Guidelines for the proposal of a system of design management indicators in product development companies

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The contribution of design to businesses is known, but measuring this result has been a complex task. This paper proposes ways of selecting design management indicators by product development companies. As a method, case studies of companies based in southern Brazil were used. Results show that indicators can be chosen by means of three criteria of selection. In addition, this study presents guidelines to build a system of indicators based on criteria of selection.
1. INTRODUCTION

Regarding design evaluation, Best (2010) has stated that it is a complex task. According to this author, in qualitative terms, design can be measured through aesthetic elements, improved brand image and increased organizational learning. However, when considering quantitative aspects such as profits and units sold, among others, isolating the design contribution is a hard task. Design managers need ways of measuring performance that aligned with both the design success measures and the company’s success strategy measures (Best, 2010).

In Brazil, design management has been scarcely discussed in academic and professional environments. This research aims to contribute to studies in the area of design management by addressing a gap related to performance measurement. It is in this scenario that this research has been developed as a way to contribute to discussions about design management, product development process and performance indicators, by establishing guidelines to propose a system of design management indicators in product development companies.

2. RESEARCH METHOD

In order to establish the guidelines for proposing a system of design indicators, the investigation were conducted in a three companies study cases. In each company, it started with interviews with the designers and people connected with them and also with the product development process, in a way of understanding the routines and environment in which the company are inserted.

The researchers have also developed, based on literature (Kaplan & Norton, 1997; Nixon, 2002; Oliver, 2002; Lockwood, 2008; Andrew et al., 2009; Viladàs, 2009; Borja de Mozota, 2003), a research protocol. The protocol was used to develop three case studies. According to Yin (2008), this method is suitable when the investigators have little control over the events and their focus is on a contemporary phenomenon from real life. Three criteria for the selection of the companies were considered: the main activity of the companies should be product development, thus service firms were excluded from the study; the companies should be located in the state of Rio Grande do Sul - Brazil, so as to facilitate visits and personal interviews by the researcher; the companies should have an internal department in charge of product development, with at least one professional working as a designer. The case studies were carried out from November 2011 to May 2012.

The research protocol was applied by means of an interview with either the designers or the people in charge of the design department in the companies studied. The respondents were free to select the indicators they regarded as the most suitable to their reality. They were also required to justify the selection of each indicator, thus characterizing the selection criterion used.
The respondents were asked to select the three most relevant indicators to their contexts from the set of 46 indicators. The interviews with the design team members were followed by a meeting to present and discuss the data. After the interviews with collaborators from the three companies, their answers were analyzed and compared, thus generating the criteria for selection of indicators.

To finish our research, based on the criteria for selecting indicators, it was possible to establish the guidelines for companies to select indicators, based on the literature review and also in the answers from the respondents from companies.

3. CASE STUDIES

3.1 COMPANY A

Founded in 1966, Company A belongs to a conglomerate of six companies that produce different kinds of products (house utensils, cleaning supplies, office supplies, and home organizing products). Company A produces hand tools. It is located in Esteio/RS and has approximately 600 employees. The research protocol was applied to collaborators that participate directly in the design management process. Four people were interviewed: (1) director of products, (2) Design coordinator, (3) Product designer, and (4) Design trainee.

In the survey process, before starting the process of indicator selection, the respondents were asked about the objectives defined at the launching of a new product. The respondents stated that the main objective is always related to the company’s financial return, but this objective is only reached through the attainment of other objectives, such as increased sales, reduced production costs, and increased consumer satisfaction, among others. Some products are launched in order to create a new market. This may initially cause financial losses, but the product may generate profits later.

Regarding the objectives of the product development process, the indicators selected may point whether the company is following the right path to attain its objective. The justifications given by the respondents for the selection of indicators may be listed as follows:

- Feedback: The indicators must give some feedback to the team about the acceptance of the product by the market. Such feedback may be related to sales, and even consumer satisfaction.

- Productivity: The indicators selected provide an overview of the industry productivity, the number of projects being executed at the same time, and the number of cancelled projects, among other things.

- Development time: One of the ways to evaluate the development process is to check how long it takes to convert an idea into a product to be marketed. The respondents stated that the market is dynamic; therefore, it is necessary to accelerate the process to launch the products ahead of the company’s business competitors.
• Competitors: Monitoring the market is important to the product development process, since it positions the company in the market in relation to its competitors and also follows the launching of new products.

The justifications mentioned above have been interpreted as criteria for the selection of indicators of design management in Company A. At the end of each interview, three indicators from the list were selected as the most important ones.

Based on the answers given by the Company A team, it is possible to notice a certain diversity among the indicators selected. No indicator from the “HR” category was selected as one of the most relevant. The team evidenced a constant concern with the evaluation of the financial return derived from their projects, but there is a clear idea that, in the end, the other indicators selected would result in a higher financial return. As already seen in the Balanced Scorecard model (Kaplan and Norton, 1992), the indicators show a cause-and-effect relationship, i.e. a variation in one indicator causes variation in the others.

3.2 COMPANY B

Company B was founded in 1958. It is situated in Porto Alegre, and develops thermal conservation products. It has approximately 700 collaborators. Presently, the product development department has three collaborators: (1) design coordinator, (2) engineer, and (3) product designer. The department reports directly to the company’s board of directors. The two designers of Company B answered the research protocol.

With regard to the result indicators, the design coordinator of Company B stated that two indicators are taken into consideration by the department: (1) number of projects launched per month and (2) attainment of sales expectations, which is also known as payback in the company.

Based on the interviews, the criteria for selection of indicators identified were the following:

• Financial return: The main objective of product development in Company B is to achieve financial return. The indicators selected must show whether the product meets the sales expectations estimated by the commercial department at the stage of Investment Analysis.

• Production cost reduction: Indicators that evidence reduced costs of the production process are important, especially in projects of existing products.

• Product performance: The portfolio of products in Company B is monthly evaluated in order to identify the products that must be kept and those that must be taken out of the production line. For this purpose, the consumer acceptance of a particular product should be measured and assessed through financial indicators in the first place, according to the development team, but issues related to consumer satisfaction are also analyzed.
• Productivity: The board of directors of Company B requires good productivity of the product development department; for this reason, indicators showing the productivity of the design team should be taken into account along the analysis of the design process. According to the design coordinator, the main indicators that meet this criterion are the number of products launched and the number of patent applications per year.

Half of the indicators selected as the most relevant ones by the Company B team are in the ‘Financial’ category. It was noticed that the designers interviewed focused on financial issues as well as on the return provided by their products. The evaluation of product success in Company B is grounded on both the confirmation of sales and the financial return estimated before the product is produced. These indicators guide the work of the product development team.

3.3 COMPANY C

Company C was founded in 1958 in the city of Canoas/RS and its head office is currently located in the city of Nova Santa Rita/RS. It has approximately 600 collaborators and focuses on the development of audio speakers for professional – nightclubs, stadiums, etc. - and domestic users – speakers for computers, cars, houses, etc. The area of product development is within the engineering department. It is represented by one product designer with master’s degree in strategic design who has worked at Company C for 10 years.

The only designer working in Company C answered the research protocol. On being questioned about the existence of indicators to evaluate design in the company, the respondent said that, in accordance with the company strategic planning, his goal is to develop three low-cost innovations. Therefore, his productivity is measured in conformity with the creation and implantation of innovations, which can be either improvement of existing products or development of new products. The second indicator is related to the company sales revenue, but this indicator is shared with the area of product engineering.

Concerning the way the design results are evaluated in Company C, the designer stated that this evaluation is performed through the use of indicators related to sales and financial return. After the application of the protocol, the criteria for selection of indicators were:

• Financial return: From the interviews with the designer and the portfolio manager, the concern with the financial return that the product development must generate has become evident. For this purpose, it is important to use indicators that show the sales performance and product profits.

• Feedback: Indicators that point out improvement opportunities are regarded as sources of information for the development of future products. Most of the time, such return appears in the form of complaints through customer service and internet.

• Competitors: The assessment of both the market in which the company participates and its relationship with competitors is relevant to the product development process.
For this reason, indicators that show the company position in its competitive setting are important.

- Productivity: The company designer’s goal is to develop three low cost innovations per year. Therefore, the use of indicators showing the industry productivity is important.

The results of the application of the research protocol in Company C were similar to those found in Company A and Company B, i.e. the financial goal is the main reason for the selection of indicators. The cause-and-effect relationship presented by Kaplan e Norton (1992) in their Balanced Scorecard model has been noticed in the selection of indicators by the designer: ideas converted into products generate a larger number of patents, which eventually generate increased sales.

4. DISCUSSION

Based on the study of companies A, B and C, it was possible to group the selection criteria used and identify the similarities and patterns in their choices. Chart 1 is a summary of the selection criteria of indicators used by the respondents of the surveyed companies.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Company A</th>
<th>Company B</th>
<th>Company C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedback</td>
<td>Feedback</td>
<td>Financial return</td>
<td>Financial return</td>
</tr>
<tr>
<td>Productivity</td>
<td>Reduction of production costs</td>
<td>Feedback</td>
<td>Competitors</td>
</tr>
<tr>
<td>Development time</td>
<td>Product performance</td>
<td>Competitors</td>
<td></td>
</tr>
<tr>
<td>Competitors</td>
<td>Productivity</td>
<td>Competitors</td>
<td>Competitors</td>
</tr>
</tbody>
</table>

*Chart 1: Summary of criteria for the indicators selection*

When analyzing the criteria for the selection of the indicators by the three companies studied, it can be observed a similarity in the responses, despite the different nature of the products developed by the companies: (1) Hand tools, (2) Thermal products, (3) Audio speakers. The researcher’s initial idea was that the companies producing products in different segments would indicate different criteria for the selection of indicators, but in practice this has not occurred because the companies’ way of choosing the indicators showed converging points.

Each company used four criteria for the selection of indicators, totaling twelve criteria. Some criteria were mentioned by more than one company, so the list was cut down to seven criteria: (1) Feedback, (2) Productivity, (3) Development time, (4) Competitors, (5) Financial Return, (6) Reduction of production costs, and (7) Product performance. By analyzing the seven criteria, similarities were found among some of them, so it was decided to join the Feedback, Financial Return and Product Performance criteria, assuming that they are information that the indicators will provide to the product development team. It was also
decided to combine Productivity, Development Time and Reduction of Process Costs, assuming that these criteria cover issues associated with the product development process itself.

The three criteria for the selection of indicators resulting from the case studies of companies A, B and C convey different companies’ visions and their relationships with the market. Criterion 01 (feedback) chooses result-related indicators, which provides information from the product’s users to the company when the product is already in the market. Criterion 02 (productivity) refers to performance indicators, whereby measurements are made in the company’s internal processes responsible for the production and launch of the product in the market. On the other hand, criterion 03 (market) presents market indicators, monitoring the competitors’ activities and providing such information to the development team. Figure 1 illustrates the relationship between the criteria, indicators and parties involved.

Figure 1: Criteria for the selection of indicators

The indicators related to criterion 01 (feedback) are those that come from the interaction of the product developed by the company and its public. The traditional financial measurements are part of this criterion. The indicators of criterion 02 (productivity) will evaluate the product development process as a whole, i.e., the design management process, idea management, and others that the company may adopt. The indicators of criterion 03 (market) are related to the interplay of the competing companies with both their public and the companies themselves.

4.1 GUIDELINES FOR THE SELECTION OF INDICATORS

The guidelines for the selection of indicators are the company’s instructions to select indicators to evaluate its design management. As a result of this research, seven guidelines
were built to perform the selection of indicators, as a result of the research methods adopted in this study: literature review and case study. The guidelines are described in the items below.

a) Alignment between indicators and the business strategy

When defining the objectives and goals for the development of a product, the company should have tools to evaluate whether it is achieving their goals or should review its actions. According to Müller (2003), indicators have the function of evaluating whether the company’s actions will meet its strategic goals. The indicators chosen must be able to correct or confirm the decisions made, so as to promote competitive strategies. A company, for example, consider to launch a product aiming to financial returns by selling the product at a price lower than the price of competitors, thus ensuring profits through sales volume. In this context, an increase in the indicators related to sales may suggest that the company strategy is being met. In another example, the company may seek a reduction of product development costs and in this case the indicators related to productivity and operating costs may indicate whether the goal will be attained.

b) Balance between the results, performance and market indicators

In the case studies of companies A, B and C of this research, an imbalance was observed in the indicators chosen: emphasis has always been on indicators of results, especially on financial indicators showing the product sales. It is suggested that the companies, when adopting a system of indicators, ensure a balance among the categories, with the purpose of obtaining information from all those involved in the product development process, both internal and external to the company, as shown in Figure 1. As seen in theory, especially as a justification for the creation of the Balanced Scorecard model (Kaplan & Norton, 1992), financial indicators are important to management, but they are not the only ones that should be considered, because financial gains are always the result of other actions, such as sales increase, costs reduction, among others.

c) Establishing relationships between indicators

As already defined by the Balanced Scorecard (Kaplan & Norton, 1992), the indicators have a cause-and-effect relationship. When the indices resulting from the calculation of an indicator are changed, others that are interconnected may also present variation. It is important to have it clear in the system how the variation of an indicator will affect the others. In company A this concern is clear when they selected indicators of different categories rather than just financial indicators.

d) Easy indicators collection

Companies should select indicators to evaluate their processes, but it is important that the company’s team can easily obtain data and measurements. There is no point in choosing an indicator that requires resources not available for its measurement such as, for example, measuring the number of products launched by the competitors without having in the
company a person or a firm contracted to perform this kind of monitoring. When structuring a system of indicators and start the measurement process, skilled people are necessary and, in some cases, investments have to be made by the company in order to operationalize the measurements.

e) Selection of indicators and the action plan

After administering the research protocol and selecting the indicators that effectively can be collected, it is recommended that the implementation of a system of indicators be planned by an action plan. The plan should include the indicators to be used, the person(s) who will be responsible to collect them, the resulting information and who will receive it, among other issues considered important by the company when implementing a system of indicators.

f) Shared vision by the users of the indicators system

Along with the goals and competitive strategy, the shared vision of the system of indicators should be disseminated across the company’s levels (Kaplan & Norton, 1997). The selected indicators must also be disclosed and made clear to all those involved in the system. A shared vision contributes to building an ambience and culture of measurement (Schiemann; Lingle, 1999). According to Harrington (1993), the use of indicators promotes the required motivation for process changes and improvements. Some of the indicators may be disclosed to the company’s areas. For example, an increase in the sales volume can be the result of the work of several areas of the company, so many sectors of the company can share it.

g) Preparation for the selection and implementation of the indicators system

Companies must train employees on how to collect and make decisions based on the information provided by the indicators system. In the case studies, it was clear that the company’s internal design teams neither had the knowledge nor the habit of working with result indicators. In this case, training would be necessary to explain the function and purpose of the indicators, in an attempt to create a culture of results measurement. It is advisable that such training be conducted before the selection of indicators so that the persons involved in the selection already have the required knowledge on the subject, thus qualifying the decisions made.

Figure 2 summarizes how the indicators system can be built in a company, based on the guidelines of indicators selection detailed in the previous sections of this work. The process begins with some kind of training to the users of the indicators system, including the basics, once some professionals, e.g., the designers, may have difficulties in understanding the terms and concepts (Lockwood, 2008). After this initial stage, it will be possible to choose indicators (a) aligned with the company strategy, and (b) easy collectable, i.e., if the company decides to increase profits, indicators to measure sales and costs reduction are indicated to be selected. It is also suggested that such indicators be chosen based on the three criteria of selection presented in this study, not privileging one of the three criteria in detriment of others.
With the indicators selected according to the criteria, it is possible to establish the existing relationships among them; in other words, how the change of an indicator will directly impact the other indicators of the system. After this mapping, it is suggested that a meeting be held to approve the start of the system implementation, thus contributing to building a culture of results measurement and evaluation inside the company.

**Figure 2: Strategy for building a system of indicators**

**FINAL REMARKS**

Some previous studies (Cooper & Press, 1995; Hertenstein et al., 2001; Ramlau, Melander, 2004; Design Council, 2005; Best et al., 2010;) provide evidence that design can contribute to successful companies. The survey conducted by Bruce, Cooper and Vazquez (1999) in small UK companies also shows that management design contributes positively to the companies’ success.

Measuring the contribution of design to successful companies is a hard task, but necessary, so that a better recognition of designers by the companies is ensured (Best, 2010; Borja de Mozota, 2003; Phillips, 2004; Lockwood, 2008). For this reason, this research seeks to contribute to the discussions relating to the methods and techniques that can be used to measure results from design. It is believed that the definition of criteria and guidelines for the selection of indicators make easy the process of selecting and implementing a system of indicators, no matter the size or other characteristics of a company.

Further researches are suggested to apply the criteria and guidelines to a larger number of companies in order to seek validation and possible improvement suggestions.

**BIBLIOGRAPHY**


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Paulo is a graphic designer with a master degree in Design. His research is in relation to design management and how to measure the results of design.
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APPENDIX

Research Protocol

1 – Schedule interviews with designers and/or design coordinators of the companies and ask them to select the indicators from the chart below that they regard as important in their company context.

2 – After the selection of each indicator, the respondent should justify his or her choice. This reason will characterize the criterion for selection.

3 – After the selection of the indicators, each respondent should select the three indicators that he or she finds more relevant than all the others selected.

4 – After the interviews with all the participants, a meeting with the company team should be held to present the data.

<table>
<thead>
<tr>
<th>Category</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial</td>
<td>□ Increased sales through new products (%)&lt;br&gt;□ Project cost x Product cost (%)&lt;br&gt;□ Savings generated by project changes&lt;br&gt;□ Investment in research and development (R$)&lt;br&gt;□ Profitability of new products in comparison to existing products (%)&lt;br&gt;□ Profitability per customer (R$)&lt;br&gt;□ Profitability per product (R$)&lt;br&gt;□ Profit obtained from new products (R$) &lt;br&gt;□ Relationship between investment in research and sales (%)&lt;br&gt;□ Relationship between sales of new products and sales of existing products (%)&lt;br&gt;□ Relationship between sales in the home market and sales in the foreign market (exports) (%)&lt;br&gt;□ Value of company stock at the stock exchange (R$) &lt;br&gt;□ Actual sales X Forecasted sales(%)</td>
</tr>
<tr>
<td>Customer</td>
<td>□ Number of positive comments (#)&lt;br&gt;□ Number of new customers (#)&lt;br&gt;□ Number of complaints (#)&lt;br&gt;□ Market share (%)&lt;br&gt;□ Consumer satisfaction with products (%)&lt;br&gt;□ Reputation among customers (quali)&lt;br&gt;□ Customer retention (%)&lt;br&gt;□ Positive and negative comments in social networks (#)&lt;br&gt;□ Number of messages received through the website and social networks (#)&lt;br&gt;□ Website traffic (# of visits)</td>
</tr>
<tr>
<td>Design and innovation</td>
<td>□ Ideas generated at the beginning of the product project (#)&lt;br&gt;□ Number of new projects per year&lt;br&gt;□ Number of new products launched in comparison to the competition’s (%)&lt;br&gt;□ Number of products cancelled during development (#)&lt;br&gt;□ Number of patents (#)&lt;br&gt;□ Number of awards X Number of contest applications&lt;br&gt;□ Number of new technologies employed per year (#)&lt;br&gt;□ Products X Level of (radical/incremental) innovation (#)</td>
</tr>
<tr>
<td>PDP</td>
<td>HR</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>□ Mean time of product development – from inception through production (days)</td>
<td>□ % of employees per job duration (% – 1 year – 2 years – 3 years – 4 years, + 5 years)</td>
</tr>
<tr>
<td>□ Number of people per project (#)</td>
<td>□ Absenteeism</td>
</tr>
<tr>
<td>□ Number of projects cancelled (#)</td>
<td>□ Training hours (#)</td>
</tr>
<tr>
<td>□ Number of projects completed on time X Number of projects delayed (#)</td>
<td></td>
</tr>
<tr>
<td>□ Quality Program – 5S, ISO – (y/n)</td>
<td>□ Number of accidents (#)</td>
</tr>
<tr>
<td></td>
<td>□ Internal customer satisfaction (quali)</td>
</tr>
<tr>
<td></td>
<td>□ Turnover rate (#)</td>
</tr>
</tbody>
</table>

**R$ = reals  # = number  % = percentage  y/n = Yes or No  Quali = qualitative, requiring value scale**