

Managing Agility for Profitability

A. N. Hayman

Managing Director, J & S Marine Limited, Barnstaple, Devon, UK

Abstract—Since the introduction of an industrial-based economy, all sectors of industry have strived to improve productivity. The Industrial Revolution was, as the title suggests, a true revolution, replacing the craftsmen with sophisticated tools and machinery. Companies in all market sectors have been intent on improving their performances year on year in the same way as athletes manage to establish new world records at every major sporting event. The mission for “lean and mean” continues and since the 1950s has followed the Japanese model embracing such methodologies as TQM, Kaizen, JIT, Value Stream Mapping, Six Sigma – to name but a few. The “lean machine” in any factory may not necessarily satisfy the customer’s desires for *value* for money, *quality* of products and services, *responsiveness* of the suppliers and *support* from the cradle to the grave. So, what is being demanded of world-class companies in the 21st Century is the ability to be agile, responding rapidly to changing customer needs and market forces. This Paper will focus on a contract manufacturing company, as an example of an organisation, which is making the transition from lean to agile.

Keywords—Agility, manufacturing, productivity, profitability.

I. INTRODUCTION

The need for companies to balance leanness with agility will be illustrated by the following fictitious case study. Right On Time, known as ROT, is a well-established delivery company with a good reputation for providing a reliable and price-competitive service. In the early 1990s however the company undertook a major review of its operations after suffering from significant reductions in profitability. An analysis of the business indicated that the major cost driver was the efficiency and reliability of its fleet of vehicles. ROT’s management team jumped to the conclusion that the initiation of a continuous improvement programme aimed at maximising the performance of its fleet would be the panacea for success.

A proactive planned maintenance schedule was undertaken and very soon the cost of deliveries was reduced and profit margins began to recover. ROT made the classic mistake, however, of focusing inwardly on only one aspect of its business and disregarding changes within the market in which it was operating. As a result the increased margins began to deteriorate whilst business was lost to more agile competitors. In particular, other delivery companies, whilst having modern, well-

maintained and cost-effective delivery fleets, had also maximised their effectiveness of delivery by introducing other process improvements such as:

- Online consignment tracking and order entry systems.
- Sophisticated warehouse management technology
- Web based management of supply chain equipment

So, ROT had put a lot of effort into improving one of its key processes and measuring the result but had not, at the same time, put an equal emphasis on measuring what was going on in the competitive environment within which it operates. Indeed, if ROT has to maintain agility in the market place it also needs to anticipate the future transportation trends that could be driven by further efficiencies, political or environmental considerations. For example there could be a move away from the use of transport, which employs internal combustion engines to methods with lower environmental pollution.

So maintaining a lean company has to be balanced by the need to remain agile and whilst this may be regarded as common sense, it is regrettably not very common. The old adage “if you can’t measure it you can’t improve it” really explains why leanness has for many years been the priority for most companies, ie it is easily measurable. Agility, on the other hand, which requires an outward focus is far more difficult to quantify. So whilst ROT could measure the performance of its delivery fleet and benchmark it against its other competitors, it would find it far more difficult to measure and benchmark its agility against others in the market.

This paper will describe a proven methodology for balancing leanness with agility, to produce lean core processes within an agile framework that can operate proactively to changes in market forces, as illustrated in Fig. 1. The methodology has been applied to a manufacturing company and the progress so far will be reviewed.

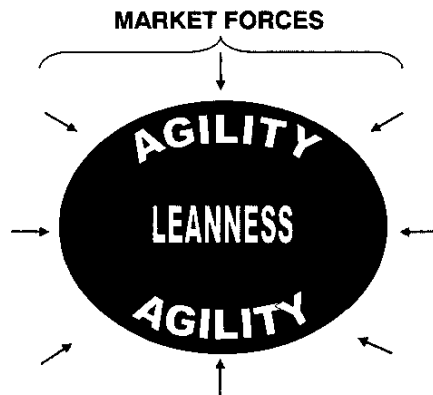


Fig. 1. The Agility Framework

II. THE LEAN MACHINE

The mission for “lean and mean” has been underway since the industrial revolution but adopted a set of well structured methodologies in the 1950s with the introduction of Japanese business processes including TQM, Kaizen, JIT, Value Stream Mapping, Six Sigma and many others. The aim was to eliminate waste in every business process and generally to do more with less, as illustrated in Fig. 2.



Fig. 2. Producing More With Less

From the 1950s to the end of the 20th Century, the engineering and re-engineering of business processes continued to be refined with the primary objective of improving profit margins as well as providing healthy incomes for the plethora of management consultants!

Business processes were and are analysed to ensure that every activity “adds value”, but who receives the benefit of this added value? The answer to this question should be the customer, who will judge any of its

suppliers on *value* for money, *quality* of products and services, *responsiveness* and post delivery *support*. There is no doubt that leanness contributes to Value and Quality, but not necessarily Responsiveness and Support. Indeed, highly efficient business processes work best when variations of product are minimised and therefore changes in customer requirements may not easily be accommodated.

It is important therefore to beware of becoming too anorexic. If the focus of the company’s activities is purely the annual ritual of reducing costs then the prime objective, which should be increasing market share, may be ignored. This is not to say that cost reduction is not important but the balance between a lean machine and agility within the market place must be preserved at all times. The problem however, is that leanness is measurable whereas agility tends to be subjective and we only know we have got it wrong when it is too late!

III. ACHIEVING AGILITY

The balance between outward and inward focus has been explained in the previous section but from a business point of view looking outward is only effective if the company can achieve proactivity in the market place.

The realisation of agility can best be described by the engineering analogy illustrated in Fig. 3.

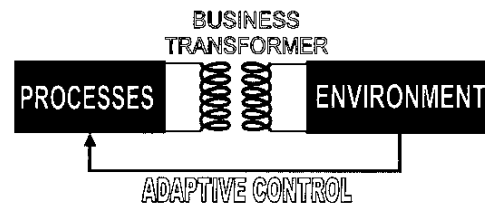


Fig. 3. The Business Transformer

Agility is all about implementing a business “transformer” which matches the impedance of internal processes to the corresponding impedance of external events. Essentially, this results in the optimisation of the management of change [1]. In Section I it was explained that the lean machine would optimise Value and Quality but not necessarily Responsiveness and Support. This is because Value and Quality are primarily controlled internally whereas Responsiveness and Support rely upon the company’s ability to operate effectively within the market place. The business “transformer” matches Value and Quality with Responsiveness and Support. In layman’s terms it ensures the business is not too lean to be agile or too agile to be lean. In essence, therefore, the

transformer allows the lean business processes to operate within an agile framework.

Whereas internal processes can be controlled, the external environment is complex and unpredictable [2]. In the words of the former US Vice President Dan Quayle "forecasting is always difficult, particularly when it has anything to do with the future"!

Whilst it is impossible to predict with any certainty future events, trend analysis can provide a vision of what might happen based on historical events. Engineers will accept that for a system to be stable it requires a feedback loop. The business "transformer" therefore, needs to sense external trends and modify internal processes accordingly. In Fig. 3. this is illustrated by the "Adaptive Control" feedback loop.

So processes must be adaptable and able to change in anticipation of market forces. The culture of the organisation therefore needs to be responsive to change and indeed thrive on uncertainty. This is easier said than done and business failures are very often the result of corporate dinosaurs being unable to change direction and business practices when appropriate. The Small and Medium size Enterprises (SMEs) very often have the advantage of more dynamic business teams, which in the words of Tom Peters can "thrive on chaos" [3]. The example given later in this paper is of a UK SME, J & S Marine, working with a leading UK academic institution, University of Exeter, through a Knowledge Transfer Partnership (KTP).

The University, through work pioneered by Professor David Zhang, has developed a business tool kit, which allows companies to measure their agility compared with the competition. The tool kit uses a number of metrics that can be grouped as follows:

- Intensity of competition
- Dynamic customer requirements
- Supply chain turbulence
- Changes in macro business environment

Within each of these four groups a whole host of metrics has been established that can be applied to any business. These can be further categorized as follows:

- Lean
- Agile
- Lean & Agile

It can be seen therefore that lean and agile have very strong dependencies upon each other further reinforcing the need to optimize balance between the two.

For the work being undertaken by J & S Marine a selection of metrics was established which were appropriate to the business operation. The company is a well-established player in the UK defence market and also has a growing presence in the equipment supply sector for offshore oil and gas extraction companies. It employs 170 staff over a hundred of who are professionally

qualified engineers or supporting technicians. The company designs, develops, produces and supports highly complex systems, which include Sonar, Data Communications, Weapon Handling and Sub Sea Control. Whilst it has a portfolio of products, these have generally not been developed speculatively but have been the result of providing solutions to Customer requirements through funded development, production and support projects. Generally, the company has been successful by maintaining a highly co-operative and responsive relationship with its customers and being able to adapt swiftly to changes in requirements.

So, agility has always been recognised as a prime requirement within J & S Marine but improving efficiencies through a continuous improvement programme has also been necessary to achieve acceptable profit margins. The work being undertaken with the University of Exeter therefore is providing a more formal structure with additional metrics to allow the company to balance its market-driven agility with profitability-driven leanness.

From the plethora of metrics that are available from the business tool kit, six Key Performance Indicators (KPIs) were established as follows:

- J & S Marines delivery performance (Lean)
- Suppliers' delivery performance (Lean)
- Rivalry in price, delivery and quality (Lean & Agile)
- Contribution (Lean & Agile)
- Effort on bids (Lean & Agile)
- Stock and work in progress (Lean & Agile)

These KPIs provide both a snap shot of the company's agility and also are a foundation for the action plans that need to be taken to improve the business performance. The plans are essentially the "Adaptive Control" feedback loop illustrated in Fig. 3., which provides a proactive modification to internal processes, when appropriate, to enable responses to anticipated changes in the market place.

There are many tools and techniques for improving the company's agility, which can be adapted to meet specific market needs in line with trend information derived from the KPIs. This continuous improvement process is the adaptive process control illustrated in Fig.3.

Inventory control is important and the balance between reducing stocks to improve cash management versus ensuring adequate stocks to maintain agility is of paramount importance. In an agile world, however, the business must consider not only storing physical assets but also providing a repository for Intellectual Capital [4]. A practical example of this concept will be provided later in this paper.

Adaptive process control includes the need to continuously review Make versus Buy decisions. The corporate dinosaurs usually fail because they assume that what they do in-house is based on what has always been

done in the past. The agile superstars however, will only do in-house what they know they can do better than the competition. There is no point being “busy fools” producing products or services that are available more competitively from other suppliers.

Any commercial business, particularly a project-based company like J & S Marine, is dependent upon efficient and effective resource management, notably human resources, for its survival. Agility will not be achieved by just employing a “gang” of specialists and multi-skilling is the name of the game. A sensible approach to this objective is necessary and as an example, a Post Graduate Physicist would probably not take kindly to serving lunches in the Canteen! (why not?!). A Technician Engineer testing equipment in the factory would, however, be willing to take his or her turn at fault finding on equipments on surface ships or submarines, even if that was not considered to be his or her normal employment.

Resource Management is also part and parcel of the Make versus Buy decision-making process. In J & S Marine there is an assumption that one of its core competencies, the design and build of acoustic sensors, should only be undertaken in-house, partly because this is one of the areas where the company can add value in the market place, both from its understanding of the design process and because it is an area where the production volumes are relatively high. The volume of production logic can, however, be challenged when, for example, analysis of the company’s use of paper is undertaken, which is significant but it would never consider chopping down trees and producing its own paper! So, it is important to review continually how the company’s resources are being used and what skills and expertise are required to be retained in-house.

To demonstrate “Lean & Agile” in action, the example of J & S Marine’s Sonar Contractor Logistic Support (CLS) activities will be described. It will first be necessary, however, to explain what CLS is all about.

In the UK Defence Market, the principal customer, the Ministry of Defence, is moving towards an innovative style of contracting for equipment and platform support services. To date, support contracts have been broken down into a number of work packages that can be broadly categorised as follows:

- Post Design Engineering Services, dominated by the management of obsolescence
- Spares
- Repairs
- In-Service Support

These packages have been let as separate contracts, usually competed, and there has been little or no communication or co-ordination by their respective project managers. So, whilst each package could be viewed as “best value for money” from the customer’s perspective, in reality, in terms of cost of work done,

“1+1+1+1 has equaled 5!” The guiding principle has always been “if it ain’t broke don’t fix it” which although is a sure way of saving money in the short term, when it is broken it will cost a significant amount more than it would have done with preventative maintenance.

In the new world the customer has decided that Through- Life Cost (TLC), should be minimised, i.e. “1+1+1+1 should equal 3” which can only be achieved if a holistic approach is adopted with respect to the afore-stated phases of support services rather than the method that has been described. The MoD in its quest for Smart Acquisition (an initiative which came out of the UK’s Strategic Defence Review in the late 1990s), has recognised that “best value for money” is achieved by competing for a *total* support package which *maximises* equipment availability.

The UK MoD has placed an innovative-style contract with J & S Marine through its prime contractor Thales Underwater Systems. The objective is to support sonar equipment in use on the UK’s fleet of surface ships and submarines, over a ten-year period, to meet a number of the customer’s Key Performance Indicators. The major consideration is ensuring minimal downtime of in-service equipments. In short, the KPI is operational AVAILABILITY.

In order to achieve the customer’s KPIs, some of the well- established techniques within a “lean and mean” organisation will inevitably be compromised. Maintaining equipment availability requires adequate stock holdings, whereas, the vision of the “lean machine” is minimising, or indeed eliminating, stock. In order to implement the business transformer as depicted in Fig. 3., stock must match the level that is required to meet the customer’s desired equipment availability and *not* be driven by the “lean desire” to reduce working capital. An innovative approach to stock holding is necessary applied to both physical and intellectual stock, which optimises the trade off between leanness and agility.

The Sonar CLS Contract requires a timely availability of acoustic arrays. These under-water listening devices incorporate a number of sub-assemblies including acoustic and non-acoustic sensors, amplifiers, analogue to digital converters, connectors, cable harnesses and a housing, which is made up of long plastic tubing, filled with kerosene. Clearly, to hold stock of completed arrays would be costly and space consuming. The stock is therefore comprised of long lead items, which can then be drawn down and combined with traditional lean Just In Time methods to ensure the arrays are delivered Right On Time! In this way agility is maintained without compromising the best practices of cost and working capital control.

When supporting equipments over long periods of time, market and supply-chain forces will almost certainly lead to changes in configuration of the acoustic arrays that are being supported. This has led to J & S Marine complementing its stock holding of physical items with the storage of Intellectual Capital. Design engineers are encouraged to anticipate problems and as an example,

proactively prepare design solutions in anticipation of longer-term component obsolescence. These designs can be held in stock, and introduced into service when anticipated problems arise. So, for example, if a critical component like a memory chip, is known to have a finite life as a result of "technology growth" then a "stored" re-design could, at the right time, be introduced which would overcome the obsolescence problem and very often provide a spin-off of improved performance. Also, sharing engineers' time between, supporting the old and anticipating the new, can improve both job satisfaction and productivity.

Referring again to Fig. 3., the Sonar CLS example illustrates how internal processes are continuously improved by adaptive control, driven by anticipated changes in the environment, which are measured through the appropriate Key Performance Indicators.

IV. CONCLUSION

In the Introduction an example was given of how the ROT Delivery Company had, with all good intentions, sharpened up its business practices to improve profit margins but had lost sight of its customers' primary requirement – Right On Time! This all too common failure amongst even well established companies provided a salutary introduction to the need to implement a lean machine within an agile framework that can continuously and proactively respond to market forces.

Having explained the principles of leanness and agility and then comparing the fictitious example of ROT with a real and live case study of J & S Marine, "Agility In Action" has been demonstrated. In short, therefore, it really is possible and indeed necessary for survival, to be capable of **MANAGING AGILITY FOR PROFITABILITY**.

ACKNOWLEDGMENT

The Author wishes to acknowledge the extensive support and assistance from Professor David Zhang and his Team at the University of Exeter who are pioneering Agile Manufacturing and guiding its implementation within a contract manufacturing company, J & S Marine, through a Knowledge Transfer Partnership.

The Board of J & S Marine Limited is thanked for its kind permission to publish this paper.

REFERENCES

- [1] Alan Hayman, "Control amidst the uncontrollable" IEE Engineering Management Journal Vol.12 No.6 December 2002.
- [2] H. Mintzberg, "The Rise and Fall of Strategic Planning", Prentice Hall Europe, 1994.
- [3] T. Peters, "Thriving on Chaos", Pan Books Ltd. 1989.
- [4] T. A. Stewart, "The Wealth of Intellect", Nicholas Brealey Publishing, 2001.