

Qualcon 2005

Six Sigma Journey: From Manufacturing to Service Organisations

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1 ABSTRACT

As transactional firms begin to embark on the Six Sigma journey, there is much learning they can take from their manufacturing counterparts.

Using the DMAIC framework as a base, this paper investigates some key points and tools that transactional companies can employ to facilitate the success of a Six Sigma program of work.

2 KEY WORDS

DMAIC

DMAIE ^[1]

Transactional

3 INTRODUCTION

Using the DMAIC (Define, Measure, Analyse, Improve, Control) framework as a guide, this paper will identify key differences between manufacturing and transactional organisations when implementing successful Six Sigma projects.

It will examine the learning's that transactional industries can adopt from the manufacturing sector in order to increase the success rate of Six Sigma projects. It will identify critical activities and tools that will benefit the transactional industry

Obviously every firm is distinct and this paper is only a guide based on the author's experience in each industry. The result is a paper that, while providing an overview, will draw largely on knowledge gained in Fast Moving Consumer Goods (FMCG) industries to represent manufacturing sector, and a bias towards the financial sector when evaluating the transactional industry.

Several global factors impinge on any Six Sigma project and every company must be evaluated independently for successful project results. Factors that may affect change at an organizational level distinct from industry level include risk taking culture, attitude towards failure, compatible processes/technology, extent of regulation, and labour reaction among others.

4 SIX SIGMA

Six Sigma is "a comprehensive and flexible system for achieving, sustaining, and maximizing business success. Six Sigma is uniquely driven by close understanding of customer needs, disciplined use of facts, data, and statistical analysis, and diligent attention to managing, improving, and reinventing business processes" ^[2]

The primary project control tool used in Six Sigma implementations is the DMAIC framework. DMAIC is a learning framework which follows on from contemporary learning frameworks such as PDCA (Plan-Do-Check-Act) and PDSA (Plan-Do-Study-Act) ^[3]

The five phases of the DMAIC methodology are: Define; Measure; Analyse; Implement/Improve; Control.

Some authors are now using a DMAIE ^{Error! Bookmark not defined.} framework with the Control phase being replaced by an Embed phase, however this is largely academic and the DMAIC framework will be used forthwith.

The DMAIC model is basically a structure that supports the use of a set of tools in five distinct phases. Many practitioners stipulate that each phase should be completed in series and should not begin before any previous phase has completed [4]

4.1 Define Phase

“Define the goals of the improvement activity. The most important goals are obtained from customers. At the top level the goals will be the strategic objectives of the organisation, such as greater customer loyalty, a higher ROI or increased market share, or greater employee satisfaction. At the operations level, a goal might be to increase the throughput of a production department. At the project level goals might be to reduce the defect level and increase throughput for a particular process. Obtain goals from direct communication with customers, shareholders, and employees.” [5]

Primary focus of the Define phase should be centered on project team and sponsor readiness for change, thorough understanding of customers and critical stakeholders, complete mapping of the ‘as is’ state, and generation of a project management charter document.

4.1.1 Define - Manufacturing vs. transactional

Manufacturing companies differ from transactional companies in this phase primarily based on experience in this type of undertaking. The exposure of manufacturing firms to process improvement methodologies over the past few decades has resulted in three core competencies that support the Define phase: a clearer understanding of their customers and of their value stream; a better understanding of their ‘as is’ processes; and, a more adequately prepared sponsor base and project team.

This is not to say that some service-oriented companies have not achieved this but from a life-cycle perspective, most manufacturing companies are more rehearsed at these factors.

Smith et al. [6] state that if you think Ford’s most important product is the automobile you would be incorrect. Instead, they note that the process of making automobiles, business process management, is what really counts. This holds true (in general) for most manufacturing companies over transactional companies.

Understanding your customers requires a clear appreciation of what customers define as defects – if not, how can companies be sure they are focusing on addressing the true issues? While many manufacturing processes are regulated by strict tolerance requirements from customers (particularly in pharmaceutical sectors), gathering this information in a transactional industry requires skilled researchers and service representatives who are able to ask meaningful questions and gather evocative responses from customers.

Most transactional companies survey customers with ratings from "un satisfied" through to "very satisfied" using survey forms. Using this methodology provides a macro view but is ineffective in fully understanding the exact cause of customer dissatisfaction.

The understanding of the 'as is' process in transactional companies is not as comprehensive as it is in manufacturing companies. Two factors leading to this are the physical vs. electronic nature of the value stream, and the underlying skill set of managers in each firm.

Electronic workflow systems have a propensity to hide the true nature of workflow movements, work in progress (WIP), and inventory. Bottlenecks are difficult to determine and personnel do not always know what happens to a transaction when they have clicked the 'Enter' key. I.e. the natural process lends itself to siloed work practices.

Many managers and workers in the transactional industry suffer a lack of detailed process knowledge in general. Their skills have been practiced around specific applications/regulations and have only recently been asked to consider a value stream in its entirety and propose improvements. The key here is for these managers to forgo their subject matter expertise through delegation and focus on process strategy.

The third cause of difference between manufacturing and transactional sectors is Project Team and Sponsor readiness.

Many transactional companies are representative of the new focus on Six Sigma: that is, "The Dumbing Down of Six Sigma" [7]. Traditionally a Six Sigma Black Belt undertook at least four weeks of training and was required to present a sufficiently significant project. They were then expected to have their approach scrutinized by a panel of experts before being considered competent. This approach is representative of many manufacturing firms that engaged in Six-Sigma in its early days.

For some reason, many companies nowadays believe that sending someone on a three day course provides the same benefits – this applies to many transactional companies who are just beginning their Six-Sigma journey. These companies looking for a quick fix need to understand that to genuinely equip a person with robust problem solving skills requires investment of time, resources and practice – commodities that many firms are loath to endow. In addition to this, the 'champion' role is disappearing. This results in a diminished capacity to engage sponsors and on overall reduction in business understanding of what Six Sigma can actually achieve.

4.1.2 Key points

- Transactional companies must be prepared to spend time and money understanding their customers thoroughly;
- Mapping of an entire value stream from customer initiation to customer receipt of goods/service is required;
- Managers need operational management training supported by strong KPIs to provide the required foundation to support a Six Sigma mindset
- Appropriately skilled practitioners are required to drive projects but more importantly, the cultural aspect of the business must empower these practitioners to deliver the change

4.2 Measure Phase

“Measure the existing system. Establish valid and reliable metrics to help monitor progress towards the goal(s) defined at the previous step” ^[5]

Key deliverables of the Measure phase involve the firm establishment of what will be measured and how, a data collection plan including measurement systems analysis, an understanding of current short and long term variation and capability evaluation of current performance.

4.2.1 Measure - Manufacturing vs. transactional

Strategy level measures are commonplace in both manufacturing and transactional companies and serve their purpose in each. Micro-level measures can be far more accessible within transactional companies – particularly when electronic workflow can timestamp every activity to the nearest hundredth of a second.

Where manufacturing and transactional companies differ greatly is the intermediate measures – particularly surrounding the customer. As Six Sigma focuses on generating value in the eye of the customer, we will focus on this measurement type.

Three areas exist where transactional companies can learn from manufacturing’s experience include: value stream measures; quality measures; and, tolerance zones.

Many transactional companies do not align their internal process measures with the overall performance of the value stream, therefore when attempting to address issues are only seeing a small proportion of the puzzle, i.e. their siloed view.

A good example of this is receipt of written requests for action. Most transactional measurement systems initiate when a document is first looked at by a processor, and terminate when the item has no more manual processing steps. What is missed is the customers’ view of the transaction. A time-value map of a process is invaluable in this case and could highlight inefficiencies in mail receipt, scanning of work, system queues, and core system processes after the manual transaction is completed.

Specific quality measures are also difficult to determine in transactional organisations – particularly the link between outcome measures and causal factors. Tax and Brown’s ^[8] (1998) study found that only 5 to 10% of unsatisfied customers formally complain, there is a definitive requirement to make the most of the limited information available.

The linking of customer dissatisfaction back to root causes can improve in both manufacturing and transactional organisations. Transactional organisations can suffer more in that feedback is not as specific as for manufacturing companies, it is therefore more difficult to assign and then address root causes. The need to capture this data is necessary and tools to equip complaint receivers are a necessary component if actively seeking to address customer satisfaction issues. To support this, forums should be established where processors and complaint receivers can meet in order to take the learning from one area back to the initiating department.

For multistage service Johnson ^[9] introduces the interesting concept of tolerance zones. While manufacturing is not immune to this, transactional organisations are especially susceptible varying tolerance zones.

The issue lies in that customers see service from an end-to-end perspective whereas feedback on issues needs to be more specific. A good example of this is if your flight is delayed, then you are seated in a non-favored position, regardless of how your flight (i.e. the physical plane trip) goes; your rating of the trip would be restricted by the service provided in the previous two services. To enable rectification of this the data collection personnel and methods need to be flexible enough to gather root cause information when feedback is received.

4.2.2 Key points

- A time-value map can be used very effectively to visualise the customer experience in a transactional process.
- Effective feedback mechanisms should be developed to enable root cause data capture

4.3 Analyse Phase

“Analyse the system to identify ways to eliminate the gap between the current performance of the system or process and the desired goal. Begin by determining the current baseline. Use exploratory and descriptive data analysis to help you understand the data. Use statistical tools to guide the analysis.” [5]

This phase requires complete understanding of the performance gap between the ‘current state’ and the ‘future state’. Root cause analysis should lead into analysis of the key sources of variation. This in turn should provide an understanding of the gap in financial terms.

4.3.1 Analyse - Manufacturing vs. transactional

Due to the amount of data and the variation that exists with it, there are several approaches that can support transactional success in the Analyse phase. This includes: a focus on reducing variation at the front end of the process; quick transition of ‘soft’ to ‘hard’ data; and, specific Six Sigma tools that work particularly well in transactional firms

Input variation is a primary cause of process variation. In transactional organisations, inputs can come in a variety of forms such as phone calls, e-mail, facsimile, ‘snail’ mail, and internet.

Compounding this is the fact that only internet (and phone to some extent) can provide up-front validation of data. Segregation of input types is essential for thorough analysis and cost studies of the various methods should be undertaken to eliminate cost inefficient input methods as a priority.

The vast amount of data captured requires two events to take place:

Broad categorization of ‘special cause’ data will dramatically reduce the time taken to complete the Analyse phase. While some valid data may be incorrectly rejected, this will avoid a major pitfall within transactional organisation - getting lost in the data.

The use of subject matter experts or vertical/horizontal slice teams to convert soft variables to workable data through matrix type tools. Again, while it will not provide the most robust of solutions, it will work well in assisting to determine priority areas without occupying too much time.

Finally, two Six Sigma tools that are especially effective for transactional firms in this phase are:

SIPOC – An essential tool for understanding process flows in a siloed organisation. This tool is used extensively in consulting to the financial world.

Cause and Effect – Forget the 6Ms of manufacturing (Man, Methods, Materials, Measurement, Machines, Mother Nature) – they don't work in transactional firms. The key is to be very precise in identifying the problem being addressed, then look for major categories around policies, technical constraints, people, legal, etc.

4.3.2 Key points

- Processes exhibiting significant variation are often caused by the varied nature of inputs
- Be aware of data overload and have plans to combat it
- Don't just use the same old tools that work for manufacturing.

4.4 Improve Phase

“Improve the system. Be creative in finding new ways to do things better, cheaper, or faster. Use project management and other planning and management tools to implement the new approach. Use statistical methods to validate the improvement.”
[5]

The Improve phase requires two distinct activities to occur. The identification and selection of the best solution(s) will ensure the optimal cost/benefit position can be realised, it should (if possible) be substantiated by a pilot process. The development of a robust implementation plan including work breakdown structure, risk management and error proofing will support delivery of objectives.

4.4.1 Improve - Manufacturing vs. transactional

The Control and Improve phases provide the most similarity between transactional and manufacturing organisations. Both benefit greatly from a focus on 'self service' options and the creation of poka-yoke devices for error proofing. Developing pilot processes is often slower in transactional companies particularly if the Software Development Life Cycle (SDLC) comes into play but is workable if the right approach is taken. The primary point of difference is the communication strategy employed.

'Self-service' in transactional firms is always an optimal strategy - providing the cost of developing such a solution is not prohibitive. Straight Through Processing (STP) gateways can be built that facilitate upfront error proofing and deliver the customers instructions in a format not dissimilar to kit manufacturing, i.e. bundled and ready to fit into place. This allows these instructions to slot into the existing databases with little or no manual interaction. This results in a quicker customer experience and a reduced cost base for the organisation. This 'self-service' format can today be seen in many industries stretching from fill and pay petrol stations, to internet bookings to bill paying over the phone.

Error proofing devices can easily be developed with the transactional industry. Software such as 'QuickAddress' is a great example where error proofing of manually entered data now occurs. Manual data entry is always fraught with errors and where manufacturing firms use devices such as infrared scanners to confirm validity,

transactional companies need to be a little innovative in their approach. The use of a second operator to validate keying entries has long been used to minimize the risk of data entry but is a very expensive and slow option. Many dual self-key options exist nowadays. Some even force the user to reverse key critical fields. For example if an amount of \$37,241 is entered into a field [37241] the system prompts for a duplicate entry of this figure but in reverse order [14273]. This is a very robust approach at a fraction of the cost and should be a focus for reducing costs and enhancing customer experience.

Pilot solutions tend to work better in manufacturing companies. The SDLC in most firms is often greater than three months and is prohibitive to all but large-scale changes. The Kaizen blitz approach should be thoroughly thought through before commencement in transactional firms due to this same fact.

Communication is the key to the Improve phase in transactional companies. A 'hidden' workflow system requires that strong communication be delivered for changes. Unfortunately many service companies rely on email to deliver their communication and critical messages are lost or not digested through this medium.

4.4.2 Key points

- Self-service options provide advantages for customers and firms
- There are many innovative ways to address data entry errors
- Ensure the Kaizen blitz approach can work without technology changes

4.5 Control Phase

“Control the new system. Institutionalise the improved system by modifying compensation and incentive systems, policies, procedures, MRP, budgets, operating instructions and other management systems. You may wish to utilise standardization such as ISO 9000 to assure that documentation is correct. Use statistical tools to monitor stability of the new system.”^[5]

The Control phase ensures a monitoring plan is in place and that procedures and documentation are in place to standardise any new processes. Most importantly for the project team however is the transfer of ownership to enable a smooth transition to business as usual.

4.5.1 Control - Manufacturing vs Transactional

Goel et al (2004)^[1] advocate the use of DMAIE over DMAIC in relation to transactional and service based organisations.

The DMAIC model is used in this paper as it is more relevant when understanding manufacturing vs. transactional organisations. DMAIE appears to be only an academic extension of the DMAIC framework and provides little relevance in this context.

Many control factors from manufacturing can be utilised to ensure successful control of a Six Sigma project in the transactional industry.

As in manufacturing, transfer of ownership back to the business is a key deliverable and will only be fully achieved by getting the Define stage correct up front. Six Sigma experts must be free to move onto the next most applicable project if the organisation

is to create a continuous improvement culture. This is especially critical in transactional organisations where many different approaches can be taken to achieve the same (and not always optimal) result. E.g. if an inefficient path is removed from an electronic workflow system, it is very easy for the initiator of the request to use alternative methods such as email, phone, etc as a secondary workflow. Without thorough communication and ownership transfer, this will be very difficult to control as it is an 'invisible' source of workflow.

Statistical Process Control (SPC) is a critical tool to control the outputs of a project and can be used equally well in manufacturing or transactional industries. In my experience I have found that when measuring customer experience from a time perspective transactional firms tend not to display a truly normal distribution but are predominantly skewed right and display several instances of special cause variation leading from long processing times. The proactive use of control charts is an effective way to capture this special cause variation, analyse it before it festers, and develop further controls at the front of the process to eliminate the variation.

4.5.2 Key points

- Ownership transferal is paramount to the success of a Six Sigma program in transactional companies
- SPC should be more widely used in transactional companies.

5 CONCLUSIONS

As transactional companies differ from manufacturing firms in their processes, culture and organisational structure, it is viable that their approach to implementing a continuous improvement program must also differ.

Certain tools and approaches will assist transactional companies on this journey. The primary of these is cultural where engagement of sponsors and development of skilled Six Sigma practitioners will provide a cornerstone moving forward.

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