

## **SOURCING PROCESS IMPROVEMENT WITH SIX SIGMA METHODOLOGY**

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**Abstract:** Although its application is most frequently related to the manufacturing and technological part of the business life, to maximize effectiveness of six sigma methodology it is worth to extend it to the whole business organization. In majority of the cases there is also a huge potential in the so called indirect processes – these are the ones that has no direct effect on the manufacturing activity and the quality of its product but their contribution to the final outcome and customer satisfaction is definitely not negligible. One of these core indirect value creation processes is the sourcing activity. The main goal of the below project introduction is to highlight the inherent opportunities of this area.

**Keywords:** *six sigma, sourcing, process improvement, quality assurance, customer satisfaction*

### **1. INTRODUCTION**

Independently from the company profile, one of the very first elements of the supply chain is the sourcing or procurement activity. Its importance does not lie solely in contributing to the company's competitiveness and profitability; this is one of the core processes with serious effect on the quality of the products or services. In contrast with its previous judgement this cannot be handled as the server function of the manufacturing or the service activities any more, it has rather become supportive – moreover the driving force of the research and development due to the professional and market knowledge it has.

Relation between material cost and company profit does not require any detailed explanation. What might be worth to be considered over the properly quantifiable and easily reportable price decrease and cost savings results: the technological competitiveness generated by the efficient sourcing activity has at least the same impact on the company's performance [1].

The main criteria of recognizing and utilizing all of these above are the most effective and optimized sourcing organization. As a continuous improvement and optimization of the entire activity it is inevitable to establish daily revalidation and change acceleration in the processes in case of need. This is how synergies of separate functions and competencies (i.e. sourcing, finance, logistic, engineering etc.) can be maximized and converted to productivity – both internally and in cooperation with external partners, like suppliers.

### **2. LITERATURE REVIEW**

As all process improvement activity, purchasing also requires continuous data collection and analyzation and – based on the gathered knowledge – definition and implementation of the necessary corrective actions [2]. There are multiple classification methodologies of process

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improvement tools available in the specialized literature, one of the most common is the list generated by professor Ishikawa in the 1950s:

- *Flow chart*: a flow chart in fact shows each step in a process which transforms an input to an output for the next step of the flow. This can be a great help in analysing a process, explore differences in actual and the intended situation and establish necessary changes to make it as simple and effective as possible. It means eliminating non-value-added ones and targeting improvement for the remained.
- *Pareto-chart*: this can be used for many areas, i.e. defects. Illustrating these with ascending or descending bar graphs helps to determine the core causes that are responsible for the examined problem.
- *Check list*: these are one of the simplest way of gathering and structuring data so that decisions can be made based on facts, rather than presumptions and anecdotal evidences.
- *Control chart /SPC – statistical process control/*: although these are based on basic principles these are the most complicated of the seven basic tools. It is used during production or after any process improvement action is implemented – to ensure that the process is within the control limits. Performance is represented with a scatter plot where upper and lower control limits are added as well – it helps to identify variations and determination of special cause and common cause variations.
- *Histogram*: these bar charts are showing the distribution pattern of the collected observations – these are segregated in appropriate class intervals and arranged in order of magnitude. A histogram is useful for studying patterns of distribution and making conclusion about the process based on these.
- *Scatter chart*: they are used during hypothesis-testing, to determine and display if there is a correlation – and how strong the correlation is – between two variables (dependent and independent).
- *Ishikawa-diagram (Fishbone or Cause & Effect-diagram)*: this tool is used to visually represent the cause or effect of a problem and helps to determine the ultimate source of it. Usually used in the very beginning of the root cause analysis to organize and prioritize these. Its main categories are: people, process, material, measurement, environment, equipment.

Part or all of these above listed tools are greatly applicable in the process optimization managed by six sigma tools. The aim of this method is to decrease the number of the defects to zero and minimize variability in the examined operation. It has five main steps, bear the acronyms DMAIC, according to below:

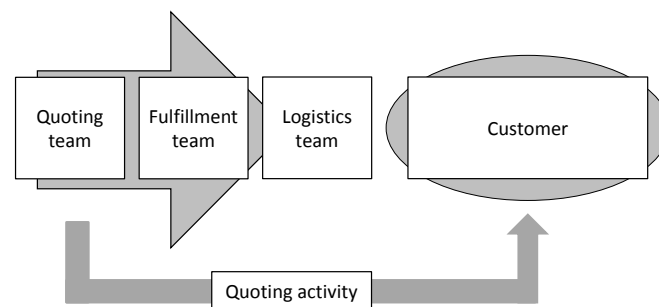
- *Define*: determining the system, the customers and their requirements, and the specific project goals.
- *Measure*: means checking the key aspects of the current process and collection of relevant data.
- *Analyse*: during data evaluation cause-and-effect relationships are investigated and verified.
- *Improve*: optimization of the current and creation of a new process based on the data analyzation.
- *Control*: related to the newly implemented process steps, ensures the longterm stabilization and maintenance.

To ensure objectivity, professionalism and success of the project the team usually consists of both experts from the specific, affected function and colleagues experienced in the six sigma methodology [3].

### 3. INTRODUCTION OF THE PROJECT

In the following, a sourcing process improvement process and the achieved results are presented, which was managed with six sigma methodology [4, 5].

From the extended – covering both the operative and strategic part of the whole fulfilment process – responsibilities of the sourcing department, this specific project is connected to the so called Quoting Team – who is managing identification and administration of the source and the related conditions of the items (such as unit price, processing time, supplier) [6, 7]. The whole process is illustrated on *Figure 1*.



*Figure 1. Fulfillment process*

Considering all the relevant parties of the project, list contains below members:

- *Customers*: in this particular case they are the final customers of the company, their requirements related to the processing time of the items can be converted to the project requirements.
- *Project team*: colleagues covering multiple functions of the whole process. The core strength of this team is complying with the basic requirements like: information and knowledge sharing, integrity, professionalism, transparency and objectivity. Beside the fundamental process improvement activity, their common goal is the project – and with this the green belt – certification. The four-person team is organized according to the below:
  - Project leader: member of the Quoting team
  - Project members: two colleagues from Quoting team and one representing internal customer's team.
- *Mentor*: a black belt-certified colleague who is responsible for the project support with her comprehensive knowledge and experience related to both the function and the six sigma methodology – there are full-time workers in this position at the company.

According to the preliminary plan program should be finished in six months. Apart from a few exceptions this is the average processing time of a six sigma project – considering all of the influencing factors, like control process and the fact that these projects usually are managed beside daily job of the employees. During this period there are multiple reviews

between the mentor and the team – the team itself has continuous cooperation and regular discussions. Based on internal regulation control phase it takes minimum six weeks.

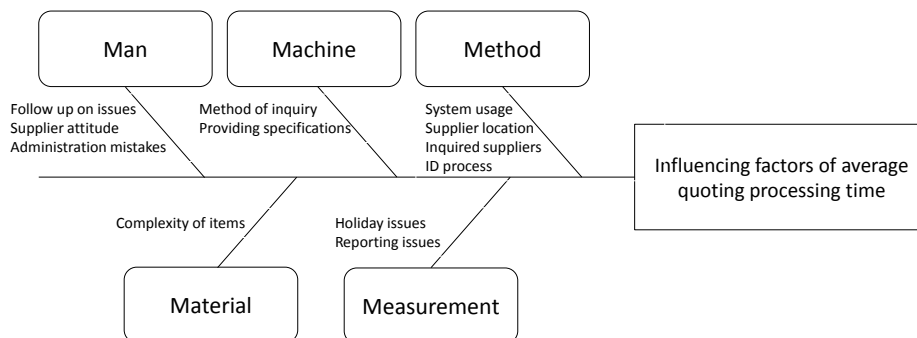
#### 4. THE SPECIFIC DETAILS AND STEPS OF THE PROJECT

Program consists the following five steps: define, measure, analyzation, improvement, control. In the phase of definition the team identified the above expounded project details, such as:

- The expected outcome of the project, specifically: decreasing average processing time of the quoting activity with two days.
- Determination of the scope – here the team decided to exclude a few transactions that were not affected.
- Assignment of roles and responsibilities.
- Preparation of a high level process map.

During measurement team applied two types of tools and considered both quantitative and qualitative data.

The latter was an outcome of a few hours brainstorming within the team and visualized with a so called fishbone chart [8, 9]. The main advantage of this tool is, besides providing insight for the complete problem, is that this helps to explore the hidden relations between causes and effects. Result of the discussion is presented in *Figure 2*.



*Figure 2. Influencing factors of quoting activity*

Prior starting the analyzation process of data downloaded from the ERP-system the team processed with a measurement system analysis – the aim of it is to validate the repeatability and reproducibility of the data with random sampling. The used tool for this activity was the Gage R&R analysis, which resulted the statement: the data is discrete. The main goal of the Gage R&R is the validation of the measurement system: whether the inspectors are consistent in their measurements of the same item (repeatability) and whether the variation between the inspectors is consistent (reproducibility). In the first phase of the examination they check the process variation of the system – in this case operator measures the same factor multiple times. Second part is related to reproducibility: in this case they determine the average variance of the measured results based on the measurements managed by multiple people. As long as variation is less, than 10% measurement system is acceptable.

Data used for the analysis was the list of historic quoting transactions for one year retrospectively – downloaded from the company’s ERP system. Based on the expected requirements all transactions over five days average processing time was marked with specific reason codes by the responsible colleagues according to the root cause of the delay [10, 11]. The analysis itself was done by program Minitab – it is statistical software for process analyzation and improvement, used mainly in quality systems. After validation of data normality, correlation and regression, the team identified the main relation between results and causes and closed out a few negligible factors they considered significant previously.

As a result of the analysis, there were three process improvement categories identified. Obviously there were more influencing factors of the current process performance, the team decided to focus on the most significant aspects and/or the short term return of the implemented changes [12]. These are the following:

- *People/Line management*: both fishbone-diagram and system data analysis detected significant differences in the individual performance and processing time of the different colleagues. Based on further discussions it turned out that, due to the lack of standardized workflow and process steps, follow up was managed in various, different ways – this caused significant increase in the processing time of a few of these transactions. As a resolution team implemented a few changes in the related work instructions – which ensured the invitation of all alternates into tenders – and introduced a daily control report for the follow up. Control report is used by colleagues in the daily work and by managers in case of escalations or need.
- *Material/Item specifications*: due to the different complexity level of the item specifications there were significant differences in quoting processing time of the transactions. From one side it was related to the system availability of the related drawings and BOMs (bill of material) internally and on the other hand the cooperation between the suppliers and the company’s representatives. With proactive filtering of these lines and a few newly introduced specific processes step majority of these delays can be eliminated and the collaboration improved.
- *Method of the inquiries*: with establishing standardized and automated process steps team could increase the number of inquired suppliers and decrease the efforts of the administration related to the inquiries – which resulted a significant improvement in closing time of the quoting transactions.

As a control step for the implemented process steps and changes colleagues introduced a daily report. By the end of this phase processing time increased with 16% – average seven days processing decreased a little below six days. In the next coming months team could successfully reach the targeted 5 days processing time in average.

## 5. SUMMARY, IMPORTANCE OF THE PROJECT

The aim of the project introduction is to emphasize the flexibility of the tool: it can be utilized for various processes and situations, over the usual manufacturing use, such as service providing or transactional environment. Beside its traditional interpretation as a quality improvement method, its excellence in optimized resource management and maximizing customer satisfaction is also a significant advantage of the method. The point of the topic is not on the methodological elements and the achieved results but rather on the fact that any

impactful process or performance factor of the given organization can be revised, analysed and developed with the appropriate action plan. The need of implementing and using this attitude in daily basis can be confirmed by multiple reasons. All, the global and local, external and internal factors generate daily risks, uncertainties and emergency situations for all the levels of the organizations – from the operative levels till the upper management. Adaptive attitude is not only an opportunity but a basic requirement in business operation. Of course, the goal and the task here is not the ultimate and drastic modification of the organization, it rather means strengthened processes and revised operational elements. The most important task and challenge is to support team members in conformation to the continuously changing conditions.

If we need to name one of the most impacted functions by these above statements and trends within the organization that will be obviously the sourcing organization. Its overall effect on the whole supply chain can easily be manifested with multiple direct and indirect aspects that gives a significant portion of the company's competitiveness.

Considering achievement of all of these above six sigma can be advised as one of the most relevant tools with its flexible elements, customer-focused point of view and involvement of all the related parties. As an additional significant advantage we can mention its continuous application and the possibility of building into the daily operation.

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