HOW TO DEAL WITH A MULTITUDE OF IDEAS AT THE EVALUATION PHASE IN A VE PROJECT

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Abstract

It is clear that Value Analysis and Value Engineering are the top methods in order to improve value of products and processes. Functional analysis delivers the gap between the ideal “should-be”-situation and the flawed “as-is”-situation. Showing this gap is crucial for finding hundreds of ideas.
But a long list of ideas is not equal with a successful VA/VE-project. The “right” ideas have to be combined to feasible concepts. The value impact of those concepts can then be precisely predicted as well as the implementation efforts. This project stage is crucial to make the right suggestion for management decisions.
This paper wants to share the experience of using the evaluation phase as part of the concept phase in order to show possible criteria, the procedure and some practical examples.

Present situation

As every VA/VE-specialist knows, the functional analysis is the core element of the Value Methodologies. With this powerful approach and in combination with the other system elements like cross functional teamwork, holistic thinking, neutral moderation and methods for finding new ideas, Function Analysis is one of the most effective and efficient ways of being creative. Very often, VA/VE-Workshops end up with a long list of ideas, often only partly evaluated. In fact, this is a big task for the project team to implement the ideas without having the basis to make the right decisions by picking the “right” ideas. So, at every VA/VE-Workshop it is very helpful to have a method for clustering ideas and measures to reasonable packages to be implemented in the next project stage.

Typical outcomes of the creativity phase

The outcomes of the creativity sessions are, depending on the project tasks, hundreds of ideas and measures to be evaluated and in case of “surviving” the evaluation phase to be implemented later on. At this stage, the project team very often realizes that some of the ideas and measures are not compatible, or even worse, they mutually exclude each other. That means, that the predicted total value impact (e.g. cost reduction, functional improvement etc.) is not possible anymore. There are no decision criteria in order to choose the “right” ideas. This inefficient process has to be supported by appropriate methodological support.

Good practices in evaluation of ideas

At the end of the evaluation phase, in each VA/VE-Project at least an estimation of the value impacts has to be executed. For instance, value impacts can be:

- Decrease in manufacturing costs
- Increase in functionality
- (more-)fulfilling of customer needs
- Reduction in capital expenditure (Capex) from the customers perspective
- Reduction in operational expenditure (Opex) from the customers perspective
- Increase of total customer value by having at least one or even more “positive” value impacts.

A reliable estimation can be sufficient in some projects, but a detailed calculation based on e.g. the bill of materials (BOM) and/or routings gives the project team a very good feeling on the value impact on every single action item.

The next important step is the evaluation of possible risks. Potential risks may appear in very different circumstances, e.g.

- Risk of technical feasibility/practicability
- Risk of unexpected implementation effort
- Risk of hindered or impossible manufacturing
- Risk of hindered or impossible assembly
- Risk of hindered or impossible commissioning/start-up

Thereby, those risks often can only be cleared in the implementation phase. But it is important to know about the risks before trying to implement the assigned ideas.

Furthermore, it is necessary to evaluate the capital expenditures for implementing the ideas and measures. Typical fields of such investments for instance may be:

- Costs for tooling
- Costs for molds
- Costs for fixtures
- Costs for machines
- Costs for industrial facilities
- Costs for buildings, building facilities etc.

Those costs can have a character of capital expenditure and may have to be depreciated during the lifetime of the equipment. This depreciation period of course has to be suitable to the lifetime of the VA/VE-object itself.

The next important step is the evaluation of the effort in order to engineer the new ideas and measures to realizable solutions. That means, the hours, days, weeks, month or probably years of work of

- design engineers,
- draftsmen,
- industrial engineers,
- purchasers
- and all other involved departments related to that specific VA/VE project

have to be estimated in order to calculate the return on investment on each single idea/measure/action item.

Last but even most important evaluation is the assignment of risks with respect to full or partly acceptance of the measure by the customer. There are many types of effects of ideas and measures out of the customer´s perspective.

On the one hand, there can be a significant design change without any influence on customer´s demand. On the other hand, slightly and from engineering´s point of view absolutely minor changes may lead to a complete denial of this solution by the customer.

For instance, in plant engineering and construction, customers willing to buy a new plant additionally to an existing plant show only limited acceptance to different solutions (even if they are cheaper or better) because they are very sensitive in implementing new technology. Reasons for that may be justified by having less educational effort on the human resources or in other cases just in order to use the same spare parts.

Building of feasible concepts by condensing ideas and measures

In order to build a feasible concept out of the existing ideas at this stage of the project, at first the criteria have to be defined. Those criteria are individual in every project and they depend strongly on the specific project goals. Building concepts in that particular case means to combine ideas and measures in the sense of the given task. Therefore, it is important to combine only those ideas and measures which fit to the concept and, which is even more important, are not concurring to other ideas in that concept. At this stage, the project team has to work very accurately and needs concentrated attention of all team members and for this reason of all involved departments.

Concepts like this can be created by using very different criteria. Those criteria can be developed in direct relation to the project tasks. They can also depend from specific circumstances related to the company´s current situation. Typically, one main indicator reaches an extreme value, either a minimum or a maximum. Examples for such criteria can be e.g.:

- Minimal time to market
- Minimal implementation efforts
- Maximal cost reduction
- Maximal increase in customer value
- Adaptation on specific customer groups or customer demands

Those concepts give the project team information on different possible solutions and their specific efforts, value impacts and risks. That means, the “real” cost reduction achieved by a VA/VE-Workshop can be calculated not before at least one concept was built. But also, the implementation efforts (and in many cases additionally the necessary man power), capital expenditure and risks can be evaluated in total.
However, generating those concepts is not an easy job. As earlier mentioned, the project team has to put his highest attention on this project stage. Errors made at this project stage may lead to wrong decisions. So every conclusion as an outcome of this project stage has to be double-checked. Often,

incompatibilities in combining ideas can be found right now. Typically, there may be lot of dependencies between lots of ideas. Those dependencies have to be considered as well. Some dependencies will arise not before having a closer look on the concepts. That also makes this project stage that important.

At building the concepts, not only full attention of the cross-functional working team is necessary. It is also highly important that team members of all involved departments are attending those workshop sessions in order to bring their specific knowledge for optimum results. Even the importance of team members of sales department is evident. This is the last (and most important) chance to implement the customer´s view
The outcome of the concept phase is at least a suggestion for the management. The management (here: task setter of the project) has to decide about the progress of the project work. So, all suggestions to the management have to be

- well prepared and clear,
- reasonable and
- transparent.

The result must show that there is absolutely no doubt on the suggestions the project team made by presenting the possible concept solutions.

Computer aided tools in order to support concept building

There are lots of possibilities in order to support the project team in building concepts. A very common solution could be a spreadsheet. Krehl & Partner uses Microsoft Excel® spreadsheets since years, permanently improving them. But still, an extreme attention by all team members is needed because of possible interdependencies between single ideas itself. A typical spreadsheet in order to build concepts is shown in Table 1. The ideas (Column “Idea”) are assigned to the specific functions (Column “Function”) of the VA/VE-object. In a rough evaluation just after the finding of ideas, all ideas were assigned to a specific level, e.g. “D: detailed idea”, “K: conceptual idea”, “N: non feasible”. All conceptual and detailed ideas are evaluated concerning their value impacts, e.g. cost reduction and/or capital expenditure or implementation efforts. Then, the ideas can be assigned to the different conceptual approaches showed in the columns “Concept 1” up to “Concept 4”. A very easy spreadsheet operation shows total cost reduction impact and efforts. Additional rows can be used for evaluating risks and other criteria. The assignment of responsibilities (e.g. team members responsible for further actions) can be done here as well.

List of Ideas

Krehl & Partner
Die Value Manager

Stück pro Jahr																	
Einsparung pro Jahr						0,00			0,00			0,00			0,00		
Einsparung pro Monat						0,00			0,00			0,00			0,00		
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Table 1: Table of ideas and “concept columns”

Further improvements on software tools supporting this fundamental project stage are possible with even more powerful tools. Based on a SQL-Database, the VA/VE-Software VE-Master can handle this process step as well. With having a real database with free definable assignments between single ideas, a real powerful tool can be used supporting this project stage. Figure 1 shows a screenshot of the database software VE-Master. Here, the value impacts of each idea can be defined. All those values can be used for the evaluation of concepts in a later project stage.

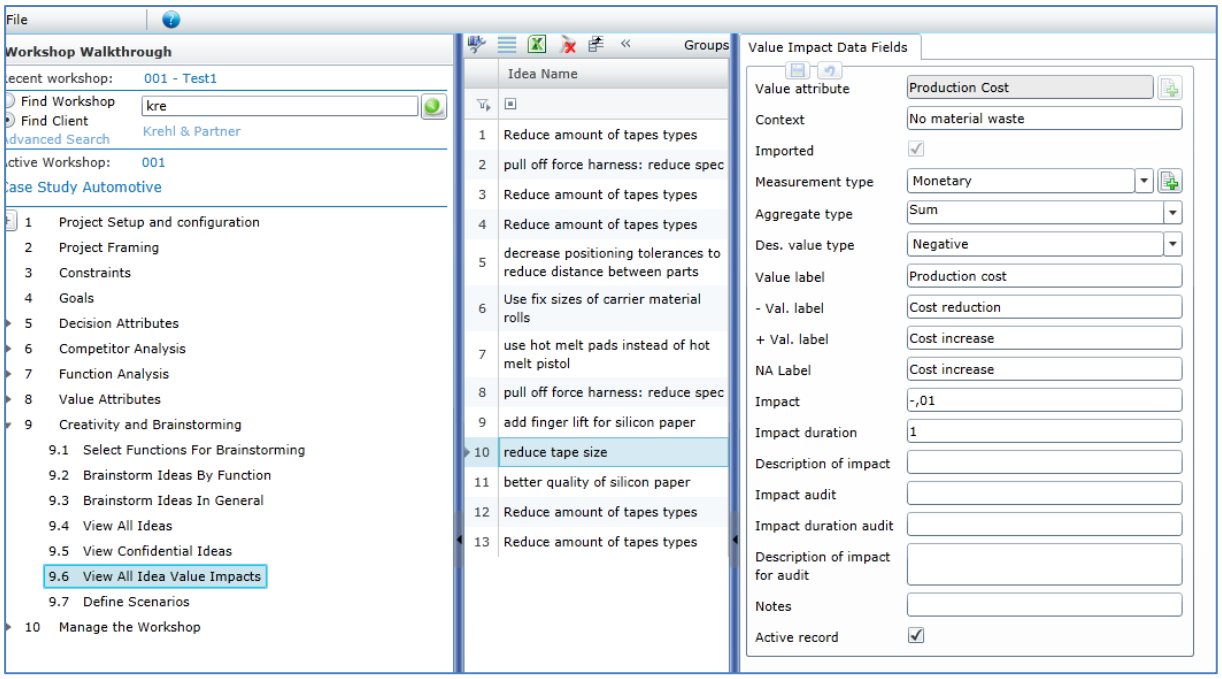

Figure 1: Value Impact Data Fields in VE-Master

Practical examples (real case studies)

Example 1: Value Engineering in plant engineering and construction

	"Quick-Win"	"100% customer acceptance "	"preferred concept"	maximum concept
Savings based on Project Reference	412.345 €	876.543 €	1.234.567 €	1.543.210 €
Implementation effort	789.101 €	165.432 €	234.567 €	345.678 €
Savings in %	**7,59%**	**16,14%**	**22,73%**	**28,41%**
ROI (measured in "orders")	1,91	0,19	0,19	0,22

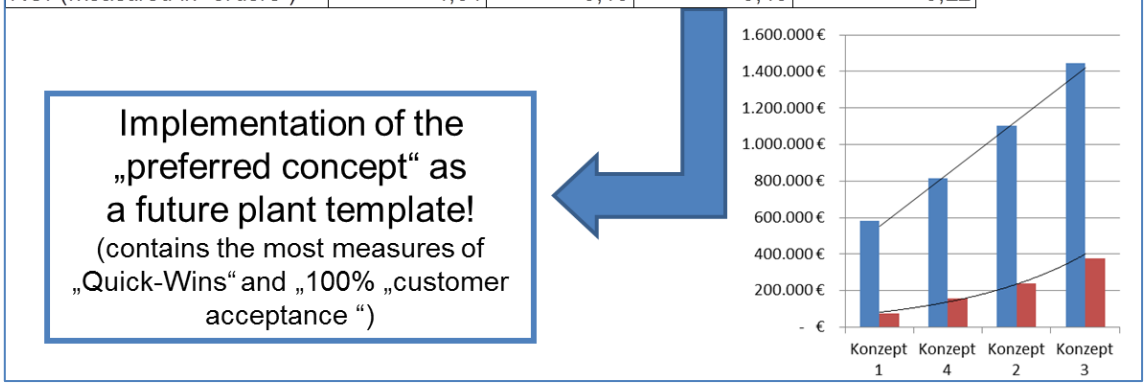

Figure 2: Example of four possible concepts in comparison

In this particular project, four possible concepts have been defined:

Concept “Quick Win” contains all ideas and measures with very low realization effort and realization time. Not all ideas and measures will find acceptance by the customer.

Concept “100% Customer Acceptance” contains all ideas which can be realized without touching the fulfillment of the customer demands.

Concept “realistic concept” contains all ideas which are technically feasible, have strong impact in decreasing costs, but may have to be explained to customer very well.

Concept “maximum concept” contains all ideas and measures compatible to each, but with no respect on possible violation of customer demands. It shows only the upper edge of possible cost reduction.

In the real project, the “realistic concept” was chosen for realization.

Example 2: Value Engineering on programmable logic controllers

Concept	Cost saving	Increase of customer value	Return on invest	Gross Margin
	Relative value from list of potentials		Pay back in months	
Current	0%	0%		100%
Concept 1	19%	0%	1,4	166%
Concept 2	21%	0%	1,1	175%
Concept 3	24%	0%	7,9	186%
Concept 4	10%	41%	27,2	269%
Concept 4a	19%	33%	7,2	268%
Concept 4a (same volume)	19%	33%	7,2	168%

Table 2: Comparison of different concepts concerning cost reduction, value improvement, pay back-period and Gross Margin

Table 2 shows the different concepts developed in a project in order to reduce manufacturing costs on a PLC. Actually, the Concept 1 was chosen to implement immediately in order to get maximum cost reduction by not touching the total customer value. The payback period by 1.4 months is very little, so that there is no doubt to implement this concept. Additionally, concept 4a was chosen to implement intermediate-term in order to push the project by increasing the customer value significantly and reducing the costs significantly as well, compared to the today´s solution. This is the concept to secure the product´s future.

Conclusions

Building suitable concepts out of ideas and measures is a crucial step in VA/VE-project. The project team has to be very attentively while building those concepts. Once the concepts are made, the total value impacts of the solutions can be predicted exactly. The comparison between possible concept solutions is a good tool for making decisions on management level. Software support for this project stage is indispensable. Spreadsheet operations can support most projects, but the more complex the projects are, the more helpful software solutions will be. Further development on such software is being done by VA/VE-Software specialists.

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