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Selecting Critical Processes for a Six Sigma Project: Experiences from an Automotive Bank

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SELECTING CRITICAL PROCESSES FOR A SIX SIGMA PROJECT – EXPERIENCES FROM AN AUTOMOTIVE BANK

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Abstract

In the automotive business, financial services have gained in importance over the last few years. Apart from sales promotion, customer retention is a primary concern. As a consequence quality management which had so far been regarded as a discipline of the manufacturing sector, has been taking a central role in the service sector. Therefore the Six Sigma methodology attracts a lot of attention in literature and is applied in many process improvement projects. In the beginning of a Six Sigma project the critical process must be selected. This selection is crucial to the success of the improvement project, and thus the success of the enterprise.

The paper focuses the selection of critical processes for a Six Sigma project in a teaching case. It presents an approach established during the prototypical implementation of Six Sigma at an automotive bank (financial service provider). Additionally, individual steps of the selection process are more closely examined.

Keywords: Six Sigma, critical process, critical success factor, customer characteristic, selection
1 INTRODUCTION

Even though Six Sigma\(^1\) has been applied in business practice for several years, its concept and philosophy have not yet been fully investigated. This fact is mirrored in numerous attempts to establish a unique definition (see Magnusson et al. 2004). Six Sigma can either be implemented as a company-wide strategy based on a management-driven top-down approach (see Harry & Schroeder 2000) or as an (process-oriented) improvement methodology (see Antony 2006, Antony 2004) or as a mere tool set (see Breyfogle et al. 2001). Using Six Sigma as an improvement methodology or a tool set reduces the overall concept to the structured application of the Six Sigma cycle (DMAIC – Define, Measure, Analyze, Improve, Control) or the selected use of quality instruments.

Although Six Sigma was originally developed in manufacturing industries, the concept increasingly enters the service sector (see Pande et al. 2000, Breyfogle et al. 2001). Despite the Six Sigma user is confronted with a number of difficulties in the service sector (see Antony 2006, Pande et al. 2000) the Six Sigma methodology has been continually developed and improved in this sector (Magnusson et al. 2004).

It is often emphasised that the popularity of Six Sigma is primarily based on the DMAIC cycle which systematically structures process improvement projects and classifies quality techniques and tools. In addition the Six Sigma methodology comprises well specified roles and a clear description of expected results.

The Background of this teaching case is the prototypical implementation of Six Sigma at one of Germany’s leading automotive banks. The automotive bank implemented Six Sigma as a process-oriented improvement project. The selection of critical processes that should be improved was the first challenge of the project. Most authors assign this task either to the first phase of the Six Sigma cycle, the Define-Phase (e.g. Antony 2006, Nonthaleerak & Hendry 2008), or sometimes even place it before this phase, as a starting point of any Six Sigma project (e.g. Eckes 2001, Ehrlich 2002, Tennant 2001). It is, however, widely agreed that the selection of processes is not only of crucial importance for the Six Sigma application, but also very difficult (Kumar et al. 2007, Nonthaleerak & Hendry 2008).

The teaching case describes the approach that was developed and implemented during the introduction of Six Sigma at the automotive bank and highlights the experiences made. After a description of the automotive bank in section 2 the identification of critical business processes at the bank is shown in section 3. Section 4 gives a final conclusion of the case. Important terms used in this case study are explained in detail in the appendix. The teaching notes at the end of the case deal with discussion questions and further literature.

The case is used in a real classroom environment for teaching important concepts like critical success factors (CSF), critical processes and core competences in Six Sigma improvement projects and has been presented to more than 80 students over the last two years.

2 CASE BACKGROUND

2.1 Details of the automotive bank

The automotive bank is the affiliate of a German automotive group and is responsible for the activities of the group’s division concentrating on financial services in Germany. It belongs to one of the leading automotive banks in Germany within the 500-1000 employees range.

\(^{1}\) Refer to Appendix A for a more detailed overview of Six Sigma.
The bank has no branch network. The product portfolio comprises individual solutions to ensure the mobility of private and business clients, as well as financing and leasing, car insurance, dealer financing and fleet management. Traditional bank and insurance products, such as deposits, investment funds, insurance of persons, property insurance and credit cards are more and more integrated into the core product range. In addition, the bank offers flexible and modern solutions for private asset management. 62% of all buyers of new cars finance the purchase by means of credit or leasing contracts at the car manufacturer’s in-house bank (automotive bank).

In contrast with the strategic goals of other automotive financial service providers, the automotive bank does not aim at being the customer’s main checking account bank. It predominantly designs and uses its range of financial products to fulfil certain tasks within the car manufacturers group. On the one hand, it is their aim to support car sales which means that the bank helps to retain (loyalise) existing customers and gain (conquer) new customer groups. On the other hand, the automotive bank concentrates on realising the prospects of revenues from automotive financial services and from asset management. Thus the automotive bank directly competes with manufacturer-independent automotive finance providers. In addition, as regards the deposit business, the automotive bank also competes with full service banks, insurance companies and other financial service providers. Its position in the market, however, is strong due to the special importance of refinancing which allows them to offer attractive interest rates.

As the automotive bank works under the German Banking Act (KWG), it has to reflect in its organisational structure the minimum requirements of risk management (MaRisk) of the BaFin (Federal Institute for Financial Services Supervision). It therefore has a functional organisational structure comprising “market”, “risk management”, and “support” as main functions. “Market” covers subfunctions which deal with the initiation, organisation, performance (and execution), and support of customer relationships and related transactions. Those process steps within these transactions which are particularly critical are controlled and verified by “risk management”. In addition, “risk management” embeds subfunctions which plan, manage and control parts of the entire customer portfolio. “Support” comprises subfunctions which belong to the coordination of the bank or serve the support of “market” and “risk management”. These are, in particular, the provision of ressources (IT (information technology), HR (human resource), rooms, etc.) as well as further interdepartmental subfunctions to ensure the efficient and effective orientation of the enterprise on the strategic and operational levels. The subfunction “customer service”, for instance, belongs to “market”, whereas the subfunctions “claims management” and “risk control” belong to “risk management”. “Information technology”, among others, belongs to “support” and is responsible for the provision of the necessary IT support for all divisions of the automotive bank.

2.2 Six Sigma at the Automotive Bank

The introduction of new banking products, the modification of business processes and legal requirements as well as the constant competition in the financial service sector forced the bank to introduce the programme “corporate quality”. The programme itself comprised several projects. The programme’s objectives were developing a standardised approach for the improvement of existing processes, the design of new processes, the restructuring of divisions as well as to give recommendations for the use of quality techniques. A quality technique is an instrument which leads to one or more results and consists of certain steps that are performed in a defined order (Hellsten & Klefsjö 2000), for instance QFD (quality function deployment), DOE (design of experiments), or FMEA (failure mode and effect analysis).

Six Sigma was chosen as the method to be used for the improvement of business processes. How to proceed in a Six Sigma improvement project is determined by the DMAIC cycle (see Magnusson et al. 2004, Pande et al. 2000, Bañuelas & Antony 2003, Antony et al. 2005), which represents the basis for any process improvement project. Since, however, the successful execution and implementation of a
Six Sigma improvement project is largely depending on the enterprise-specific environment, the approach had to be adapted to the particular environment of the automotive bank.

To carry out the implementation, Six Sigma had to be tested on a few critical business processes, and simultaneously adapted to the specific enterprise environment. Based on the obtained experiences the standardised approach was defined and successfully applied in following projects.

The case study is based on the first step of the “corporate quality program” and focuses the selection of the critical processes. Even though the Six Sigma methodology supports the selection of the critical processes, it does not offer an approach to do so. Therefore an approach had to be developed to select critical processes. The main criteria for the selection were critical success factors, customer types and characteristics, and the enterprise’s core competences.

3 IDENTIFICATION OF CRITICAL BUSINESS PROCESSES

For a better understanding, the approach of selecting critical processes is briefly described in the following. Afterwards the application of the approach is introduced.

3.1 The Approach of Selecting Critical Processes

The approach consists of four steps:

1. Candidates for critical processes, core competences, customer characteristics and critical success factors\(^2\) are determined based mainly on interviews with chief executive officers, department managers and employees from the “marketing”, “IT”, “human resources”, and “quality management” departments. Based on the customer characteristics the customer types are identified (Figure 1 – arrow I).

2. The consistency of core competences, customer characteristics, customer types and critical success factors are analysed (Figure 1 – arrows II and III). The analysis is based on the matrix similar to “House of Quality” (HoQ)\(^3\) from the QFD technique (see Akao 1990).

3. Candidates for critical processes are cross-checked with the core competences, customer types and critical success factors (Figure 1 – arrows IV, V and VI). The cross-checking is based on HoQ. As a result candidates for critical processes are gained.

4. The candidates for critical processes are to be prioritised (Figure 1 – arrow VII) based on the Analytical Hierarchy Process (AHP) (see Saaty 1980, Saaty 1990).

Starting point for this approach are interview results which have to be checked in two iterations. It was first checked whether core competences and critical success factors met expectations of the individual customer types. Second, it was checked which processes have the strongest relation to core competences, customer types and critical success factors. HoQ were used to support this procedure. Those processes with strong relations were then prioritized with the help of AHP. Figure 1 shows the approach for the selection of critical business processes that was used at the automotive bank. The approach resorts to qualitative criteria, a circumstance that has been explicitly intended by the responsible project management for the introduction of Six Sigma.

\(^2\) Important terms (critical process, critical success factor, core competences) are explained more detailed in APPENDIX B.

\(^3\) Refer to Appendix C for a more detailed overview of the House of Quality.
3.2 The Application of the Approach at the Automotive Bank

Step 1

To begin with, it was necessary to determine the critical success factors, the core competences of the enterprise as well as the characteristics of typical automotive bank customers. In addition “important” processes are identified, which are considered as decisive for business success.

To gather this information several efforts were taken by the project team:

- First, in-depth interviews were held with the chief executive officers (CEOs) of the automotive bank. This was necessary to identify the management’s strategic concept for the years to come. The management was interviewed about which critical success factors, core competences as well as customer types they considered as decisive. Based on this information the CEOs were asked to name business processes they believed to be critical for business success. In preparation of the interviews, questionnaires were sent to the CEOs beforehand. Thus the management members were able to prepare for the interview which led to more precise and well-founded results. The questionnaire also included a selection of 30 critical success factors, 6 core competences, 27 customer properties and 5 customer types, typical for financial providers. This information was derived from literature as well as from prior cooperation projects in the financial sector.

- In addition, in-depth interviews were held with department managers as well as employees from the “marketing”, “IT”, “human resources”, and “quality management” departments of the automotive bank. In doing so, the employees’ views on the critical success factors, core competences as well as customer types and properties were collected. Since the employees had direct contact with the customers, they could immediately name specific customer characteristics.

*Figure 1. Approach for the selection of critical processes*
Furthermore, secondary data from marketing was analysed. In particular, complaints as well as customer satisfaction surveys provided significant insights into customer expectations and requirements on the automotive bank. This information was matched with the results obtained from the in-depth interviews.

After collecting the above information, the results were gathered. These were the outcomes:

- There was a clear focus on five critical success factors, namely “rapid processing of customer transactions”, “strategic positioning”, “high service quality”, “flexibility of employees, organizations, processes and IT” and “innovation in product design”. This distinct focus was a prerequisite for the application of the AHP procedure: the success factors appear as sub-goals in the AHP tree.

- To categorise the customers of the automotive bank, customer characteristics were identified in interviews with CEOs, employees and through the analysis of secondary data. To determine customers on the basis of properties, a taxonomy of German financial customer types was used (see Rill 2006, Grebe & Kreuzer 1997). Each customer type of this taxonomy (“benefit-oriented financial type”, ”opportunity- and risk-oriented financial type”, “fun-oriented financial type”, “traditional financial type” and “consultancy-oriented financial type”) is characterized by certain properties. These are, for example, “sensitive concerning price”, “high financial activity” or “risk-averse”.

- **Arrow I** (Figure 1): The analysis of the customer characteristics showed a big overlap with the ”benefit-oriented financial type” and the ”opportunity- and risk-oriented financial type“(see Figure 1 – arrow I). Both types are characterized by having “profound knowledge concerning financial products”. They both use the Internet for financial transactions and expect a “product-oriented approach” from the financial service provider; likewise they expect to be provided with “customised product information” (see Rill 2006).

- In total, five core competences were identified by means of the in-depth interviews with CEOs and employees: “Offering attractive, customised leasing products”, “adoption of new technologies”, “comprehensive consultancy”, “know-how concerning financial market development”, and “risk management”.

- In addition, the CEOs named 22 business processes they considered as decisive for business success. Whether or not these processes were to be seen as “critical” had to be worked out in the steps to follow.

Steps 2 to 4 of the approach for the selection of critical processes were conducted in a workshop the department managers of “marketing”, “IT”, “human resources” and “quality management” were invited to. The results shown are the outcome of the participants’ discussion within the workshop.

**Step 2**

In a next step, the consistency of the data and the influence of the components on each other were examined. For instance, in the matrix “core competence – customer type” (see Figure 1 – arrow II) it was checked to what extent the core competences were matching the expectations of the customer. To do so, the core competences and the customer characteristics were listed as lines and columns; similar to the HoQ, the strength of the relation was then determined for each line of the matrix.

If the line totals would have shown that the core competences did not support the customer characteristics at all, this could be an indication that the persons interviewed had not thought thoroughly about their answers. Even worse it could also be an indicator for the inconsistency of the business strategy, since the wrong customers may be focused. A discussion with the CEOs and decision of management are indispensable in that context. Nevertheless, in the project at the automotive bank the customer characteristics matched with core competences. Arrow III (see Figure 1) follows this procedure.
**Arrow II** (Figure 1): The comparison of the automotive bank’s customers with the core competences shows that the enterprise-specific competences could fully serve the interests of the different customer types. Example: A “technology oriented” customer who needs little consultancy concerning financial products such as the “opportunity- and risk-oriented financial type” will more likely expect core competencies like “customer-oriented adoption of new technologies” (e.g. Web 2.0, Mobile Banking) than “comprehensive consultancy services”.

**Arrow III** (Figure 1): The critical success factors, too, matched the expectations of the automotive bank’s customers. Example: The “opportunity- and risk-oriented” customer, knowledgeable in financial products and focusing on bonds, will appreciate critical success factors like “rapid processing of customer transactions”. “Standardised products”, on the contrary, might not meet his demands as regards the customisation of products.

It could thus be stated that core competences, customer types and critical success factor of the automotive bank matched.

**Step 3**

Afterwards the core competences, critical success factors and customer types were used to identify the candidates for critical processes (see Figure 1 – arrows IV to VI).

**Arrow IV** (Figure 1): The core competences were compared to the “critical processes” as surveyed in the interviews. It was the aim to find out those processes which could be allocated to as many as possible competence areas and be classified as “core processes”.

Example: For an automotive bank that excels over competitors by core competences such as “offering attractive, customised leasing products” the process “product development” is crucial to its success; therefore, in this context, the process “product development” ranks higher than the process “document management” (see Figure 2). For lack of space and due to reasons of commercial confidentiality we only show an excerpt of the results in Figure 2.

The matrix shown in Figure 2 highlights that the process “product development” does not only have a strong relation to the core competence “offering attractive, customised leasing products” but also to the “adoption of new technologies”. The product development process is the bank’s driving force for offering attractive leasing products that are better than those of their competitors. Therefore the core “competence of offering attractive leasing business” strongly relates to the product development process. In addition, product development has to react to and reflect new technologies as expected by the focused customer type. Therefore it greatly supports the company to become a leader concerning the adoption of new technologies.

The relationship is indicated by the symbols which are characterized by certain weights (strong = 9, medium = 3, weak = 1, no relation = 0). The weightings were adapted from several proposals in literature (for example see Scheurrell 1994, Gonzalez et al. 2004).

Each cell represents the relationship between the process considered and a certain core competence. The line total indicates the importance of a process concerning all core competences mentioned. In this example product development has a total of 24 points and is to be considered as crucial in supporting the core competences.

**Arrow V** (Figure 1): Likewise, the customer types and the operational procedures were compared resulting in five specific processes which, in the eyes of both the personnel and the project team, made an essential contribution to the customer satisfaction of the focused customer types. Example: processes such as “settlement of contracts” as well as “product development” are crucial to dealing with customers expecting individualized product offers and service. On the basis of these processes, products can be customised and processed in a rapid way.

**Arrow VI** (Figure 1): Finally it was checked to what extent the selection of processes was harmonised with the critical success factors of the bank. Here, too, four processes proved to be equally important...
for all named critical success factors. Example: to provide adequate, customised service, the “rapid
processing of customer requests and transactions” is an important critical success factor (which was
one result of the project). Therefore the processes “settlement of contracts” as well as “customer care”
are vital in this context.

After validating the collection of potentially “critical” business processes against the background of
the core competences, the customer types, and the critical success factors, those processes had to be
selected which had excelled during the comparison. At the same time, the intersection between the
processes was sought for. Therefore the line totals for the three Houses of Quality (see arrows IV, V,
VI in Figure 1) where summed up for each process. The four processes with the highest total were
then selected as potential candidates for a Six Sigma project. In doing so, their number could be
reduced to just the most “critical” ones.

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<th>Core Competences</th>
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<tr>
<td></td>
<td>Offering attractive, customised leasing products</td>
</tr>
<tr>
<td>Product development</td>
<td>9</td>
</tr>
<tr>
<td>Customer service</td>
<td>9</td>
</tr>
<tr>
<td>Application development (IT)</td>
<td>3</td>
</tr>
<tr>
<td>Customer transfer between financial services and automobile branch</td>
<td>9</td>
</tr>
<tr>
<td>Settlement of contract</td>
<td>9</td>
</tr>
<tr>
<td>Customer care</td>
<td>3</td>
</tr>
<tr>
<td>Credit assessment</td>
<td>1</td>
</tr>
<tr>
<td>Document management</td>
<td>0</td>
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Legend: strong relation (9); medium relation (3); weak relation (1), no relation (0)

Figure 2. House of Quality (HoQ) for determining the relation between core competences and
critical processes

Step 4

In the last step (see arrow VII (Figure 1)) these candidates had to be prioritised. To do so, the AHP
procedure was used due to its formalisms.

After discussions in the project team the automotive bank decided (for reasons of complexity) to base
the prioritisation of the critical processes on the critical success factors only.

Eventually, the following sequence of priorities could be determined. In this context, however, only
the generic proxies of the processes will be named, not the enterprise-specific processes themselves.

The following processes were identified as critical processes in the automotive bank (see Figure 3):
- Settlement of the contract
- Customer care


- Customer service
- Product development

Figure 3. Critical processes at the automotive bank

These critical processes served as a basis for further investigations and were systematically improved with the help of Six Sigma.

4 CONCLUSION

This teaching case deals with a central issue which had to be solved during the implementation of Six Sigma at an automotive bank (financial service provider): the selection of critical processes which are the basis for Six Sigma improvement projects. To solve this problem, an approach was developed and applied to structure the decision making process at the automotive bank.

The approach that supports the selection of critical business processes is based on criteria and concepts which can be (re-)used by any process-oriented enterprise. The approach used several types of criteria: customer types and characteristics, core competences, and critical success factors. In addition further concepts are used: multiple matrixes from the HoQ and AHP in order to prioritise the processes. Furthermore crosschecks between the criteria are conducted in order to validate the existence of relationships.

The teaching case shows how critical processes can be selected with the help of a reusable approach that was developed and implemented during a Six Sigma project at a German automotive bank. Even though this case was conducted at an automotive bank, both the findings and the selection approach can be transferred to any bank and to any selection of any critical success factor, because the presented approach operates on a general level.

Apart from the problems referred to in the teaching case (how to select critical processes), the relevant literature deals with further obstacles occurring during the application of Six Sigma in the service sector. These obstacles are not mentioned in this teaching case, since here the focus is specifically on aspects which have to be dealt with at the beginning of a Six Sigma project.
By means of the “corporate quality programme” the automotive bank achieved multifold short-term as well as long-term improvements. Short-term improvements concerning specific business processes included restructuring of forms and simplification of sorting procedures for instance. These were implemented immediately within a very narrow time-frame. Long-term improvements mainly focused on the reduction of media breaks and cycle times. Altogether the projects achieved tremendous monetary benefits.

APPENDIX

Due to page restrictions you can find the APPENDIX here:

http://www-be.uni-regensburg.de/fileadmin/user_upload/ECIS_2010_Appendix.pdf

The APPENDIX includes:

- overview of Six Sigma,
- important terms (critical Processes, criteria for selecting critical processes, critical success factors, core competences),
- house of quality (HoQ),
- teaching notes (primary learning objectives, introductory reading list, discussion questions, additional discussion questions).

5 REFERENCES


