How to Identify the Right Customer Requirements for a Future Product

AUTHORS: MARC PAUWELS, Dr.-Ing., PVM, TVM, CVS, FSAVE
KREHL & PARTNER – The VALUE MANAGER

Dr. Marc Pauwels is co-president of Krehl & Partner in Germany, the leading Value Management Consultant Company in Germany. Since his start with VA/VE/VM, Dr. Pauwels performed hundreds of VM-related studies in Germany, whole Europe, USA, Mexico, Singapore, Saudi-Arabia and China and trained personally thousands of future VA/VE-specialists. In parallel to his work and since 2001, Dr. Pauwels is president of the German Value Management Society, where he is – for instance - responsible for the development of technical guidelines and the annual German Conference of VA/VE. In SAVE International®, Dr. Pauwels is assigned Regional Director Europe.

Dr. Pauwels holds the European Certificates of Professional for Value Management and Trainer for Value Management as well as the CVS certificate. He is a certified trainer for VM1 – VM3 and the MOD 1. In 2018, he became a member of the SAVE College of Fellows.

Summary

Customer is king. But some kings have only little wallets …

Looking at specifications that are defined either by internal (marketing, product management, sales) departments or by external (customers, public authorities) entities, the executing people could think to read a Christmas wish list. If there is no cost limit, there is also no problem. But this is very seldomly the case and so the challenges start. How can it be assured that only the necessary functions and specifications are defined and that a reasonable design freedom is leading to best value results? This paper deals exactly with these questions and gives, with the help of some examples and on basis of function analysis, some answers.

Initial Situation and Need for Action

Writing technical specifications is a crucial task for every company. Is it to purchase products or components from other companies or is it to provide the basis of the own R&D department – these specifications define already 80% of the later product. Based on the author's long experience in hundreds VA/VE studies, this high importance is not enough considered in real life. A lot of specifications are based on a "copy & paste" mentality, in good cases checked and adapted before freezing them.

What are the consequences? The purchased or developed products do either not meet the market requirements or they are overengineered and thus, too expensive. The solution is easy: take advantage of this early stage in product development and take care to question all specifications with the help of appropriate methods: VA/VE and Function Analysis.

Some examples

In this chapter, some examples are shown. Due to confidentiality all examples are alienated.

Example 1: Overengineering by customer

A truck cabin must be opened and closed in order to reach the engines and other parts located in this area (see **figure 1**). The customer is one of the big companies producing trucks (OEM), the supplier is a company developing sub-assemblies for the trucks.

Figure 1: A truck with opened cabin (Source: http://www.guenthersleben.de/?p=966)

The subassembly is a device needed for this functionality. The OEM is requesting a life time of 8.000 openings/closings of the cabin over lifetime of the truck, that is around 10 years. Nobody is questioning this number, but a short calculation of the figures reveals that this means a cabin would be opened twice per day. The real value is around twice per year! A redesign of the device to a life time of 1.000 cycles could reduce the cost by 10%. And this is still over-engineered.

Example 2: Overengineering by own R&D

A climate test chamber (**figure 2**) is a testing system which can be used to conduct a temperature stress test (high temperature change speeds) and/or a moisture stress test on the products to be tested.

Figure 2: A climate test chamber

One characteristic defining the product program is the speed of temperature change per minute: 10K/min, 15K/min etc. The competitor analysis of the 10K/min products reveals that some competitors are reaching a value of around 9,8K/min, what is close enough to 10K/min. The data sheet of the company's product shows already 12K/min and the test results in 14K/min. So, the engineers wanted to be sure to have the best product and to always reach the 10K/min. But cost wise, this product is already very close to next higher 15K/min class,

Example 3: Overengineering by own Sales

A cold rolling mill is producing sheet metal coils based on incoming coils with different characteristics, e.g. higher thickness. One important criterion of the finished good is the accuracy of the strip, as tolerances in thickness and width. To control and assure these tolerances, the cold rolling mill can be equipped with a strip adjustment. This is necessary, if the incoming quality is not very good. In this specific case, the customer produces already the incoming coils on the company's hot rolling mill, with excellent parameters. A strip adjustment was not necessary for this specific case, but not recognized by Sales.

Example 4: Overengineering by lack of communication

In the case of an Aluminum Processing Line, R&D was designing all drives capable for the use with special treatment. This was increasing the cost dramatically. But Sales was not aware of this, or no customer needed this, resp. And so, the high-cost feature was never used, but always built in.

Example 5: Overengineering by interfaces

A pickling line is a huge plant in the environment of steel production. Several different and highly specialized departments are necessary to work on the complete plant. In the waste water process, flow meters are necessary to have a good control of the processes. Of course, each department involved in this process is planning these flow meters where ever necessary. But putting the different sections of the waste water process together revealed that in two sections close to each other 2 flow meters have been built in: exit of section 1 and entry of section 2. In reality, the distance between the two devices was 1m and of course they measured exactly the same flow.

The solution

The solution to this situation is clear: apply Value Methodology with Value Analysis (VA) and Value Engineering (VE) according to the general procedure shown in **figure 3**.

The examples shown in the previous pages all lacked a good analysis in the first phase: Customer requirements. But how can this happen, even in high-class companies? There are several possible answers.

Lack of time:

Even that there are huge differences between different industries, as an example plant engineering and automotive industry, almost all companies have the same challenges: Develop more and more products in always shorter time frame with less people. Customer demands grow (via internet, the customer is well informed about products worldwide), comparing different products is easy (virtual shopping centers, search engines, etc.) and companies and their shareholder like 2-digit growth values. Of course, the management of a company as well as the different specialists know exactly what to do and give a certain

pressure on the definition of the product's specification, based on the last specification, of course with some changes. If the company is a typical supplier company, then it is happy to receive the specifications from the customer and starts working on the implementation without questioning the given data.

Market, customers, stakeholders & their requirements:
Without knowing the customer/stakeholder and their requirements, no product, process, project can be optimized!

Analysis of the as-is situation and function analysis:
Starting point is to know the existing product, process, project with all pros & cons!

Idea finding:
Target is to find as much ideas as possible!

Evaluation & Concept phase:
Combining reasonable ideas to different concepts!

Implementation:
Only the implementation offers the wanted benefits!

Figure 3: General procedure in every VA/VE project

Lack of real cooperation, communication and transparency

The high complexity companies encounter today forces them to have an organization with different specialists that work on the single topics. This is ok and necessary. But there is also a high need to bring these specialists again together and let them share their knowledge and ideas. A company producing coffee machines wants to produce coffee machines and this with a certain profit. The coffee machine company does not need an over-specified product, a perfect organized production, a lean purchasing organization, if this will not result in a good profitability. In simple words: The main target of a company is the profit in total and not the world-class situation of a specific department. All other activities are subordinated to this company target. If we want to follow this hypothesis, then the consequences are clear: the departments and their specialists must share their knowledge and strive for the best solution for the company and not for the best solution for the department. Exchanging information and ideas will directly result in better products.

Low or no willingness for changes

The human being is a difficult species. We love to stick to our behavior and habits, including also our ideas and developed solutions. Asking a design engineer to change his product (his "baby") is a real threat for him. He has put all his knowledge and experience in this product and of course there is only one goal: having the best product in the market. But in some cases, this "best product" is not needed and the customer doesn't want to pay for it.

Low or no willingness for taking risks

This behavior is highly dependent on country culture and also company culture. And then it is also a question of the industry. As an example, a plant engineering company selling 1 piece of plant every year is not able to go into high risks that this plant is not working well. Prototypes are almost impossible to have, due to the cost and size of the components. A producer of 100 Mio. screws per year can much more easily work on tests and prototypes before going to the serial production. But also considering these different situations, it is crucial for new developments to go into risks. The author would state that

there is no real innovation without a certain risk. This can be a market risk, a business risk, a technical risk or others.

This list of possible reasons could be enlarged, but with the experience of the author, these are the most common ones.

The solution to these problems was already mentioned: Follow the general procedure of Value Methodology. But there are also some more characteristics of VM. These are listed here.

Cross-functional teamwork and holistic perspective

To avoid this kind of misunderstanding of different perspectives and to gather the knowledge and experience of all involved stakeholders, a VA/VE project must be performed in cross-functional teamwork. Members of the involved stakeholder groups work together in the VA/VE study. In a product development project, the team members could come from R&D, Sales, Production, Quality and Purchasing.

Another aspect of cross-functional teamwork is that the result of the value study is seen as a team result. It is not anymore “the solution from R&D” or “this is what Sales wants to have”, but a common-sense solution of the team. This results in a much better performance in the implementation phase.

Figure 4 explains very clearly the underlying situation.

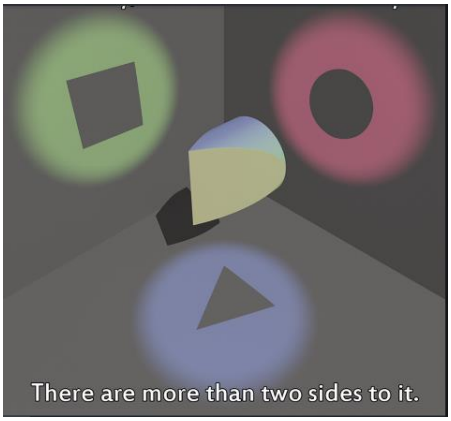

Figure 4: Different perspectives (https://imgur.com/gallery/1zZ6VSe)

Function analysis

The functions of Function Analysis are as follows:

- Promote understanding (of product or process)
- Create (same level of) knowledge
- Support communication (within the team)
- Support learning process
- Recognize importance (of functions)
- Encourage motivation

Thus, all points that underline the already above-mentioned necessities.

Figure 5 shows the underlying principal of Function Analysis

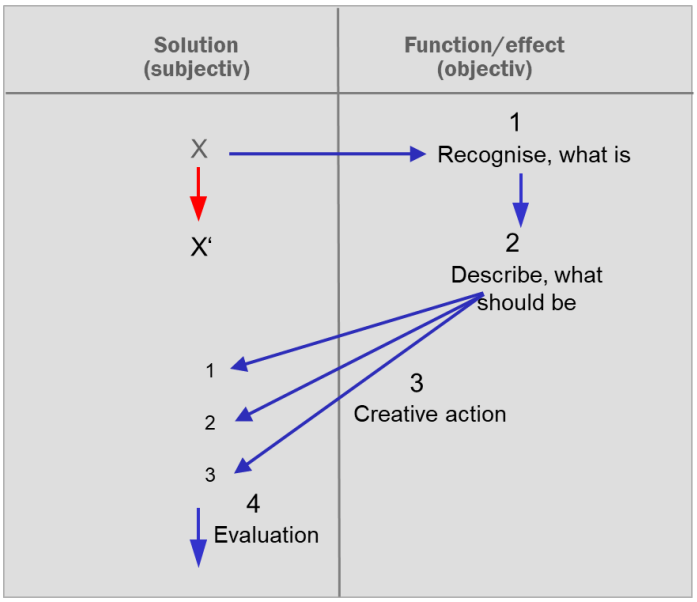

Figure 5: Finding new solutions by abstraction – Function Analysis

The direct path from an existing solution X to an optimized solution X’ is not easy: the creator of this solution knows all details about it and as the “father” of this solution he always tends to defend his “baby”. This is not a sign of bad character or not showing professional behavior, it is only pure natural behavior of human beings. Here is the benefit of function analysis. The team has not to discuss about the existing solution anymore, but about its functions. First step in Function Analysis is the question: “What is the object doing?” The team shall recognize the current situation – the “as-is” situation. And here is the chance to reveal unnecessary functions or over-specified functions, resp.

This leads to the necessary second question: “What shall the object do?” The team has to describe the desired situation – the “should-be” situation. It is possible that the existing solution carries functions that are not necessary anymore for the new, targeted situation. And it is also possible that there are some functions missing for the targeted situation. Both possibilities are given. Very often, the discussion of these two questions and their answers lead to important findings for the projects. On this basis, the creativity phase and later the evaluation of all ideas can start.

Supporting tools

A last question is not yet answered: how can a company define the right customer specifications for a product that is launched to the market in several years and then still shall fulfill customer requirements for another set of years? Very often, companies base their definition of customer requirements on the experience of the past and the current situation. In good cases, also a preview on the next years is made. But is this enough? Of course, not or at least not always, depended on the industry.

Here are some tools, methods and procedures that can help looking into the future.

Mega Trends

Mega trends are long-lasting developments with a high impact on society and economy – and thus also on products. According to different sources, the Mega Trends for the future are e.g.

- Digitalization
- Urbanization
- Connectivity
- Neo-ecology
- Individualization
- Health

Gartner Inc. (see www.gartner.com and **figure 6**) is frequently presenting the newest development of emerging technologies.

With the help of such information, the companies should analyze, if the expected developments have an influence on their products within the next years. It could be used like a check list of the defined specifications

Growth–share matrix

According to Wikipedia, this matrix (aka BCG-matrix) is a chart that was created by Bruce D. Henderson for the Boston Consulting Group in 1970 to help corporations to analyze their business units, that is, their product lines.

The chart (see **figure 7**) is showing relative market shares and growth rates of products and then analyzes the different areas:

Cash cows is where a company has high market share in a slow-growing industry

Dogs are units with low market share in a mature, slow-growing industry

Question marks are businesses operating with a low market share in a high-growth market.

Stars are units with a high market share in a fast-growing industry.

Depending on the own product program, companies easily get an overview on the situation and get a feedback on the specification of the future products.

Analysis of other industries

This doesn't seem to be a high-sophisticated method, but indeed it is an effective and efficient way to get some important insights. Different industries are in different evolution zones. Some are more innovative, others are more conservative. Looking at other industries could show the actual technical possibilities as well as the acceptance by customers. Also, the mistakes having made are known and could be avoided by followers.

Conclusions

The definition of products by technical specification is crucial for the business of each company. Making mistakes in this early phase of a product could lead to a disaster, even for the entire company. This paper contributes to this subject and shows to avoid as much as possible such mistakes through applying the right methods. VA/VE with its underlying procedure and including Function Analysis together with other methods are highly recommended ways to support this phase.

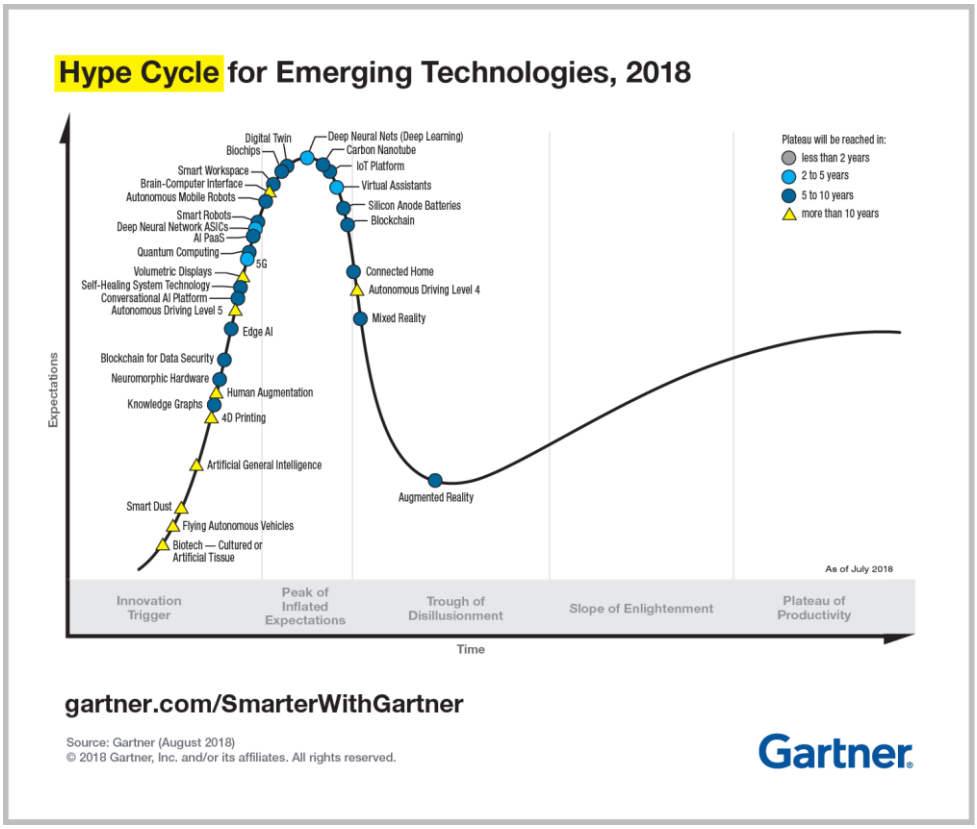

Figure 6: The Gartner Hype Cycle for emerging technologies

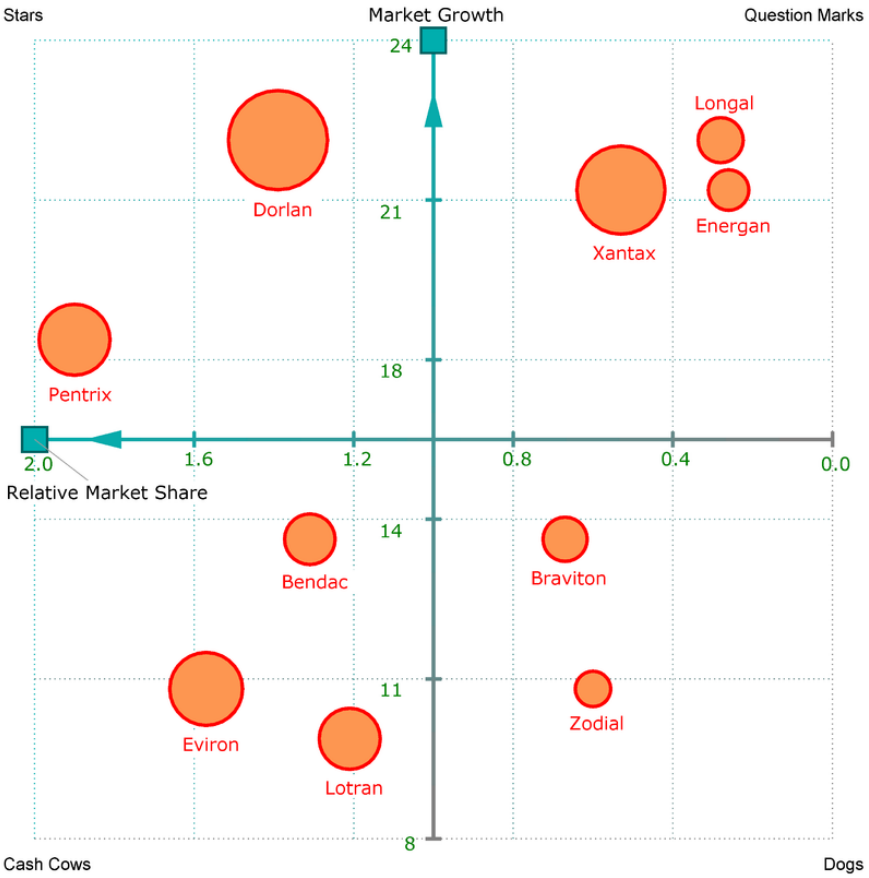

Figure 7: Example of a Growth–share matrix (Source: https://en.wikipedia.org)