SETTING ENVIRONMENTAL TARGETS IN PRODUCT DEVELOPMENT

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ABSTRACT

An import factor for reaching environmental improvements in product development is to have relevant environmental targets that actually influence the product development process. In this paper are procedures of setting environmental targets for product development projects identified, described and analyzed based on studies in three large companies operating in different industries. The different procedures have their own advantages and disadvantages and some of them can be combined within a company. The aim is to illustrate approaches of setting environmental targets early on and show different procedures of setting the environmental targets at a strategic level and how the way of setting environmental targets early on influences the product development process. This paper has a strong empirical connection.

Keywords: ecodesign, product targets, product specifications, design for x

INTRODUCTION

Ecological sustainability needs to be seen as a strategic issue [1] and several sources through time has defined the needs for clear driving forces for making actual improvements in industrial development of products e.g. [2]. Manzini [3] states that *"Recognising the environmental problem is not synonymous with more sustainable choices and behaviour"* (p.8) promoting a change that goes beyond any organization alone. Within the scope of such needed change this paper take its point of departure in that industrial organizations can play a role *if* actual requirements for environmental improvements are made and preferably on a strategic level with commitment and knowledge among product developers.

What is clear is that environmental aspects need to be integrated in the very early stages of product development, such as the idea stage, prior to defining product targets in order to have a strong impact [4]. It is even stated that setting early priorities is the most critical factor for successful ecodesign [5]. So in order to get maximum environmental benefits from products, we need to integrate environmental considerations as early as possible in design, when developing the project brief or generating ideas [6]. Such an approach could enable ecodesign to move from being corrective in character to influencing more innovative solutions and active environmental work in firms. [7] founds in their research that the product orientation of environmental work is in parallel to environmental improvements also increasing the cost efficiency of products, thus further strengthen the argument for new approaches.

The research objective was rooted in the conclusions drawn from academic studies, namely that successful ecodesign needs to have a clear direction and that environmental targets should be set early on in the product development process. Setting the target specification for a project is an important activity affecting the environmental performance of products. An underlying assumption here is that if environmental considerations are only taken into account once the specification for a product has already been set, the design possibilities will be limited[8], [9]. In the later stages of a project, there is less design freedom and the cost of making changes is higher [10].The importance of environmental targets is often stressed; still little research has so far been conducted on how environmental targets are actually set in industry. Therefore the research question dealt with in this paper is: *How are environmental targets set during product development in manufacturing companies, and what are the advantages and disadvantages of different procedures?*

SETTING PRODUCT TARGETS

The product specifications, which include the design requirements, play an important role in product development. The design requirements have two principal roles: 1) they serve as an agreement about what is desired in the end product, and 2) they provide the basis upon which the engineer can proceed when developing a solution [11]. They thus represent both a contract between management and operational product development and a guide for project leaders and engineers in the development process. The activities leading to a product specification are important parts of ecodesign, for they involve setting environmental targets.

In an ideal world, the product specifications are set only once early on in the design process [12]. However, this is rarely possible for technology intensive products. For such products, the specifications are set *at least* twice. The first specification is strategic, and involves a general *target specification* set after the first planning stage. From an ecodesign perspective, this is a very important stage for setting environmental targets. However, this target is specified before the constraints for the product technology are known. Thus the specification is refined and revised during the operational development, once a product concept has been chosen. Difficult trade-offs have to be made between different desirable characteristics in order to reach the *final specification*. Some specifications may be revisited many times during the development process. If this is not done, and there is no flexibility in the approach, a determined effort to fulfil often incomplete and conflicting requirements may result in sub-optimisation and project stagnation [13].

Several actors are involved in the target-setting process. The first target specification is set prior to the development of concepts. At this, strategic planners and marketers are heavily involved in the target-setting process. Rather than being explicitly methodology-based, the development activity is characterised by a responsive ad hoc approach [11].

Bragd [14] attempted to outline the balancing process involved in setting targets. In this process, the company has to deal with conflicting demands and ambition levels that are dictated by the technology and core values, while simultaneously remaining tuned in to customer values. Environmental aspects of the project also have to be dealt with as part of this process, and they are in competition with all the other considerations. She argues that the balancing process is highly arbitrary. Even though it takes place within a structure of normative reasoning, it boils down to who has the best bargaining power and can thus get their specifications included in the target.

It is also in place to address that the many suggestions for frameworks, methods, tools or other approaches for ecodesign that exist today is seldom addressing the issue of setting environmental targets. Regardless of being useful and important many sources describe approaches for assessing and evaluating products and environmental aspects e.g. [15, 16, 17]. As Knight addresses there are several barriers to adoption and application of ecodesign approaches and consequently ways of overcoming barriers must be found. With the case companies that will be presented here setting targets are definitely one way to encourage and motivate product developers to carry out sustainable changes.

METHODOLOGY

The empirical study is based on semi-structured interviews with different actors in three companies. One firm is from the automotive industry, and one firm from the telecom sector and the third one develops products for energy sector, The actors interviewed are a selection of business developers, environmental managers, product planners, project leaders and project members, table 1. The interviews were performed at the location of the respondents and were recorded and transcribed. Telephone interviews have been made with some of the respondents in order to clarify information or to gain new data. These interviews were documented by taking notes.

Table 1. Overview of the company studied and the research approach

Type of industry	Respondents	Research design	Data collection
Automotive Company	Environmental, market and product representatives (n=4)	Interview study Qualitative inductive approach	Interviews Documents
Telecom Company	Business developers, environmental managers, product planners and project leaders (n=8)	Interview study Qualitative inductive approach	Interviews Documents
Power systems Company	Project managers and project members (n=10)	Case study Qualitative inductive approach	Interviews Project documentation

In the study of the Automotive Company and the Telecom Company interviews were made on a general level not focusing on a specific project. For Power Systems a more in-depth case study was performed and a project were studied in retrospective covering the start of the project to market launch. The data collection methods used in the case study includes studies of archives, interviews, questionnaires and observations [18]. The project studied can be characterized as a radical innovation and ecoinnovation project. It was a high-risk project with a high degree of technological uncertainty (read more in [19]. The technology was new both to the company and to the customers, and it involved a technology leap.

COMPANY CASES AND THEIR APPROACHES OF SETTING ENVIRONMENTAL TARGETS

In this section are approaches of setting environmental targets described. The approaches are described for each company and exemplify different ways of setting environmental targets:

- Automotive company: A strategically decided product identity having environmental performance as a prioritized property
- Telecom company: Centrally decided ecodesign specifications sets the standard for environmental performance and
- Power Systems Company: Management states and supports a high environmental ambition for a specific project

Automotive company: Breaking down environmental targets for each project separately from a product identity

Environment is one of eight prioritized property target, for the product, to be used in the product development process at *Automotive*. A representative is responsible for the environmental property targets as well as for the black and grey substance list and for integrating environmental issues in the product development process.

The product identity is described by three experience values that the customer and the user are to experience when using the product. In order to fulfill these three values, eight technical performance properties have been regarded. One of the eight technical properties is environmental performance. There is one person responsible for each technical performance property that is also responsible for coordinating the achievement of the technical properties. For each technical property strategic documents contain descriptions of what *Automotive* wants to achieve in terms of performance. The environmental property targets are divided into specific areas, they are detailed and how to measure

them are also expressed. Some targets lack measuring techniques but the goal is to develop measurement techniques for all targets. The overarching targets for the product of the company need to be broken down for specific part projects.

Target specifications are developed in cooperation between the product planning department, sales and the technical organization. The target specification has two purposes, being a decision foundation and a basis for the project definition. A product planner is responsible for the target specification being written before the project is started and the project leader is responsible for the project definition. The project definition is the contract for the project leader between the business department and the technical department. It is a way to communicate to the organization what to achieve and what the commitment is, according to the project leader. The project definition is broken down into object definitions. Object leaders for different subprojects are responsible for the object definitions. The environmental objectives are defined for Automotive in an environmental management system. For each department such as R&D, production, sales and services the objectives are broken down. The targets are set in collaboration with respective line management representatives. Each objective has an action plan.

In the product development process environmental issues are integrated as checkpoints and by product targets. For product development and R&D the environmental targets are expressed as one of eight prioritized performance properties. The property targets are set up guiding how to set environmental targets for projects. The environmental coordinator responsible for the property develops the targets for the environmental property. Upper management approves the targets. Resource efficiency and low global and regional impacts are guiding principals for the environmental work.

In the product development, engineers are obliged to consider environmental aspects and to report that they are considered. In the PD process deliverables and checkpoints are controlled. The checklist includes aspects such as weight; black and grey list for materials, transportation, end-of-life aspects and waste handling. A guidelines list is available for the engineers and verification is reported 3-4 times in a project, object examination, before a gate decision. For each development object, the object leader is responsible for securing relevant aspects being handled.

The environmental organization is decentralized and spread in the organization. An Environmental Committee consisting of environmental coordinators from the whole organization has the Environmental Manager as chairman of the group. The group has representatives from product development, sales and services, purchases, production sites etc. The representatives are environmental coordinators at their departments. They in turn have operative contact persons at their departments. The Environmental Committee reports to the Executive Board, responsible for strategic issues.

The project leaders have a central role in assuring that the environmental aspects are included into the final specification. The project leaders are recommended to verify the specification with the environmental coordinator. This opportunity is frequently used by some of the project leaders, partly depending on environmental interest according to an environmental coordinator. In a conflict situation between demands a compromise is made and the responsible person should notify the person responsible for the environmental property targets. This is not working in all cases although the procedure is prescribed in the PD process. The respondent states that there is a conservative attitude that needs to be overcome. There is inertia in the organization and it takes time to adjust to new work procedures. The environmental coordinator for product development also, to some degree, experiences a lack of interest in environmental issues.

A product planner argues that the environmental property targets are positive since they have contributed to putting more focus on environmental issues. However, unless an environmental requirement is a regulation it is difficult for it to get a high priority. One reason is, according to the respondent, that it is difficult to set a monetary value. The product identity and the properties described are, according to the respondent, important though the environmental properties are considered to be "soft" and "hard" data is still more important, such as volume, profitability and risks,

for example. The respondent claims that they have had cases were it would have been easy to chose another technical solution to gain environmental image value.

The bargain power and the status of the person responsible for a property also influence the importance of the property. The person responsible for a property needs to be known in the organization in order to be called to, for example, meetings.

A project leader argues that the environmental targets are difficult. They consist of several parts such as regulation, fuel consumption, hazardous substances and recycling aspects, and the respondent finds it difficult to measure some of the aspects. It is also difficult to break down properties expressed for the end product to development projects for a small part of the end product. He argues that much of the responsibility for reaching the targets is up to the engineers and not the project. It is in the methods of the engineer. The project asks for the result.

A difficulty is that the properties differ in how well they are developed. The respondent also claims that legal demands are not the goal but are obvious. The important issues are also how *Automotive* is perceived. The product planner asks for even more specific environmental targets in order to increase their usability.

Telecom company - Developing ecodesign specifications to be used in all projects
Environmental targets are mainly handled in two ways at Telecom: (1) The energy consumption targets are specified through business units and product planning and integrated into the product strategies and demands for the products (2) other environmental targets are mainly handled by a general Design for Environement (DfE) specification. The work with lowering energy consumption is based on LCA and targets for energy consumption are partly based on environmental analysis but also on consumer requirements..

The DfE specification is developed by the DfE workgroup. Several product development units are represented in the DfE workgroup, such as product leaders and engineers. They continuously bring together legal demands, customer requirements, life cycle aspects, technical aspects and business aspects. From the information, a DfE specification is developed and continuously revised, and the Environmental Steering Group makes the decision to accept it. The specification is a guide for the product managers in setting environmental demands on the products. Some requirements are mandatory and some are optional. According to a respondent, environmental requirements are to be included in the target specification and then broken down to detailed specification and treated just as all the other requirements. How environmental targets are developed and distributed in the organization is shown in figure 1.
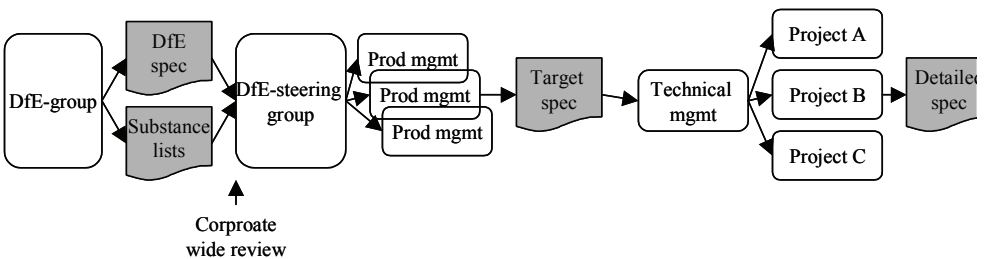

Figure 1. How environmental targets are developed and distributed in an organization.

The environmental coordinator describes that most of the demands are legal demands so that no conflict occurs with other objectives when writing specifications. Mandatory demands are balanced with other demands such as cost, functionality, quality and technical demands.

The product owners and product managers are responsible for including the environmental demands into the target specification. The product owners are responsible for several product groups, on the market side, and have technical product managers responsible for different product groups. An environmental representative describes that this is a weak link and that some product planners do not actively read the DfE specification and delete or add demands applicable for their product. Often they make a general reference to the DfE specification without prior discussion or prioritizing.

The product owner describes that environmental demands are sometimes handled before the decision to start a pre-study and sometimes before the decision to run a project. If environmental requirements are especially important, such as a new customer demand or legal requirement, in a project then they are handled early on in the target specification. He also describes that energy consumption is highly prioritized and that it is put forward in the environmental management system.

A product manager describes that sometimes environmental demands are written in a general specification for all products and from that he can transfer the requirements into a project. A product manager describes that environmental requirements are not described for each development project but are dealt with in the development process as checkpoints. He also states that sometimes the demands are hard to grasp since some demands are not written in the specification but are rather included later on and sometimes "spin around" in the organization. Firm group directives for examples may not be included in a target specification. Then it needs to be prescribed in the formal development process to secure that they are included later on.

A hardware design process has general checkpoints for verifying that demands in the DfE specification are handled. A product manager considers that engineers should know the demands either by reading a detailed specification or by general requirements documents that also should be in the backbone of the engineer. The engineers should know that they are to design for low energy consumption or to avoid specific materials.

Power Systems Company: Management states and supports a high environmental ambition for a project

The project studied can be characterised as a radical innovation and ecoinnovation project. The project was a high-risk project with a high degree of technological uncertainty. The environmental ambition was high and expressed from the start.

Environmental issues were considered when developing the new technology strategy and environmental demands were considered from the start. One interesting statement found in the project documentation was: *"Development of a new technology is a very good opportunity to invoke environmental considerations. This should be considered for the project."* . The statement shows that there was an understanding of the importance of considering environmental aspects early on in the development project. It is also a positive statement regarding the possibilities that exist in the development of a new technology.

The environmental requirements were added to the product specification. The product specification was developed in the pre-study, involving members of the project group and their main customer. This was one factor that created commitment for the environmental targets set. One of the product developers expressed it as follows: "the environmental requirements were demanded by the customer but formulated by the project group".

Several of the project members stated that they perceived the targets to be of the nature: "to develop a product with less effect on the environment than the previous product". The overriding goal in product

development was to "improve the environmental performance of a product". Several of the environmental targets were expressed as "reduce" and some were more specific and expressed as "eliminate". Some specific targets were, for example, to have a recyclable product and to eliminate lead and oil. It is apparent from the interviews and reading the documentation that a strong environmental vision existed in the project group.

Several of the project members stated that they perceived the targets formulated by upper management as being of the nature of 'develop a product with less environmental impact than the preceding product'. The objective of the company was to 'improve the environmental performance of a product'. This objective does not include any measurable or specific targets, but simply urges that the product should be improved. Some challenging absolute environmental targets were also set by management.

From the interviews, it is obvious that the product owner was seen both as a strong project champion and an environmental champion. He had an important role in both the technology development and the high environmental commitment. The product owner did have experience of ecodesign from an earlier project. The product development process was also organised so that it supported innovative development.

For Power Systems, great commitment was achieved by having the development team participating in setting some of the challenging environmental targets. Environmental literature also affirms the importance of creating commitment and ownership of targets if they are to be fulfilled [13]. The perception was that there was a strong environmental vision in the project group. Such a vision is very important, especially in uncertain projects [20].

Even though the targets for the project were formulated by the project team, support for having challenging targets was expressed at a business level. From the very start of the project, the environmental demands were in focus and the environmental targets were set very early on. Both consumer demands and the business strategy of the company supported and demanded challenging environmental targets.

DISCUSSION

The studied companies use different strategies for setting environmental product targets. *Automotive* defines environmental targets based on a product identity, on how they want the customers to perceive their products. It is suitable with the type of product that Automotive sells. For *Telecom* the targets are more expressed through the DfE specification or by performance targets developed for each project at a business level such as for energy consumption. At Power Systems the targets were highly set for a specifically studied project and described at a strategic level and embraced and broken down by the project team.

In reaching innovation, setting challenging targets and prioritizing environmental aspects are important. In literature there is much focus on reaching re-design and re-thinking and, in order to reach that, challenging environmental targets are important. Environmental targets can be used either for setting challenging proactive environmental targets or for securing a "lowest environmental level" such as securing that legal requirements are fulfilled. The level of the environmental targets needs to be in line with product development strategies and business strategies in the company.

It is sometimes stated that environmental targets need to be treated in the same way as the targets for weight, performance and the like (see also [14], [21]) and need to be integrated in the technical specification. It is, however, clear that those environmental targets are different in the sense that they not only define the performance or characteristics of a product but are also related to personal values and ethical decisions. Respondents in the study stated that they considered environmental work to be closely related to ethical decision-making. This linkage is problematic, since different people have different interests and different personal values and act in accordance with them. Consequently different people in a company will act differently. There is thus a need to have a really clear statement of the strategy behind the objectives relating to environmental issues in product development. The

business aspects of working with environmental issues need to be worked through and targets set accordingly.. This strategy also needs to be communicated very well throughout the company.

It is clear that in the balancing process, when different demands to be included in a specification are being considered, there is need for someone to 'fight' for the inclusion of environmental issues (see also [14]). This has to be someone with interest in and knowledge of environmental issues.

Characteristics and implications of the different approaches

The three case companies has revealed three different ways of setting environmental targets in an organization. However, we believe that these targeting approaches can be combined in different ways within one company and that they in much complement each other. They are also as identified in this research overlapping each other in some ways. In the following the main characteristics and their implication in the organization and in environmental work will be discussed. Three procedures for setting environmental targets for products were identified in the studies. They are useful for different purposes and all have advantages and disadvantages, summarized in Table 2.

Table 2. The procedures, advantages, disadvantages and implications

Procedure	Advantage	Disadvantage	Implication
Breaking down environmental targets for each project separately from a product identity	Relates customer perception. Customer value are connected to environmental improvements. Defined at business level.	Difficult to apply in subprojects for complicated products.	Relation to customer value and definition at business level guarantee actual environmental improvements of the product. Environmental performance and the link to business strategy is discussed and clarified. Requires support for managers to interpret and brake down the target to a specific project..
Developing ecodesign specifications to be used in all projects	Ensures a specific environmental ambition by mandating requirements. Encompass all projects in the company.	Do not assure awareness and commitment to guidelines. Easy for managers to just add to the product specification without discussion or commitment.	Gives support but no guarantee that environmental improvements are made since targets are not defined as requirements (apart from legal issues).
Management states and supports a high environmental ambition for a specific project	Defined at business level. Creates enthusiasm and commitment if properly communicated in the organization.	Could be difficult to interpret the targets for the project. Requires that management show commitment and can create commitment.	Create enthusiasm and commitment in the organization. Might not be easily repeated for every project.Good when aiming for innovative solutions making and aiming for large environmental improvement

Management especially states and supports a high environmental ambition for a specific project

This procedure is beneficial when strategic characteristics of a product are also considered to be significant environmental aspects. In the case of Power Systems this was crucial in order to get a high

environmental focus in the project. Also at Telecom this was used when extra attention were needed in a project due to customer demands, strategic decision or new harder legal requirements. These approaches allows scope for taking advantage of innovation potential by setting challenging targets at a strategic level early on in the project and make large environmental improvements.

When aiming for innovation and acknowledging and embracing the environmental possibilities, it is important to set proactive targets at a business level and also to create commitment in the project team. Find the innovation potential and consider the environmental possibilities as well as the consumer aspects when setting targets. The team should be guided by an environmental strategic direction.

In the Power Systems case it is shown how effective it is that the upper management team and the project leader clearly shows the environmental importance of a project and really involves the project team in the work of reaching the environmental targets. This underlines the findings by [4], [5]and [6] that when really setting environmental targets at a strategic level it gives effect when having strong management commitment and focus in the project progress.

Breaking down environmental targets for each project separately from a product identity

This procedure is useful for clarifying the environmental performance targets at a strategic business level. It is connected to consumer perception and the business strategy and is a good way of communicating the environmental strategy for products both externally to customers and internally It opens up for a discussion at a strategic level of environmental issues early on in the design process..

It is a requirement in the company that the project leaders include environmental targets to the project specification. The environmental performance targets support the management in that process. It is however clear that the environmental performance targets needs to be clearly expressed in order to really be useful and support needs to be given to project leaders in the process of brake the targets down to a specific project. Too general specifications are hard to transform and use in specific projects. There is need for a well-known person for management to turn to for discussing the environmental considerations. In the described case the managers could turn to the person responsible for the strategic targets and get support in the target setting process..

It also became clear that the status of the person responsible for a particular property and how well he or she was known in the company affected the willingness to contact that person for information or for discussions and meetings. These results are similar to those found by [10], who identified the following factors affecting how the description of a property is interpreted: 1) different ambition levels for different properties, 2) some properties have a stronger profile in the company, 3) the reputation, knowledge and bargaining power of the person in charge of a property is important and 4) different departments have different foci and are interested in different aspects of the project.

The strong relation between customer perception as well as setting targets at a business level in an organization is guaranteeing a strong fulfillment of environmental requirements. It is not optional weather to fulfill the targets since they are clearly defined. However, the target on an end product is still hard to translate to targets for subsystems in the product.

Developing ecodesign specifications to be used in all project
Pre-defined ecodesign specifications are especially useful to ensure that all legal requirements are met in a project. This approach is especially suitable in incremental projects when the innovation potential is low. Designers can use them directly in the operational stages. The legal requirements are easily communicated from management to product developers by e.g. definite avoidance of a specific material. Also the ecodesign specifications become valid for all projects in the organization. Though at the same time it is avoidable as it is a rather loose instruction, apart from legal requirements and might not have a strong influence in projects.

Engineers are often to high degree given the responsibility for including environmental targets. In both Automotive and Telecom technical project managers and product planners point out that it is to a great extent the responsibility of the engineers to include environmental considerations in the product

development process. Managers claim that environmental considerations should be expressed in the work routines in product development and *"it should be in the backbones of engineers"*. That managers have to think environmental aspects through, and take a stand on which of the pre-defined targets that are applicable for a specific project, leads to environmental aspects being regarded and that is a step in the right direction. If this is done early in the development process, a thorough discussion may be held at this point. Then a general environmental specification would not just be added to the specification for the engineers to deal with. It is, however, a clear risk that environmental targets are just generally added to the project by adding the pre-defined list as also described by the environmental responsible persons.

Using general environmental targets or DfE specifications, as information source for management on environmental considerations and for incorporating environmental targets early, could be efficient; however, the targets or specifications also need to be both actively used by management and written in a way that makes them useful. A difficulty is that information needs to be spread via several actors before actually ending up in a target specification and even more so in a detailed target specification. The ecodesign specifications are to be adjusted and discussed for each project by product owners and project leaders, this is not always the case and then the important discussion of the environmental potentials get lost.

Setting targets and its implication on different company levels

The statement that it is important to get managers interested in environmental issues may seem trite, but it is a reminder that it is still difficult for managers to accommodate environmental aspects among all the other aspects they need to consider. Yet commitment is crucial for achieving environmental targets. That is why pre-defined targets may result in less commitment when they are handed to a project group then when they are developed by the project group. Consequently, a general notification in the empirical research is that targeting is not a procedure or approach that can be done at one level in the organization and then assumed to be realized. Management has to define targets *and* make sure that this is absorbed in the product development organization and possible to understand and adopted. A top-down as well as a bottom-up work has to be done – comparable to any change work where commitment at all level is required (see e.g [22]).

When using general ecodesign specifications, there is a risk that environmental targets are just added to the project by tacking them on to the pre-defined list. Yet there mere presence on the list creates an opportunity for managers to think about environmental aspects and take a stand on which of the pre-defined targets (including ecodesign) are applicable to a specific project. An argument can then be made for including environmental improvements at an early stage. Including general ecodesign specifications on the list is also one way of ensuring that obligatory environmental requirements are met. Both environmental specialists and product developers should develop the targets.

Managers complain that environmental targets are often difficult to quantify and follow up to see whether they have been achieved. The classic advice of having specific targets is still valid, but is apparently not always easy to achieve in practice.

There is also a risk that targets such as those describing a product identity are so general that they are of little use to those who need to refer to them when writing specifications.

Checkpoints in the product development process for follow up

Both at Telecom and Automotive it is described that having environmental checkpoints in the product development process at reviews are important to secure that the environmental targets are followed up in a project. This is also secures that managers discuss the issues during the project progress.

Environmental targets and business rationale

When developing environmental targets for products, it is a good idea to maintain a customer focus and concentrate on how consumers perceive the products. This approach creates a business rationale for the environmental targets, which is a strong driving force for actually carrying through the improvements needed by environmental targets.

It has also been shown in other research that new product ideas can be realized and successful by applying an environmental thinking in product development, regardless of that the company can not identify marketing opportunities related to environmental performance [7]. Striving for a sustainable development this opportunity is of outmost importance as also stated by [3].

CONCLUSIONS

Manufacturing companies should evaluate how they set environmental targets. General ecodesign specifications used in all projects could be enough when aiming for applying legal requirements. How the targets are implemented into the specification is important. Even when having a general ecodesign specification and low environmental ambition managers needs to discuss them and adjust the targets to each project in order to give them attention and assure that they are achieved. In the case of only using general ecodesign specifications there is a clear risk that the responsibility for fulfilling them and keeping track of them to falls on the project members and only routinely added to the specification by project management. When the company, due to customer demand, strategic decision or new legal requirements wants to put extra attention to environmental targets, managers need to promote that, discuss it with project leaders and the project team and create commitment to them. The strategically decided targets can either be communicated through management directly for a specific project or communicated via a product identity where environmental standards are set and then broken down for specific projects. Important is to secure that the environmental discussion is held at top management level, project management level and with the project members. To have a formal product development process with gates that include checking environmental targets is helpful for managers. Environmental considerations should be given clear status in the company, for example, by making them the responsibility of a well-known and highly regarded person. Managers and projects members can then easily turn to that person when balancing requirements or when there is a need to resolve questions about environmental targets.

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