Use Customer Feedback To Choose Six Sigma Projects

HOW ALSTOM POWER USES PRODUCT FAULT REPORTS TO IMPROVE ITS PROCESSES.

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In an article in the *Harvard Business Review*, D.A. Garvin stresses the opportunity to learn from failures while noting many managers are indifferent to the past.[1] So how can we use feedback from dissatisfied customers to develop future products? It costs approximately five times as much to gain a new customer as to keep a current one.[2] Most companies spend 95% of their resources solving individual complaints and less than 5% of their resources analyzing how to solve the original problem.[3]

One way to approach an organization's improvement potential is to use Six Sigma methodology. However, selecting Six Sigma projects is "…one of the most frequently discussed frustrations," according to M.D. Goldstein.[4] He says teams responsible for developing project selection processes could provide valuable project portfolios by establishing significant project success factors.

Goldstein goes on to say organizations that have formalized customer feedback systems or field quality data systems have to establish critical factors that give priority to the information as a means to provide reliable and valuable information to project selection teams. When selecting project candidates, he says it is important to identify significant quality characteristics. The customer should be able to notice the improvement, and the response variables should be easy to measure. Also, a project should be able to be completed in four to six months and have a high probability of success.

Dissatisfied customers are an almost unending source of ideas concerning product innovation and product improvement. Unfortunately, this resource is often left untapped.[5] There is a gap between the knowledge of service personnel and that of product development personnel. Service personnel obtain much information from dissatisfied customers; however, the transfer of that information to the new product development process (NPDP) and the NPDP improvement teams is lacking.

To learn how a systematic process can be developed, we will explain how Alstom Power Industrial Turbines in Sweden uses feedback from dissatisfied customers as a driving factor in its process improvement process (PIP). This process helps Alstom select the most significant Six Sigma projects to improve the company's development processes where future products emerge and can be developed.

Customer Dissatisfaction Feedback

An effective reliability program, including several methods for predictions, needs vital information from field failures.[6] The presence of a reliability group in charge of field data is crucial to product quality. Interestingly, in an investigation of first tier suppliers to the automotive industry, Sime Curkovic discovered reliability, durability and product support are closely related to the financial performance of the supplier; however, most CEOs focus on the importance of other quality dimensions, such as conformance and design.[7]

According to Walter Shewhart, "The object of industrial research is to establish ways and means of making better and better use of past experience."[8] J.M.

Juran describes failures as "gold in the mine," when the costs of poor quality could be sharply reduced by an investment in a quality improvement program.[9]

So what is the best way to collect this essential past experience and customer dissatisfaction feedback? According to a study of 22 large customer driven companies, the companies spent an average of $1 million annually and employed the equivalent of 13 full-time professionals who focused on customer feedback systems.[10] The researchers concluded the real problem is not collecting data, but actually doing something with it once it's collected. In another study of three organizations operating in three multinational Swedish manufacturing companies, researchers discovered a lack of processes to transfer feedback from dissatisfied customers to the NPDP.[11]

Initiating Six Sigma Projects

Measurement systems, nonconformity reports, business strategies and supplier problems are good places to look when trying to choose a Six Sigma project and provide an opportunity to use customer complaints as a means to initiate improvement projects. Manufacturing organizations typically don't use customer input as a means to improve designs and processes because they lack formal processes that facilitate transfer of the feedback.[12] It is important for these processes to be established when using customer feedback as a means for selecting Six Sigma projects.

Selecting projects is one of the most difficult elements in the deployment of Six Sigma. A Six Sigma project is "… a problem scheduled for solution that has a set of metrics that can be used to set project goals and monitor progress."[13] Therefore, it is essential to identify the process containing the actual root cause of the problem.

In an article in *Quality Progress*, R.D. Snee and W.F. Rodebaugh examined four key phases in the maturation of a project selection process:[14]

1. Identify Black Belt (BB) projects managed in early stages of the overall Six Sigma process.
2. Create project hoppers that contain new projects for BBs to start.
3. Decide if the project portfolio meets the organization's strategic improvement needs.
4. Implement an improvement system designed to manage the organization's improvement efforts, including Six Sigma projects.

In an article in the November 2002 issue of this magazine, W.M. Kelly discusses what he believes are the three important steps in project selection:[15]

1. Identify project selection steering committees.
2. Institute project selection matrixes.
3. Schedule fixed customer and project evaluation meetings.

He says Six Sigma projects should give priority to customer issues, and project selection lists should to be reformulated continuously based on new customer issues.

According to Geoff Tennant, it is important to listen to the voice of the customer (VOC) and perform a customer needs analysis in a Six Sigma project.[16] He goes on to discuss the difference between improve and design Six Sigma. Improve Six Sigma occurs when the Six Sigma approach starts with a customer problem and the process improvement is focused. Design Six Sigma, on the other hand, starts with a business solution concept that is directly product or service focused.

Six Sigma projects should also be doable and viable in a short time.[17] Qualified projects are determined through an understanding of company metrics. Cost of poor quality is an important metric when the cost is due to failure to produce and deliver quality to customers.[18] The costs can be either internal—reworking and sorting—or external—warranty costs and repair of returned products from dissatisfied customers.

The Case

Alstom Power is a world-class supplier of infrastructure equipment for power generation. The site in Finspong, Sweden, is part of the Industrial Turbine segment within Alstom's Power sector. In the past 100

Figure 1. **Eight Phases Used in Six Sigma Projects at Alstom**

Step	Phase	Process improvement system report status
1	Define	Problem defined
2	Measure	Data measured/facts collected
3	Analyze	Data analyzed and root cause found
4	Improve	Development of improvement suggestion
5	Check	Process improvement checked
6	Control	Improved process in control
7	Standardize	Improved process standardized
8	Close	Improvement project closed

years, Alstom has produced gas and steam turbines for industrial applications, specializing in power generation, district heating and mechanical drive applications. At one point, STAL-Laval and ABB STAL owned the factory in Finspong.

In 2002, Alstom Power employed 120,000 people and brought in about 22 billion euros, and the Industrial Turbine segment employed 2,000 people and brought in about 400 million euros.

Alstom Power's Industrial Turbine segment was searching for a way to select Six Sigma projects by using feedback from dissatisfied customers to improve its products and processes. So in 2002, the company initiated the development of its PIP. This process transfers customer claims used to select Six Sigma projects.

A Six Sigma project team is appointed when a process improvement project is initiated at Alstom. If the project concerns several different departments in the organization or if it must be able to manage a holistic infrastructure problem, a BB is appointed team leader. In less demanding situations, a Green Belt is appointed team leader. Team participants include people from a process owner's team, external customers, internal customers and suppliers. A steering committee, which in many cases is the same as the process owner's team, is also appointed.

The project team uses Six Sigma methodology to solve problems, but unlike the traditional, five-phase Six Sigma methodology, Alstom's methodology has eight phases: define, measure, analyze, improve, check, control, standardize and close (see Figure 1). These phases correspond to the status reports in the process improvement system (PIS)—a system designed to support the PIP.

Alstom decided to focus on improving the gas turbine development process. By doing so, it hoped to find the primary root causes of problems related to current products and improvement potentials in the creation of future products.

The gas turbine development process at Alstom includes four subprocesses:

1. **Strategic development:** Ensures the product portfolio is competitive. Process inputs include present and possible future customer needs, analyses of market opportunities, in-house technology opportunities, analyses of competitors, company directives and society regulations. Process outputs include product portfolio strategies and phantom turbine specifications, which are products the company should be able to develop within two, five or 10 years.

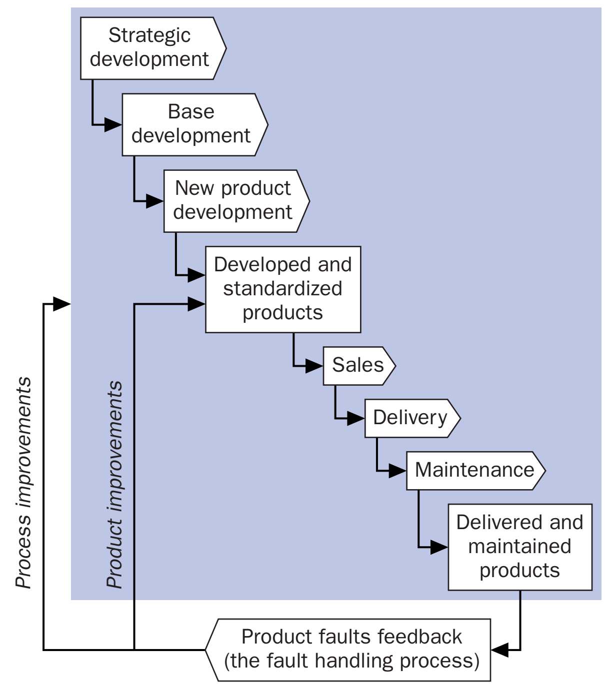
2. **Base development:** Process inputs include phantom turbine specifications, and process outputs include technologies, components, subsystems and competencies or means for the development of future gas turbines projects.

3. **NPDP:** Process inputs include product development specifications from the product portfolio strategies and predeveloped components and subsystems from the base development. Process outputs include verified products that are either new or improved. This process has several checkpoints. For example, effort is put on managing reviews, designing workflows, documenting instructions, setting criteria, developing guidelines and designing software and hardware tools. These documents are available on the company intranet.

4. **Fault handling:** Transfers customer dissatisfaction feedback, codified as product faults or nonconformances. This process has several customers and objectives, which will be described in the next section.

Alstom also has sales, delivery and maintenance processes (see Figure 2).

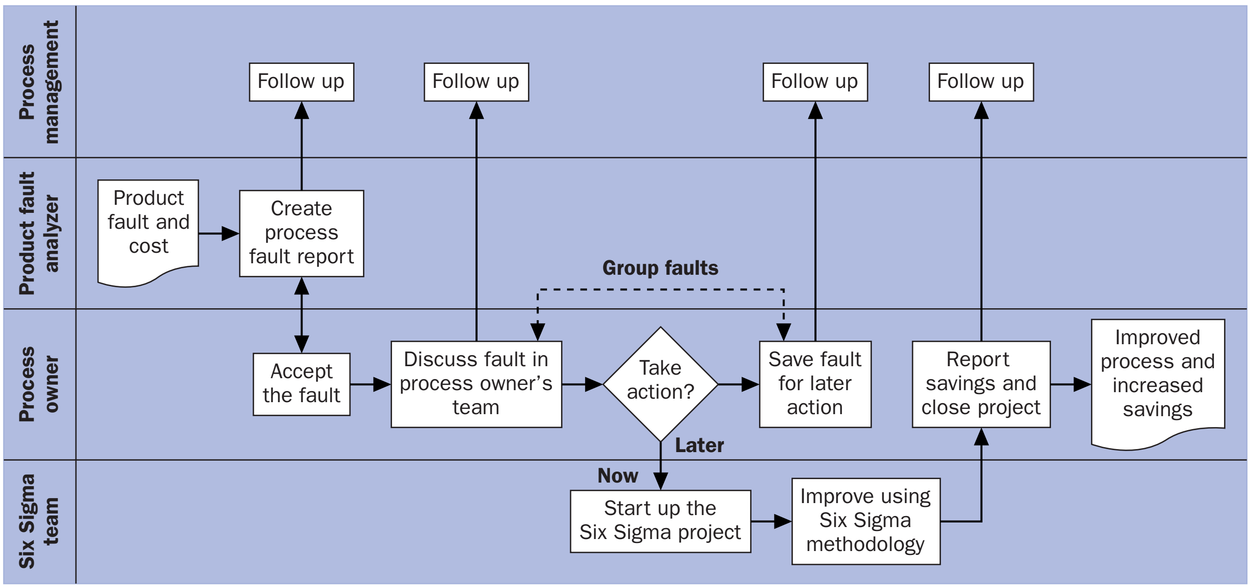
Figure 2. **Alstom's Processes**



The Fault Handling Process

When a product fault occurs, such as when a component breaks during commissioning or after customer

Figure 3. **The Process Improvement Process (PIP)**



takeover, a service engineer creates a product fault report in the fault report system. The report is then transferred to the appropriate design department, which investigates the problem to correct the product fault. For example, the broken component is replaced with a redesigned one, and the comparable components applied to nonfault applications are also replaced.

At one point, the fault handling process was simply a product support process, and process faults before this were neither identified nor corrected. That's why a Six Sigma project was initiated to improve the fault handling process so it could also handle process issues. The goal was to reduce recurring product faults by improving the development processes. Root cause analyses were conducted to find and manage these process faults.

The PIP (see Figure 3) is subsequent to the product support process. When a fault is reported into the PIP, the appropriate design department investigates the fault because it includes vital information about the original root cause. The department aims to reveal whether the fault arose due to a root cause, such as design criteria, manufacturing processes or poor quality assurance of a subcontractor. The process owners support these investigations today, but in the past, the engineers were conducting analyses without support and didn't have the authority to improve the processes that caused the product faults.

To prevent recurrence of faults, the PIP emerged and a PIS was developed to support it. The purpose is to help process owners detect process faults, give priority to improvement efforts and administrate these efforts. Six Sigma project selection is based on the costs due to the product faults and the predictions of recurrences. The costs due to product faults are the major costs of poor quality at Alstom.

Once the root cause analysis of the product fault is complete, the product is modified based on new requirements, and the product fault report is closed. At the same time, a process fault report automatically emerges in the PIS when the product fault analyzer creates the product fault report. The report indicates the most suitable process that should handle the fault. A motivation to the choice of process, a classification of the process fault and an estimated cost per year due to the fault is included.

When a process fault report emerges, a message is sent to the appointed process owner, who examines the report to decide whether the fault is accepted or not. If it is not accepted, the report is sent for review to the issuer. If a fault originally comes from the interface between two processes, the upstream process is selected.

Several process fault reports are created each week. The process owners check and classify these reports, trying to find the most significant process improvement projects. The precedence of projects is based on how often the fault reoccurs, the complexity of the problem, the estimated costs due to the faults and the resources available for managing improvement projects. It is common for improvement projects to be prioritized on the basis of frequently occurring process faults.

Every fault is reported in the PIS, and the system overview selects the most convenient process. Once the improvement projects are closed, the financial savings are accounted.

Lessons Learned

Alstom's implementation of the PIP and the supporting PIS is still in progress due to a Six Sigma project initiated to improve the fault handling process. The improve phase has been completed, and the check phase has been started. Out of 2,295 reported faults, 1,070 have been classified by contributions from nine process owners. This classification has induced 67 potential Six Sigma projects.

Even though the implementation project was strongly supported by company management and process owners, there have been three main problems. First, the individuals who analyze product faults have put up some resistance. Most are designers or engineers who are used to solving product problems, not specifying causal processes or classifying process faults. This is because they lack knowledge about the processes and haven't had sufficient time to work with them. Hence, managers have to remember to schedule for any extra time needed.

Second, Alstom's processes are not sufficiently defined. Though this has supported a separate initiative to define and map primary processes, the previous processes and process owners are still used in the PIS. This can be frustrating and confusing. It would have been easier for Alstom to implement the PIP if the primary processes had been defined and mapped before the project began.

Third, the process owners have been involved to different extents in mapping the processes. This has caused instability when implementing the PIP. Some of the process owners think of these activities as something new and objectionable; however, most of them appreciate the PIS support.

Consequently, only a small number of root causes have been detected, and only a small amount of process faults have been solved.

Future Research

Alstom learned how to employ a fault handling process as a means to transfer customer dissatisfaction into the organization and believes it would be interesting to eventually involve experienced dissatisfied customers as catalysts in the development processes. They could be used as a means to improve the processes and to help create future products.

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