Tqm implementation

Business

Part of any successful business organization is strategic planning. At Analog Devices, Inc. (ADI), a yearly business planning process is followed to generate a five-year strategic plan. Within ADI, product line groups (including Marketing and Product Development) follow a typical business planning process. Strategic business planning traditionally includes an assessment of intended customers and markets, analysis of competition, determination of necessary products and services (and objectives for meeting those), defining a statement of purpose and financial model, which ultimately leads to detailed implementation plans.

However, business planning by a Service Provider may also be used successfully for an organization such as a manufacturing foundry site. The Analog Devices manufacturing site in Greensboro North Carolina completed such a " Service Provider" strategic business plan for FY98-FY02. In the process of developing the strategic business plan, tools were necessary to complete each portion in a logical and efficient manner. It was determined that a combination of TQM tools could be applied for specific steps within the business plan development. The particular combination and application of TQM tools (including Voice of the Customer, Concept Engineering, Solution Planning Matrix, Hoshin Management and so on), is described in this paper. The output of the overall process is the benchmark plan for the coming year and a 5-year plan.

Background

Analog Devices, Inc. is comprised of several product lines who develop and release products, and manufacturing foundries for wafer fabrication,

assembly, and testing. Each manufacturing foundry provides a distinct range of technologies, processes, package styles, and test platforms to multiple product lines. Conversely, each product line may select and choose the manufacturing foundry that best suits their needs. The ADI Greensboro is completing a five year strategic business plan in order to position itself as a crucial provider of necessary services including integrated circuit (IC) and multi-chip module (MCM) assembly and testing to various ADI product lines.

Customer & Market Assessment Using VOC

The early phases of developing a business plan include an assessment of the desired customers and markets served. The assessment focused through identification of specific targeted customers. In this phase, ADI Greensboro Manufacturing desired to identify their role in the value chain currently, and in the next five years. What needs to identify the factors influencing the product line's decision to select and prefer a specific foundry; and match the foundry expertise to fit the product development needs. This phase required the Manufacturing staff to " swim in the fishbowl" of internal customers, the product lines. It is also obvious that manufacturing services should be developed and provided from a " Market In" focus, to match assembly, testing, production planning, logistics, and reliability services with specific planned new product releases. Hence, the Voice of the Customer (VOC) method taught by CQM was selected to allow collection and analysis of the product line's needs.

The use of the VOC method in this case, was adapted for usage with internal ADI customers, similar to outside customers of our products. The basic

concepts of VOC - to determine key problems, identify specific needs for improvement, set directions for the manufacturing organization, anticipate future customers' needs, and broad exploration apply equally well for internal customers. The VOC method in this phase also aligns with the first of " The Seven TQM Infrastructures" - Goal Setting. The VOC was completed in the following steps using a PDCA (Plan, Do, Check, Act) cycle format.

Table 1: VOC Steps.

Table 2: Example VOC Discussion Guide.

Developing a Common Image of the Customer's Environment

The customer voices required further analysis in order to derive a list of detailed requirements. It is necessary to develop a strong concept of specific manufacturing and testing services that would meet these customer requirements. Again, the team facilitators would consider whether a useful tool was available for this task. In this case, the Concept Engineering tool was found to fit our needs for transformation of voices into images and customer requirements. After the VOC data is collected, we developed a common image of the internal customer's environment. This was done by " Image Collection" (Step 3 of Concept Engineering). The images are scenes or descriptions of the customer using our services, in their own environment. The team will select an image or thought corresponding to each of the common themes from customer voices. Used is a graphic image (from simple clipart files) or a phrase, which captures each common theme. The themes were arranged into a matrix together with their associated images. This matrix forms a logical and visually stimulating foundation for further analysis

of the common themes. Examples of some of the images are provided in Table 3 (right).

Table 3: Images and Voices.

Transferring the Customer Voices into Requirements

Now that a complete list of common themes and associated images is completed from the internal customer voices, the next step is to develop insight and transfer these into customer requirements. This step allows the voices to be distilled into a smaller set of key customer requirements. At this phase, ADI is still focusing on the customers' needs in terms of performance requirements (what), not solutions (how to's). In preparation for this step, the customer voices have been categorized and linked to one of the images in the matrix. A Customer Requirements Worksheet is to be constructed (see Step 4 of Concept Engineering). This worksheet includes the voice categories and images and was expanded to include a column for Key Items and Requirements. The key items have been extracted as the primary need of the customer expressed by the voice/image combination. Detailed requirements will then be developed, using the guidelines listed below.

Requirement statements:

o Identify the customer's functional need.

o Are clear & specific.

o Are multi-valued to express a desired range of performance.

o Are stated in terms of active voice.

o Make definite assertions in positive form.

Typically, more than one requirement was developed for each key item. Also, there are overlap between key items, such that a requirement statement sometimes applied to more than one key item. In this case, each requirement statement was only listed once.

Table 4: Example of Requirements Matrix

Transferring Requirements into Solutions

Now that the requirements are developed, prioritized, and ranked, the next step is to transfer the requirements into solutions. Solutions will naturally develop into implementation plans for the 5-year strategy period. Solutions are also necessary in order to assign ownership and implementation goals and metrics for each department manager within the Manufacturing staff.

The solutions are developed using simple brainstorming techniques in review of each requirement. A list of several suggested solutions was captured for each requirement. Again, it would be noted that a solution could address more than one requirement and vice versa. The solutions are not bound by knowledge of existing resources or processes. Rather, the solutions are suggested based on their strength and correlation to the specific customer requirements. Again, a prioritization process is performed for each potential solution by ranking in terms of impact on the requirement and feasibility (with existing data/knowledge). This scheme allows the organization to select the solutions that will provide the most " bang for the buck" (i. e., the most effective and timeliest of all potential solutions).

Table 5: Example of a Solution Planning Matrix.

The Detail Plan - Deriving Implementation Plans from Solutions

The process now allowed a " scrubbed list" of programs and projects to emerge. A formal statement of the site's strategic intent was developed. The list of major projects was mapped directly to specific key strategic initiatives. The site strategic intent was reflected in a product/service segmentation analysis. The model used for Product Segmentation was " Whole Product Analysis", categorization of foundry services into the following:

o Generic - fundamental, rudimentary services.

o Expected - minimal essential customer expectations.

o Augmented - services beyond or exceeding normal customer expectations.

o Potential - new or improved methods, technologies or services that could be used attract and hold customers.

The purpose of the Segmentation exercise is to clearly distinguish the services that define competitive distinction and differentiate the foundry from others providing competitive services. This analysis is key for planning site growth.

Technology roadmaps were generated to show planned progress and growth in implementation of various additional or improved processes or products throughout the 5-year period. Each major project will be assigned to a specific staff manager. Each owner will then be responsible for developing the infrastructure and planning for resources required for full

implementation. The next level of abstraction will be for each staff manager to " flow down" their assignments to teams or individual contributors. Performance of the teams or individuals could then be routinely monitored throughout the year (example of monitoring process: see Hoshin Management) The detail plan will then be analyzed in terms of required resources, capital equipment expenditures and projected volume so that a financial picture can be developed. The financial plan includes projections on key metrics such as revenue growth, gross margin, and inventory. Total site performance metrics included specific goals for number of new product releases, on time delivery to customers, outgoing quality level, quantity/dollars shipped, cycle time, and headcount.

Where Do We Go From Here?

The business plan is a dynamic ongoing process; it must be routinely repeated to accommodate changes in market conditions, new or modified services and formal evaluation of the current plan results. The next year's plan must include reflection to check and analyze site performance against the plan, and adaptation of new business opportunities. The follow-up to the initial plan should allow for continuity (not starting over again from scratch). A recommended process flow for the subsequent year's plan is as follows:

Figure 1 illustrates a dynamic business planning flow.

Summary

TQM tools are well-established techniques that can be applied equally well to process improvement as to the development of strategic business planning.

This paper has described the application of a variety of TQM tools used to implement a strategic business plan that are more often used for process improvement or product concept development. ADI finds the usage of these TQM tools improved the efficiency of the business planning process and shortened the time frame for completion of highly detailed and complex tasks. The management team will use standardized templates developed from this project for future business plans. The feedback received by the team, from both senior management at Analog Devices and internal product line customers, recognized the value and quality of information derived from the usage of these tools.