

# **System Dynamics models to detect side effects in apparently sound strategies designed through a Balanced Scorecard approach: some examples**

## **Extended abstract**

Strategy is commonly intended as a coordinated set of decisions for the achievement of business success and, hence, for the satisfaction of those needs a company exists for. In order to evaluate strategies' validity, it is important to verify whether companies are moving in the desired direction by measuring the achieved results and compare them with strategic objectives. For this purpose, managers utilize performance measures, which are quantitative indicators of companies' efficiency and effectiveness in pursuing strategic goals. However, often companies use aggregation of stand-alone measures, which do not provide any insight of how performances in different functional areas are interrelated. This may imply strategy disconnections and, as a consequence, a waste of efforts. For this reason, different performance measurement systems have been proposed, where indicators are linked to each other in terms of either mathematical or causal relationships.

Traditional performance measurement systems, such as the DuPont system, have been criticised<sup>1</sup> because they are exclusively focused on financial measures. Precisely, they do not enable the management to control soft variables (i.e. customer satisfaction, company image, product quality, customer loyalty, etc.), which are crucial in determining the success of a company.

Generally, such soft indicators are not enough focused by conventional accounting tools, since, usually, they are not expressed in financial terms. However, monitoring the dynamics of non-monetary performance indicators is a necessary step to assess the company's attitude to satisfy stakeholders, a pre-requisite for achieving financial targets and long-term survival and growth.

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<sup>1</sup> Norreklit H., "The balance on the balanced scorecard – a critical analysis of some of its assumptions", Management Accounting Research, vol. 11, 2000.

In particular, a systemic view of those indicators allows firms to:

- evaluate managerial efficiency and effectiveness;
- individuate and set policy-levers to improve performance also in the long term;
- outline targets referred to different business areas and link them to compensation and career systems;
- discern about causes related to unexpected results;

Basically, the risk of relying exclusively on financial measures is that they do not provide an accurate picture of the company's direction and, thus, they can lead the management to seek short-term goals rather than long-term growth. Managers, in fact, may be reluctant to invest in intangible assets in order to avoid reductions of current financial results<sup>2</sup>. In the long term, such a policy may imply lower efficiency, customers and stakeholders dissatisfaction and, hence, companies' failure.

Finally, the difficulty to translate financial indicators included in traditional performance measurement systems into non-monetary goals for the different functional areas may hinder communication of companies' strategy to managers and employees at the different level of the organization hierarchy and, hence, determine incongruence between strategic decisions and daily operations.

At the beginning of the 90s, Kaplan and Norton introduced the Balanced Scorecard with the aim of overcoming the above-mentioned limitations characterizing financial performance measurement system. In particular, Kaplan and Norton affirm that financial measures (ROI, ROE, etc.) are lag indicators, which only provide information about past results neglecting the drivers of future performances (lead indicators).

Specifically, lag indicators are outcome measurements, as they indicate the result of a strategy. In other words, they point out how the company has performed. On the contrary, lead indicators are *driver* measures, as they show the progress of key areas in the implementation of a strategy. Outcome measures can only indicate the final result, while driver measures illustrate incremental changes that ultimately affect the outcome.

As a consequence, they suggest a performance measurement system, the Balanced Scorecard, where lead and lag indicators are balanced so that companies can

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<sup>2</sup> Norreklit H., "The balance on the balanced scorecard – a critical analysis of some of its assumptions", Management Accounting Research, vol. 11, 2000.

simultaneously evaluate the achieved results and their progresses towards the implementation of a strategy in the core business areas.

Moreover, in order to avoid that performance improvements in one area may be at the expense of performance in other areas, the BSC translates the company's strategy into a set of causal relationships between the objectives contained in four key-perspectives (financial, customer, internal processes, learning and growth).

Precisely, this approach is aimed to offer a systematic and a comprehensive road map for organizations to follow in translating their mission statements into a coherent set of performance measures. These measures are not only intended to control company performances, but also to articulate and communicate the organization's strategy and to help align actions from different levels of management for the achievement of a common goal.

Furthermore, the BSC enhance managers' understanding of strategies and stimulates the creation of a common company's vision. The BSC, indeed, forces managers to elicit, compare and discuss their implicit assumptions and beliefs and to articulate them for the formulation of company's strategy. Managers, in fact, are requested to contribute to the implementation of the BSC by identifying a set of objectives that are connected by causal relationships and that are consistent with the vision and mission of the company.

Even though the BSC has been largely adopted by companies throughout the world and has been widely accepted in the business management academia, it presents some conceptual and structural limitations:

- delays between actions and their effects on the system are ignored;
- causal relationships between performance measures follow an open-loop logic and, hence, they do not consider feedbacks;
- important external factors (competitors' reaction, technological innovations), which can seriously undermine strategy's success, are not adequately considered;
- performance measures' relevance, relationships between indicators and corporate strategy, and underlying assumptions cannot be validated against reality.

In particular, with regards to the last aspect, Kaplan and Norton alert managers that the BSC describes the vision of the future for a company, but it cannot indicate if the vision

is wrong. Furthermore, if the BSC is not a valid representation of the business strategy it will lead individuals and departments to “*unknowingly sub-optimize their performance*”. Likewise, if the lead indicators included in the BSC are incorrect, companies’ investments “*will be wasted*”.

In the light of such warnings, managers, who already adopted or intend to apply the BSC as a performance measurement system, should wonder:

*How can we know whether our vision is right?*

*How can we validate our BSC?*

*How can we individuate the correct lead indicators?*

In consideration of the above mentioned flaws in the accounting and BSC approaches for a strategy planning and control process, it is evident the need of managers for a strategic decision support tool that enables them to cope with dynamically complex systems. Kaplan and Norton explicitly recognized that integrating BSC and SD might satisfy such a need. In fact, they affirmed:

- “*The BSC can be captured in a SD model that provides a comprehensive, quantified model of a business’s creation value process*”<sup>3</sup>;
- “*Dynamic Systems Simulation would be the ultimate expression of an organization’s strategy and the perfect foundation for a Balanced Scorecard*”<sup>4</sup>.

Precisely, in the literature<sup>5</sup> different advantages stemming from the adoption of the SD approach in the formulation of BSC have been outlined. In particular, the use of a SD model will help managers in:

- obtaining a deeper understanding of the causal structure of the entire company system;
- taking into consideration delays between actions and their effects;
- validating the description of company’s strategy against reality,

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<sup>3</sup> Kaplan R., Norton D., “Linking the Balanced Scorecard to Strategy”, op. cit.

<sup>4</sup> Richmond B., “A new language for leveraging scorecard-driven learning”, reprinted from Balanced Scorecard Report, Harvard Business School Publishing, Vol. 3, no. 1, 2001.

<sup>5</sup> In particular, Akkermans H., van Oorshot K., “Developing a Balanced Scorecard with System Dynamics”, 20<sup>th</sup> System Dynamics International Conference, Italy, 2002.

- filtering performance measures in order to select the smallest number of proper indicators of company's progress towards strategic goals,
- simulating the effect of performance drivers on financial outcomes in order to individuate the most opportune policy levers,
- implementing *what if* analysis to learn about future scenarios and potential threats,
- assessing company's strategy and vision and their coherences in order to detect potential side effects.

Based on case studies from the literature this paper shows how static BSCs may reveal some major drawbacks in detecting potential side effects in adopting strategic policies.

Precisely, this analysis intends to give some examples of the opportunity to support the BSC with a SD model to develop managers' ability to individuate and to counteract the unanticipated and undesirable effects of statically designed strategies.

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