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Managing and Measuring sustainability:
the business case of public utility industry

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Abstract

The most advanced organizations recognize that a multidimensional perspective is necessary to integrate stakeholder needs into a long term value creation process, but only in a few cases performance measurement systems are able to integrate traditional measures with social and environmental indicators. To quantify sustainability, and to understand the factors that contribute to it, we propose a performance measurement system based on a set of indicators that are structured in two levels: primary and secondary measures. These measures are further organized using two managerial instruments, showing the horizontal (DartBoard) and vertical (Clover) relationships between them.

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1 – Introduction

It is clear that traditional models used to promote economic growth and development no longer meet the requirements of the world in which we live. News outlets ever more frequently report on the negative impact that industry has on human health, on the ecosystem, and on future generations. We are forced to investigate new standards by which industry must operate. Instead of assuming a "predatory" stance, designed only to consume utility (Mokhiber and Weissman 1999), industry should adopt a more respectful and responsible behaviour, one that could restore well-being to the environment and to social communities it affects.

While this idea seems instinctively preferable, there exists today an animated debate on the fundamental aims that industry should work toward. On one side, there are the defenders of a purely economic vision, who assert that the only way for industry to effectively contribute to well-being is to maximize profits (Friedman 1962, 1970; Hoffman 2002; Jensen 2001; Khanna and Anton 2002). On the other side, there are defenders of a more social agenda, who sustain that economic initiatives and productivity can only be measured by the extent to which they improve, in a broader sense, the quality of life (Lorraine *et al* 2004; Drucker 1984; Rubenstein 1993; Kelly *et al* 2005).

Current literature about sustainable development asserts that the only way for companies to guarantee themselves a place in the future is to adopt a business approach that equally favours profit, the environment, and the community (Bansal 2005; Clayton and Radcliffe 1997; Laszlo 2003; Willard 2002). Such propositions are further supported by empirical analyses that have demonstrated a positive correlation between multidimensional management and stock values (Margolis and Walsh 2003).

In Italy, the Public Utilities (PU) offer an example of industry working towards sustainability. These companies are in a unique position, since they are monitored by regulation authorities, their controlling groups are usually national or local Governments, and some of the bigger companies are listed on the stock exchange (Civicum 2005). While the stock negotiation protects the economic dimension, the institutional function of the Government and regulation authorities protects the social and environmental dimensions.

However, translating the concept of sustainability into daily operations is not easy. Management must be able to offer opportune strategies to its shareholders who require a sustainable model. At the same time, it is necessary to provide adequate planning and control systems in order to support management in implementing those strategies.

Our paper offers a multidimensional and multilevel framework to quantify sustainability, and to understand the factors that contribute to it. The paper is organized as follows: section 2 provides a theoretical background describing the evolution of of the concept of sustainability;

section 3 discusses the importance of sustainability in managing companies; section 4 proposes the framework for planning and control of sustainability. This section, which is the essence of our work, explores both the logical issues that lie behind the framework, and presents two managerial instruments with which the framework becomes operational; section 5 offers an application of the model that can be implemented by Public Utilities; finally, section 6 identifies limitations and provides suggestions for further research.

2 – Theoretical background

The concept of sustainable development was born from the realization that the pre-existing growth paradigms were incapable of meeting the constantly changing needs of modern culture. An important phase of its evolution came towards the end of the 1980s, when the idea emerged that economic growth could not be considered as the whole of its aspects as related to the macro-system, without also taking into consideration the well-being of the individuals who operate within the system.

In following years many more definitions were given for sustainable development, in order to satisfy the need for a more scientific structure to the concept. All of them offered a clearly political and social commentary on reality, with suggestions on how to confront it.

In 1987, the *World Commission on Environment and Development* (WCED), seated at the United Nations, and presided over by the Norwegian Prime Minister Gro Harlem Brundtland, offered the definition for sustainable development that would become the most widely accepted as: "*development that meets the needs of current generations without compromising the ability of future generations to meet their needs and aspirations*" (WCED, 1987: 8).

Following this definition, the term development was no longer linked solely to economic growth, but to the concept of quality of life. Development, then, was to be recognized as multidisciplinary, made up of economic, cultural, social, and environmental factors (Fletcher 2002).

Even though the attempts to formalize the concept of sustainability were numerous, the principal problem with its meaning was of a macroeconomic nature. No definition was given that offered guidance to a company that was willing to translate the concept of sustainable development into daily business practice.

The United Nations Conference on Trade and Development (UNCTAD), the World Business Council on Sustainable Development (WBCSD), and the Dow Jones Sustainability Group Index (DJSGI), all made useful contributions to understanding the pillars of sustainable development in terms of industry economics.

They identified the three principal components: environmental integrity, social equality, and economic prosperity (Elkington 2000). Each of the three parts represents a necessary prerequisite for sustainable development, which can only be achieved when all three conditions are met simultaneously (Bansal 2005; Smith 2003).

So, the concept of performance is evolving. If we accept the idea that development is not sustainable if any one of the three principles is not adhered to, then we see that traditional performance measurement systems based on shareholder value are inadequate for sustainability management.

In order to understand how these ideas were received, it is sufficient to observe the reality of industry today, as well as the numerous academic publications on the subject of sustainability measurement (Atkinson 2000; Bebbington and Gray 2001; Bell and Morse 2003; Bieker *et al* 2001; De Haas and Kleingeld 1999; Epstein and Roy 2001, 2003; Epstein and Wisner 2001a, 2001b; Figge *et al* 2002).

Indeed, sustainability reporting has become a high-profile issue, increasingly requested by stakeholders and required by governments (Terzani 2002; KPMG 2005; SustAinability *et al* 2004).

We can observe a growing number of standardization initiatives, such as the ISO 14031 guidelines on environmental performance evaluation (ISO 14031, 1999), and the Global Reporting Initiative template for sustainability reporting (Global Reporting Initiative 2002), designed to make it easier for more companies to take action, and for stakeholders to compare their progress.

From this evidence we formulate our research question: what does a planning and control system that can monitor all three principles equally and simultaneously look like? In short, how should a performance measurement system be built for the planning and control of sustainability?

3 – Research methodology

To answer our research question, we needed to have an internal business point of view, both to understand if companies were looking for better environmental and social performance data, and if and how they were assembling such information to manage sustainability. So, we decided to seek out the Head of Financial Controllers as we identified them as the best sources for this type of information. Because of their position and skills, they can perfectly evaluate stakeholder needs, and performance obtained. As they participate in strategy formulation to satisfy stakeholders, and contribute to the design of the performance measurement system, these controllers can suitably describe what companies are doing to pursue sustainability.

After establishing some preliminary contact with staff members indicated to us by the office of the CEO in thirteen of the Public Utilities (three of them quoted on the stock exchange), we met with those controllers.

A standard protocol was developed to ensure that answers to key questions of interest were obtained from all persons interviewed.

4 – A multidimensional and multilevel framework for planning and control of sustainability

The companies we interviewed unanimously agree that a multidimensional perspective that could integrate stakeholder needs into a long term value creation process (Freeman 1984) is necessary, but in only a few cases do performance measurement systems allow the integration of traditional measures with social and environmental indicators. In other words, we are faced with a paradox: in front of a growing request for sustainability, an increasing number of companies are currently communicating sustainability performances, but only very few of them are taking steps towards managing sustainability.(i.e., Enel and Telecomitalia).

A planning and control system is essential for the diffusion of the principles of sustainability. The majority of such systems do not seem to have fully embraced the philosophy of sustainable development.

Some of them, like Balanced Scorecard (Kaplan and Norton 1992, 1993, 1996, 2004; Zingales *et al* 2002), are limited by measurement systems that were developed to gauge economic performance, and are not equipped to measure social and environmental performance.

Other frameworks, such as the Drivers of Sustainability (Epstein and Roy 2001), while accepting the importance of social and environmental aspects of performance, consider them only as drivers of financial performance.

In order to internalize the concept of sustainability, it is not enough to simply accept the original three dimensional model. Instead, we must recognize that the relationships between the dimensions cannot be imposed in a hierarchical manner, but they must be developed following the concept of utilitarianism, in which the pursuit of satisfaction for everyone is the primary goal. In this light, development will be sustainable only if improvement in any one dimension does not lead to diminished performance in either of the other two. On the basis of these convictions, we propose a model for planning and control that allows us to measure the degree of sustainability achieved. We do not intend for this model to replace existing managerial instruments.

Instead, it could represent an evolution in current practice, given the necessity to adapt to a more complex business management style, as a result of the multidimensionality of the approach.

In fact, performance measurement systems have to be modified as circumstances change (Kennerley and Neely 2002).

The framework for our model is constructed in three phases (Figure 1):

1. *input identification,* in which the fundamental aims of the organization are defined, the paths that lead to their fulfilment are identified, and specific actions to obtain tangible results are determined;

2. *identification of objects to be measured,* in which the levels to measure performance are defined coherently with the corresponding input;

3. *output identification,* in which the instruments are predisposed to measure each identified object, to appreciate effectiveness and efficiency reached.

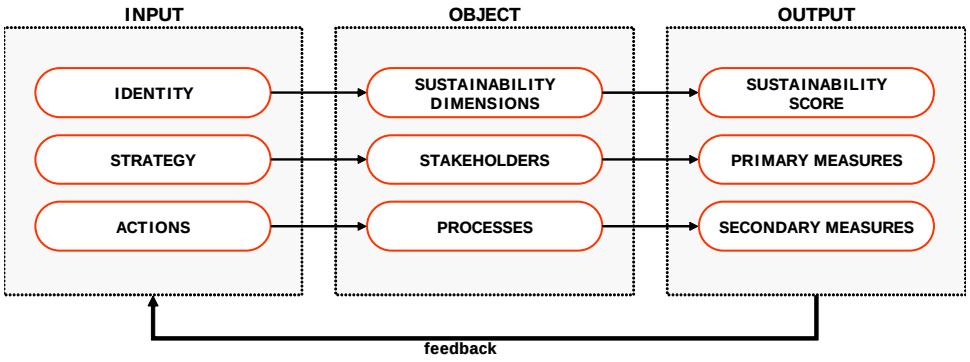
A planning and control framework built in this way can facilitate the work of management in the pursuit of sustainability, offering support in the critical moments of *feedforward*, *current*, and *feedback* control (Terzani 1999). In particular:

1. in the *feedforward* control, the system must be capable of providing a preliminary assessment of the extent to which the intended strategic options will contribute to sustainability;

2. in the *current* control, the model has to verify that the actions necessary to reach sustainability have been taken;

3. in the *feedback* control, the system must verify that the hypotheses put forth in the relationship between actions and strategies are true.

Fig. 1 - Planning and control framework for sustainability



4.1 – *Input identification*

The starting point of strategy formulation for sustainability consists of the formalization of a clear *business identity* (Global Reporting Initiative 2002; Kaplan and Norton 2004) that can be defined as a combination of:

1. **mission** that identifies the role of the business and the reason for which it exists;
2. **values** that are the ideals and goals of the company, shared by its employees and partners;
3. **vision** that has to put forth the goals that the company would like to reach and the position in the competitive environment in a medium-long period. This is the link between mission stability and dynamic operational strategy; its role can be seen as the technical and organizational input for operation;
4. **code of business conduct** that has to translate the value system into operational guidelines. It represents the formal codification of member attitudes to reach the company's vision (i.e. the ethical code) (Trevino and Nelson 2003; Paine 1994).

Although the definition of business identity is a necessary starting point, it is not sufficient to move towards sustainability. For this reason, a clear *strategy* must be formulated and management has to combine a right mix of internal and external resources. Sustainability, in fact, requires the translation of strategy into *action* by defining the steps that must be taken to reach strategic objectives.

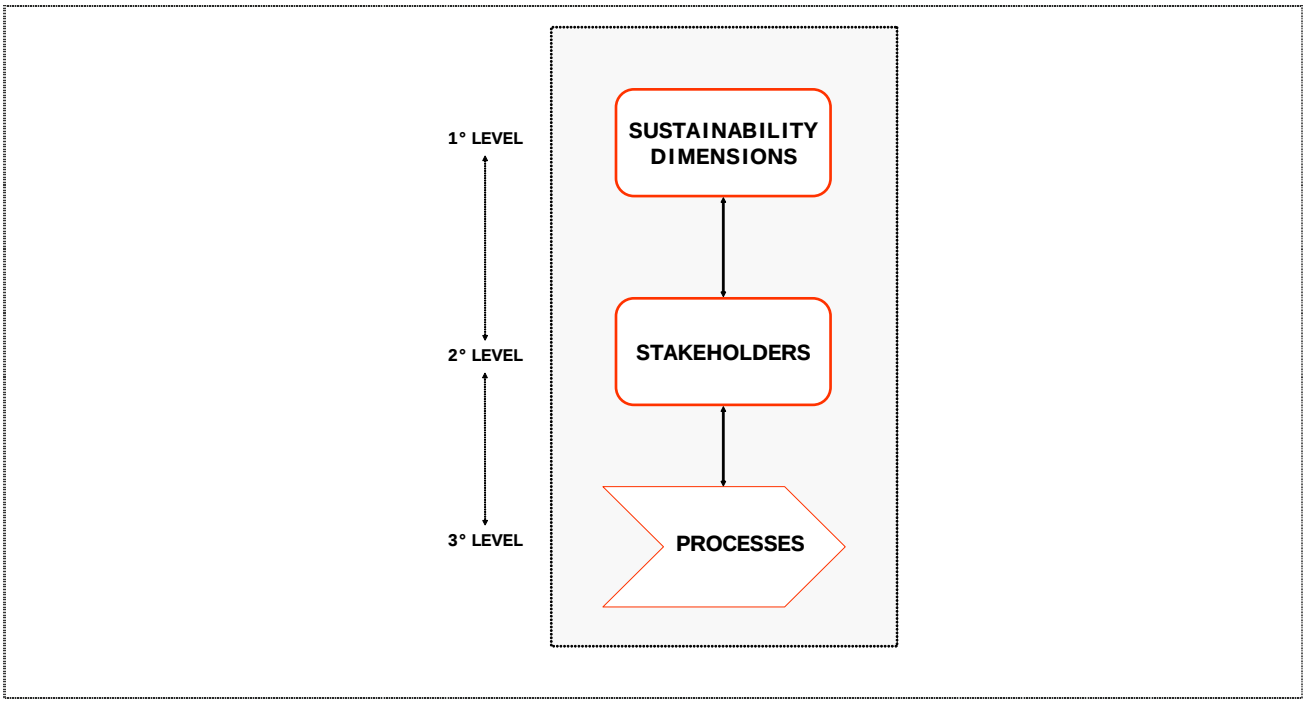
4.2 – *Identification of objects to be measured*

In order to effectively evaluate the business performances, each decision-making input must be linked to a measurable object, in particular (Figure 2):

1. at the corporate identity level, it is necessary to monitor the simultaneous evolution of the economic, environmental and social dimensions;
2. at the strategy level, it is necessary to measure the degree of satisfaction of the stakeholders in all three dimensions, since strategies are implemented in an effort to increase their satisfaction;
3. at the action level, the focus must be on the internal processes aimed toward translating actions into operating activities.

At this point it is important to highlight that the objects to be measured are logically connected. In fact, each *dimension* is an aspect of performance which can be appreciated only through observation of *stakeholder* instances, whose satisfaction depends on effectiveness and efficiency of *processes*.

Fig. 2 - Multilevel relation between object to be measured



4.3 – *Output identification*

After identification of both the input and the objects to be measured, to complete the framework we need to develop a system of measurement that will be able to guide managers in their short, medium, and long-term decisions. This system must be able to summarize the level of sustainability and to highlight its drivers. For this reason, it is necessary that the control system be articulated on a multilevel basis. In particular, the levels to consider are three: sustainability dimensions; stakeholder satisfaction; process development.

The first level of the measurement system is constituted by a *Sustainability Score* that shows the results achieved (or achievable) in all three dimensions at the same time.

Then, in order to understand the drivers of the three dimensions, it is necessary to move the analysis to the second level, in which the parameters for stakeholder satisfaction are identified. To get this result, we have to build a set of *primary measures* (lag indicators), having a financial or non-financial nature, able to give feedback information about the effectiveness and the efficiency in which strategies have been realized. These measures are characterized as being connected through a logical relationship to stakeholder satisfaction (Nørreklit 2000).

To complete the breakdown of sustainability performance drivers, it is now necessary to analyze the third level. In particular, is necessary to work out a system of *secondary measures*

(lead indicators) focusing on those processes that are being carried out and should lead to stakeholder satisfaction. They are characterized as being feedforward measures, able to explain why primary measures are achieved or not (Newman 1975).

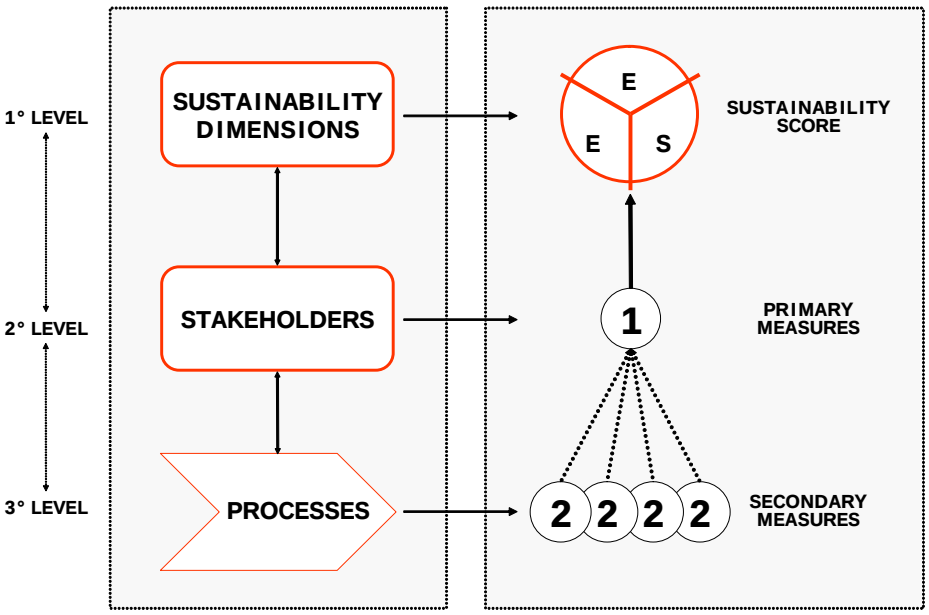
These indicators are directly linked to processes and for this reason tend to be company specific, reflecting the uniqueness of business strategy (Figure 3).

The secondary measures differ from the primary ones in the kind of relationship they have with stakeholder satisfaction.

On one hand, there are logical relationships between stakeholder satisfaction and primary measures. On the other hand, there are usually etiological (cause-and-effect) relationships between primary measures and secondary measures, based on assumptions that have to be tested by the performance measurement system (Epstein and Manzoni 1998).

At the top management level, the primary measures help to evaluate the degree of stakeholder satisfaction; at the middle management level, the secondary measures shows the results of the processes, evaluating whether they are operating as intended (Atkinson *et al* 1997).

Fig. 3 - Relationship between objects to be measured and connected output



4.4 – *Horizontal and vertical development*

To quantify sustainability, and to understand the factors that contribute to it, we propose a performance measurement system that includes two managerial instruments:

- *DartBoard of sustainability;* [1]
- *Clover of sustainability.*

DartBoard (Figure 4) offers a detailed measurement of sustainability. In fact, it lets us appreciate the *horizontal relations* between the three dimensions of performance, allowing managers to weigh trade-offs related to each strategic option. Without integration of the dimensions, a complete appraisal of the mutual influences that tie the several perspectives together is impossible. Such a situation could easily induce management to choose non-sustainable strategies. Technically, DartBoard is a geometrical space divided into three equivalent areas, respectively dedicated to the economic, environmental and social dimensions. In order to appreciate the company's capacity to perform in every dimension, DartBoard splits every area into sections, each of which represents a particular stakeholder. Since stakeholder satisfaction is defined by the primary measures, it is sufficient to monitor the fluctuation in any of them, in order to appreciate the degree of relative stakeholder satisfaction. For this purpose, DartBoard provides a graduate straight line for each primary measure, reporting the following kinds of normalized values:[2]

1. the *minimum value*, which reflects the minimum results as defined by the corporate identity and obligations placed on the company by law. It represents the "boundary system" (Simons 1994). All minimum values, taken together, give us the *minimum sustainability score*;

2. the *planned value*, which represents the results to be expected, based on specific strategies taken. All planned values, taken together, give us the *planned sustainability score*;

3. the *achieved value* which reflects the actual results achieved in the period surveyed. All achieved values, taken together, give us the *achieved sustainability score.*

As you can see in Figure 4, the sustainability score is not given as a single value. Instead, it is a combination of different types of indicators that can only be appreciated visually.

Using this system of scoring, DartBoard allows managers to evaluate sustainability both in an *absolute* and a *relative* sense. The former is represented by the minimum sustainability score, the latter is a comparison between:

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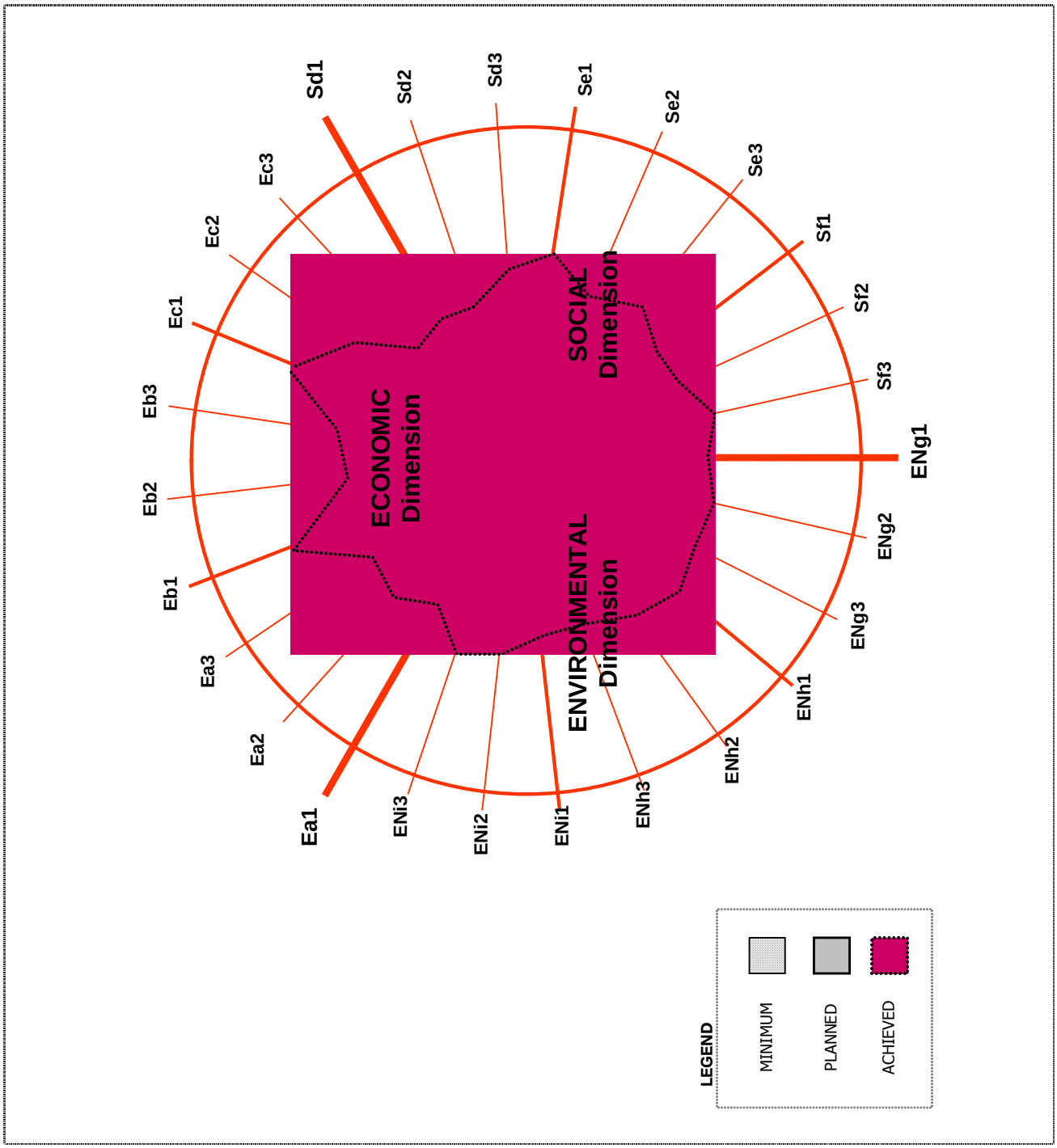
[1] *DartBoard* is a trade mark of the Authors.
[2] The values are normalized to obtain zero at the minimum sustainability value. That is why in figure 5 the minimum values as a whole build a circle.

a. the planned and achieved sustainability scores;

b. results of past and present periods surveyed.

a. The planned and achieved sustainability scores.

Fig. 4 - DartBoard of sustainability



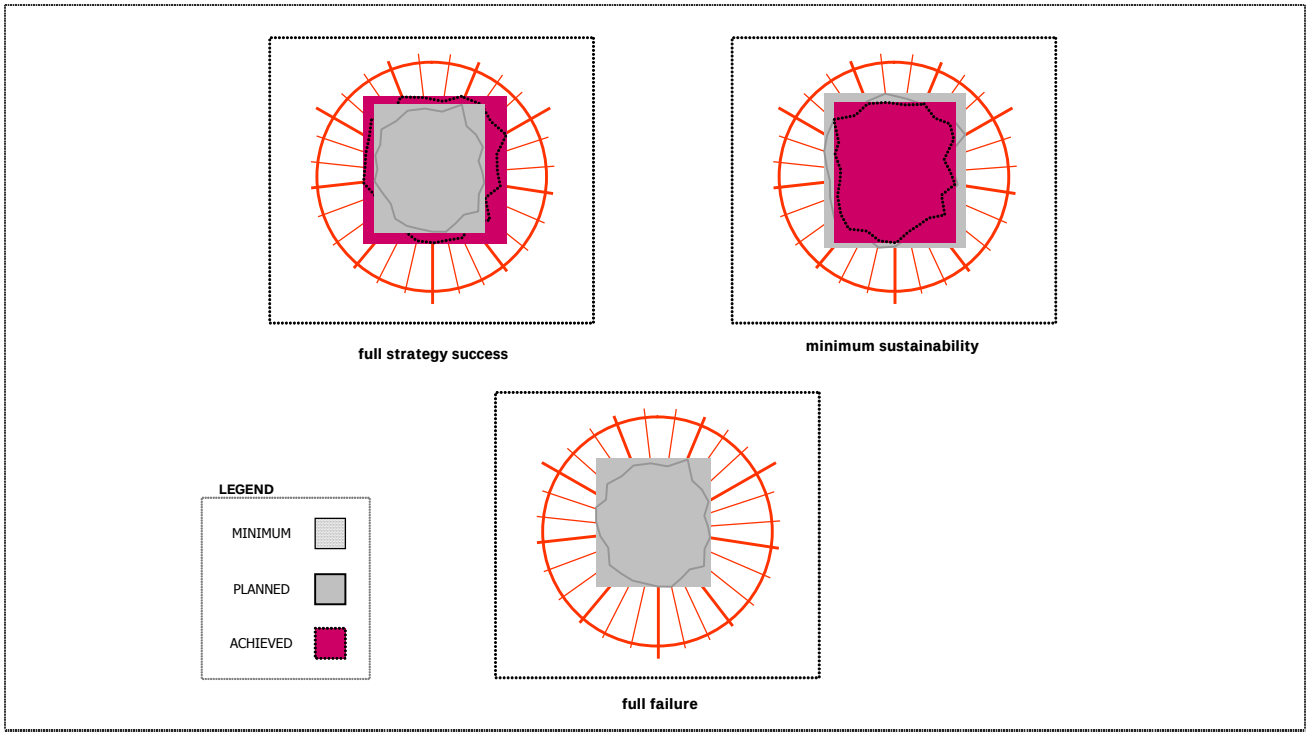
Through the comparison of the achieved sustainability score to the other sustainability scores (minimum and planned), some extreme situations, requiring particular attention from management during strategic formulation, can be identified in the following combinations (Figure 5):

1. *full strategy success*: in which the achieved sustainability score reaches or exceeds the planned sustainability score;

2. *attainment of minimum sustainability*: while still higher than the minimum sustainability score, the achieved sustainability score does not reach the planned sustainability score;

3. *full failure of sustainability*: in which the achieved sustainability score is below the minimum sustainability score.

Fig. 5 – Interpretation of DartBoard



b.Results of past and present periods surveyed.

Particular attention has to be paid to the comparison between results referring to time series data. For instance, two typical situations are (Figure 6):

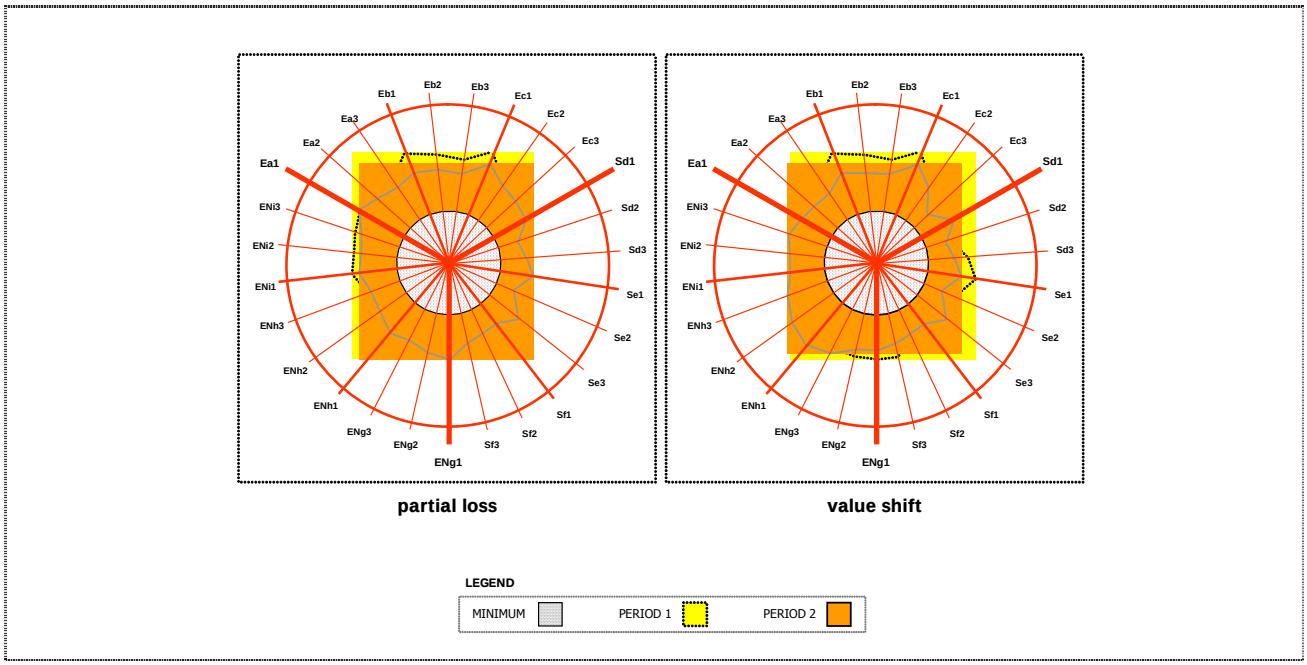
- *partial loss:* in which we observe a decline in at least one dimension while the others remain the same (a dimension declines when at least one of its primary measure values decreases);

- *value shift:* in which the results show improvements in some dimensions, and decline in others.

Among the described extreme cases numerous intermediate combinations can also be observed. Judgment on these possible outcomes can be expressed only by managers, who will have to consider the internal and external factors in which results have been achieved.

Although the comparison is essential in the control process, it represents only a starting point for deeper analysis. As such, the model we propose is able to analyze the sustainability drivers through a two-step process. The first step, using DartBoard, highlights the dimensions with an increasing or decreasing performance due to a gain or a loss in stakeholder satisfaction. The second step, through Clover, allows managers to identify the direct and indirect causes of stakeholder satisfaction or dissatisfaction.

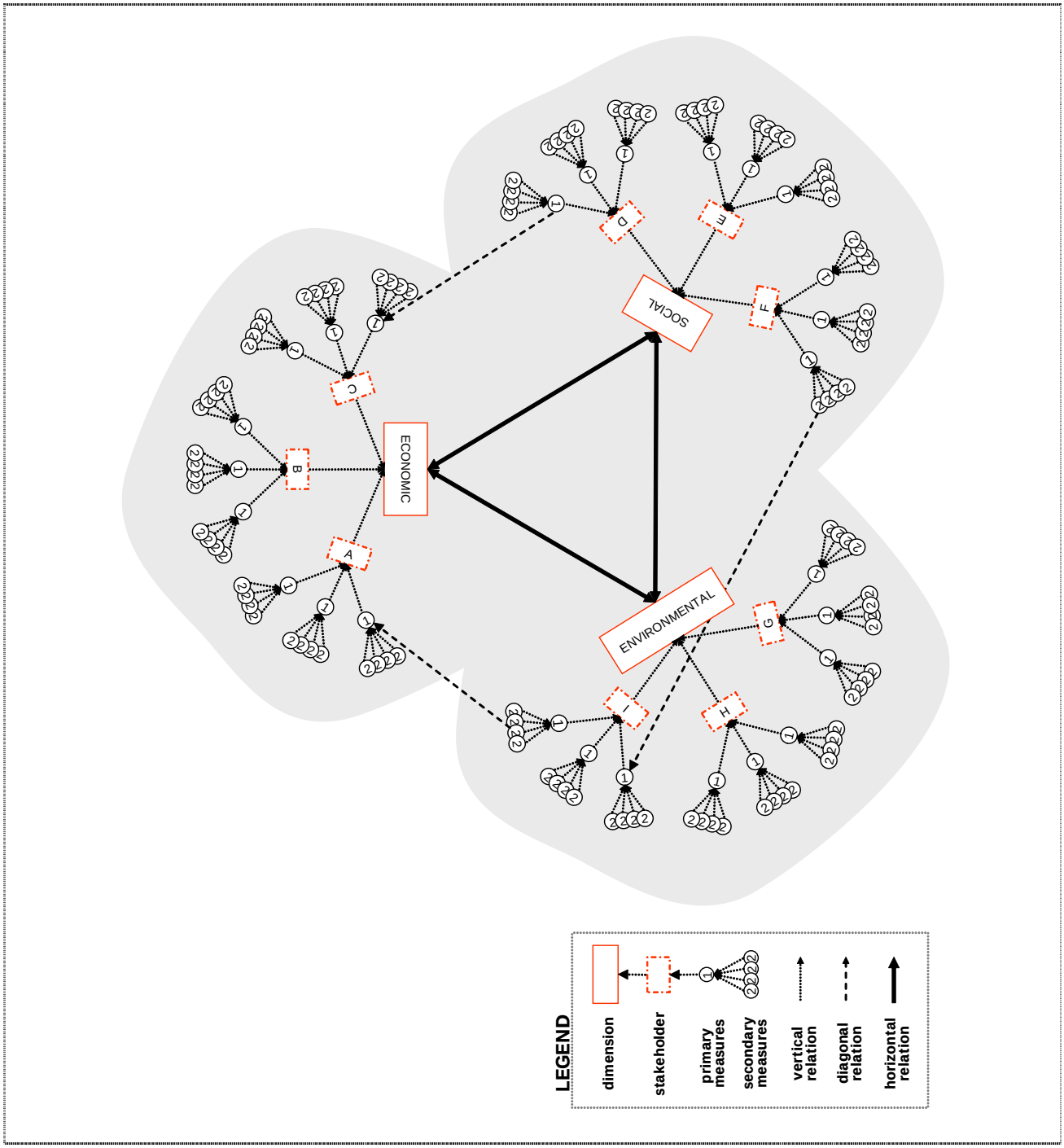
Fig. 6 - Comparison of results through DartBoard



Clover (Figure 7), in fact, lets us understand the connections between processes, stakeholder satisfaction, and each single dimension that encompasses them, through a vertical and diagonal development between primary and secondary measures. *Vertical* development involves both the identification of a logical relationship between stakeholder satisfaction and primary measures, and the evaluation of the cause-and-effect relationships between primary measures and secondary measures. *Diagonal* development, instead, involves the secondary measures that, while connected

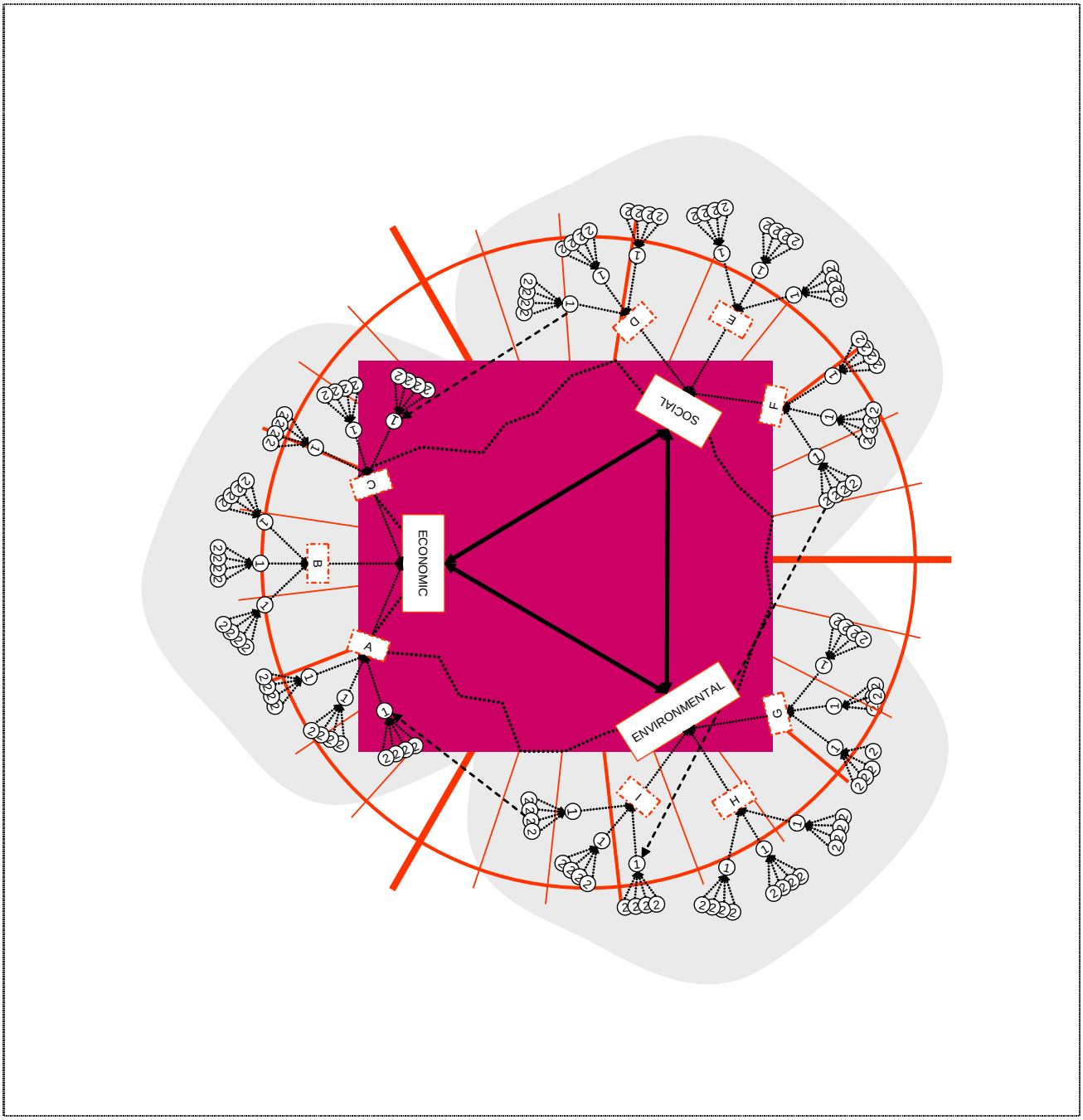
by a vertical relationship to stakeholder satisfaction, could also affect the satisfaction of other stakeholders.

Fig. 7 - Clover of sustainability



In addition, it is necessary to notice that some primary measures logically connected with a given stakeholder can, at the same time, be linked by a cause-and-effect relationship with the satisfaction of other stakeholders, becoming a sort of secondary measure. In this case, the model will show a diagonal relationship between two primary measures.

Fig. 8 – Complementary characteristics of DartBoard and Clover



DartBoard and Clover appear in this context more than ever complementary, and have in the primary measures the element that links them. These measures, in fact, are connected logically to stakeholder satisfaction (the base of DartBoard), and at the same time, they are the results of what has happened at the process level (quantified in the Clover by secondary measures) (Figure 8).

4.5 – *Planning and control process for sustainability*

DartBoard and Clover alone are not sufficient to move companies towards sustainability. Rather, they have to be part of a three phase process that allows for the spread of sustainability into day-to-day operational decisions.

The first phase consists of building a sustainability unit inside the planning and control function that must coordinate the entire process, whose main task is to ensure coherency between the sustainability principles and the strategies by:

a. evaluating the impact on corporate sustainability of each significant investment;

b. reporting sustainability data to top-management.

The second phase involves identifying measures, and begins when managers define the guidelines for strategic options to pursue critical success factors, and the strategic objectives for each business unit. These guidelines are formalized inside the industrial plan and quantified both in DartBoard and Clover.

For identifying measures it is necessary to distinguish between:

- *primary measures*: established, with a top-down approach, on the basis of industrial plans, stakeholder needs, sustainability ratings requirements (i.e. SAM, EIRIS, SiRi), sustainability reporting guidelines (i.e. GRI), successful practices of other companies;
- *secondary measures*: defined from each organizational unit with a bottom-up approach during the process of translating guidelines into measures.

Fig. 9 - Target chart

STRATEGIC OPTION:						
STRATEGIC OBJECTIVES	***PRIMARY MEASURES***	***TARGET***	***SECONDARY MEASURES***	***TARGET***	***ACTION PLANS***	***BUDGET***

For each pursued strategic option, a target chart must be defined in order to highlight (Figure 9):

- strategic objectives;
- primary measures and their targets;
- secondary measures and their targets;
- action plans;
- budget.

Finally, the third phase, consists of implementing a business intelligence platform that would gather the numerous and heterogeneous (qualitative and quantitative) data in one place.

5 – The public utilities' business case

After building the theoretical framework, we offer an empirical exploration of the case of Public Utilities (PU). This industry, in fact, is characterized by a large number of powerful stakeholders capable of affecting strategic choices (Andrews and Slater 2002). With reference to the strategic options that today seem to be on the agenda of many of the PU, we suggest an application of the proposed performance measurement system that can characterize the control system of these companies. In order to do this, we must first follow a process consisting of three distinct phases:

1. *map* all different groups of stakeholders, showing the needs that each of them expect to have met, and assign them to the right dimensions (Neelly *et al* 2002);
2. *formalize* the strategic options identified by senior management to achieve strategic goals;
3. *build* a set of measures capable of representing the degree of stakeholder satisfaction.

In the case of PU, the above mentioned phases are developed as follows:

1. the performance of the PU is influenced by a number of stakeholders, each with equal importance, including: regulation authorities, community, customers, employees, future generations, investors (shareholders and lenders), and local governments;

2. the main strategic options are tied to *enlargement of the client base*, to the *research of synergy between the various businesses*, to *alliances and aggregations*, to the *protection of the integrity of the natural environment*, and to *social acceptance* (AGICI 2005);

3. in the end, primary and secondary measures will be associated to each involved stakeholder, in order to evaluate the degree of satisfaction reached within the initial objectives imposed by

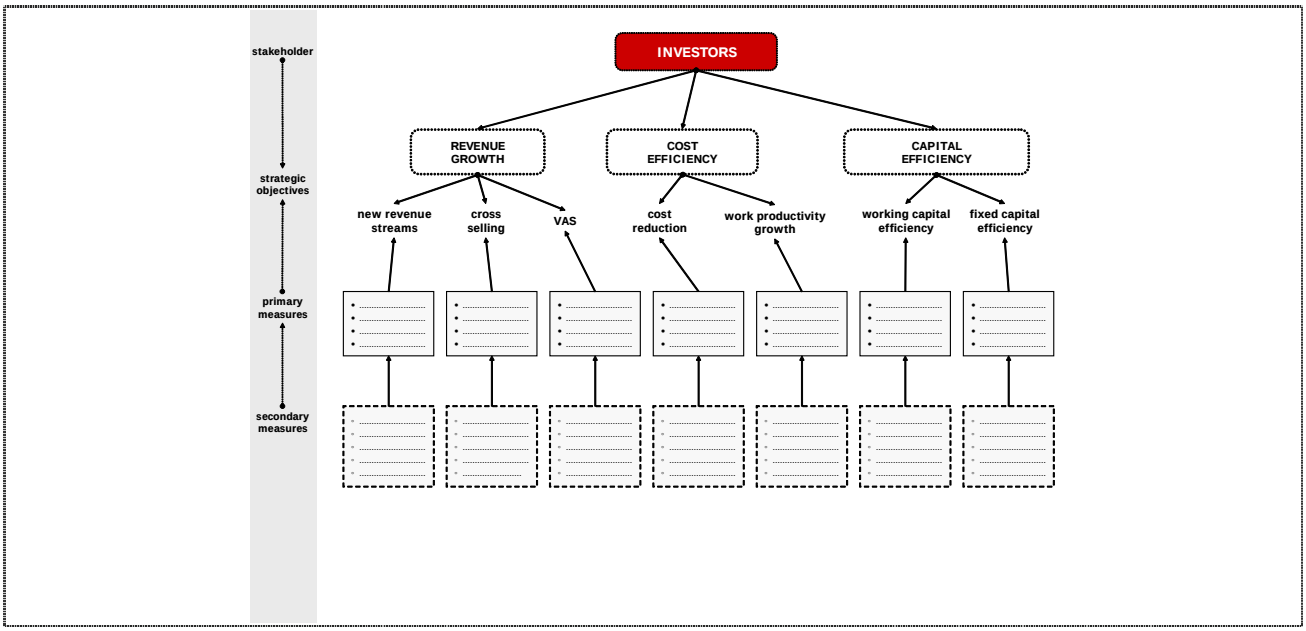
senior management. On the basis of this information, it is possible to design the framework, and to highlight the system of horizontal, vertical, and diagonal relationships between measures.

We now have the necessary elements to construct Clover, because it is possible to separate and place the needs of the stakeholders according to the various strategic options available to fulfil those needs, and build the measurement system.

We proceed by analyzing, in alphabetical order, each dimension. Since the structure of the primary and secondary measures is strictly connected to the strategic options, we cannot yet complete the set of measures shown in Figures 10-14.

In the economic dimension we can find at least two stakeholders: shareholders and lenders. Their needs are most clearly linked to value creation. As we already know, growth and efficiency are the two principles behind promoting value creation (Figure 10). In the context of PU, growth can be stimulated by exploring new revenue streams or by increasing sales to existing customers. Higher efficiency can be achieved through an increase in asset utilization and a reduction of costs.

Fig. 10 - Measurement of "investors" satisfaction



Moving to the environmental dimension the most important stakeholders are those that represent future generations. In fact, every business initiative brings with it consumption of materials and energy, producing a cost, that can be quantified as (Figure 11):

- *consumption of natural resources*;

- *pollution*, determined by the production of waste, emissions, and their effects on the environment.

Fig. 11 - Measurement of "future generations" satisfaction

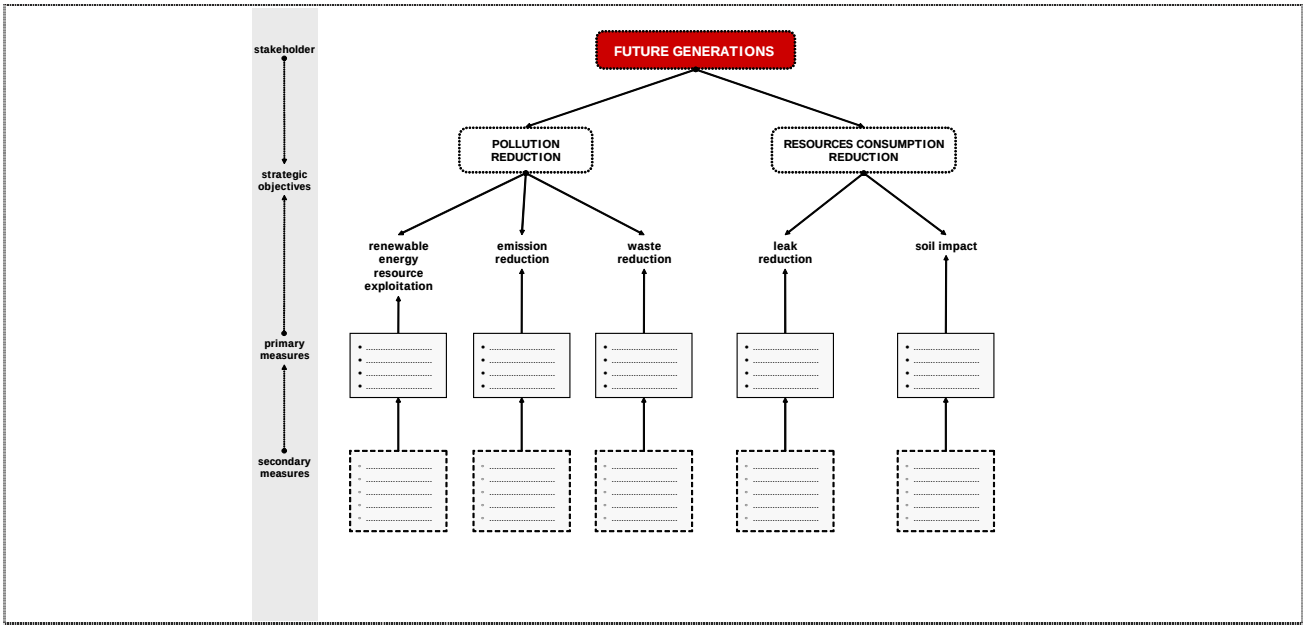
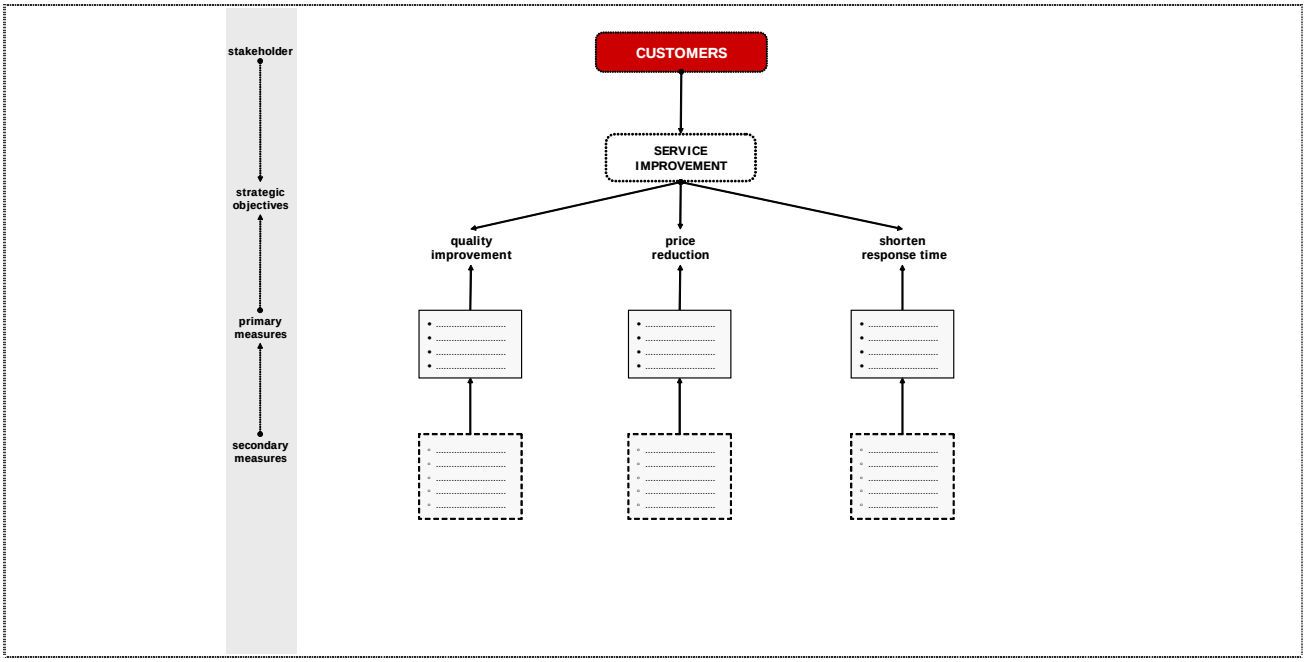


Fig. 12 - Measurement of "customers" satisfaction



Finally, in the social dimension we can find at least four stakeholders: customers, community, employees and regulation authorities. For the customer category, it is necessary to formulate strategic options that would improve quality, reduce prices, and shorten response time, in order to satisfy their needs (Figure 12).

Fig. 13 - Measurement of "community" satisfaction

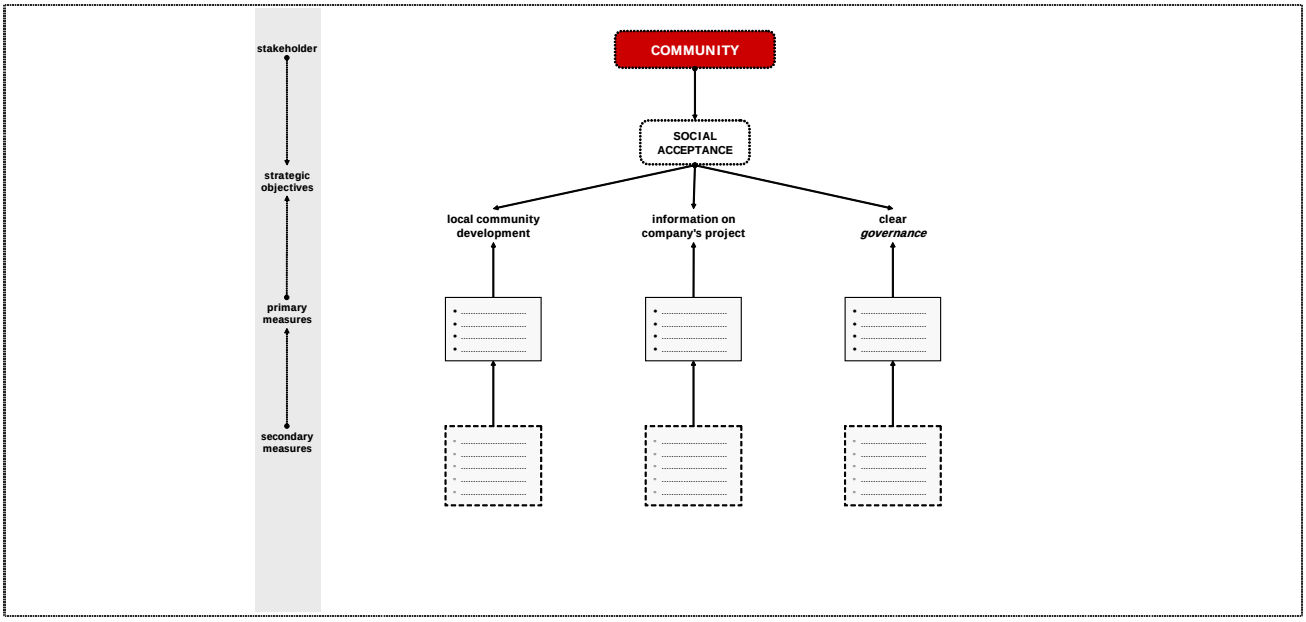
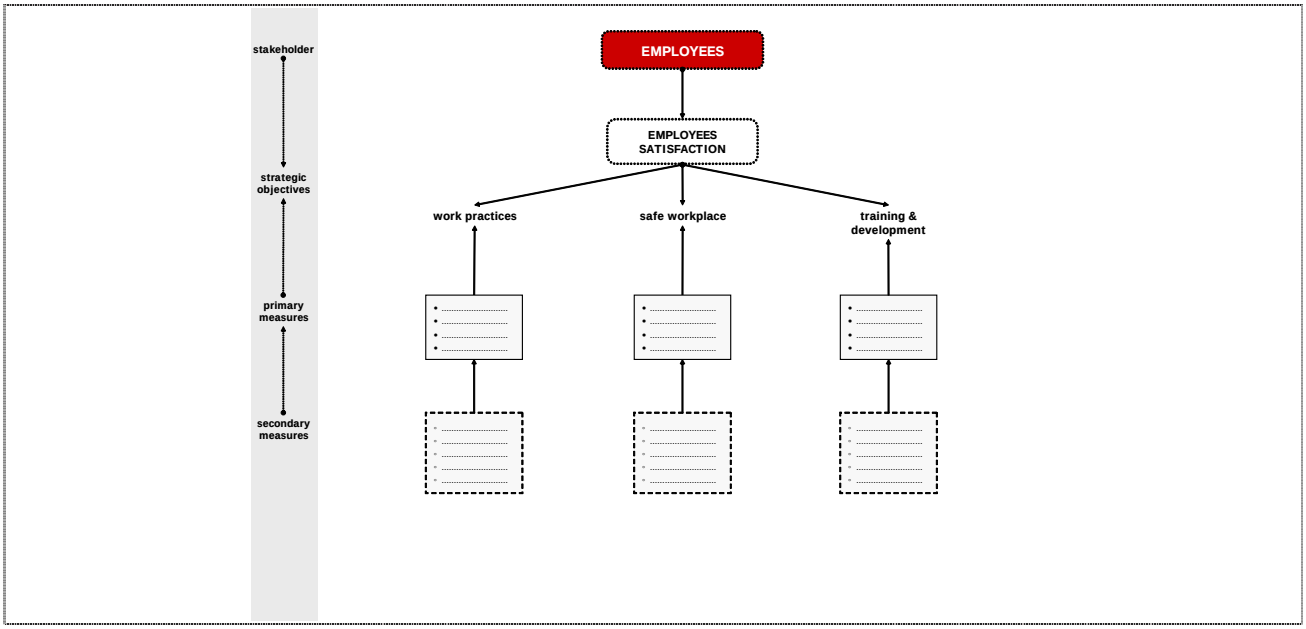


Fig. 14 - Measurement of "employees" satisfaction



The other two categories included in the social dimension are community and employees (Figures 13-14).

For these stakeholders, needs can be summarized as:

- *community*, which looks for an increase in the quality of life of any singular member (i.e. promotion of cultural activities and support for local initiatives);
- *employees*, who aim to obtain a safer workplace and room for growth in the company.

The PU industry is monitored by local and national regulation authorities, and often local governments represent a large portion of the shareholders. Although these are two important stakeholders, it would be redundant to create a set of measures expressly for them. Their satisfaction is determined by the level of satisfaction demonstrated in the customer and social-environmental categories.

As discussed earlier, it is impossible to complete the Figures 10-14 because the determination of strategic options has not yet been made. To Clover fulfilment let us imagine, for example, that top management decides to follow the strategic option of "*production of energy from renewable resources*" in order to satisfy the spectrum of its stakeholders. Such a decision implicates a deliberate choice made from a vast array of strategic objectives that, based on the breakdown into dimensions, can be exemplified as follows:

Economic Dimension:

- *cost reduction* in energy production, tied to obtainable savings from the progressive elimination of fossil fuel;
- *new revenue streams*, that can assume the form of green certificates or by capturing market shares to ecologically sensitive customers (i.e. Acqua Lete and ENEL);

Environmental Dimension:

- *emission reduction*, through elimination of toxic emissions tied to the production of electricity from fossil fuel;

Social Dimension

- *product quality improvement* for those customers who distinguish themselves as defenders of the environment;
- *safer workplace* through reduction of risks associated with the organization of safety meetings.

Following the logic of the proposed model, we must now identify a set of indicators for each sensitive stakeholder grouped into each dimension, and build within them a system of relations so that it will be possible to:

a. appreciate with *ex-ante* logic the future sustainability of the strategy;

b. verify *currently* that the actions are coherent with the strategy;

c. monitor *ex-post* the progress of the planned objectives.

Fig. 15 - Target chart

STRATEGIC OPTION: *PRODUCTION OF ENERGY FROM RENEWABLE RESOURCES*						
ECONOMIC DIMENSION						
STAKEHOLDERS: *SHAREHOLDERS, LENDERS*						
STRATEGIC OBJECTIVES	***PRIMARY MEASURES***	***TARGET***	***SECONDARY MEASURES***	***TARGET***	***INITIATIVE***	***BUDGET***
cost reduction	*average cost for KWh*		*% KWh from RES*			
			tot KWh from RES			
new revenue streams	*revenues from green certificates*		*KWh of green energy produced*			
	new environmentally minded customers		*marketing investments to push the green brand*			
ENVIRONMENTAL DIMENSION						
STAKEHOLDERS: *FUTURE GENERATIONS, REGULATION AUTHORITIES, GOVERNMENT*						
STRATEGIC OBJECTIVES	***PRIMARY MEASURES***	***TARGET***	***SECONDARY MEASURES***	***TARGET***	***INITIATIVE***	***BUDGET***
emission reduction	*direct emission of Greenhouse Gasses (CO2, CH4, NOx)*		*# of emission prevention projects*			
			ISO 14001 certification			
			R&D investments			

SOCIAL DIMENSION						
STAKEHOLDERS: *CUSTOMERS, REGULATION AUTHORITIES, GOVERNMENT, EMPLOYEES, COMMUNITY*						
STRATEGIC OBJECTIVES	***PRIMARY MEASURES***	***TARGET***	***SECONDARY MEASURES***	***TARGET***	***INITIATIVE***	***BUDGET***
quality improvement	*survey score for customer perception about the service*		*RECS participation*			
			ISO 14001 certification			
information on company's project	*survey score about the impact of the new generation plants*		*R&D investment to lower impact*			
			investment for customer engagement			
safer workplace	*# of accidents*		*safety investments*			
			# of hours of safety meeting per worker			

The set of indicators relative to the strategic option "*production of energy from renewable resources*" can be usefully represented by the following "target chart" (Figure 15).

In order for the system of measurement to be effectively used for planning and control, it must be organized according to Clover. In this way, it is possible both to make evident the validity of the hypothetical vertical, and diagonal relationships between measures, and to create the propositions for the verification of the horizontal relationships among dimensions, that would come through DartBoard if given real data.

Given that primary measures are logically linked with stakeholder satisfaction, it is more interesting to describe the cause-and-effect connection between secondary measures and primary measures. The above formulated strategic option assumes, for example, the following vertical and diagonal relationships:

- *vertical* relations between primary and secondary measures are:

a. *average cost for KWh* should be related to *tot KWh from Renewable Energy Sources (RES)*, because the average cost of green energy is believed to be lower;

b. *revenues from green certificates* should be related to *KWh of green energy produced*, because the more green electricity you produce, the higher the number of certificates you receive;

c. *new customer acquisition* should be connected to *marketing investments* to push the green brand, because customers are assumed to be increasingly demanding "green-differentiated" products;

d. *direct emissions* should be connected to the power of innovation in the field of renewable resources, linked to *Research & Development (R&D) investments*, because it is assumed that the more that is invested in R&D, the higher the probability will be to reduce emissions;

e. *survey score for customers about the impact of the new generation plants* should be linked both with *R&D investments to minimize the aesthetic impact of production plants*, and the *investment in customer engagement*, because it is assumed that the more that is invested in R&D and in customer engagement, the better the chances are to create customer acceptance;

f. the *number of accidents* should be minimized with *safety meetings* addressing the potential risks of the new production plants, because it is assumed that the more informed the employees are, the more attention they will pay to safety procedures, thus reducing the accident rate;

- *diagonal* relations between primary and secondary measures:

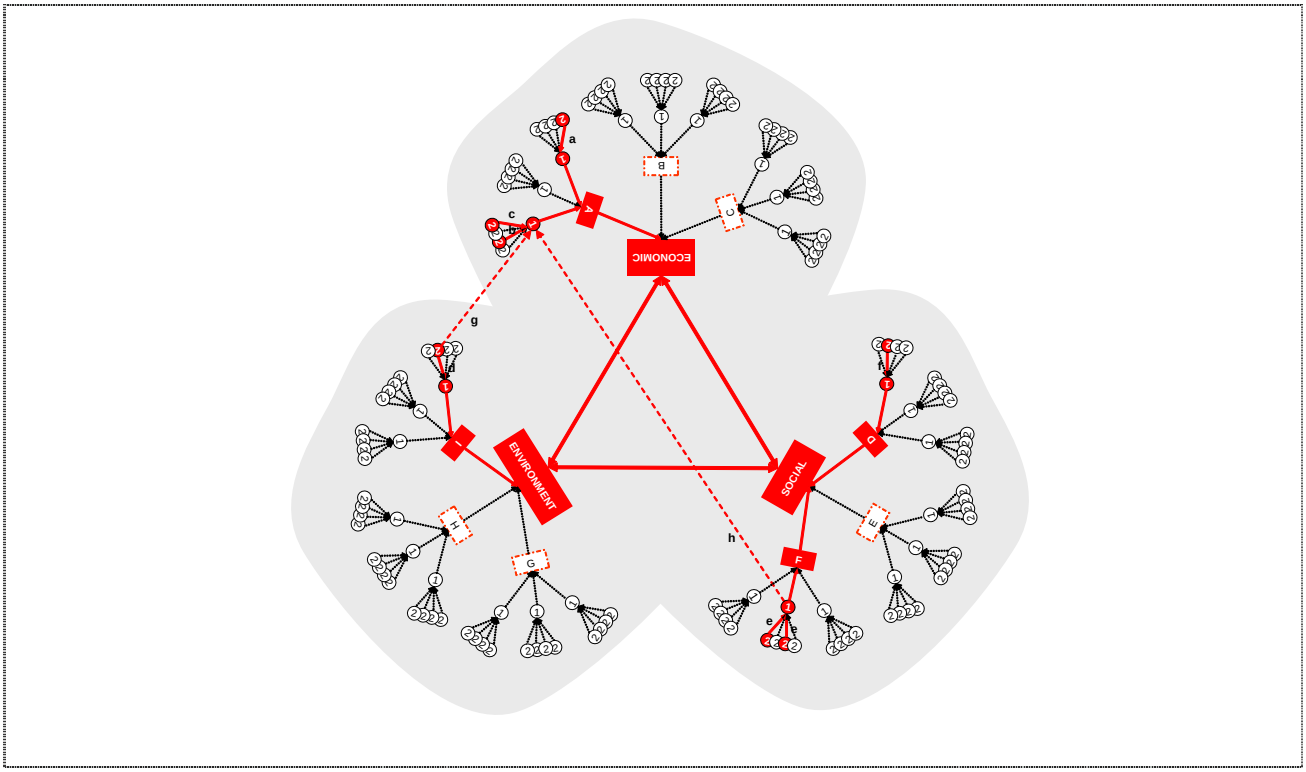
g. *revenue from green certificates*, which should be related to the *R&D investments*, because the innovation process could increase production of electricity;

- *diagonal* relations between primary measures:

h. *new customer acquisition,* which should be connected to the *customers survey score for customer perception about the service*, because it is assumed that the more customers are satisfied with the service, the higher the customer acquisition rate will be.

Figure 16 gives the image of Clover in action, where the strategic option *"production of energy from renewable resources"* is organized into the network of relationships highlighted by the lower-case letters in accordance to the description given above.

Fig. 16 - Clover in action



The last step to shape the performance measurement system is to transfer all the primary measures onto DartBoard, to evaluate the impact on sustainability of the given strategic option.[3]

6. Conclusion and future aims

The requests for sustainability by interested parties are continually growing in number and force. Stakeholders have put great pressure on companies, forcing them to be more transparent in the market, and have succeeded in convincing them that the traditional system of reporting no longer

[3] To complete this task, we would need the real data that we are unable to produce here, since the situation is hypothetical

suffices. As such, environmental and social performance reporting has been introduced, and in its most evolved form, companies can even replace the single bottom line with the triple bottom line (Elkington 2000). The attention to sustainability, however, cannot be limited to external reporting. If sustainable development is the only option that guarantees survival, all business decisions must be made in accordance with it. For this reason management needs a control system that supports the decision-making process through:

- evaluating business performance through its economic, environmental, and social dimensions, in order to analyze their horizontal relationships (that highlight the trade-offs between the dimensions);
- identifying the performance drivers, by formalizing the system of vertical relationships (that link the actions taken to the realization of strategic objectives).

The proposed model performs these functions by using two complementary instruments of planning and control, *DartBoard* and *Clover*, placing them among the current instruments of management, with the intention of integrating the functionality of existing models.

However, some aspects still have to be elaborated. In particular, it is necessary:

1. to test the model here undertaken for PU in other industries, in order to verify its validity on a larger scope;
2. to identify a standard set of measures for every industry, making the degree of sustainability among companies a characteristic that can be compared in space and time. This would allow us to increase sustainability with a standardized DartBoard that could serve as a better performance interpretation tool;
3. to establish a system of scoring that makes it possible to correlate sustainability performance with stock market performance.

It is clear that many firms today still function on the basis of the traditional shareholder value maximization model. Nevertheless, we observe a growing interest in the new paradigm of performance, sustainability, for which an adequate measurement system has not yet been found. Our work represents a starting point that we hope will facilitate the management of sustainability.

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