

The Agile Supply Chain : Competing in Volatile Markets

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Turbulent and volatile markets are becoming the norm as life-cycles shorten and global economic and competitive forces create additional uncertainty. The risk attached to lengthy and slow-moving logistics 'pipelines' has become unsustainable, forcing organisations to look again at how their supply chains are structured and managed. This paper suggests that the key to survival in these changed conditions is through 'agility', in particular by the creation of responsive supply chains. A distinction is drawn between the philosophies of 'leanness' and 'agility' and the appropriate application of these ideas is discussed.

The importance of time as a competitive weapon has been recognised for some time (1). The ability to be able to meet the demands of customers for ever-shorter delivery times and to ensure that supply can be synchronised to meet the peaks and troughs of demand is clearly of critical importance in this era of 'time-based competition' (2).

To become more responsive to the needs of the market requires more than speed, it also requires a high level of manoeuvrability that today has come to be termed *agility*.

What is Agility?

Agility is a business-wide capability that embraces organisational structures, information systems, logistics processes and, in particular, mindsets. A key characteristic of an agile organisation is flexibility. Indeed the origins of agility as a business concept lies in flexible manufacturing systems (FMS). Initially it was thought that the route to manufacturing flexibility was through automation to enable rapid change (i.e. reduced set-up times) and thus a greater responsiveness to changes in product mix or volume. Later this idea of manufacturing flexibility was extended into the wider business context (3) and the concept of agility as an organisational orientation was born.

Agility should not be confused with 'leanness'. Lean is about doing more with less. The term is often used in connection with lean manufacturing (4) to imply a 'zero inventory', just-in-time approach. Paradoxically, many companies that have adopted lean manufacturing as a business practice are anything but agile in their supply chain. The car industry in many ways illustrates this conundrum. The origins of lean manufacturing can be traced to the Toyota Production System (TPS) (5), with its focus on the reduction and elimination of waste.

Whilst the lessons learned from the TPS principles have had a profound impact on manufacturing practices in a wide range of industries around the world, it seems that the

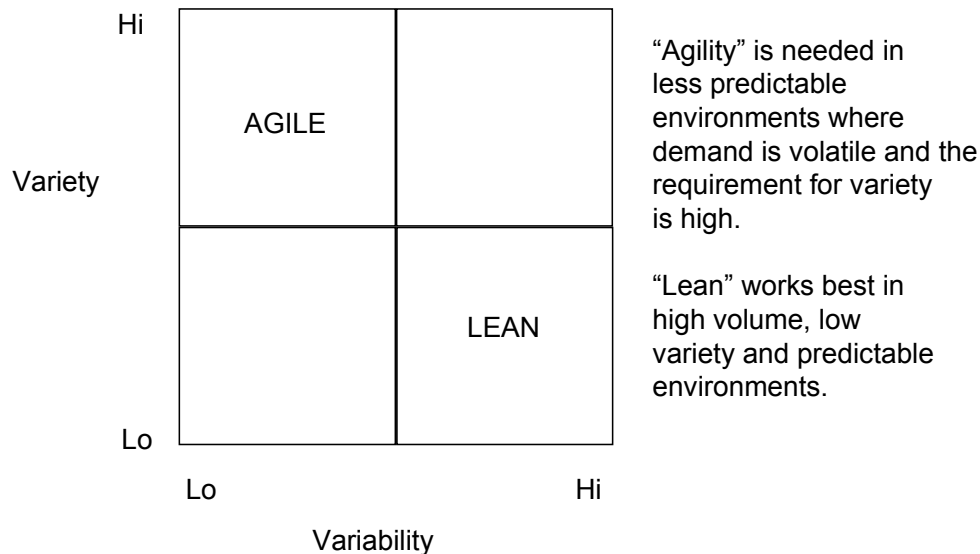
tendency has been for the benefits of lean thinking to be restricted to the factory. Thus we encounter the paradoxical situation where vehicle manufacture is extremely efficient with throughput time in the factory typically down to twelve hours or less, yet inventory of finished vehicles can be as high as two months of sales – and still the customer has to wait for weeks or even months to get the car of their choice!

Whilst leanness may be an element of agility in certain circumstances, by itself it will not enable the organisation to meet the precise needs of the customer more rapidly. Webster’s Dictionary makes the distinction clearly when it defines lean as ‘containing little fat’ whereas agile is defined as ‘nimble’.

There are certain conditions where a lean approach makes sense. In particular where demand is predictable and the requirement for variety is low and volume is high. In fact the very conditions in which Toyota developed the lean philosophy. The problems arise when we attempt to implant that philosophy into situations where demand is less predictable, the requirement for variety is high and consequently volume at the individual stock keeping unit (SKU) level is low – a set of characteristics which is more typical of the Western automobile industry. In other words it could be argued that many firms have been misguided in their attempts to adopt a lean model in conditions to which is not suited.

Figure 1 suggests that the three critical dimensions of Variety, Variability (or predictability) and Volume determine which approach – agile or lean – make greatest sense.

Figure 1 : Agile or Lean?



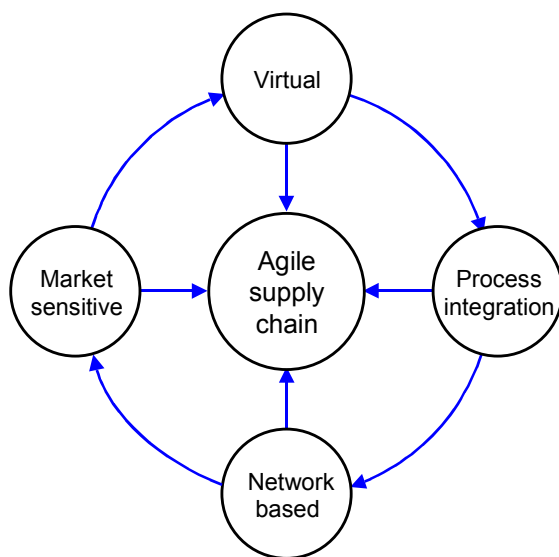
Agility might therefore be defined as the ability of an organisation to respond rapidly to changes in demand both in terms of volume and variety. The market conditions in which

many companies find themselves are characterised by volatile and unpredictable demand. Hence the increased urgency of the search for agility.

The routes to agility

To be truly agile a supply chain must possess a number of distinguishing characteristics as Figure 2 suggests. Firstly, the agile supply chain is *market sensitive*. By market sensitive is meant that the supply chain is capable of reading and responding to real demand. Most organisations are forecast-driven rather than demand-driven. In other words because they have little direct feed-forward from the marketplace by way of data on actual customer requirements they are forced to make forecasts based upon past sales or shipments and convert these forecasts into inventory. The breakthroughs of the last decade in the form of Efficient Consumer Response (ECR) and the use of information technology to capture data on demand direct from the point-of-sale or point-of-use are now transforming the organisation's ability to hear the voice of the market and to respond directly to it.

Figure 2 : The Agile Supply Chain



The use of information technology to share data between buyers and suppliers is, in effect, creating a *virtual* supply chain. Virtual supply chains are information based rather than inventory based.

Conventional logistics systems are based upon a paradigm that seeks to identify the optimal quantities of inventory and its spatial location. Complex formulae and algorithms exist to support this inventory-based business model. Paradoxically, what we are now learning is that once we have visibility of demand through shared information, the premise upon which these formulae are based no longer holds. Electronic Data Interchange (EDI) and now the Internet have enabled partners in the supply chain to act upon the same data i.e. real demand, rather than be dependent upon the distorted and

noisy picture that emerges when orders are transmitted from one step to another in an extended chain.

Shared information between supply chain partners can only be fully leveraged through *process integration*. By process integration is meant collaborative working between buyers and suppliers, joint product development, common systems and shared information. This form of co-operation in the supply chain is becoming ever more prevalent as companies focus on managing their core competencies and outsource all other activities. In this new world a greater reliance on suppliers and alliance partners becomes inevitable and, hence, a new style of relationship is essential. In the 'extended enterprise' as it is often called, there can be no boundaries and an ethos of trust and commitment must prevail. Along with process integration comes joint strategy determination, buyer-supplier teams, transparency of information and even open-book accounting.

This idea of the supply chain as a confederation of partners linked together as a *network* provides the fourth ingredient of agility. There is a growing recognition that individual businesses no longer compete as stand-alone entities but rather as supply chains. We are now entering the era of 'network competition' where the prizes will go to those organisations who can better structure, co-ordinate and manage the relationships with their partners in a network committed to better, closer and more agile relationships with their final customers. It can be argued that in today's challenging global markets, the route to sustainable advantage lies in being able to leverage the respective strengths and competencies of network partners to achieve greater responsiveness to market needs.

Hybrid strategies are often appropriate

There will be occasions when either a 'pure' agile or lean strategy might be appropriate for a supply chain. However there will often be situations where a combination of the two may be appropriate i.e. a hybrid strategy.

Hybrid supply chain strategies recognise that within a mixed portfolio of products and markets there will be some products where demand is stable and predictable and some where the converse is true. As Fisher has pointed out (6) it is important that the characteristics of demand are recognised in the design of supply chains. However, it is not necessarily the case that a supply chain should be either lean or agile. Instead a supply chain may need to be lean for part of the time and agile for the rest.

Zara the Spanish fashion company provides a good example of this hybrid supply chain strategy (7).

Zara is one of Spain's most successful and dynamic apparel companies, producing fashionable clothing to appeal to an international target market of 18 to 35 year-olds. Zara's international market positioning places it in direct competition with some of the most skilled operations in the business, including Italian fashion giant Benetton and US-based The Gap and The Limited. Its rapid growth and on-going success in such a fiercely

competitive environment is in fact a testament to its ability to establish an agile supply chain which still incorporates many 'lean' characteristics. The pursuit of this hybrid strategy has enabled Zara to develop one of the most effective quick-response systems in its industry.

The whole process of supplying goods to the stores begins with cross-functional teams - comprising fashion, commercial and retail specialists - working within Zara's Design Department at the company's headquarters in La Coruña. The designs reflect the latest in international fashion trends, with inspiration gleaned through visits to fashion shows, competitors' stores, university campuses, pubs, cafes and clubs, plus any other venues or events deemed to be relevant to the lifestyles of the target customers. The team's understanding of fashion trends is further guided by regular inflows of EPOS data and other information from all of the company's stores and sites around the world.

Raw materials are procured through the company's buying offices in the UK, China and The Netherlands, with most of the materials themselves coming in from Mauritius, New Zealand, Australia, Morocco, China, India, Turkey, Korea, Italy and Germany. Approximately 40% of garments - those with the broadest and least transient appeal - are imported as finished goods from low-cost manufacturing centres in the Far East. The rest are produced by quick-response in Spain, using Zara's own highly automated factories and a network of smaller contractors. Material or fabric is also held in 'greige' i.e. undyed and unprinted and if demand for a particular garment turns out to be higher than expected then local manufacturers can quickly manufacture additional product.

Zara's manufacturing systems are similar in many ways to those developed and employed so successfully by Benetton in Northern Italy, but refined using ideas developed in conjunction with Toyota. Only those operations which enhance cost-efficiency through economies of scale are conducted in-house (such as dyeing, cutting, labelling and packaging). All other manufacturing activities, including the labour-intensive finishing stages are completed by networks of more than 300 small subcontractors, each specialising in one particular part of the production process or garment type. These subcontractors work exclusively for Zara's parent, Inditex SA. In return they receive the necessary technological, financial and logistical support required to achieve stringent time and quality targets. The system is flexible enough to cope with sudden changes in demand, though production is always kept at a level slightly below expected sales, to keep stock moving. Zara has opted for undersupply, viewing it as a lesser evil than holding slow-moving or obsolete stock.

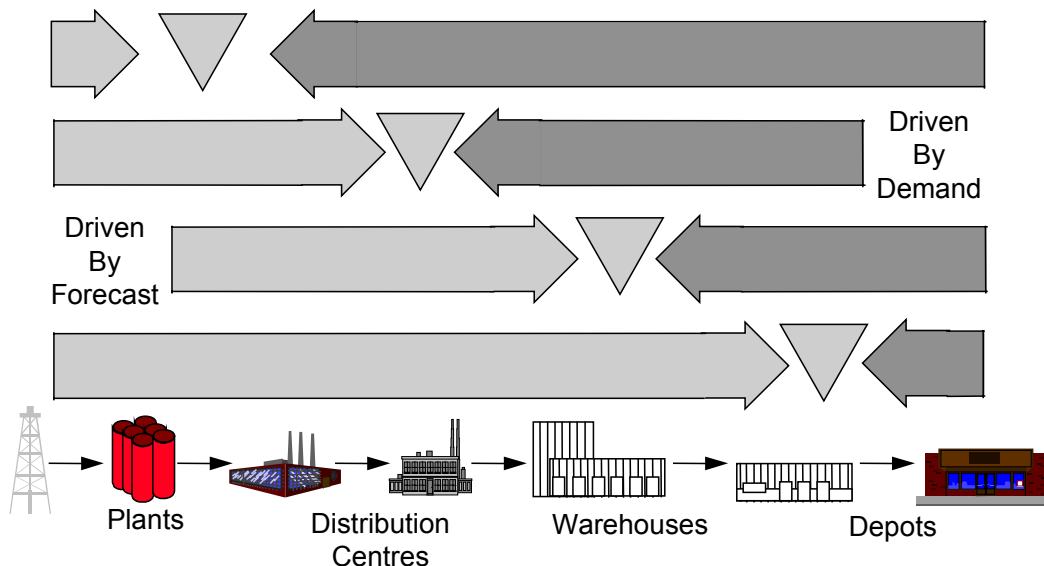
The role of the 'decoupling point'

A major problem in most supply chains is their limited visibility of real demand. Because supply chains tend to be extended with multiple levels of inventory between the point of production and the final marketplace, they tend to be forecast driven rather than demand driven.

The point at which real demand penetrates upstream in a supply chain may be termed the decoupling point. Previously, this idea has been termed the ‘order penetration’ point (8). However, the issue is not how far the order penetrates, but how far real demand is made visible. Orders are aggregations of demand, often delayed and distorted due to the actions and decisions of intermediaries (9). On the other hand, demand reflects the ongoing requirement in the final marketplace in as close to real-time as possible.

The decoupling point should also dictate the form in which inventory is held. Thus, in the uppermost example in Figure 3, demand penetrates right to the point of manufacture and inventory is probably held in the form of components or materials. In the lower example, demand is only visible at the end of the chain. Hence inventory will be in the form of finished product. The aim of the agile supply chain should be to carry inventory in a generic form – that is, standard semi-finished products awaiting final assembly or localisation. This is the concept of ‘postponement’, a vital element in any agile strategy.

Figure 3 : Decoupling points a strategic inventory



Postponement, or delayed configuration, is based on the principle of seeking to design products using common platforms, components or modules but where the final assembly or customisation does not take place until the final market destination and/or customer requirement is known.

The advantages of the strategy of postponement are several (10). Firstly, inventory can be held at a generic level so that there will be fewer stock-keeping variants and hence less inventory in total. Secondly, because the inventory is generic, its flexibility is greater, meaning that the same components, modules or platforms can be embodied in a variety of end products.

Thirdly, forecasting is easier at the generic level than at the level of the finished item. This last point is particularly relevant in global markets where local forecasts will be less

accurate than a forecast for worldwide volume. Furthermore, the ability to customise products locally means that a higher level of variety may be offered at lower total cost enabling strategies of 'mass-customisation' to be pursued.

The challenge to supply chain management is to seek to develop 'lean' strategies up to the decoupling point but 'agile' strategies beyond that point. In other words by using generic or modular inventory to postpone the final commitment it should be possible to achieve volume-oriented economies of scale through product standardisation. The flow of product up to the decoupling point may well be forecast driven; after the decoupling point it should be demand driven.

An important point to recognise is that there are actually two decoupling points. The first is the one already referred to i.e. the 'material' decoupling point where strategic inventory is held in as generic a form as possible. This point ideally should lie as far downstream in the supply chain and as close to the final market place as possible. The second decoupling point is the 'information' decoupling point. The idea here is that this should lie as far as possible upstream in the supply chain – it is in effect the furthest point to which information on real final demand penetrates.

Mason-Jones et.al (11) have demonstrated through simulation the beneficial impact that information feedback can have on reducing upstream amplification and distortion of demand.

By managing these two decoupling points a powerful opportunity for agile response can be created. At the same time the notorious 'bullwhip' or Forrester effect (12) (13) can be reduced. Billington and Amaral (14) have suggested that whilst the combined effect of shared information in a supply chain and delayed configuration through postponement can significantly improve responsiveness, the effect of delayed configuration is actually greater than the impact created by shared information (15).

Leveraging supplier relations

One of the keys to achieving agile response to fast-changing markets lies upstream of the organisation in the quality of supplier relationships. Often it is the lead-time of in-bound suppliers that limits the ability of a manufacturer to respond rapidly to customer requirements. Equally new product introduction time can be dramatically reduced through the involvement of suppliers in the innovation process.

Still today many companies have not recognised that competitive advantage that can be derived from closer relationships with key suppliers (16). Instead there is often an arms-length, even adversarial approach to managing the supplier base. To really leverage the opportunity for greater agility through closer supplier relationships requires a number of pre-requisites to be in place.

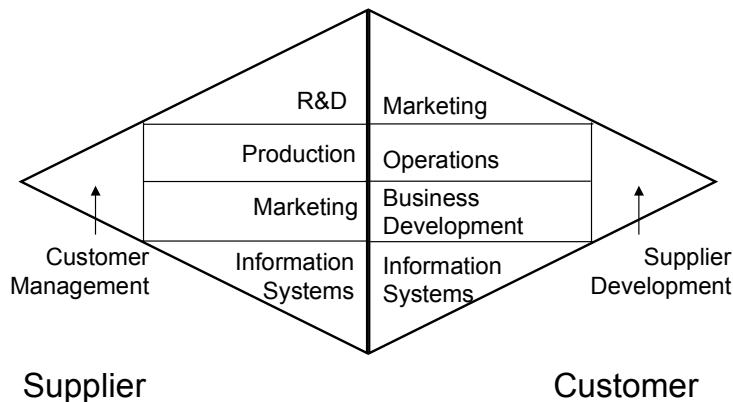
Firstly, it is inevitable that the supplier base be rationalised. It is not possible to create close relationships through process integration with multiple suppliers. Agile companies have sought to identify a limited number of 'strategic' suppliers with whom they can

work as partners through linked systems and processes. Whilst the dangers of single-sourcing need to be recognised, the advantages of having a network of key suppliers able to synchronise their production and deliveries with the requirements of the company are considerable. Opportunities for establishing information-based, paperless systems utilising concepts of vendor managed inventory (VMI), for example, are clearly greater when both buyer and supplier see each other as vital links in a more competitive supply chain.

A further pre-requisite for the creation of a more agile supplier base is a high level of shared information. In particular there has to be clear visibility of downstream demand; data on real demand needs to be captured as far down the chain as possible and shared with upstream suppliers. As well as the IT and the IS necessary to make this possible there needs to be a willingness amongst the partners to put aside any previous mistrust and instead to create an environment in which information can freely flow in both directions in the chain.

Perhaps the most important pre-requisite is the need for a high level of ‘connectivity’ between the firm and its strategic suppliers. What this implies is not just the exchange of information on demand and inventory levels, but also multiple collaborative working relationships across the organisations at all levels. It is increasingly common today for companies to create supplier development teams which are cross functional and as such are intended to interface with the equivalent customers management team within the supplying organisation (17). Figure 4 illustrates the concept.

Figure 4 : Building stronger partnerships through multiple links



Reducing complexity to enhance agility

One of the biggest barriers to agility is the way that complexity tends to increase as companies grow and extend their marketing reach. Often this complexity comes through product and brand proliferation but also it can come through the organisational structures and management processes that have grown up over time (18).

The reduction of product complexity should be a major priority for marketing and logistics people working together. Product complexity includes not only design issues

(e.g. the number of non-standard components in a product) but also excessive variety that does not contribute to greater customer or consumer value. Procter & Gamble for example have in recent years focussed on product range rationalisation, pack standardisation and reduced promotional activity in order to attack complexity.

Complexity is caused also by the way in which organisation structures and management processes are designed. One of the benefits of the Business Process Re-engineering (BPR) movement has been that it has highlighted the need to reduce or eliminate the many non-value activities that are inherent in traditional functionally-based business. Breaking down functional silos and re-grouping around value-creating processes will help reduce organisational complexity. A further aid to complexity reduction, and hence, enhanced agility, will be the development of a human resource strategy that leads to multi-skilling and encourages cross-functional working. Team-based management has been demonstrated (19) to be a highly effective facilitator of organisational agility.

Conclusions

Marketing management has not traditionally recognised the importance of logistics and supply chain management as a key element in gaining advantage in the marketplace. However, in today's more challenging business environment, where volatility and unpredictable demand becomes the norm, it is essential that the importance of agility be recognised.

Leading companies are already implementing marketing strategies which are underpinned by a supply chain strategy designed with agility in mind. These are the organisations that will be best equipped for survival in the uncertain markets of the 21st century.

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