Generic Lean Six Sigma Project Definitions in Financial Services

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Lean Six Sigma (LSS) is applied in financial service organizations to improve operational efficiency and effectiveness. LSS prescribes that these improvements are designed and implemented by projects. The purpose of this article is to facilitate the process of defining LSS projects in finance, because the lack of a clear definition is an important cause of project failure. The authors' strategy is to provide seven standard project definitions (generic templates). Project leaders can use these templates as an example and as a guide in the definition phase. This will help them to formulate crystal clear project definitions that have explicitly stated goals and a solid business rationale. In this article, the authors will discuss these seven generic categories and show how this simple categorization and subsequent standardization of approaches can help LSS teams simplify the definition phase.

Key words: CTQ flowdown, efficiency, improvement projects, innovation, service quality, service management

INTRODUCTION

Financial services organizations face increasing competition, not only from domestic competitors, but also from best-in-class firms internationally. Moreover, competitors from abroad usually play the strategy game according to different rules, making it harder to respond effectively (Porter 1980). One strategy companies can pursue to avoid competitive disadvantages is the elimination of operational inefficiencies (Levitt 1976; De Mast 2006). Berger, Hunter, and Timme (1993) and Berger and Mester (1997) show that inefficiencies are large in the financial sector, on the order of 20 percent or more of total banking industry costs. Thus, reducing operational inefficiencies is an important issue for financial institutions.

Lean Six Sigma (LSS) is a method that can help financial institutions improve operational efficiency and effectiveness (George 2003; Snee and Hoerl 2004). LSS prescribes that actions to improve operational efficiency and effectiveness are performed on a project-by-project basis. These projects are managed according to the five-phase define, measure, analyze, improve, and control (DMAIC) cycle. Each phase is completed only when specific milestones are reached (De Mast, Does, and De Koning 2006).

Despite the structured DMAIC approach, some LSS projects fail. In the project management literature the clarity of the project definition is pinpointed as one of the most important factors for project failure (see Morris and Hough 1987; Pinto and Slevin 1988; Partington 1996; and Lynch, Berolono, and Cloutier 2003). In practice, LSS project definitions come in

different levels of precision and completeness. They range from crystal clear (captured in terms of metrics, for instance) to poorly stated, vague, and lacking a business rationale. In some cases the project definition only identifies the process to be improved. As a result, project leaders (called Black Belts and Green Belts in LSS) and project owners, in the sense of the responsible person for the process that the project aims to improve (called Champion in LSS), often develop diverging views of what constitutes a successful project and what should be delivered by the project leader. Wasted effort, missed deadlines, and even preliminary project termination may be the consequence.

The purpose of this article is to facilitate the process of defining LSS projects in finance and improve its effectiveness. The authors' strategy is based on the observation that many projects have similar goals and comparable project definitions. Thus, it is possible to provide a number of standard project definitions (generic templates). Project leaders in financial services can use these templates as examples and guides in the definition phase of their own projects. They can simply choose from the list of existing (standardized) project definitions. This ensures that they use crystal-clear project definitions that have explicitly stated goals and a solid business rationale. The second concern is to check to what extent these templates form a classification (taxonomy) of LSS projects in finance. This classification groups projects with a common project goal. In other respects, such as the type of improvement actions, the projects within one category might differ.

The idea of providing templates forming a classification of LSS project definition categories was applied earlier to healthcare (Does et al. 2006). Based on a large sample of LSS healthcare projects, Does et al. (2006) established six generic categories of LSS project definitions. These categories are distinct in their structure and aimed at improving one or more generic strategic goals. The idea of categorizing (quality) problems is even older. Smith (2000) presents a division of quality problems into five categories (that is, conformance, unstructured performance, efficiency, product design, and process design problems).

METHODOLOGY

Classification studies are common in disciplines such as medicine and biology. In psychiatry they classified psychiatric disorders, resulting in the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association 2000). The literature does not describe in great detail the process of constructing a taxonomy, but criteria for judging a taxonomy once it has been constructed are provided. Chrisman, Hoffer, and Boulton (1988) mention the following criteria:

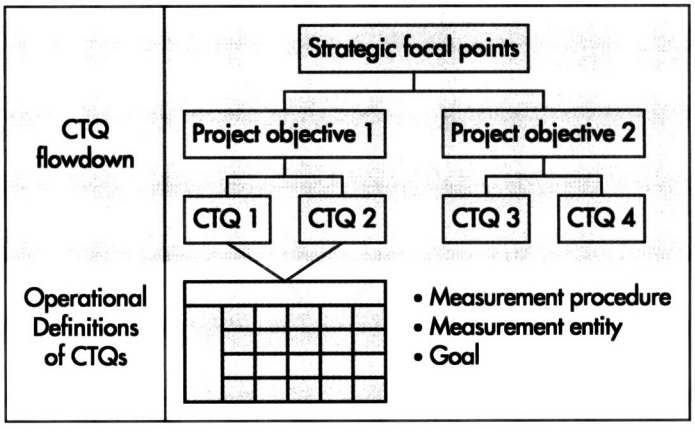
1. Categories should be mutually exclusive (each project belongs to one category only).
2. Categories should be internally homogeneous (projects belonging to one category are more similar to one another than projects belonging to another category).
3. Categories should be collectively exhaustive (each project should belong to at least one category).
4. Categories should be described clearly.

In this research, which partly aims to classify LSS project definitions into a few categories, these criteria will be used to judge the quality of the constructed taxonomy. The starting point for the construction of the templates and a taxonomy was a collection of descriptions of 65 LSS projects carried out in five different financial services institutions. This sample represents a cross section, which varies along key dimensions, such as type of department (back office, staff, or front office), type of organization (both insurance companies and banks), scope (both Black Belt and Green Belt projects), and size (ranging from 20,000 to approximately 3,000,000 euros worth of savings). Part of the description of each project was a project definition, which included at least:

- A business case, specifying the business rationale for the project
- A macro-level process description
- Selected measurable indicators of performance (called critical-to-quality characteristics or CTQs in LSS terminology, see Harry (1997))
- A description of the measurement procedure for each CTQ

Still, the information available per project varied: the descriptions did not have a uniform format, and the terminology used varied widely. Therefore, the descriptions of the project definitions were not in a format suitable for classification and had to be structured first. The authors work with a standard structure for project definitions, which consists of two elements, namely a CTQ flowdown and operational definitions. The CTQ flowdown is a commonly used tool to translate strategic focal points into CTQs (De Koning and De Mast 2007). High-level strategic focal points are related to project objectives. In their turn project objectives are linked to and decomposed into CTQs, which are made operational in the form of measurements. This is done by providing operational definitions, which help to make CTQs measurable by specifying a measurement procedure. Figure 1 shows the format of the combined CTQ flowdown and operational definitions.

Figure 1 The two elements of LSS project definitions: CTQ flowdown and operational definitions.



For each of the 65 projects, the CTQ flowdown and operational definitions were reconstructed. The resulting project definitions were compared and then grouped into projects with a similar structure. The generic CTQ flowdown templates were constructed from the common denominator of each group of projects. Then, after constructing the LSS project definition templates, it was verified whether the resulting groups of projects formed a taxonomy that complied with the previously mentioned criteria. Finally, operational definitions were made for each template. Projects in each group were checked to see how the CTQs were operationalized and generic operational definitions were constructed.

TEMPLATES FOR GENERIC LEAN SIX SIGMA PROJECTS

The authors' analysis resulted in six generic project definitions. Two of the categories focus on reducing operational cost, two focus on improving revenue, one focuses on reducing operational losses, and the last category aims to improve business decision making (availability, completeness, and relevance of management information). In this section the authors give an in-depth discussion of each of the six generic project definition categories, but first they provide an overview of the categories:

1. Decreasing operational cost by improving processing efficiency
2. Decreasing operational cost by using cheaper channels (automation)
3. Improving revenue by increasing customer satisfaction
4. Improving revenue by servicing more customers
5. Decreasing operational losses
6. Improving business decision making

Since many projects combine in their definition the goals related to categories 1 and 3, the authors distinguish a *seventh* category labelled "Increasing customer satisfaction and improving processing efficiency." Based on Figure 2 one can see that category 7 (increasing customer satisfaction and improving processing efficiency) accounts for 31 percent of all projects, followed by category 3 (improving revenue by increasing customer satisfaction) accounting for 20 percent, category 1 (decreasing operational cost by improving processing efficiency) accounting for 17 percent, and category 4 (improving revenue by

Figure 2 Pareto chart of LSS financial services project definitions.

1. Decreasing operational cost by improving processing efficiency
2. Decreasing operational cost by using cheaper channels
3. Improving revenue by increasing customer satisfaction
4. Improving revenue by servicing more customers
5. Decreasing operational losses
6. Improving business decision making
7. Increasing customer satisfaction and improving processing efficiency

Other project categories

servicing more customers) accounting for 9 percent. Cumulatively, these four project definition categories account for almost 80 percent of the projects that were encountered. The three smallest categories, category 6 (improving business decision making), category 2 (decreasing operational cost by using cheaper channels), and category 5 (decreasing operational losses), account for another 16 percent. Only 6 percent of the projects in the sample could not be classified in the proposed taxonomy (indicated in Figure 2 as "Other"). Because these were stand-alone cases, they did not justify adding new categories.

In the following the authors present the seven generic project definition categories in terms of the CTQ flowdown and operational definition of the CTQs. For each generic category they also provide an example.

Project Category 1: Decreasing Operational Cost by Improving Processing Efficiency

Projects in this category strategically focus on operational cost, which is in a large part driven by personnel cost. Personnel cost is determined by headcount (in full-time equivalent (FTE)) and the average cost per FTE. The LSS projects belonging to this category in the sample focused only on headcount (not on average cost per FTE), which in turn is composed of:

- Total processing time, which is divided into net processing time (PT) and additional PT due to rework
- Work volume
- Number of productive hours an employee works in the process

Figure 3 shows these relations and the four CTQs of this category.

Figure 3 CTQ flowdown for projects decreasing operational cost by improving processing efficiency.

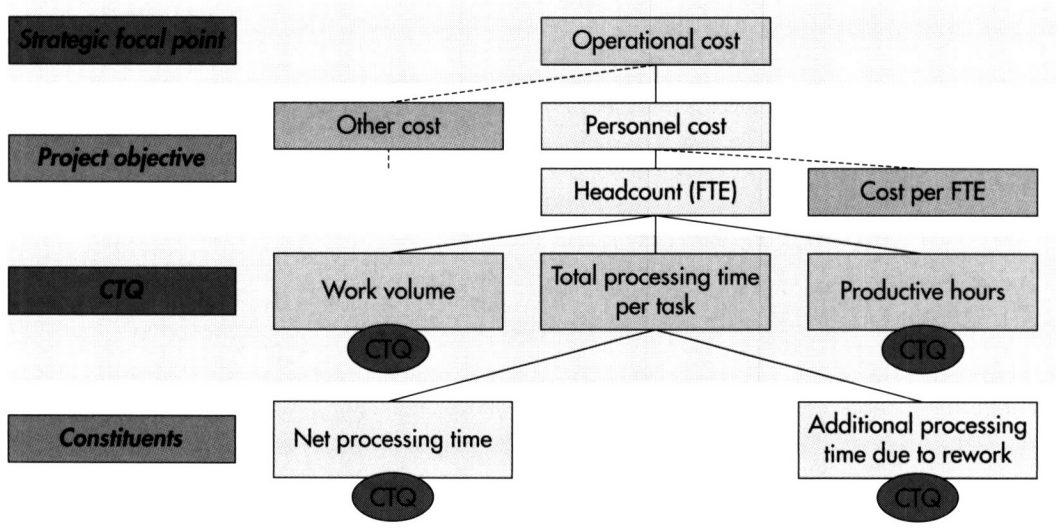


Figure 4 Operational definitions for projects decreasing operational cost by improving processing efficiency.

CTQ	Net processing time/ Additional processing time due to rework	Work volume	Productive hours
Unit	Per job (request, file, complaint, payment, etc.)	Per day, per week	Per day, per week
Measurement procedure	Time stamps, job tracking system	ERP, job tracking system	Time sheets
Goal	As short as possible	As little nonvalue-adding work as possible	As close to target as possible

Projects in this category have all or some of the CTQs in Figure 3 as project goals. The total PT is sometimes split up in the PTs per process step. This provides more information to diagnose the problem in the analyze phase. Rework can originate internally, but also *externally*. If, for instance, a client complains or asks for additional information, this typically causes an additional processing loop. In the latter case, an additional benefit of reducing the amount of rework, one of the project aims, may be an increase in customer satisfaction. The operational definitions needed to measure the CTQs are shown in Figure 4.

Figure 4 shows that the operational definition of a CTQ consists of three elements. First, one specifies per which entity the CTQ is measured. This entity is called the *experimental unit*. Net PT and additional PT due to rework are measured per job (a request, file, complaint, and so on), whereas work volume is typically measured per day or per week. Second, a measurement procedure for the CTQ is specified. PT is commonly measured with the help of time stamps. A travel sheet is attached to a file on which employees can time stamp the start and end time of the processing of the file. Alternatively, one can use job tracking systems to measure PT or the "day in the life of" (DILO) method. The DILO method prescribes that employees record on regular time intervals (such as every 10 minutes) during the day the activities they are engaged in. Finally, the operational definition includes a goal for the CTQ. In the case of PT and additional PT due to rework, the authors aim to make it as short as possible.

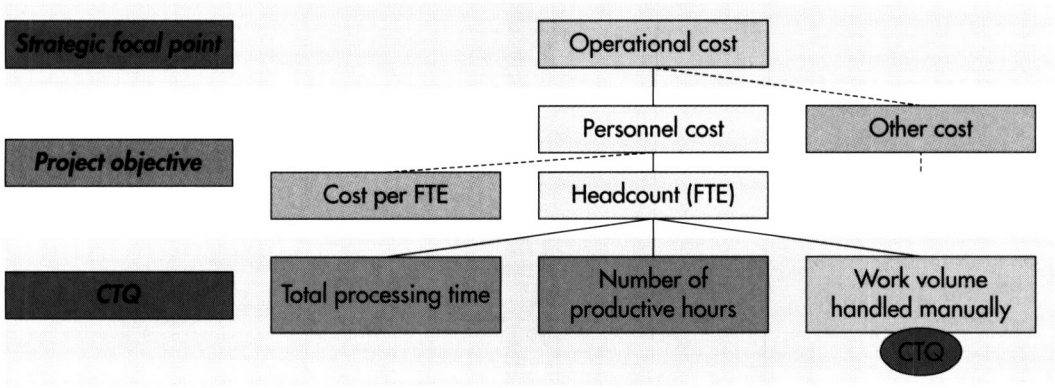
Example 1

In a department that processes offers for loans and contracts resulting from these offers, an LSS project was done aimed at reducing both the net PT and the amount of rework. Analysis revealed that the offers and contracts were processed batch-wise, partly because the different process steps were physically far removed from one another. This problem was solved by integrating the process flow and locating the different process steps at one location, making single-piece flow feasible. The average net PT was reduced slightly from 12 to 10 minutes, but the percentage of rework loops improved drastically from 8.0 percent to 2.4 percent.

Project Category 2: Decreasing Operational Cost by Using Cheaper Channels (Automation)

In financial institutions many processes have been automated to some extent with the aim of improving the service level, but mostly to reduce cost. In some cases almost all processing is done automatically, with just a small manual component consisting of exception handling. In other cases the automated channel processes only a small percentage of the total work volume. Projects of this category focus on cost reduction by trying to increase the (relative) amount of the work volume that is handled automatically. Shifting work to an automatic channel enables one to reduce headcount and hence personnel cost.

Figure 5 CTQ flowdown for projects decreasing operational cost by using cheaper channels.



Processing the work items automatically also imposes costs, but these are almost independent of volume. In Figure 5 this line of reasoning is shown, including the resulting CTQ. Note that the typical CTQs of the former category—processing time and number of productive hours—are only taken along as boundary conditions; they should not become worse as a result of the project, but their improvement is not included as a project objective.

Projects in this category focus either on the total work volume handled manually or the relative amount of work volume handled manually. The operational definition of this CTQ is shown in Figure 6. The information needed for the measurement of the work volume processed manually is typically available in enterprise resource planning (ERP) or job tracking systems.

Figure 6 Operational definitions for projects decreasing operational cost by using cheaper channels.

CTQ	Work volume handled manually (percentage or volume)
Unit	Per day, per week, per month
Measurement procedure	ERP, job tracking system
Goal	As small as possible

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Example 2

Customers of a Dutch bank can ask the bank to provide a copy of a current account statement. This can be done in two ways: in some cases customers call the bank and are guided through a menu structure that works automatically and results in the customer getting the required copy without human intervention. In other cases customers call the service desk of the bank and get the copy by asking a call center employee. The CTQ of the project was the percentage of customers using the fully automated channel. The project succeeded in increasing this percentage from 56 percent to 64 percent, reducing operational cost by 260,000 euros. This was done partly by making the menu structure more customer friendly and simple. Analysis showed that about 40 percent of customers that tried the automatic channel for the first time broke off prematurely and ended up calling the call center.

Project Category 3: Improving Revenue by Increasing Customer Satisfaction

Customer satisfaction is seen as a driver of revenue, either because it affects market share or because it reduces price sensitivity. To this end, projects seek to improve service delivery processes in order to improve service quality. Following the studied projects, service quality can be decomposed into the following underlying dimensions:

- External iterations

Figure 7 CTQ flowdown for projects improving revenue by increasing customer satisfaction.

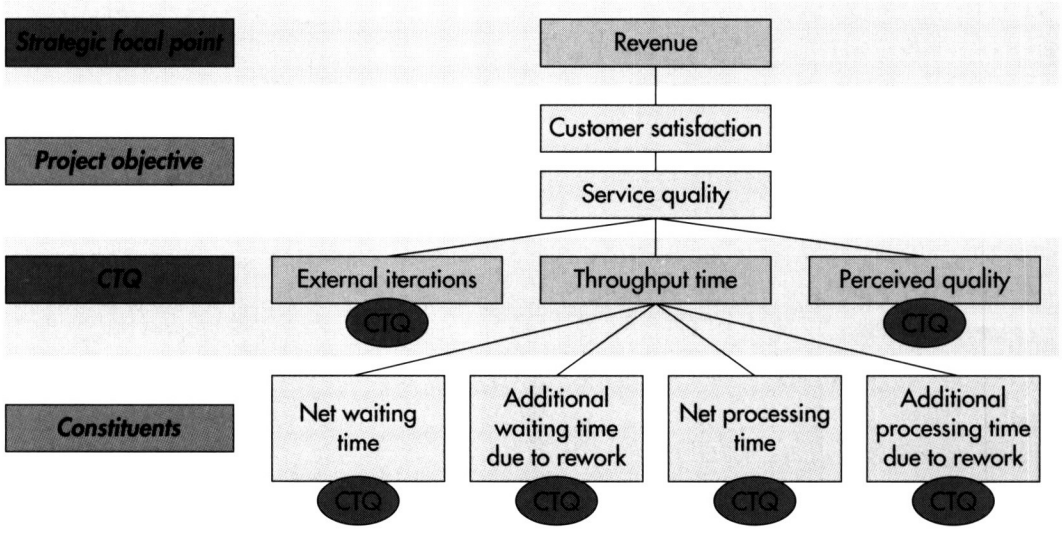

Figure 8 Operational definitions for projects improving revenue by increasing customer satisfaction.

CTQ	PT/WT/Additional PT due to rework/Additional WT due to rework	External iterations	Perceived quality
Unit	Per job (a request, file, complaint, payment, etc.)	Per day, per week	Per customer
Measurement procedure	Track a sample of jobs (with time stamps), job tracking system	Counting based on a sample of jobs, or from an ERP or other logging system	Quality rating based on a survey of customers
Goal	As short as possible	As small as possible	As good as possible

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- Throughput time, which can be decomposed into: net waiting time (WT), additional WT due to internal and external rework, net PT, additional PT due to internal and external rework
- Perceived quality

These relations are shown in Figure 7. Projects that belong to this category aim to increase customer satisfaction, and the selected CTQs are therefore the ones indicated in Figure 7.

To relate net WT, additional WT due to rework, net PT, additional PT due to rework, number of internal and external iterations, and perceived quality to specific measurements, one needs operational definitions. These are provided in Figure 8.

Measuring external iterations and the underlying components of throughput time is straightforward. External iterations (or errors) are measured either automatically in case an ERP or other logging system is in place. Otherwise, it is best to sample a number of jobs and measure the percentage that contain errors or iterates. In the case of throughput time, sometimes the number of rework loops, instead of additional processing and waiting time due to rework, is measured.

There is less agreement concerning the measurement of the CTQ "perceived quality." In some of the LSS projects in the sample perceived quality is measured by asking the customer directly (using a customer survey), whereas in others it is hypothesized to be related to the underlying dimensions. These

Figure 9 CTQ flowdown for projects improving revenue by servicing more customers.

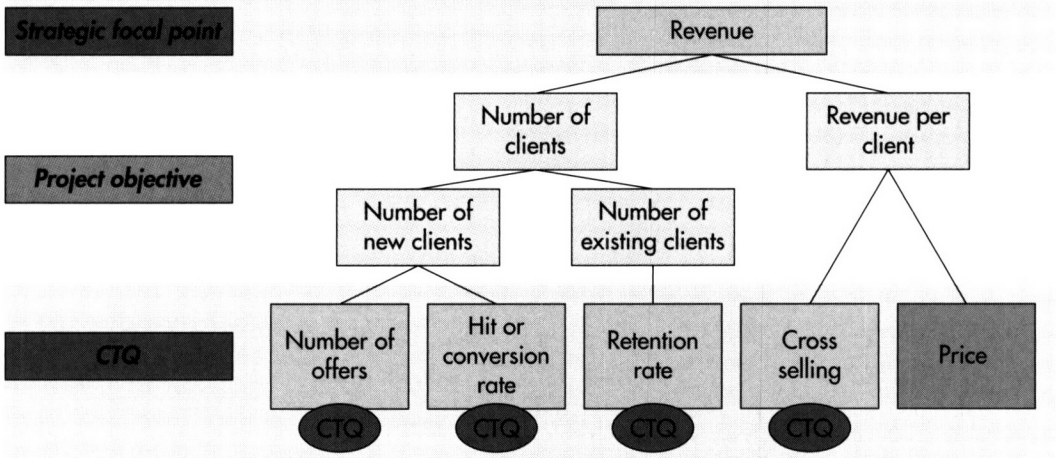


Figure 10 Operational definitions for projects improving revenue by servicing more customers.

CTQ	Number of offers	Hit or conversion rate	Retention rate	Cross selling
Unit	Per week, per month	Per week, per month	Per week, per month	Per customer
Measurement procedure	Via the CRM database	Via the CRM database	Via the CRM database	Via the CRM database
Goal	As much as possible	As large as possible	As large as possible	As large as possible

underlying dimensions are highly project-specific. To give some examples:

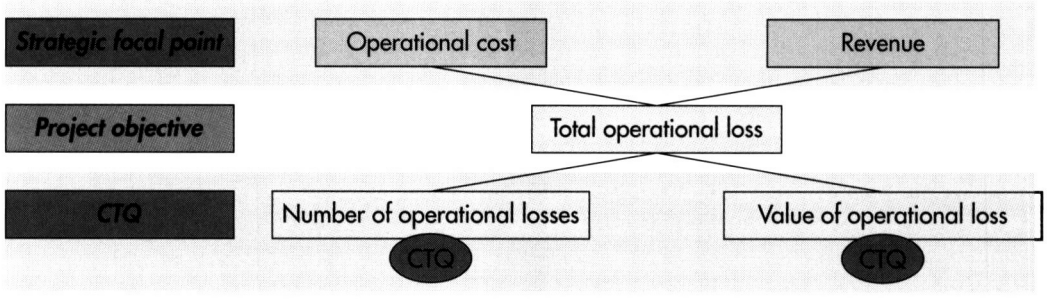
- Completeness of answers to questions and the correct routing of service calls (in a call center of a service desk)
- Clearness of the response, tone of voice, and the difference between client expectation and actual solution in reclaim handling

The authors conclude that the exact measurement procedure for perceived quality is hard to capture in a generic operational definition. This view is concurred by the findings of Parasuraman, Zeithaml, and Berry (1985). In an effort to define the concept of service quality, they find that, although there is a set of fairly general dimensions of service quality, it is highly situation-specific as to which dimension is the most important. Note that in Figure 8 only one possible operational definition of perceived quality is shown.

Example 3

In one of the projects in the sample the processing of changes in life insurance policies was improved. A customer survey showed that customers were particularly dissatisfied with the throughput time of processing changes to their life insurance, and less so with other quality issues, such as errors and communication. Therefore, the total throughput time to process a change was chosen as CTQ. The project scope was confined to the two most current products. Measurement showed that the throughput time was longer than the agreed-upon service level (45 days) in more than 30 percent of the cases. Furthermore, analysis showed that waiting time contributed more than 99 percent to the total throughput time. The solution was to change from batch processing to single-piece flow and to apply critical path techniques, changing the sequence of some of the process steps.

Figure 11 CTQ flowdown for projects decreasing operational losses.



Project Category 4: Improving Revenue by Servicing More Customers

In the previous category revenue is improved by increasing customer satisfaction. Typically this is done by improving service quality through the improvement of back-office processes. In this category projects try to improve revenue as well, albeit differently. The focus here is to sell more products or services by improving sales processes. Improving revenue can be done by either getting more revenue per client or increasing the number of clients. The former is achieved by cross selling or asking a higher price. The latter, increasing the number of clients, can be effectuated by:

- Increasing the number of new clients by: identifying more prospective clients and/or improving the conversion rate from prospect to contract, which is called the hit or conversion rate
- Keeping existing customers by improving the retention rate

These relations and the four CTQs are presented in Figure 9. Note that price is not included as a CTQ, because pricing strategies are beyond the scope of LSS.

The operational definitions of these CTQs are shown in Figure 10. The CRM database refers to the customer relations management database. In the definition of cross selling, the goal reads "as large as possible."

Example 4

In one of the projects in this category the goal was to improve the conversion rate from offers for loans to accepted offers for loans. The improvement effort focused on three elements:

1. Making the conversion rate more visible to employees (visual management)
2. Providing incentives for managers by incorporating the conversion rate for their department in their performance contract
3. Allowing more freedom to employees with respect to negotiating loan conditions, giving them more leeway to operate commercially

Figure 12 Operational definitions for projects decreasing operational losses

CTQ	Number of operational losses	Value of operational loss
Unit	Per week, per month	Per operational loss
Measurement procedure	Via the operational loss database	Via the operational loss database
Goal	As small as possible	As small as possible

Project Category 5: Decreasing Operational Losses

A specific kind of operational cost or lost revenue is called an *operational loss*. Operational losses can have a variety of causes, such as fraud, accidents, product flaws, natural disasters, and so on. In financial services institutions an operational loss could,

Figure 13 CTQ flowdown for projects improving business decision making.

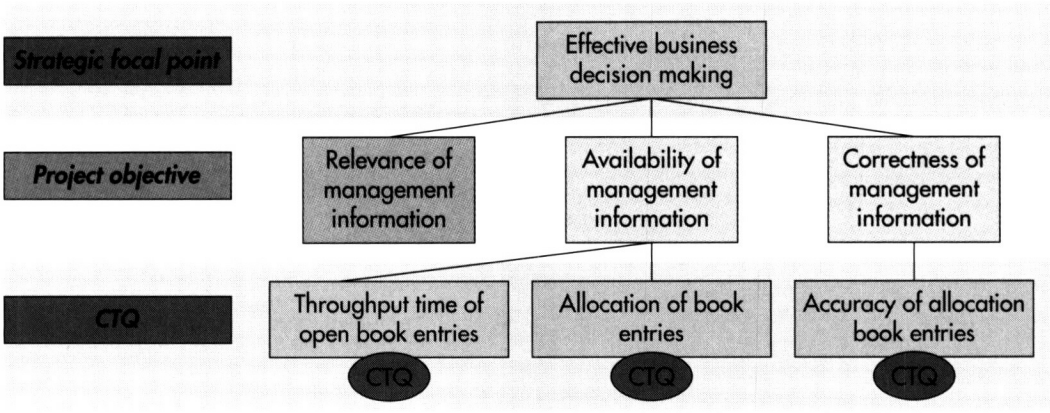


Figure 14 Operational definitions for projects improving business decision making.

CTQ	Throughput time of open book entries	Allocation of book entries	Accuracy of allocation of book entries
Unit	Per open book entry	Per week, per month	Per week, per month
Measurement procedure	Via the system, database	Via the system, database	Counting based on sample of book entries
Goal	As short as possible	As large as possible	As large as possible

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for instance, be caused by making errors in offers to clients such as proposing a lower than intended provision or interest rate. This would result in lower revenue. Sometimes additional costs are incurred, for example, in the case of penalties. In both cases the total financial impact is determined by:

- The number of operational losses
- The average value of the operational losses

In the projects in this category these are selected as CTQs (see Figure 11). Operational definitions are described in Figure 12. The data needed for the measurements are extracted from an operational loss database.

Example 5

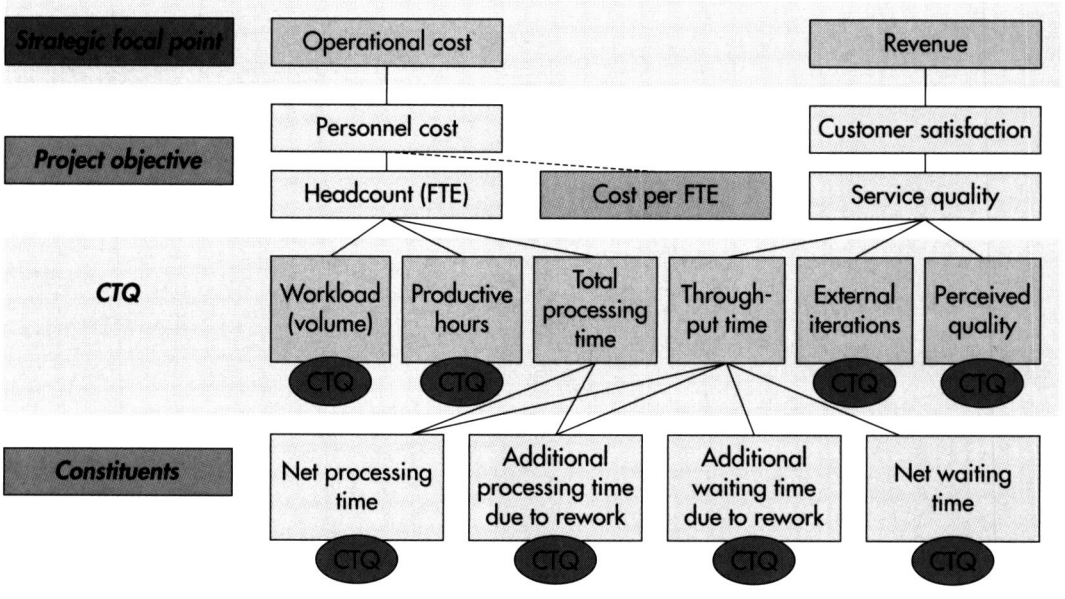
In processing direct payments, mistakes sometimes lead to an operational loss. In one of the LSS projects these operational losses were measured in number and value. A lack of understanding of the number and causes of operational losses was found to amplify the problem. Several improvement actions were initiated:

1. A feedback loop was implemented, providing employees with information on operational losses. This helped the employees not to repeat the same mistake.
2. The management information system in which operational losses are reported was changed, including an overview of underlying causes for operational losses.
3. Periodic reviews of procedure compliance was implemented. Moreover, a quarterly quality workshop was introduced to raise awareness about operational losses.

Project Category 6: Improving Business Decision Making

Companies need accountancy reports for legal purposes, but also as input for business decision making, such as decisions about investments, new services to launch, markets to serve, and the like. To make the right decisions top management needs information

Figure 15 CTQ flowdown for projects increasing customer satisfaction and decreasing operational cost.



that is up to date, accurate, and relevant. Three principal accountancy statements that serve to provide this information are:

- The income statement (also called profit and loss account)
- The balance sheet, showing assets, liabilities, and equity
- The cash flow statement (showing the starting cash position and cash flows from operations, investments, and financing activities)

Several projects in the sample dealt with the quality of information of the first of these accountancy statements, the income statement. CTQs taken along are:

- Throughput time of open (credit and debit) book entries. (How long does it take to allocate book entries to a business unit?)
- Completeness of allocation of (credit and debit) book entries. (What percentage or volume of book entries have been allocated to a business unit?)
- Accuracy of allocation of (credit and debit) book entries. (What percentage or volume of book entries have been allocated to the right business unit?)

The first two CTQs relate to availability of management information, and the last one relates to the accuracy of the management information. The rationale for these CTQs is shown in Figure 13. The operational definitions of the CTQs are shown in Figure 14.

Example 6

In one of the projects in this category the goal was to explain the deficit in one of the profit and loss accounts and to allocate so-called open entries, that is, entries that were not allocated to one of the company's business units. A second goal was to prevent the emergence of deficits in the future. One solution was to implement a different account structure and a different management information system. Moreover, the project leader introduced a control tool to monitor debit and credit entries on a daily basis. As a result, the management information is more accurate and timely. A beneficial spin-off of the project was that a business partner could be after-charged for approximately 300,000 euro.

Project Category 7: Increasing Customer Satisfaction and Decreasing Operational Cost

Some projects are aimed both at improving customer satisfaction and decreasing operational cost. Projects

of this category are a combination of categories 1 and 3, as can be seen from Figure 15. Evidently, the CTQs are also a combination of those of category 1 and 3. Their operational definitions can be found in Figures 4 and 8.

Example 7

When issuing a new insurance policy, correct and complete information is critically important. If during the pre-processing one notices missing information, a request for information is sent to the client. The processing of the new insurance policy pends until the required information is retrieved. The key aspects of information requests that drive this process's performance are:

- Additional processing time (PT) due to an information request (rework)
- Additional waiting time (WT) due to an information request (rework)
- The number of information requests per application

Seeing the additional PT due to an information request as given, the project leader pursued a reduction of the number of information requests per application, and a reduction of the WT per information request. The improvement action was to design a standardized process and to communicate more clearly to the customer the information that was needed. The basic principles of this newly designed process are:

- The frequency of communication with the customer is standardized, as is the communication channel. A communication frequency of once per 10 days is now compulsory; the number of contacts with the customer is limited to a maximum of three. If, after three requests, the information still is not provided, no more effort is done to get it. Only written communication with the customer is allowed.
- A standardized template for written communication with the client is provided to the employees; use of this template is compulsory.
- For each type of insurance, a checklist for the required information is provided to the employees.

The average number of information requests per application dropped from 5.5 to 2.6. This resulted in estimated annual savings of 330,000 euros. The average WT per information request increased from 3.9 to 4.8 days, because employees are only allowed to send a new information request after 10 days. The number of information requests dropped, however, so the average total WT per application due to information requests dropped from 21.5 to 12.3 days.

Remaining Projects

Four projects in the sample could not be classified in the existing taxonomy of project definition categories. Two of them strongly resembled category 7 projects, but they had one extra element. Both projects had as an additional CTQ the time between doing the actual work and the moment the customer pays. Long waiting times before the customer pays create higher costs of capital. The other two projects that could not be classified were hybrids, combining categories 7 and 5.

VALIDITY OF THE CLASSIFICATION

The authors developed a set of generic LSS project definition categories and corresponding standardized templates. As pointed out in the methodology section, the quality of a taxonomy is determined by the extent to which the categories are described clearly, are mutually exclusive, are internally homogeneous, and are collectively exhaustive. A clear conceptual structure is guaranteed by building on the existing literature and using existing structures to capture the project definitions. The project definition categories are structured by the CTQ flowdown technique, including operational definitions for the CTQs. This ensures a unified conceptual framework, containing concepts such as strategic focal points, project objectives, and CTQs.

The categories are not collectively exhaustive, but the majority of projects can be allocated to one of the categories. Those that could not be classified (6 percent of the projects in the sample) are hybrids (combinations of other categories). Even with

a refined taxonomy it does not seem likely that all LSS projects can be classified.

Finally, categories 1 to 6 are mutually exclusive. Categories are internally homogeneous in that projects within a category share similar project definitions. Projects in a category differ, of course, in aspects that are not related to the authors' categorization, such as the types of analyses and improvement actions.

The aforementioned issues address the study's internal validity. External validity addresses the question of to what extent this taxonomy is also useful and applicable outside the sample used. External validity is determined here by the extent to which the sample is representative. The current set up has some limitations:

- Projects are sampled from one country only, the Netherlands
- All the project leaders are trained with the same "dialect" of LSS, in the sense that they are all trained by the same institution
- The sample contains few projects carried out outside a back-office environment

On the other hand:

- The sample represents five companies
- The sample reflects a good mix of Black Belt and Green Belt projects
- The projects in the sample varied widely in terms of scope

Future research to refine and corroborate the proposed classification should focus on at least four issues. First, cases originating from a larger sample of countries, different training environments, and different departments within financial services could help to test and expand the current taxonomy. Other categories or exceptions may emerge in this way. Second, theoretical grounding is needed to place the strategic focal points presented in the generic categories in theories on business-economics of financial service industries. Third, it is interesting to study what the similarities and dissimilarities are between the generic categories of different industries. Finally, further research may uncover guidelines that suggest for each of the categories what steps to take next and what solution strategies may be appropriate. This research direction is similar to the work of Smith (2000), who divides quality problems into five classes. For each class he indicates a problem-solving approach and some commonly applied solutions.

CONCLUSIONS

The analysis and research on generic LSS project definition categories allows the authors to draw several conclusions:

1. Providing standardized templates for project definitions facilitates making crystal-clear project definitions, having a solid business rationale.
2. The majority of LSS projects in financial services fall in one of six generic categories or a combination of these categories.
3. All of these generic project definition categories have a clear rationale from a business point of view. Most are directly related to drivers of operational cost, whereas some are related to revenue and effective business decision making.
4. The common conceptual framework for project definitions, consisting of a CTQ flowdown, including operational definitions for CTQs, facilitates communication about the project.

Apart from these conclusions some limitations can be pinpointed:

5. The relative size of each category still must be determined. The sample size and representativeness of the sample are insufficient to determine this precisely.
6. The project definition categories need to be validated in other circumstances and contexts as well. The current sample contains projects carried out in the Netherlands, with Black Belts and Green Belts trained by one training institution.
7. The project definition categories need to be validated theoretically to check whether all important strategic focal points relevant to financial services institutions are covered. Literature on management information systems and balanced scorecards provides an interesting angle.

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