND DISADVANTAGES OF PUSH :

The Principal advantage of the push system is predictability of scheduling and machine loading. This lends itself to computerization which in turn makes it possible, on paper at least, to produce plans involving the production of products in a variety of mixtures, which could not be easily worked out using manual methods.

Also, these plans can be changed easily and options worked out using simulations and literature processes. The disadvantages are that in all but the near perfect plant, the plans rarely work as practice. The usual problems of excess stock, machine breakdown etc., can occur at any time, and frequently do. Some systems allow for this, but the allowance usually generalize, based upon past experience. The danger here is accepting these allowances as norms and rarely challenging them. Perhaps the main disadvantage of the push system is inaccuracy of forecasting. Some refer to this as the crystal ball gazing' phase. No matter how good the feedback may be from marketing and market research, differences between forecast and actual performances are bound to occur. Sometimes this will result in products moving more slowly than predicted. The result : warehouses full of unsold product, supermarkets stocked with slow-moving items taking up space on the display shelves. At other time means that demand will outstrip supply. When this happens panic usually sets in, sensitivities relating to lost sales run high, corners are cut and mistakes occur. These will often result in lost sales in the future and a vicious cycle may begin.

With the pull system, things are different. Generally it is less dependent on computers and more on the ability of the system to respond to sudden and unexpected demands. This is the principal advantages of the Kanban System.

The principal disadvantage of the pull system is the risk of not being able to respond to unexpected demand. In its ultimate state, there will be no stocks of anything at any point, nothing being made until it is wanted. Any breakdown in this system will result in a failed expectation. In its ultimate state, the pull system has no built-in safety factors. Everything must respond positively when demand materializes. Obviously, compromises must be made, particularly in the later stages of development, but ultimately this is the goal.

The pull system places great demands on those responsible for its maintenance. Machines must be in good working order at all times when demand is expected. Planned maintenance is therefore essential. Process capabilities must be such that inspection of parts become totally unnecessary. Everything must be right the first time. (parts per million defects – ppm). However, the achievement of ppm goes for beyond application of techniques; it requires a totally new approach to work.

Relationships with the workforce must be such that stoppage are virtually non-existent; motivation levels high and skill levels always at least adequate for the task in hand. It requires professionalism of the highest order. All operators must be skilled in problem-solving both on an individual and a group basis. In fact, the demands of the pull system are identical to those described for the hard' conveyor system described earlier.

These demands may be hard to achieve in the last stages, but the pay off comes in the form of Zero inventory, virtually zero scrap and rework, no unscheduled plant breakdowns and rapid response to demand.

Where push' is required, the aim should be to keep batch quantities at the lowest possible level, frequent small batches being the target. Of course, this puts demands on management to ensure the quickest possible tool changes.

FINISHED GOODS WAREHOUSE :

One of the goals of JIT is the total elimination of this facility. Consider the financial implications of such an achievement. Even modest sized companies often keep huge quantities of finished product in warehouses all over the country. Quite apart from the stock value of products stored in this way, additional costs are incurred through deterioration, heating, maintenance, handling, damage – not to mention picking errors', this being the term, used to describe the selection of wrong items from stock.

In the ideal JIT factory operating the pull system, there will be no finished goods warehouse. Following the final operation, the product is loaded on to a pallet, shrink wrapped and placed into a waiting lorry usually dsestined for the customer or other point of sale.

The JIT factory is considerably smaller for a given volume of output than its more traditional competitor.

JIT IMPLEMENTATION :

A successful JIT implementation may provide significant benefits for the operation of the whole company. There have now been a sufficient number of JIT implementations to demonstrate that JIT, when successfully implemented, will :

- H reduce inventory levels, probably by about 50 per cent.
- H improve quality levels.
- H reduce scrap and rework rates
- H reduce manufacturing lead times probably by 50-75 per cent
- H improve customer service levels
- H improve employee morale

These benefits are, of course, dependent on a successful implementation. Almost all JIT implementations will lead to some improvements, but the major benefits of JIT will probably only come about if the implementation is carried out in an informed and professional manner.

JIT is not a software package. We do not purchase the computer software, input the correct data and collect an output to form the basis for managerial action. Software packages have formed the basis of several approaches to manufacturing management that have been, and still are, prevalent. Examples are materials requirements planning (MRP), manufacturing resource planning (MRP II) and optimized production technology (OPT) (see Fox 1982). Although software may form part of the JIT implementation, it will not be the basis of it. Instead JIT is oriented towards improving the fundamental processes of manufacturing so as to improve the overall operation of the manufacturing enterprise.

JIT is not strict methodology that can be defined as a series of equations or data relationships. Rather, it is a philosophy that leads to significant changes in the way that manufacturing management operates.

The philosophy of JIT is one that seeks continual improvement and for this to be effective the JIT philosophy must function at the core of company operations. Company personnel must therefore have assimilated the various aspects of the philosophy. This requires a significant change in attitudes. Education plays a major role, since without good education programme the JIT implementation will at best be mediocre. This need for a change in company philosophy means that the JIT implementation cannot be achieved overnight but requires a good implementation plan, sufficient resources and a reasonable length of time (about one year for initial implementation).

We should expect that at the end of the initial implementation, provided that this is done well, manufacturing lead times, customer service and inventory levels will have

improved. However, it is probably of far greater significance that, at the end of the initial implementation, the operation and attitudes of company personnel should have changed by absorbing the JIT philosophy. If this is not the case, the initial benefits of JIT will be lost as company personnel revert once more to their old habits.

Employees attitudes are a key measure of successful JIT implementation. Our goal is for continual improvements in operations for years to come which will only come about if the JIT philosophy is fully assimilated. The initial implementation should be considered only as a start with a successful implementation continuing to improve year after year.

The four principles of the JIT philosophy are as follows:

i) Attack fundamental problems : JIT maintains there is little point in making major problems such as capacity bottlenecks or poor quality vendors. It is far better to solve these fundamental problems and avoid a fire fighting' style of management.

ii) Eliminate waste : Waste is any activity that does not add value. Samples of such activities are inspection , transport and inventory. JIT stresses that these activities need to be eliminated to improve the overall operation of the company.

iii) Strive for Simplicity : Any approach that is adopted should be simple if it is to be effective. Previous approaches to manufacturing management have been based on complex management of a complex manufacturing system. By contrast, JIT implementation simplified the flow of materials and then superimposes simple control.

iv) Devise systems to identify problems : In order to solve fundamental problems, they need to be identified . A JIT implementation will include mechanisms that will bring problems tom the fore. Examples of these mechanisms are statistical quality control (SQC), which monitors the manufacturing process and draws attention to any defect-producing trend, and pull kanban systems,, which identify bottleneck production areas.

These four principles for the basis of any implementation but the way in which they are implemented may vary.

In this five steps have been described which, when implemented iln the proven path, have been shown to be effective. These are :

STEP 1 :

Getting the ball rolling : This step starts the whole implementation sequence and as such it sets the tone for the remainder of the implementation. The step can be broken down to a number of stages : basic understanding, preliminary education, cost / benefit

analysis, top management commitment, a go / no go decision, project team and pilot plant identification. The time scale involved in step I varies from company to company depending on the time taken to obtain top management commitment, the average being at least four months.

STEP 2 :

Education : The make or break issue. A comprehensive education programme is essential to the success of a JIT implementation. JIT is concerned with a major shift in philosophy within the company and this can only materialize through JIT education.

STEP 3 :

Process Improvements : The manufacturing processes themselves have to be improved to produce small batches with short lead times. Process improvements include set-up time reduction and the move to product family flow lines.

STEP 4 :

Improve the Control : The simplified shop layouts typical of Jit implementation require simple but visible shop floor control to be fully effective. The mechanism generally favoured is the use of pull / kanban systems which are simple control arrangements that pull work through the factory rather than non-JIT shop floor control mechanisms which are primarily push. Advantages of these simple pull / kanban systems are that their operation is visible to the shop floor personnel and that they automatically limit the amount of work-in-progress and hence the manufacturing lead times. These pull / kanban systems will work most effectively where the shop floor culture is suitable and again this depends to a large extent on the education programme. In addition quality at source' needs to be pursued and the favoured method of achieving this is statistical process control.

STEP 5 :

Vendor / Customer links : This final step provides the enlargement necessary for JIT to encompass the entire system. Improving the vendor / customer links includes the gradual move to single-source high volume vendors. However this should be done under extreme care to avoid the company becoming vulnerable.

To some extent several of these steeps can be undertaken in parallel with a full implementation plan which the proven path promotes. In this proven path, Step 1 provides the essential preliminary phase. The time scale involves obtaining top management commitment. Many companies manage step 1 in four months whilst others require several years. However, once step 1 is completed a company can then proceed to implement the other steps. The overall time scale for initial implementation is around twelve months from the end of step 1, and companies can expect to keep to this time scale.

The end result of implementing the five steps will be improvement in the manufacturing operation. However, what may be of greater long term significance is that this initial implementation provides the basis of further improvements from year to year. It is the establishment of an infrastructure for on-going improvements that provides the major test of whether or not an implementation is successful.