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Six Sigma in Synergy with Risk Management

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Abstract
Because of globalization, stiff competition, Rapid market change，higher environmental uncertainty and lower technology cycle time, it is inevitable to include risk management in the six sigma methodology no matter whether the organization is manufacturing concern or service concern. Risk management is to play a basic role in Define, Measure, Analyze, Improve and Control phase (DMAIC) and Define, Measure, Analyze, Design and Verify phase (DMADV) in the supply chain. In this paper a need is established using exiting literature to include risk management into six sigma methodology and its potential benefits are described.
Keywords: Six Sigma, Risk Management, Supply Chain Management

1. Introduction

In fact that has been quite successful for the companies to make six sigma fully compatible with the organizations for competitiveness, Profitability, growth and quality in special. There has been lot of researches in context of combining the six sigma with various other management strategies. Some of these combining with six sigma are Total Quality Management (Revere and Black, 2003), Hammer and Goding, 2001), Human Resource Functions (Wyper and Harrison, 2000), Lean Production (Antony et al., 2003), ISO 9000 (Catherwood, 2002), ISO 9001 (Dalgleish, 2003), and the capability maturity model (Murugappan and Keeni, 2003). While the literature is silent about the risks associated with six sigma projects in broad perspective of risk management (R.K. Padhy and S. Sahu, 2011). In any project risk management is necessary (Ian Isaac , 1995).It applies on the six sigma projects also to assure the success of the project from every perspective.

Six Sigma is a process improvement methodology that uses statistical tools to reduce the process variability leading to nearly zero defect in the processes. Six Sigma goals are to reducing defects less than 3.4 parts per million, (PPM) (Goh and Xie, 2004).

Today's supply chain has tangible risks such as high level of process variations which leads to poor performance. (Martin Christopher and Hua lee, 2004). Mason Jones and Towill, (1998) described five overlapping supply chain risk sources: environmental risk sources, demand and supply risk sources, process risk sources and control risk sources. Uta Ju¨ttner (2005) discovered by focused group discussion that six sigma is not widely used in supply chain risk analysis in traditional risk assessment. Researches are mainly carried on the implementation of six sigma in the supply chain for reducing process variability.

Risks Management is defined as the "Combination of probability or frequency of occurrence of a defined hazard and magnitude of the occurrence" (BS 4778, 1991). Roger Williams et all (2006) found three types of risks in the context of quality management: (a) predictable risks that organizations know they face, (b) the risks which an organization knows it might run but which are caused by chance (c) the risks which organizations do not know they are running. The purpose is to make Risk management and six sigma fully compatible with the requirements of the modern organizations.

Risk management practices along with six sigma are very important. Basically six sigma projects and risk management goes side by side. Six sigma is related directly with the risks present in the projects. (Antony et al., 2007; Pande et al., 2000). Six sigma tackle the quality risk for the company to assure profitability, efficiency, and low variability. Indeed they are the risk. But six sigma is confined to specific projects for variability reduction but the larger scenario is about the risks which are arising due the six sigma projects for the long term and short term operations of the company. The role of risks management in six sigma is increased in the dynamic business environment. Risk management deals with the effects of six sigma projects on the organization in the overall strategic way and to assure the full benefits from the six sigma projects. Six Sigma makes the supply chain efficient. At the same time it introduces new risks to be handled to maintain the continuity and the profitability of the organization. These risks include:

- Budget overrun, Time delay and Project related risks
- Continuity risks
- Contingency risks in case of DFSS
- Cost and benefit risks of six sigma projects
- Operational risks arising if training for six sigma is not up to standard.
- Compliance of the project with the company strategy
- Managing risk of wrong information while including the voice of customer in six sigma planning as the Dedeke (2002) suggested that the audit process should be devised to ensure the relevance of the six sigma projects with the requirements of the customers.
- HR related risks on the hiring of new employees related to six sigma

The benefit of the model is that it reduces the cost of the six sigma and the risks management if done under the separate head using less financial and human resources.

2. Comparison of Risk Management and Six Sigma

The paper will investigate into the enhanced role of standard risk management practices in Six Sigma methodology from basic theory, Process, starting point of solving problems, implementation steps, attention object, staff training, Financial Investment, Critical Success Factors and Tools

2.1 Basic Theory

Six Sigma came from the Motorola Corporation in 1980's for reducing the process variability. In empirical term its goal is to reduce the defect rate of the process up to 3.4 DPMO. It is related purely to engineering background. Organization around the world adopted this methodology and enjoyed significant benefits. Researches has been carried on six sigma from various perspectives to make it complete fit within the organization whether it is a manufacturing or service, Large scale or Small scale.

Risks are inherent in every organization. Risk management implies to eliminate, minimize or transfer of risks of potential loss or damage to the organization. Its scope is wide covering both the internal and external sources of risks.

2.2 Process

The process of six sigma consists of two methodologies which consist of DMAIC and DMADV. Six sigma teams are under the Company's management which is fully committed to reduce the process variations. Six sigma goal is to reduce the process variations up to 3.4 defects per million opportunities. Six sigma teams are fully devoted to reduce process variations, fully trained and certified as per their training and experience in Process variability reductions.

Risk management process consist of different but commonly coherent as per different authors and practitioners. The complete supply chain risk management process (SCRMP) consists of three phases. Phase I includes (a) Risk Identification (b) Risk Measurement (c) Risk Assessment, phase II includes (a)Risk Evaluation which includes Risk Ranking, Risk Acceptance, Risk mitigation and contingency plans and Risk Planning. And the final Phase III includes Risk Controlling and Monitoring (Rao Tummala and Tobias Schoenherr, 2011).

Risk management and six sigma process have synergy as the Risk identification and Risk assessment is compared with Define and Measure phase of DMAIC. (James D.T. Tannock, O.Balogun and H.Hawisa, 2007).along with the above function risk management has two other functions as (I) Tackling the risks associated with the running of six sigma projects and their probable negative impacts if failed to achieve the results. As one study carried out on investigating the reason of the green belt projects failure and success. (Ying-Chin Ho et all, 2008). (II) The large role of risk management in the six sigma is when the company is taking the decision to implement six sigma methodology to achieve remarkable results. Standard risk management process is necessary in this regard to make the six sigma a complete fit for the organization in terms of cost and benefit analysis, culture, staff quality, resources, scale of the company, assessment of special needs for the company and assessment of the special risks associated with that particular industry or company for six sigma implementation.

2.3 Starting point of problem solving

In DFSS six sigma identifies the variability problem in the organization and make its assessment to design the process. The need of DFSS arises when there is necessary to establish a new process or when the existing process is not meeting the performance requirements even with DMAIC. DMAIC starts with identifying the process variability and reducing it.

Risk management starts with Identification of risks and then tackling those risks to prevent the organization. It

provides an umbrella cover at the start of DMAIC and DFSS. It forecasts the probable risks in carrying out these projects. Risk management reduces the chances of failure of DMAIC and DFSS to the minimum.

2.4 Implementation steps

Six sigma is implemented through a well-structured teams system which commonly includes Executive Leadership, Champions, Master Black Belts, Black Belts and Green Belts.

Risk management carries out its process through Chief Risk Officer (CRO).which performs its functions under the executive leadership. The Risk management hierarchy is not well defined. It varies from organization to organization.

2.5 Attention object

Attention of six sigma is on process variability reduction to increase efficiency and avoid cost of reworks.

Risk management is concerned with removing or mitigating the risks associated with the normal functioning of the organization. It guarantees the contingency and continuity planning if risks identified are materialized. It also tackles the regulation and compliance risks.

2.6 Staff Training

Risks management starts with establishing the context and identifying the risks. The most commonly used tool for identifying the risk is brainstorming (Ian Isaac, 1995). This method is easy and reliable since the experts or the employees direct on the work knows better about the process risks and exploring those risks by discussion is used.

2.7 Financial Investment

Six Sigma is a well-structured approach which requires considerable investment in training, tools and techniques. Cost and benefit analysis is done on every aspect of the Six sigma.

Risks management requires considerably less financial investment but its tackles the most crucial aspect of the organization and six sigma projects especially Continuity and Contingency planning.

	Critical Success factors for Six Sigma	**Critical Success Factors for Risk Management**
1	Management commitment and involvement	Top Management Commitment and support
2	Understanding of six sigma methodology, tools and Techniques	Communication
3	Linking six sigma to business strategy	Culture
4	Linking six sigma to customers.	Information Technology
5	Project selection, reviews and tracking.	Organizational Structure and Design
6	Organizational infrastructure.	Training
7	Cultural change.	Participation of Everyone
8	Project management skills.	Trust
9	Linking six sigma to suppliers.	Measurement
10	Training	
11	Linking six sigma to human resources,	
12	Investment of essential resources	
13	Incentive and reward system	
14	Cooperation and communication	
15	Coordination with a knowledge management system	
16	Data System	
17	Bottom Line Focused	
18	Change Management	
19	Adaptable System	

Note1.

	Commonly Used Tools of Six Sigma	Commonly Used Tools of Risk Management
1	Sampling	Brainstorming
2	ANOVA	Risk Probability assessment
3	Statistical Process Control.	Risk Probability assessment
4	Quality Function Deployment,	Risk Impact assessment
5	Regression analysis,	Risk Classification
6	Correlation studies	Ranking of risks
7	Quality Costing	Quality management
8	Analytical Hierarchical Process	Training Programs
9		Simulations
10		Cost benefit analysis during risks planning
11		Cause and effect analysis
12		Customer satisfaction surveys

Note:

3. Conclusion

Six sigma and risk management are necessary for each other. Without proper risk management six sigma projects may fail to fulfill their goals. To achieve the synergy between the two methodologies a theory approach is needed. More empirical research is needed in this regard.

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Notes

Note 1.

Six Sigma, Factor 1-11(Wyper and Harrison. 2000), Factor12 (Jiju, A., Banuelas, R., 2002), Factor 13(Keller, 2001), Factor 14 (Henderson and Evans, 2000), Factor 15 (Pande et al., 2000), Factor 16-19 (James E. Brady and Theodore T. Allen, 2006)

Risk Management, Grabowski and Roberts (1999), Galorath (2006), Hasan Ali (2002)

Note 2.

Six Sigma Tools 1; (De Koning & De Mast, 2006), Tool 2; (Yang, Choi, Park, Suh, & Chae, 2007), tools 3, 4; (Antony et al., 2007), tool 5, 6; (Knowles et al., 2005), tools 7; (Antony, 2006), tools 8; (Yang et al., 2007)

Risks Management tools T. Raz, E. Michael (2001)