THE ELECTRONIC PLUGHOLE

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If manufacturing companies do not understand, and then manage the opportunities offered by electronic communication, they will be overwhelmed by them.

INTRODUCTION

Manufacturing planning and scheduling is a business process which must not be conducted mechanistically, and without consideration of the key business drivers which (should) shape the complete spectrum of the firm's business processes. Enhanced awareness of a firm's planning and scheduling needs will become ever more important if it is to prosper from supply chain relationships; first and second tier supply chain members will require their suppliers to have 'suitable' planning and scheduling systems to support the supply arrangements. In turn, the supplying firm must understand how its planning and scheduling system, controls its response to customers and how this affects the operation of the business.

The interplay of planning decisions with all other business processes and the overall commercial performance is leading to the (relatively) new concept of Advanced Planning & Scheduling (APS). Such systems enable near instant visibility of the result of the myriad of conflicting factors (material availability, capacity, machine loading, due date performance, costs....) inherent in a planning and scheduling decision. The understanding of the key requirement of a planning and scheduling system is a vital component in assessing suitability of APS systems. The growth of e-commerce (existing and new, 'invisible' customers assessing the firm's capability to supply through web-bases interrogation of stocks, schedules, ...) will add a further requirement for an appropriate planning system.

The developing concept of APS and the opportunities emerging from e-commerce are a direct result of the huge strides made in the last decade in the area of information technology, whereas the concept of supply chain planning has grown from areas like supply partnership, streamlined supply base and benchmarking.

However, all three modern day terms are inter-related and bear upon the success or otherwise of manufacturing businesses.

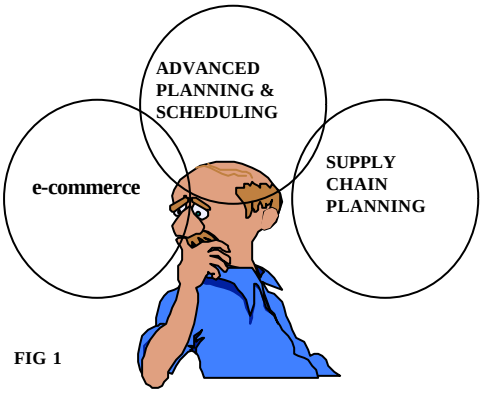

FIG 1

Let us consider the components shown in Figure 1 above.

ADVANCED PLANNING & SCHEDULING

An exact, universally accepted definition of APS, its scope and interelation with business control systems (ERP, etc) is yet to emerge. The Institute of Operations Management has a Special Interest Group which is pursuing these issues,

and there will be details of seminars, presentations, etc elsewhere in this journal. Most are agreed that APS, through the enormous computing power now available (and growing exponentially) can examine the interactions between latest material availability, actual production, latest resource levels and updated customer demand and provide the user with an 'optimum' schedule. Early MRP systems could not do this, since they were unable to respond quickly to the dynamics of the shop floor and customer order changes. Addition of Finite Capacity Scheduling Systems gave improved visibility of schedules and the effect of disturbances, but (still) tend to be incapable of simultaneously evaluating all resources constraints *as they arise*, and the effects on customer order changes. APS effectively becomes the planning engine of the production control system, taking over from the top-down MRP process.

Such near-instant visibility of an optimum schedule (maybe after a few iterations to examine some trade-off areas) might seem the perfect answer to the beleaguered planner, but no system, not even APS can completely replace the experience and judgement that must be exercised in evaluating a schedule and all its implications.

E-COMMERCE

The term 'e-commerce' is in popular use today. To many, it is simply a descriptor of the process of ordering items over the Internet such as CDs, clothes, holidays and so on. This is however a gross over-simplification. Many business of all sizes have Web pages which are used to market their products and services; many have a facility for accepting orders. Larger organisations routinely 'talk' electronically to customers and suppliers along their respective supply chains. Such types of contact must change the nature of business functions, inter-department activities and relationships. The ability to offer goods and services over the Web has had a remarkable impact on a wide number of industries. For example over $750 million in airline tickets were sold over the Web last year and the brokerage industry now manages $200 billion worth of assets in online accounts.

PERCEIVED ADVANTAGES OF E-COMMERCE; CUSTOMER RELATIONSHIP MANAGEMENT

E-commerce enables an ongoing dialogue with customers. The Web can be used to communicate directly with customers, letting them get the answers they want, when they want.

It enables a better understanding of customers' needs, by recognising customer preferences and buying patterns thus allowing a build of individual customer solutions across all business channels and divisions, as well as across and along the supply chain.

Thus:

- Opportunity for personalised, individually focussed service
- Immediate visibility of availability (we have it in stock....)
- Immediate information on progress or order
- Enhanced customer loyalty
- Data on customers can be used to focus on what that customer would be likely to buy...
- Faster delivery, streamlined processes
- Cashless transaction
- Integration across all business units (sales, marketing, warehouse) leading to unity of data, ability to 'speak to the customer with one voice'.

MORE EFFICIENT MARKETING EFFORTS

Accurate, readily accessible customer information can be provided for more precise targeting so that it becomes more possible to anticipate what customers are looking for. A new level of service can be achieved by offering customers information and services they want before they are aware themselves. Departments and divisions can be linked seamlessly. The call centre, sales force and every other department in the organisation can have access to the

customers' data updated in real time. A consolidated customer service strategy can be constructed at every point of contact and customers will see the firm as a unified entity.

Better customer service means long-term loyalty and ultimately, higher margins. In addition, it may actually reduce overall business costs. As is widely known, it costs one-sixth less to keep a current customer than it does to attract a new one.

Thus the impact of e-commerce on a firm can be summarised thus:

- greatly enhanced awareness of customer behaviour
- ability to conduct true relationship marketing
- ability to provide a step change in improvement to customer service

But all of this needs to be *managed*. There is no point in continuing to provide first class service to a customer who provides little or no (or even worse, a negative) margin of profit. A step further away from this unhappy but distinctly possible scenario is the one where the firm does not *know* the relative profitability of its customers, so cannot make an informed service/cost trade off decision

SUPPLY CHAIN PLANNING

The development of the concept of Supply Chain Planning has tended to follow the stages of evolution of MRP into MRPII and beyond into ERP. Early MRP systems were designed to bring control and logic to material procurement, storage and consumption. Control of material was extended into control of manufacturing, and with the incorporation of some commercial functions into the suite of connected modules, and eventually with the closed loop, MRPII was born. At this point the boundaries of the system still lay within the boundaries of the firm. The notion of production planning, scheduling, material control, purchasing, distribution planning, etc being integrated under one unified data source was able to drive out the local sub-optimisation that had previously existed in these areas.

At this point, some functions of the firm lay outside the integrated set. Thus for example one business within a division of a large corporation might have its own manufacturing resource planning system (quite probably tailored to its particular needs) yet another business within the same division might have another separate (and quite possibly suitable) system, incapable of communicating with the first or with some host divisional system. One of the major objectives of ERP systems is to standardise under a common data and control system. At this point, the business control system boundaries becomes the same as the firm's own notional boundary. See Figure 2

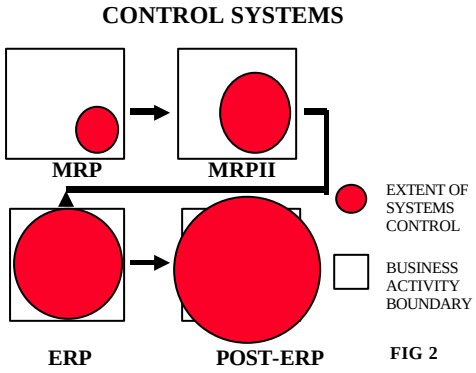

FIG 2

A unified, integrated system such as that implied is obviously capable of communicating its requirements, product availability, etc *outside* the boundaries of the firm with the confidence that the picture presented is correct, balanced and timely. Thus the ERP boundary now goes *beyond* the firm's boundary and has opened up the possibility of establishing an electronic supply chain.

Supply chains are a logical development from the concept of supplier partnerships. The traditional adversarial, arms length relationship between buyer and seller is replaced with a longer term shared goals and benefits type of relationship that must depend for its existence on the sharing of reliable data. Thus the forward demand for components from Company A's planning system can become a trigger to manufacture by its supplier, Company B. Clearly all links, both electronic, commercial and strategic must be in place for this transaction to happen, but through ERP and the realisation that boundaries can lie outside the firm's natural boundary, a powerful opportunity for efficiency gains, enhanced competitive power, etc is created for *both* companies. The linking of commercial information through electronic means is one of the dimensions of e-commerce, and the source of information to be shared, made viewable, etc will certainly include schedules, order status, capacity and so on. Such information could reside within ERP functions, but could be generated from APS systems

Benefits include:

- Sharing of data along the supply chain
- Visibility of stocks, order status, production schedules
- Integrated data set, 'singing from the same hymn sheet'
- Efficiency gains in purchasing, logistics
- Enhanced supply relationships, leading to long term mutually beneficial developments
- Immediate feasibility enquiry results (when can we have it?)

The questions of what standards of performance are expected from members of a supply chain, and how efficiencies can be measured are gradually being addressed in one approach through a form of benchmarking. The US Supply Chain Council [1] has been building membership both nationally and internationally where ideas on performance metrics, configuration of supply chains, etc are discussed, and some form of standards are emerging. The Council also makes available to members its modelling tool, SCOR, for members to visualise and then refine their various supply chains. SCOR allows the user to model the supply chain against the key activities of plan, source, make, deliver. See Figure 3.

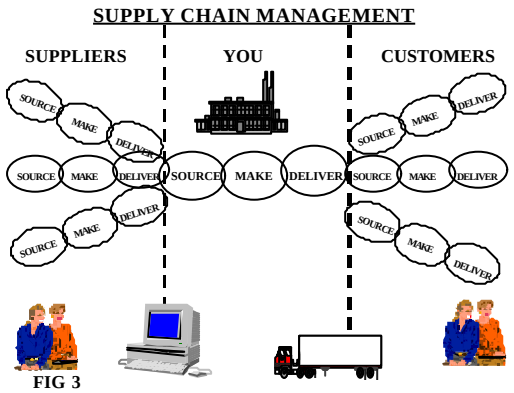

FIG 3

IMPLICATIONS FOR MANAGEMENT

The opportunities for business growth through enhanced customer service, and in turn through 'slick' planning systems, and electronic connections along the supply chain are very real but go together with the very real dangers of inappropriate use.

CUSTOMER SERVICE ISSUES

Perhaps today's high profile focus on customer service has been adopted too zealously and with too little thought by many manufacturing (and service) businesses; the rule should surely be to provide the best possible customer service consistent with sound commercial sense. This is well represented in Figure 4.

CUSTOMER SERVICE:- COST vs BENEFIT

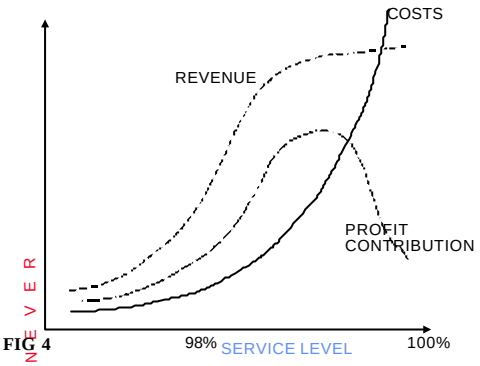

FIG 4

The goal of 100% service is *theoretically* only achieved through infinite resource flexibility, either manifested in stocks or manufacturing capacity. It cannot be sensible to target 100% customer service if major manufacturing inefficiencies are introduced, or that distribution dis-economies are introduced on a major scale, or that high stock levels are held (and thus financed) to protect perfect delivery performance.

The concept of 'managing the customer' is a recognition of the undesirability of giving 100% service, perhaps by closer relationships (better forecasting, shared responsibility for stock cover, agreed levels of flexibility...). The whole notion of managing customers can only make sense if the basis for managing, decision making, control etc, is founded across all aspects of the supply chain.

CUSTOMER PROFITABILITY ANALYSIS

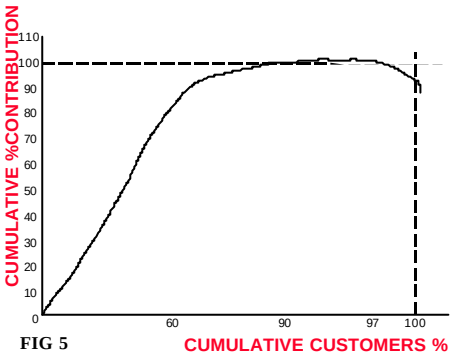

FIG 5

Thus a Sales Director saying 'yes' to a customer should only happen when the full ramifications of that response have been assessed across all activities of the supply chain, and only an integrated logistics function is able to take the proper balanced view of the conflicting elements of isolated customer requests.

Fundamentally not all customers are equal in value to the business; indeed it is highly likely that some customers are being serviced at a loss, as suggested by Figure 5. The business must not only be aware of this but also have a clear policy toward individual customers which reflects their relative importance. This in turn clearly requires that the business has a costing system which captures and allocates costs to customers on a realistic basis [Activity Based Costing is an approach which attempts to address this issue]. Few businesses do this well.

Of course, this is perhaps a simplistic view; today's most important customer (how is this judged and by whom?) may not be so in two years time and conversely, today's No 3 customer (same judgement criteria problems) may become No 1 provided he is well serviced *now*. What is certain is that not all customers are equal and the organisation must have a clear understanding, integrated across the decision points of the business, of customer service *policy* and criteria in respect of service level decisions.

The foregoing serves to underline the need for an organisation to perform a strategic analysis of its customer base, both current and potential future. Through such an analysis, insights can be obtained on the *relative* importance of members of the customer portfolio. Christopher [2] has suggested that the portfolio can be expressed as the classic 2 x 2 matrix:

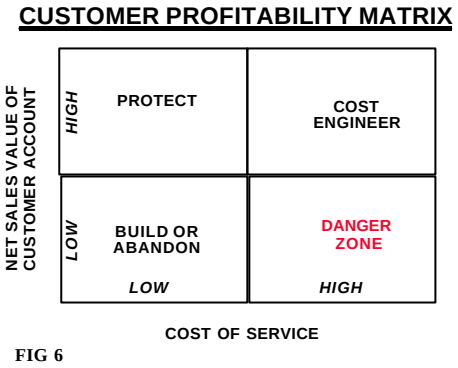

FIG 6

Self evidently, a large proportion of customers should be resident in Upper Left, and service policies should be geared to ensuring such customers are always well served and the relationship protected. Customers in the Upper Right segment have the capability of being 'moved' left by careful manipulation; perhaps delivery frequency can be relaxed at no penalty to service, or the holding of consignment stock might allow longer production runs, with resulting economies of scale. Any customers resident in Lower Left segment must be viewed either as having potential for upward movement (thus tailor service policy to encourage this) or as having a danger of moving Right, which is the sector to actively minimise. Many suppliers to the retail grocery trade will feel that these customers reside in the Lower Right segment, but the importance of the volume of business prevents the firms from ceasing supply. This in turn is known and ruthlessly exploited by this type of customer.

At any given time, most firms will have customers in all four segments. The strategy should be one of assessing the customer mix and how each might move segments, and in turn what factors would cause such movement. As far as possible, the firm should be proactive in encouraging segment migration, since it then retains some degree of control.

All the above assumes that something is known about the customer; enquiries or even orders via the Web might well come from customers who are *not* known, and therefore cannot be evaluated as discussed above. It might be wise to limit the exposure to this type of customer, for example by limiting supply offers to a (low) percentage of the order book.

ENDPIECE

Advances in information technology and developments in clever planning and control tools certainly open up the prospect of more customers and more sales to a firm. Possession of clever planning systems, and electronic connectivity is almost a pre-requisite. Yet like an axe in the hands of a madman, these tools can be very destructive. There is an ever greater need for customer management, planning systems which throw up the right trade-off questions and answers, and a management structure which is capable of balancing the commercial conflicts in a consistent, transparent manner. Otherwise, the plughole beckons…..

REFERENCES

1. Supply Chain Council: www.supply-chain.org

2. Christopher M, "*Logistics & Supply Chain Management*"; Pitman ,1992.

3. Gattorna J L, and Walters D W*;"Managing the Supply Chain, A Strategic Perspective"*

Macmillan Business Press , 1996.

About the author

Keith Porter, MIOM graduated from Manchester University in Chemistry and then completed his doctorate before moving into industry. Over a 20 year period he worked for various FMCG companies including Lever Brothers, Barker and Dobson and Express Foods in posts ranging from Packaging Buyer to Factory Planning Manager to Logistics Manager.

Currently a Senior Lecturer at Liverpool John Moores University, he has recently helped launch a supply chain improvement development programme to assist SMEs on Merseyside. Keith is a member of the Institute of Operations Management