Lean Six Sigma spreading its message beyond manufacturing into services

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Introduction

The term 'lean thinking' refers to the use of ideas originally employed in lean manufacturing to improve performance in all departments within the enterprise. It is defined as a systematic approach to identifying and eliminating non-value added (waste) activities through continuous improvement by flowing the product at the pull of the customer in pursuit of perfection (National Institute of Standards and Technology). Six sigma is focused on identifying variation and the factors that cause variation. By doing this, it is possible to focus on process improvements that happen when variation is reduced or eliminated. All work processes can be defined, measured, analysed, improved and controlled. This sequence is referred to as DMAIC in six sigma parlance. An organisation is performing at a six sigma level if it has equal to or less than 3.4 defects per million opportunities. This means that for every million opportunities in a work process it is done correctly 999,996 times.

History

Most of the techniques used in lean six sigma have their origin in pioneering work done many years ago. Techniques used to map processes and define relationships between work elements and flows of product and information have their origins in Industrial Engineering for example. Walter Shewart brought together the disciplines of statistics, engineering and economics (Shewart, 1980) and described the basic principles of statistical process control. This technique still sits at the heart of quality assurance and control in modern manufacturing systems and processes. W. Edwards Deming was a pioneer in the area and is widely credited with revolutionising Japanese manufacturing quality in 1960s (Deming, 1986). Joseph M. Juran was another pioneering giant in the area and wrote numerous articles and books on the subject such as the Quality Control Handbook (Juran & Blanton, 1999). Philip Crosby was credited with the zero defects philosophy and also wrote such books as “quality is free.” The concept of total quality management (TQM) is credited to Armand V. Feigenbaum and Kaoru Ishikawa developed the now famous cause and effect diagram approach used extensively in problem solving. In addition to these pioneering legends the Toyota motor company is credited with being the pre-eminent leader in developing and applying the concept of lean manufacturing.

Application in Services Industries

Despite the successes enjoyed in manufacturing over the years, lean six sigma (LSS) has not been used as extensively in service industries. For the purposes of this article we can define services as all nonmanufacturing operations and activities, either in nonmanufacturing industries or within organizations that manufacture. One wonders why this is the case?

In some instances when individuals are faced with the need to improve service processes, they assume that lean Six Sigma does not apply. For example, providing health care in a hospital or reviewing mortgage applications is very different from making computer chips in a factory. The typical response is, “we’re different.” That may be true but it is also true that many differences exist between manufacturing plants. Fabricating computer chips is very different to moulding glass, or plastic into different shapes. Lean six sigma offers a generic improvement methodology that can be used to improve anything. The “we're different” mind-set in services may be caused by some or all of the following :

- Popular stereotypes about manufacturing being engineering and efficiency intensive.
- Historical emphasis on improvement initiatives in manufacturing.
- Unique conceptual and technical challenges in services.
- In manufacturing it is easy to measure economic inputs and outputs whereas in some services, economic inputs are converted into 'difficult to measure' social outputs eg: Healthcare, Social welfare, public goods.

This type of thinking blurs the fact that LSS is a generic improvement methodology. It assumes a one size fits all transfer from manufacturing to services. While there are common strategies, principles and methods that are applicable to virtually all applications, there are inevitably some unique aspects of each situation that require some degree of tailoring. Of course, this is also true of LSS applications within different manufacturing sectors.

Key elements of LSS such as the precise identification of what is value and where it is created within the services system are vital to the success of services organisations. The focus on customer driven responses or “pull” as it is referred to in LSS is also vital as is the need to create an even “flow” of service delivery that meets customer expectations and boundary conditions. These basic principles of LSS are applicable to a wide range of service activities and recent literature has shown a move toward greater understanding and acceptance of this. Karr (2011) for instance points out that when the term best practice is used instead of standardisation the use of LSS is much more acceptable in healthcare settings. Edwards, Nielsen, Jaconsen (2011) describe how lean surgery can be performed in a hospital setting and knowledge work is examined by Staats & Upton (2011) in a Harvard business review article that describes a study on LSS implementation in an IT environment in India.

Technical differences need to be taken into account when applying LSS in any setting and a one size fits all is not usually appropriate. It is also crucial that a systematic approach is followed driven by data to properly define problems before entering the solution development phase of a project. The lack of suitable measurement systems from which to obtain data in some sectors of services can be an issue. Manufacturing companies have very good measurement processes. This is due to the fact that it has become a vital part of manufacturing processes to do so in order to assure and control quality and meet critical performance targets. This same need however exists in most services sectors especially those in a competitive environment in these very challenging times.

Another typical technical difference relative to manufacturing is the fact that many service processes are not well-defined or standardized because of dependence on expert knowledge to deal with very complex and knowledge intensive work. If you ask several doctors how they decide a specific diagnosis, they may have trouble agreeing on a specific set of steps in this decision making process. They will all look at the same data but may not do so in exactly the same way. Similar problems exist in manufacturing however. Problems such as how different engineers approach and resolve complex process and yield issues in semiconductor manufacturing is one example. The LSS process helps to seek out and identify these variations in approach and then brings the experts together to define the components of variation with a view to reduction or elimination. The IT services sector is an example of this (Staats & Upton, 2011).

Similarities

If so many things are different let's ask what is similar. 1) All work gets done via processes, 2) Quality is usually a very important part of the end output, 3) Undesired variation is usually an enemy and adds both cost and poor quality, 4) Information is usually a vital ingredient to enable good decisions to be made, 5) Some activities add value and others are wasteful.

Applications in Ireland

Let's explore some two simple examples of how LSS can be applied in real live service situations that illustrate points of 1-5 above. *(note: references to the above 1-5 are in bracketed italics)*

The first example is a major disability service provider in Ireland with an annual expenditure of Eur30M. It provides support and care services for 284 disabled people. In November 2010 it undertook a lean six sigma programme under the nomenclature of a value discovery in order to focus the intent in a positive way (Karr, 2011). The first thin slice analysis of its business showed a significant level of undesirable variation *(ref, item 3 above)* in their performance on cost and quality across their 22 service locations in Ireland. Problem solving methodologies were used to unearth the components of that variation and it led to a significant amount of business process *(ref, item 1 above)* mapping & data analysis to define the components of the variation. In addition the organisation re-examined how they defined value *(ref, item 2 above)* and created a graphical representation of that value *(ref, item 5 above)* using Maslow's hierarchy of needs.(Maslow, 1943). At the base of the pyramid was the health and care needs of the individuals and then came the normal first rung ie: physiological needs. This helped to focus the entire organisation on what mattered and what didn't matter. The latter then became a target for evaluation with a view to reduction or elimination of waste. They also began to focus on looking at quality measurement *(ref, item 4 above)* in line[1]. This is a classical manufacturing technique aimed at building quality into the process and goes all the way back to Shewart, Deming etc. In 2011 (as of Sept) they had eliminated Eur500,000 worth of waste and had seen significant improvements in quality standards. Most of the techniques applied came straight out of the manufacturing handbook but applied in an appropriate way and with appropriate sensitivity in this unique health and care setting.

The second example is a $5BN pharmaceutical company that operate their European, Africa and Middle Eastern (EAME) customer service organisation from Dublin. The operation is service intensive and they process massive amounts of customer data on a daily basis from over 32 countries stretching to Russia in the east to South Africa in the south. In June of 2011 the manager of the customer service division engaged in an LSS programme to resolve problems in an area that processed thousands of transactions per day. The problem was that workload had grown significantly as new

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1 In line means that the quality measures happened at each step of the process as distinct from waiting until the process ended to determine success or failure.

countries were coming on stream all the time. Existing staff were coming under pressure and the incidence of re-work and other quality related matters started to increase. The easy thing to do would be to hire new staff, but this individual wanted to make sure that the systems and processes were effective before adding more staff. Value stream mapping VSM *(ref, items 1&2 above)* was used to chart the progress of each piece of information. It began with the customer in his/her local country and ended with the final process transaction in Dublin. The exercise showed that only 70% of the incoming traffic was capable of being processed successfully first time. Undesirable variation *(ref, item 3 above)* in the precision and accuracy of information was found. This was due to translation, understanding, unavailability of information *(ref, item 4 above)* and gaps in system capability. It was creating enormous amounts of re-work and filling up the daily lives of staff going back and forth trying to resolve these problems.

The causes of this variation were established using data gathered by staff and a new business process was designed and implemented to validate all data before it is sent to the service centre in Dublin. Once again this is a classical manufacturing approach which is to assure quality at the critical input stage to a controlled process. The company has implemented the new business across most of its EAME division as of Dec 2011 and has plans to use LSS in other key areas of its business.

Summary

LSS has demonstrated its worth in manufacturing over many years. It hasn't been as widely deployed in service operations. The reasons for this are varied but revolve around a misconception that services are different. This short paper focuses on the similarities and provides two current service projects that have achieved considerable benefits from the deployment of LSS in their operations.

For further information and references contact : info@adaptivehvm.com

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