

POTENTIAL OF THE VISION MODEL WITH REGARD TO THE SUSTAINABILITY ORIENTATION OF A DEVELOPMENT PROJECT

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ABSTRACT

During product development (PD), the vision model method is used as a guide to ensure that development is progressing in the desired direction and that the results meet the original goals and expectations. Among other things, the method can also be used to collect feedback from stakeholders and, if necessary, to adapt visions and goals that are recorded and visualised in the vision model accordingly.

In addition, the literature suggests methods and tools for the strategic alignment of the project with sustainability aspects at the start of development projects. The Ten Golden Rules and the design-for-sustainability strategies are important guidelines for a development project in pd. The Ten Golden Rules represent a method for improving product quality and performance, while the design-for-sustainability strategies aim to minimise the environmental impact of products by means of guidelines. Both methods help to focus on the product life cycle and the impact of a product in it. In order to apply these guidelines in practice, they should be integrated into the development process from the outset.

This can be done by training developers and through targeted use in alignment meetings. This can be useful to ensure that the guidelines are adhered to throughout the development process.

Both alignment methods and the vision model are sometimes used independently or either one or the other. This article presents a concept for the active inclusion of sustainability requirements for a product in the vision model. The focus here is on the clear visualisation of the goals to be achieved for the long-term orientation of development towards sustainability.

Keywords: Sustainability, target visualisation, product development

1 INTRODUCTION

During the PD phase, the vision model method serves as a critical navigational tool, ensuring that the development process is moving in the intended direction and is not only a guide but also a means to gather feedback. In addition to the vision model method, literature recommends various strategies and tools for the strategic alignment of projects with sustainability aspects at the inception of development projects. Among these are the Ten Golden Rules [1] and the design-for-sustainability strategies [1], [2] both of which provide valuable guidelines for a development project in PD. The integration of sustainability goals into the vision model will be used in the teaching of sustainability aspects in practical projects and will have a supportive effect in order to fulfil the development goals as well as to promote the resulting dissemination of knowledge in the economy. This will have a long-term effect on society by raising awareness and specialisation. For example, this can help to ensure that sustainability is an integral part of product design and PD and not just an afterthought. This can also help to improve the company's long-term competitiveness by ensuring that its products meet changing customer needs and regulatory requirements.

2 THEORETICAL FOUNDATIONS

This chapter gives an overview over the theoretical foundations of the vision model and The Ten Golden Rules as well as their potentials for improvement through a combination of the two methods.

2.1 The Vision Model

The vision model (VM) is used to show the end goal of a project development project in a concise and easy to understand manner [3]. In contrast to functional specifications documents [4], [5] and requirement lists [6] the vision model centres around finding the balance between clarity and granularity. The vision model describes goals and results of a project as well as the necessary steps to reach them. It's a tool that helps defining as well as communicating goals and expectations of all stakeholders, making it an essential part of project management and product development.

The vision model is usually presented as an illustration or at least some sort of text visualisation and transports information about the general mission, underlying goals, target audience, environment and technology needed for the project or product. Figure 1 depicts an example of a vision model for a mechanical lemon press, with a general vision describing the overall goal (drinking juice straight from the fruit), fundamental goals underlying the overall vision (producing pressed juice fast and easily with a mechanical press) and detailed instrumental goals that describe the actual steps that need to be taken to develop such a product.

The VM can also visualise assumptions and restrictions that are relevant to the product or project, as well as measures to reach the vision. This enables the team to keep an overview over their shared goals throughout the whole project.

The overall goal or vision needs to be open to an array of different results or solutions and work as a motivator for the team. It does not have to be technically reachable, but rather convey a slogan or mantra. It is important for companies or teams to be able to identify with the overall goal, so everyone can stand behind the idea and work towards a common goal [3].

The fundamental goal specifies the concrete job the team has to achieve within one short sentence, while the detailed instrumental goals can be used as a collection of the most important characteristics of the project or product. The detailed goals are ideally grouped under themes like function, design or comfort (or any other group that was deemed relevant to each use case) and consist of three to four points at most.

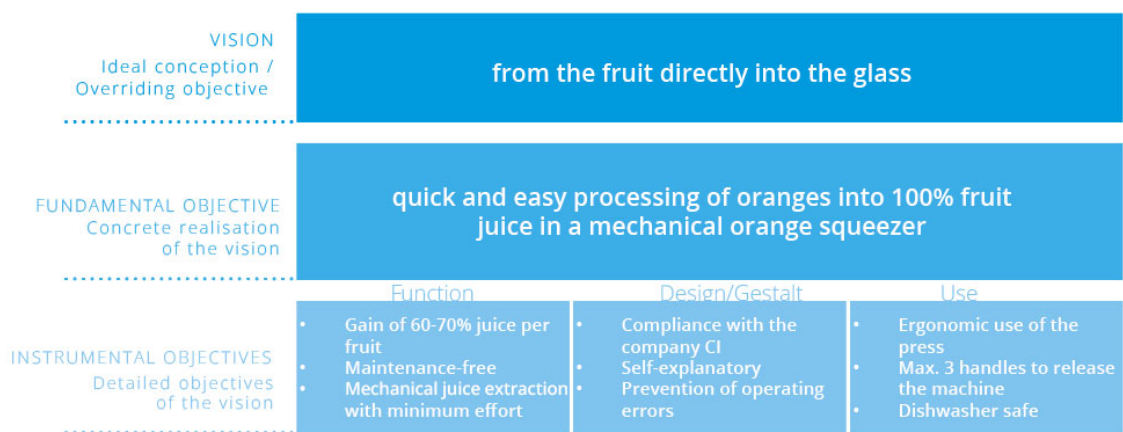


Figure 1. Example of a Vision Model [3]

The point of the VM is not to give a comprehensive overview like a requirement list but rather a focused visualisation of an overall goal. The detailed goals can never list everything that is relevant and serves a different purpose than a requirement list – which can still be useful in addition depending on the project or product [3].

Potentials

While the vision model is a great tool to visualise overall goals that are easy to communicate, there still is some untapped potential to support its use.

- **Prioritisation:** One challenge is the prioritisation of goals in order to build such a concise overview without becoming too vague. The VM can never be as detailed as a requirement list and therefore should not be used instead of one but in addition to. It is impossible to fit all relevant points into the VM, but only the most important.
- **Adaptability:** The VM as it is designed currently can be used completely independently, no bias or direction is added into the concept. It can be used to frame a product development project and as a strong communication tool it can be adapted to help teams focus on sustainability in addition to

other relevant aspects.

- **Fit for sustainability:** By expanding the VM by aspects of sustainability, it can be used to further promote the sustainability of products and communicating with stakeholders. Thus, this contribution proposes an approach that specifically integrates the ten golden rules into the VM.

2.2 The Ten Golden Rules

The Ten Golden Rules can be used to improve a product's sustainability [7] and help making a product longer lasting, efficient and environmentally friendly. It consists of ten rules or guidelines that can be adapted to each project according to its goals. As a result of its deliberate adaptability, the concept has been successfully applied in companies [1].

The "Ten Golden Rules" are structured according to the life cycle of a product. Each rule is assigned a picture that visualises the respective focus of the rule.

Example of the generic version:

1. Use of closed loops for necessary toxins or complete avoidance of toxins.
2. Minimising energy and resource consumption in the production phase and during transport through improved housekeeping.
3. Using structural features and high-quality materials to minimise product weight without compromising required flexibility, strength or other functional priorities.
4. Minimising energy and resource consumption in the use phase, especially for products with the most important aspects in this phase.
5. Promoting repairs, maintenance and upgrades, especially for system-dependent products (e.g. cell phones).
6. Promoting a long service life, especially for products with significant environmental aspects outside the use phase.
7. Investing in better materials, surface treatments or structural precautions to protect products from contamination, corrosion and wear and tear to ensure lower maintenance and longer life.
8. Provide for upgrade, repair and recycling through accessibility, labelling, modules, predetermined breaking points and manuals.
9. Promote upgrading, repair and recycling by using fewer, simple, recycled, non-mixed materials and no alloys.
10. Use as few fasteners as possible and use screws, adhesives, welded joints, snap-fits, geometric locks, etc. according to the life cycle scenario. [1]

The ten rules are kept general so that they can be adapted, concretised or further developed depending on the context. For example, rule 2 can help to ensure that a product is manufactured with fewer materials, which leads to a reduction in waste and environmental impact. Rule 6 can help ensure that a product lasts longer and therefore needs to be replaced less often, which in turn leads to a reduction in waste and environmental impact. Therefore, the Ten Golden Rules can be applied as part of a comprehensive approach to improving the sustainability of a product.

Potentials

- **Adaptability:** The rules could be further developed so that they can be applied flexibly to different contexts and rapidly changing environments. This would ensure that the rules remain relevant even in dynamic and agile working environments.
- **Measurability:** Establishing customised rules can help to evaluate the development and measure the progress of the implementation of sustainability.
- **Collaboration and sharing of best practices:** The experiences and insights related to the "Ten Golden Rules" serve to share and could lead to an improved understanding and cross-industry innovation of the sustainability of products.

2.3 Possible adaptation of the vision model

Combining the vision model with the Ten Golden Rules can be a powerful tool for PD, helping to ensure that the final product meets the original goals and expectations while taking sustainability aspects into account.

One way to combine the vision model with the Ten Golden Rules is to use the rules as the basis for developing the vision model. For example, each rule can be seen as an important aspect to be implemented that must be harmonised in the vision model. By developing the vision model in this way, the Ten Golden Rules are reflected in the development task, and it can be ensured that product

development is built on a solid sustainable foundation based on best practices from the outset. Another way to combine the vision model with the Ten Golden Rules is to use the vision model as a framework for applying the rules in the PD process. For example, each rule can be seen as an important milestone to be achieved in the PD process and the vision model can be used to measure and monitor progress in achieving these milestones. By using the vision model in this way, it can be ensured that the Ten Golden Rules are not only applied in theory, but that they are actually put into PD practice. Finally, the vision model could also be used to visualise and communicate the impact of the Ten Golden Rules on product development. For example, the rules can be presented as part of the vision model to show how they impact different aspects of product development, such as product quality, usability, environmental impact, etc. This can make the vision model a powerful communication tool to help all stakeholders develop a shared understanding of how PD efforts align with the organisation's goals and expectations. In addition, the D4S strategy approach can also be used here, where the rules are used to orientate the project at the beginning of a development task and the rules are used within a spider matrix during the course of development to evaluate the sustainability of the development.

3 A SUSTAINABILITY VISION MODEL

As both methods are used to align projects and represent an overarching guideline, this contribution proposes a combination of both methods to form the sustainability vision model – sVision model - (sVM).

One possible approach suggested here is;

1. Identify the rules: Firstly, the Ten Golden Rules should be identified and understood. This involves carefully analysing the rules to ensure that they are fully understood and that their meaning and relevance to product development is clear.
2. Selection and adaptation: The rules are then adapted according to the development task or removed from the list so that any unsuitable rules no longer need to be considered.
 - a. It is also suggested that the rules be expanded to include the aspects of holistic utilisation;
 - i. Consideration of social and good working conditions in the pre-use phase.
 - ii. Promoting a collaborative, barrier-free and intergenerational solution; ensuring satisfactory functioning even after the use phase.
3. Integration of the rules into the vision model: Next, the rules should be integrated into the vision model. This involves considering each selected and customised rule as an important aspect of the vision model and ensuring that it is appropriately reflected in the model. For example, each rule could be represented as a separate element in the vision model or considered in combination with other elements of the model.
4. Development of the vision model: Once the rules have been integrated into the vision model, the model can be further developed to ensure that it covers all relevant aspects of product development. Other factors such as customer requirements, technical requirements, market trends, etc. can be considered.
5. Validation of the vision model: Finally, the vision model should be validated to ensure that it meets the requirements and expectations of the stakeholders. Feedback loops can be conducted with stakeholders to ensure that the model is accurate and meaningful and that it can serve as a basis for product development.
6. Development evaluation: The customised rules can also be used in the course of the project to evaluate and compare the development and/or product concepts. The rules can be visualised in a spider matrix and evaluated by the development team on the basis of a score. The evaluation thus represents a good visualisation of the status in order to communicate the results and to be able to make decisions in relation to the development task in a targeted manner.

By incorporating the Ten Golden Rules into the vision model as shown in Figure 2, it can be ensured that product development is built on a solid foundation based on proven procedures and practices. This supports product development to become more effective, efficient and successful and that the end product meets the original goals and expectations as well as the sustainability goals.

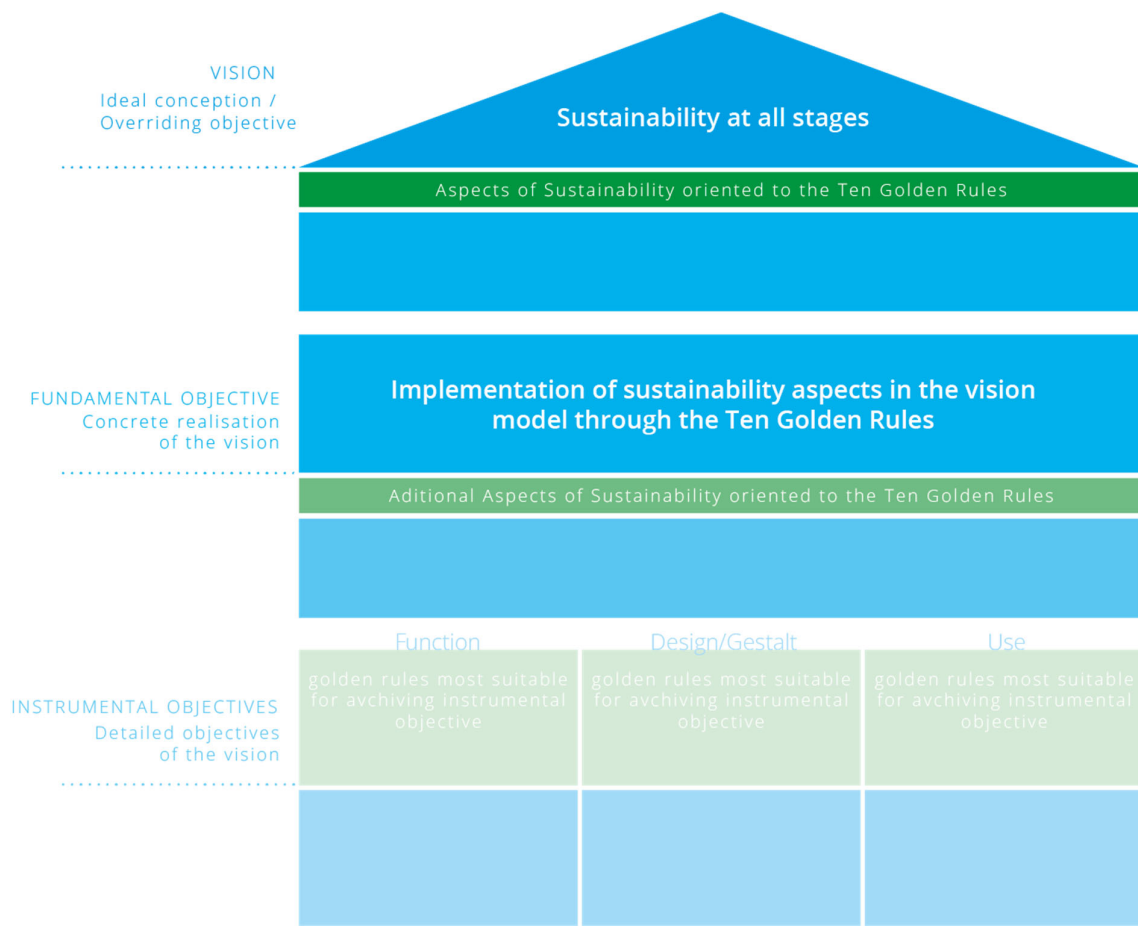


Figure 2: Example of an sVision Model

The sVM provides predefined space for the respective Golden Rules that have been deemed most appropriate for each level of the model. By not forcing developers to use all ten rules, the implementation becomes more realistic for the actual development project, as not all rules may be applicable in a meaningful way and therefore delay the application rather than empower the team. The free space serves as an orientation for the inclusion of the sustainability aspects from the Ten Golden Rules in the development goals of the sVM. These can be reflected on during the first step of the proposed approach and successively categorised in the second to third step in the vision model. The objectives can be differentiated between very tangible instrumental objectives and almost unattainable visions and localised in the sVM. The Ten Golden Rules are woven into the sVM at all levels to have relevance in all phases of the PD project. The vision is guided by the rules as well as the fundamental and instrumental goals. The developer must decide which objectives apply to which level and where they have the greatest impact.

In the future, this approach will be used in case studies with students in order to test the sVM for suitability for use and ease of application and to be able to address any adaptation requirements that may arise. The focus of dissemination is increasingly on small and medium-sized companies (SME), as they often lack the capacity to apply more complex methods and are therefore dependent on methods that are easy to understand and apply [8], [9], [10], [11]. Among other things, this is a major hurdle for integrating methods with the focus on sustainability into SMEs approaches. Better communication of the results of a technique [12] thus represents a great potential for better integration of sustainability aspects into the product development (PD) of SMEs.

4 SUMMARIES

The Vision Model is used to show the end goal of a project development project in a concise and easy to understand manner [3], while the Ten Golden Rules are used to improve a product's sustainability [7] and help making a product longer lasting, efficient and environmentally friendly. By combining the two,

this contribution seeks to support the early phases of product development, when the potential to influence the sustainability of the product is highest.

Within this contribution, the Vision Model and The Ten Golden rules are transformed into the Sustainability Vision Model, a new approach to a more effective, efficient and successful product development that incorporates sustainability from the beginning. It helps to visualise the objectives of a product development and the sustainable objectives in one organised form. The combination of the strengths of the two methods is advantageous in view of the overarching social trend and also in the teaching of sustainable product development.

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