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## Supply chain management six sigma at Samsung



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In its early years, supply chain management (SCM) was narrowly conceived as a new approach to inventory management or operating cost reduction. However, in the 1990s organizations and some specific industry segments began to recognize the much greater roles and impact of SCM on their business operations.

The Samsung Group of companies is recognized as a leading global manufacturing, financial, and services conglomerate. It was founded in 1938 and focused its businesses on areas such as textiles, shipbuilding, machinery, and chemicals. Since the 1980s, the group has made enormous efforts and investment in the electronics and semiconductor industry. As a result, the Samsung Group has experienced a dramatic growth in net profits since the 1990s. The flagship unit, Samsung Electronics Company (SEC), was one of only two manufacturing companies worldwide to post profits of more than \$10bn in 2004 (Toyota Motors being the other). Many regard these successes as reflecting a continuous and relentless effort at Samsung to improve the way it conducts business. For the last few years, SCM and six sigma have been two pillars of business innovation at Samsung.

The Samsung Group of companies has large, complex, global supply chains in most of the products it manufactures and makes extensive use of SCM solutions and process innovations to support and improve its operations. Most notably, at SEC, advanced planning and scheduling (APS) systems have been adopted since the 1990s and have brought the company many successes in terms of operational excellence. Recently, Samsung Electronics was ranked seventh in a respected analyst's ranking of the global top 25 companies in supply chain excellence.

Six sigma has been a key enabler for the group's success. The Chairman of the Group proclaimed the adoption of a business innovation approach

called “new management” in 1993. “New management” is the pursuit of quality-oriented management in business operations as well as in manufacturing. Along with the “quality movement” in industry, new management evolved from initial product quality assurance but later shifted its focus to include the quality of the entire business process, which is the rationale behind six sigma. The outcomes were high-quality, innovative product developments, and consequently an increase in customer satisfaction and profits, and are well demonstrated by many of the world's best technological resources.

### Why SCM and six sigma?

Despite the extensive use of SCM solutions and process innovation to improve global business operation, in 2004 the company still felt that its supply chain operations had significant room for improvement. In the early 1990s, the Group's senior management decided to capitalize on the potential synergy between SCM and six sigma, which they believed were based on four key areas:

1. Project discipline
2. Sustaining results
3. Well-established HR framework
4. Quantitative strength

The company put together a methodology to formally combine SCM and six sigma, by training and developing supply chain staff to be more capable of leading SCM innovations. Over the last two years of implementation, SCM six sigma has become a unique and useful component of Samsung's strategy for systematic and continuous improvement of its SCM activities.

### Samsung SCM six sigma

Samsung's SCM Business Team (SBT) researched six sigma approaches at General Electric (GE), DuPont and Honeywell to get perspectives on how other companies have innovatively applied six sigma to similar needs:

- **General Electric** – A key element of GE's approach to six sigma is the tailoring of underlying methodologies to specific needs and characteristics of its business units. SBT researched GE business that has taken the generic six sigma methodology for process innovation (PI), and has tailored them to specific needs of system design and implementation, and product development activities.
- **DuPont** – DuPont combined six sigma principles with the SCOR (Supply Chain Operations Reference) model, which scopes five core management processes, including plan, source, make, deliver, and return. DuPont's Six Sigma approach utilizes a quality function deployment (QFD) tool – a method for converting customers' requirements to products, processes or services.
- **Honeywell** – Honeywell was selected because of its extensive application of lean methodologies, which has become a major tool in the implementation of six sigma. Honeywell developed a proprietary Six Sigma approach called Six Sigma Plus which links lean manufacturing concepts and tools, such as value stream map and thought process map, into a general six sigma.

Each of the above approaches was analyzed and the following conclusions drawn, which fed into the subsequent development of the Samsung SCM six sigma methodology:

- **Nature of SCM projects may involve either design or improvement** – Six sigma projects usually focus on either redesigning processes and systems or improving performance levels of existing systems. In six sigma parlance, the former is addressed most commonly through DMADOV (define, measure, analyze,

design, optimize, verify), while the latter is addressed using DMAIC (define, measure, analyze, improve, control). SBT estimated that among the SCM projects at Samsung, about 75 per cent would involve re-designing processes, while the remaining 25 per cent would focus on process improvement.

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- **DMADOV is not enough** – The DMADOV methodology, while useful, could not provide the necessary support to execute the entire range of SCM projects at the Samsung Group. The key difference is that after performing analyses, the task for the project team would be not to optimize or design as in DMADOV, but to specify how a suggested improvement would be realized in practice. Therefore, a step, “Enable”, in place of Design and Optimize, was introduced to address this activity.
- **System development option** – SCM six sigma projects, in most cases, result in system development. Accordingly, a new approach was needed to cover a process enablement step to support system building activity. However, many SCM innovation projects may call for changes that can be enabled within existing system capabilities. Therefore, it was necessary to consider an approach in which system implementation would be an optional enablement activity. The DABTL (define, architect, build, test, launch) approach was used, incorporating proven software engineering discipline to six sigma based SCM methodology.

### DMAEV

The resulting approach is termed DMAEV (define, measure, analyze, enable, and verify). Additionally, Samsung incorporated the concept of five design parameters (process, operation rule and policy, organization role and responsibility,

performance measure, and system), process modeling and value chain map techniques, and SCM related investment value analysis methods.

SBT realized that the success of the DMAEV methodology in driving SCM innovation would depend not only on the strength of the methodology itself, but also on relevant business and organizational factors. Based on the SBT team's experience and expertise in business and organizational aspects of SCM, the following design principles that would guide SCM six sigma projects through all of the DMAEV stages were drawn:

- **Global optimum** – All improvement ideas must be aligned with global rather than local goals. That is, when improving a process through SCM six sigma, it will be necessary to measure, monitor, and, if possible, improve key performance indicators (KPIs) of related upstream and downstream processes. Thus, two mechanisms for ensuring global optimization were utilized:

*A flow-down tree of the critical-to-quality KPIs (CTQ-Y).*

*A bottom-up check to ensure that global KPIs have not been adversely affected.*

- **Process KPI mapping** – Process KPIs follow the SCOR Model, and are used to define objectives and monitor the process towards managing improvement plan goals. Compared to generic six sigma, SCM six sigma increases the credibility of CTQ-Y selection using KPIs decomposed by detailed supply chain processes of the SCOR model.
- **Systematization** – Systematization is viewed as a key component of an SCM initiative at Samsung. Samsung uses systems extensively to effect behavioural and process changes. Therefore, to the extent that SCM changes need to be reflected in processes and systems, systematization is a critical component of SCM six sigma.
- **Five design parameters** – The underlying belief is that any organizational change requires a comprehensive, multi-faceted approach. Thus, DMAEV uses the five design parameters to characterize the changes that need to be managed throughout the DMAEV process stages.

## Future direction

Today, there are various approaches and systems available for process innovation. Six sigma and supply chain management (SCM) are among those techniques aiming for process and quality improvement, and synchronization of a company's value chain, from inbound logistics to sales and customer services.

At Samsung, SCM and six sigma have been two important enablers for the group's management innovation and growth. However, Samsung realize that there is significant room for improvement in its SCM operation. Thus, the effort has been synthesizing SCM and six sigma and developing a unique six-sigma based methodology to improve its SCM operation.

Samsung's effort and investment has turned out to be fruitful. Their SCM six sigma program has produced highly qualified and talented SCM specialists, who are currently training the methodology to other members in their organizations and leading SCM projects. SCM projects are being prepared and conducted in a more disciplined way and their outcomes are continuously monitored and shared through Samsung's repository for six sigma. Samsung's endeavour for global optimum is continuing and SCM six sigma is expected to play an enabling role. □

July 2007.

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**This is a shortened version of “Supply chain management six sigma: a management innovation methodology at the Samsung Group”, which originally appeared in Supply Chain Management: An International Journal, Volume 12 Number 2 2007.**

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