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Best Practice insights into the training and competency of the Lean Six Sigma facilitators?

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Introduction

From a literature review of Six Sigma academic and industrial research, it is clear that a number of authors have concluded that an effective training and education of the Six Sigma practitioners is a critical success factor for the success and sustainability of a Six Sigma Quality program resulting in a positive impact on the performance of an organization (Antony *et al.*, 2005); (Waxer, 2004); (Antony *et al.*, 2002); (Pyzdek, 2003a).

However, very little attention has been given to the competency of this training. In practice it appears that the competency of a Six Sigma facilitator is measured by one or more of the following:

- The success of a project led by the facilitator to positively impact the bottom line
- The number of successful projects completed by the facilitator in a given period
- The number of trainees that have been trained by the facilitator

The purpose of this paper is threefold:

1. Comment on what academic researchers have noted about the training and education of the Six Sigma facilitators

2. Review the training, education, competency measures and certification in Australia

3. We further propose a model for the training and competency of a Six Sigma Black belt.

It is hypothesized in this paper that competency of the Six Sigma facilitator or expert is an important factor in the long term success and sustainability of a Six Sigma quality program.

Literature Review

Harry (1998) introduced the concept of a Six Sigma practitioner known as a Black Belt. The Black Belt is a trained technical leader to a high level of proficiency in the application of the Six Sigma methodology. Other levels of facilitators have been created

– Master Black Belt, Green Belt and Yellow Belt and most recently Gold Belt [www.6-sigma.com].

The Master Black Belt is usually the company facilitator, strategist and in-house trainer, the Black Belt is the technical leader and in-house trainer, the Green Belts are the projects team members and the Yellow Belts can be data analysts. Large organizations would have all these levels but smaller organizations may be restricted to just a Black Belt and a number of Green belts. Training at all levels except the master level generally is done internally or through external providers like Quality Certification bodies [www.asq.com]. The black belt examination is available in Australian through AOQ - Victoria. Some training is available through certification bodies like SAI Global. Also green belt training is also offered by companies like Ford Australia to support their supplier's efforts in introducing Six Sigma. Australia does not appear to have training available at Master Black Belt level. Currently training at this level is only performed in the US, for example at the Air Academy [(www.airacad.com].

Harry (2000) concludes that the number of full time personnel devoted to Six Sigma should not be large. Mature Six Sigma programs, such as those of Motorola, General Electric, Johnson & Johnson, AlliedSignal, and others average about one-percent of their workforce as Black Belts. There are usually about one Master Black Belts for every ten Black Belts, or about 1 Master Black Belt per 1,000 employees. A Black Belt will typically complete 5 to 7 projects per year. Project teams can be led by Green Belts, who, unlike Black Belts and Master Black Belts, are not employed full time in the Six Sigma program. Black Belts are often recruited for key management positions elsewhere in the company, for example under the career practices within GE by chief executive officer, Jack Welch. Stamatis (2003) suggests ratios for the number of black belts, master black belts and green belts to the size of the organization should be different for a financial organization.

Mitra (2004) makes the point that the training of Six Sigma facilitators needs the involvement of academia in designing appropriate courses. In particular he says, "Academia has a critical role to play in ensuring that sound statistical education is an integral part of Six Sigma curricula".

Pyzdek (2003b) comments that the International Quality Federation [IQF] is taking a first step by certifying Six Sigma Black Belts.

Carnell (2004) believes that "the focus of most discussions on Six Sigma gravitates toward Black Belt training and certification. People are constantly searching for the perfect training material, even though they are aware of the adult learning models and understand the classroom serves up superficial knowledge that is insufficient to deliver a standalone Black Belt.

Hoerl (2001) has compared different Black belt curriculum training material between General Electric's material, Certified Quality Engineer of the American Society for Quality [CQE] training material and a Master of Science in Applied Statistics. He concludes that the expertise developed by black belts is inconsistent across companies and are dependent to a great extent on the certifying body.

According the Parr (2004) the Six Sigma community "needs to work hard to maintain standards for the knowledge level or technical competence and experience of those it calls Master Black Belts".

Brue (2004) is not encouraging of Six Sigma practitioners. He states that "the rapid and widespread acceptance of Six Sigma and its phenomenal success have touched off a stampede of self-proclaimed experts all claiming to possess the knowledge to put the methodology into action. Expectations frequently fall short, however, because some of the practitioners are virtual impostors who do not fully understand or practice the true Six Sigma methodology". He further suggests that "the intellectual property looks credible enough to fool a novice and even generates excitement about Six Sigma implementation and also that what's being disseminated now are altered, covered-up, watered-down versions of the original success model and essential tools are being misapplied, resulting in less-than-stellar performances".

Training in Australia

There are a growing number of Six Sigma training providers in Australia ranging from Registered Training Offices (RTO's), private companies and individual consultants. Training is also provided in-house by facilitators previously trained externally. These courses are at a public level in that the participants may be from a number of organizations with different skills and experience.

Training at Green Belt levels and lower has been provided by various organizations in the Automotive Supply Chain (e.g. Ford Australia, PACAAR/Kenworth) to their first tier suppliers. Again the participants are from a wide variety of backgrounds with different skills and experience.

Another supplier to the automotive industry has undertaken green belt training of selected individuals using their own internal training material.

The content of these training programs vary considerably and the time taken to complete the training also varies.

It is not clear whether this training material covers the same depth as the examinations in the US or the certified examinations of the American Society for Quality [ASQ].

By observation and reading it appears that competency of a Six Sigma facilitator can be measured by the following:

- The success of a project led by the facilitator to positively impact the bottom line (savings, cost reduction, customer satisfaction and renewal) – e.g. ASQ's pre-requisite examination criteria
- The number of successful projects completed by the facilitator in a given period (employee satisfaction)
- The number of trainees that have been trained by the facilitator (company culture)

From the above discussion it appears that Six Sigma practitioner training, competency and experience needs to be researched further to gain insights into the success or otherwise of a Six Sigma program.

Proposed Model of Competency for Black belts

In Australia, the Commonwealth Government is supporting a number of industry sectors including Manufacturing by providing funding towards learning and competency associated with subjects linked to Six Sigma and Lean. In particular the Advanced Diploma in Competitive Manufacturing can include Six Sigma related units (refer to www.ntis.gov.au and www.mskills.com.au and www.npc.tvetaustralia.com.au) that can be assessed for competence towards this qualification and are also equivalent to the Body of Knowledge set by the American Society for Quality (www.asq.org). However, this is training and assessment for the advanced diploma is not widely seen in at present.

These programs are tailored to a specific industry or company and a Certificate course can be selected from a wide variety of core and elective units. For example, it is possible to obtain a Certificate IV in Competitive Manufacturing by completing 10 units over a period up to 24 months. Some of the units cover the fundamentals of lean, 5S, quality, project management, process management, simple statistical analysis and also team management units like team effectiveness and workplace learning.

At a diploma level the units cover a similar variety but go more in depth into the subjects of lean and Six Sigma. Table 1 gives a mapping of the Units against the Body of Knowledge (BoK) of the American Society for Quality (ASQ). This is just one example of the association between the units and the BoK. It would depend on the needs of the company that is being trained.

More particularly, though these units have a set of competencies that can be used to assess the candidate for competence. This may be more appropriate than assessing Six Sigma facilitators by the success of a project or number of projects completed or time to completion.

On completion of the units for the diploma the candidate can be assessed for competency against the set criteria and then it is recommended for the candidate sit for the ASQ 150 multiple choice questionnaire examination. A number of projects would normally be undertaken during the diploma and this would cover the ASQ's necessary requirement.

Conclusion

Training and competency of Lean six Sigma facilitators is critical to success of a Six Sigma quality program. This success will be measured by impact on the organization in terms of financial returns and tacit factors such as employee satisfaction.

Further work is required on this proposal though but I welcome feedback from the participants. Also it is important to investigate a competency model for Six Sigma with input from all relevant stakeholders.

APPENDIX

American Society of Quality's Body of Knowledge	Competitive Manufacturing Units for Diploma (20 Units)
I. Enterprise-Wide Deployment A. Enterprise view B. Leadership C. Organizational goals and objectives D. History of organizational improvement/foundations of six sigma	MCMS600A Develop a Competitive Manufacturing System, MCMS605A – Develop a Balanced Scorecard for use in Competitive Manufacturing, MCMT641A – Implement a Continuous Improvement System, MCMS602A Manage a Value Chain, MCMS603A – Develop Manufacturing Related Business Plans
II. Business Process Management A. Process vs. functional view B. Voice of the customer C. Business results	MCMT430A – improve Cost factors in work practices, MCMT631A – Undertake value analysis of product costs in terms of customer requirements, MCMT630A – Optimize cost of product, MCMT622A – Design a Process Layout
III. Project Management A. Project charter and plan B. Team leadership C. Team dynamics and performance D. Change agent E. Management and Planning Tools	MCMC611A – Manage People relationships, MCMC612A – Manage Workplace Learning, MCMC613A – Facilitate a Holistic Culture Improvement in a Manufacturing Enterprise, MCMC614A – Develop a communications Strategy to Support Production, MCMC413A – Lead team Culture Improvement, MCMT460A – Use Planning software systems in Manufacturing
IV. Six Sigma Improvement Methodology and Tools - *Define* A. Project scope B. Metrics C. Problem statement	MCMT650A – Determine and improve Process Capability Improvements, MCMT452A – Apply Statistics to processes in Manufacturing, MCMT653A – Apply Six Sigma Techniques
V. Six Sigma Improvement Methodology and Tools - *Measure* A. Process analysis and documentation B. Probability and statistics C. Collecting and summarizing data	MCMT650A – Determine and improve Process Capability Improvements, MCMT452A – Apply Statistics to processes in Manufacturing, MCMT653A – Apply Six Sigma Techniques

	D. Properties and applications of probability distributions E. Measurement systems F. Analysing process capability	
VI.	Six Sigma Improvement Methodology and Tools - *Analyse* A. Exploratory data analysis B. Hypothesis testing	MCMT650A – Determine and improve Process Capability Improvements, MCMT452A – Apply Statistics to processes in Manufacturing, MCMT653A – Apply Six Sigma Techniques
VII.	Six Sigma Improvement Methodology and Tools - *Improve* A. Design of experiments (DOE) B. Response surface methodology C. Evolutionary operations (EVOP)	MCMT650A – Determine and improve Process Capability Improvements, MCMT452A – Apply Statistics to processes in Manufacturing, MCMT653A – Apply Six Sigma Techniques, MCMT652A – Design an Experiment
VIII.	Six Sigma Improvement Methodology and Tools - *Control* A. Statistical process control B. Advanced statistical process control C. Lean tools for control D. Measurement system re-analysis	MCMT650A – Determine and improve Process Capability Improvements, MCMT452A – Apply Statistics to processes in Manufacturing, MCMT653A – Apply Six Sigma Techniques, MCMT451A – Mistake proof a production process
IX.	Lean Enterprise A. Lean concepts B. Lean tools C. Total productive maintenance (TPM)	MCMT640A – Manage 5S system in a Manufacturing Environment, MCMT620A – Develop quick changeover procedures, MCMT621A Develop a JIT system, MCMT623A – Develop a levelled pull system, MCMT681A – Develop a Proactive Maintenance Strategy
X.	Design for Six Sigma (DFSS) A. Quality function deployment (QFD) B. Robust design and process C. Failure mode and effects analysis (FMEA)	MCMT652A – Design an Experiment

D. Design for X (DFX) E. Special design tools	

TABLE 1: Mapping of Competitive Manufacturing Units against BoK of the ASQ

A sample of the competency requirements for the Unit MCM602A – Manage a Value Chain are:

MCMS602A Manage a value chain

Unit descriptor: This unit covers the knowledge and skills needed to manage a ***value chain***, a ***supply chain*** or a ***demand chain*** including the close liaison with suppliers and customers and even the managing of the supply/demand chain of smaller suppliers/customers (if they wish it). This unit covers the managing of the supply chain, the demand chain as well as the overall value chain and may be applied to the managing of the chain internally/externally within an organisation.

Application of the competency

In a typical scenario, the person (who may be a manager, technical specialist or similar) needs to manage the value/supply/demand chain on an ongoing basis to achieve the best overall contribution of valued added to their product in terms of customer benefit and/or features. This unit has the prerequisites of:

- *MCMS601A Analyse and map a value chain*
- *MCMT631A Undertake value analysis of product costs in terms of customer requirements*.

ELEMENT PERFORMANCE CRITERIA

1. Evaluate the Value Chain

1.1 Identify all members in the value chain for product/s in area of responsibility
1.2 Identify ***value added*** by each member of the chain
1.3 Identify acute and chronic issues which impact on the value chain
1.4 Develop priority list of items for improvement

2. Liaise regularly with chain members

2.1 Establish and maintain regular liaison with all chain members
2.2 Identify current and forecast issues with each member
2.3 Work with members to help them address their issues
2.4 Build trust and confidence in the relationship
2.5 Develop a priority list of items for improvement
2.6 Negotiate with all chain members to ensure improvements benefit chain members and improve the benefits/features perceived by the ultimate customer

3. Monitor the Value Added at each step

3.1 Identify changes in value added by each chain member
3.2 Identify areas where changes to value added are required

3.3 Develop a priority list of items for improvement
3.4 Work with chain member to bring about improvements to value added

4. Continue to reduce waste
4.1 Identify ***waste*** in value chain
4.2 Work with chain members to continually reduce waste

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