

BALANCED SCORECARD AND ITS INFORMATION SYSTEM:
THE PERFORMANCE DATA WAREHOUSE

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Abstract

The Balanced Scorecard is a strategic management tool that was formed in 1992 by Robert Kaplan and David Norton. Its success has been proven by the wide diffusion that has characterized it in the last decade. Basically, Balanced Scorecard represents a performance appraisal system that demonstrates an overall vision of how a firm is performing. In the evaluation, four relevant perspectives of a company are taken into account: economic-financial; customer satisfaction; internal business processes; innovation and organisational learning.

Obviously, in order to create an evaluation system based on many key performance indicators, it requires the availability of information about different areas and, therefore, with completely different contents. Furthermore, the information available must be spread throughout the organisation and be legible by all the members that belong to the different firm's units and functions. Hence the necessity of an integrated Information Technology project that provides such sources.

This paper offers a synthetic description of the Balanced Scorecard tool, its functioning and effectiveness, but mainly it intends to highlight the importance of a particular Information System dedicated, Performance Data Warehouse, and to describe how it supports the Balanced Scorecard on a long-term dynamic relationship.

1. Introduction

The Balanced Scorecard has to be collocated in the wider context of Performance Management and represents one of its most important and innovative tools.

Performance Management can be defined as a system that allows the calculation of business outcomes through their alignment with the business strategy, in order to support the decision process coherently with strategic predetermined goals and with all the improvement initiatives aimed to the achievement of that strategy.

Basically, its diffusion within the business practices is explained by the requirement of monitoring new critical variables: business more than products, processes more than functions, quality and service more than volumes. Costs are more influenced by the business complexity than by the production volumes and the key resources have an immaterial connotation (know-how, flexibility, innovation capability, etc.).

All these changes have focused the attention of management on the competitive position of the firm and on its future outcomes, in order to figure out the economic value created and not just the current profitability.

Thus, the Balanced Scorecard satisfies these new requirements because it allows the monitoring of critical variables that Kaplan has identified in: financial; internal business process; customer; learning and growth.

Hence, not only financial measures as ROE, ROI or EVA but a set of integrated variables as Customer Satisfaction, Market Share, Time to Market, Employee Productivity, and so forth.

Finally, another innovative aspect is the building path of the Balanced Scorecard as it is a typical top-down process; what has been done in the operational level becomes meaningful, even in terms of its evaluation, only if it represents the operational implementation of a strategic issue. So such a tool intends to be a link between the company strategy and its accomplishment allowing the evaluation of the achievement degree of objectives.

2. Balanced Scorecard and its functioning

The scorecard addresses a serious deficiency in traditional management systems: their inability to link a company's long-term strategy with its short-term actions. Many problems related to this gap are sorted out when a firm uses the balanced scorecard as strategic management system because its implementation requires a defined building path made up of four new processes: **1) translating the vision; 2) communicating and linking; 3) business planning; 4) feedback and learning.**

The first process helps managers to clarify the vision and to build a consensus around the organisation's strategy.

Although the implementation process starts by the Top Management, it is paramount to creating a consensus on the way in which both the business unit **vision** and **mission** are translated in operational goals and measures. Any member has to know the final aim of the firm (vision) and the set of activity required in order to achieve that aim (mission).

The second process gives managers a way of ensuring that all levels of the organisation understand the long-term strategy and both departmental and individual objectives are aligned with it. Then the broad participation in creating a scorecard means that the information from a larger number of managers is incorporated into the internal objectives and it encourages a stronger commitment to achieve those goals. Once the top management has clarified what the organisation is trying to achieve for shareholders and customers, the next step is aligning employees' individual

performance with the overall strategy through three activities: communicating and educating, setting goals, and linking rewards to performance measures.

The third process enables companies to integrate their business and financial plans. The exercise of creating a balanced scorecard forces managers to think about the strategic planning simultaneously with the resource allocation and the budgeting process. Thus, at the end of a business planning process, managers should have set targets for the long-term objectives in all four scorecard perspectives, they should have identified the strategic initiatives required and allocated the necessary resources to those initiatives.

The fourth process enables companies to monitor progress in the achievement of strategy in the light of recent performances. Most companies operate in a turbulent environment with complex strategies that, though valid when they were launched, may have lost their validity as business conditions changed. Strategic learning, or **double-loop learning**, consists of gathering feedback, testing the hypotheses on which strategy was based, and making the necessary adjustments. Traditionally, companies use the monthly or quarterly meetings between corporate and division executives to analyse the most recent period's financial results trying to understand why some objectives were not achieved. The balanced scorecard, with its specification of the causal relationships between performance drivers and objectives, allows corporate and business unit executives to use their periodic review sessions to evaluate the validity of the unit's strategy and the quality of its execution.

The above mentioned performance drivers, and their causal relationships with objectives, are another relevant feature of the scorecard. With this tool an important distinction is made among **outcome measures**, which are taken into consideration by the management due to their relevance for an evaluation of how a firm is operating, and **performance drivers**, which represent the critical factors on which the management might intervene because of their influence on the business outcomes.

Thus, between those two factors there is supposed to be a tight causal relationship in order to impact on strategic goals through well-defined adjustments about several performance drivers that seem to have a relevant influence on the most critical business results.

2.1 The four perspectives

Today the complexity of managing an organisation requires managers be able to view performance in several areas simultaneously. The balanced scorecard brings together all the information about the four perspectives in a single management report but, mostly, it focuses the managers' attention only on the handful of measures that are most critical, avoiding an overload of information.

Looking at an overall company's performance allows knowing either whether improvements in one area have been achieved at the expense of another or if those improvements are aligned with the future initiatives in the same area or in another.

Financial perspective

The balanced scorecard should encourage the different business units to link their financial goals to the overall company strategy.

Many firms adopt the same set of financial objectives for all the business units because it facilitates the internal communication and the managers' appraisal. But when the single divisions adopt different strategies or they are going through different business life cycles, even the financial goals should be adapted to reflect which performances are more important for a strategic area and which are indeed less relevant.

However, the financial objectives have to be used either as final goals for the objectives and the measures of all the others perspectives or to define the economic performance of the strategy.

Typical financial goals have to deal with profitability, growth and shareholder value. To overcome their backward-looking focus and their inability to reflect contemporary value-creating actions, often managers conduct shareholder value analysis which forecasts future cash flows and discounts them back to a rough estimate of current value.

Customer perspective

Many companies today have a corporate mission that focuses on the customer. The balanced scorecard requires that managers translate their general mission statement on customer service into specific measures that represent the factors that are very important to customers.

Basically, there are two kinds of measures that reflect the distinction between outcomes and performance drivers. Included in the first set of variables are: customer satisfaction, customer loyalty, new customer acquisition, customer retaining and customer profitability.

In the second set of variables, the performance drivers, are included: qualitative features of a product/service, customer relationship and brand reputation.

Internal business process perspective

Customer-based measures are important, but they must be translated into measures of what the company must do internally to meet customers' expectations. Managers need to focus on those critical internal operations that enable them to satisfy customer needs.

Traditionally, performance appraisal systems were based on the single responsibility units and not on integrated business processes. With the balanced scorecard both the objectives and measures for this perspective are drawn by explicit strategies aimed to satisfy shareholders and customers expectations. This kind of top-down process enables finding out new critical operations and competencies in which the company must excel. To achieve goals on cycle time, quality, productivity and cost, managers must devise measures that are influenced by employees' actions. Thereby, even employees at lower levels in the organisation have clear targets for actions, decisions and improvement activities that will contribute to the company's overall mission.

Innovation and Learning perspective

Once the company has defined which financial measures fit its business, has focused its strategy on the customer and has found out which are the most critical internal processes, it has to set up the infrastructure that supports the whole system. Here

infrastructure means the set of organisational capabilities represented by the human capital and the information system. Without long-term investments on the human resources, on the research and development, and on the technologies, competitive advantages achieved in the customer and internal processes perspectives are likely to be kept in the short-term.

Hence, only through continuous improvements related to the innovation and learning capability may a firm be able to launch new products, to penetrate new markets, to create more value for customers and shareholders, in short, to grow effectively.

3. The need for an alignment between business strategy and information technology strategy

The Innovation and Learning perspective highlights the importance of choices related to the organisational structure and, in particular, the information system.

Information systems (IS) have evolved from their traditional orientation of administrative support toward a more strategic role within organisations participating in the creation of competitive advantages for businesses. They range from automation to business process reengineering to the paradigm shift of creating completely new business models.

Porter (2001) described the five overlapping stages in the evolution of technologies in business: automation of discrete transaction, functional enhancement of activities, cross-activity integration, integration of the entire value-chain, and the optimisation of various activities in the value-chain in real time.

The organisation literature offers many perspectives to analysing the importance of strategic choices about the IS within organisations and their effects on performance, value-chain structure, innovation capability, and so on.

Here it might be interesting adopting the strategic alignment framework that studies the relationship between business and IT strategies. If the methodology of the Balanced Scorecard has pointed out the necessity of an explicit strategy, understood by the entire organisation, then it should not be overwhelming recognising which critical role a strategic IS could play in the communicating and monitoring processes of a company.

The notion of strategic alignment originates from a body of conceptual and empirical work in the organisation's literature whose fundamental proposition is that organisational performance is the consequence of fit between two or more factors such as strategy, structure, technology, culture and environment. The contingency relationship that has received particular attention, has been the one between business strategy and technological deployment that supports the information processing requirements, due to the continuous strategic changes facing organisations.

This approach is thus based on the assumption that organisations will be more effective and will perform better when their information-processing capacities (IT structure) fit their information-processing requirements (IT strategy).

This concept of 'alignment' or 'fit' expresses an idea that the object of design, e.g. an organisation's structure or its information system, must match its context in order to be effective (Iivari, 1992).

Parsons (1983) was one of the first to argue that IT can affect a firm's ability to execute their business strategy. Since then, many others have emphasised the need to develop a fit between IT strategies and business strategies (Henderson and Venkatraman, 1989; Galliers, 1991; Chan et al., 1997).

Thus, strategic alignment is not an event but a process of continuous adaptation and change. A critical lever for attaining this dynamic capability is not a specific set of sophisticated technological functions, but the organisational capabilities to leverage technology to differentiate its operations from competitors. In other words, single IT applications could not deliver a sustained competitive advantage. Rather, advantage is obtained through the capability of an organisation to exploit IT functionality on a continuous basis. This requires a fundamental change in managerial thinking about the role of IT in organisational transformational, as well as an understanding of the critical components of IT strategy and its role in supporting and shaping business strategy decisions (Henderson and Venkatraman, 1999).

Any strategy should address both **external** and **internal** domains. The former is the business arena in which the firm competes and is concerned with decisions such as product-market offering and the distinctive strategy attributes that differentiate the firm from its competitors. The latter is concerned with choices pertaining to the logic of the administrative structure (functional or divisional or matrix organisation), and the specific rationale for the design of critical business processes, as well as the

acquisition and development of the human resource skills necessary for achieving the required organisational competencies.

4. Strategic information systems planning

Strategic information systems planning (SISP) is a key concern facing top business and information systems executives. SISP is the process whereby an organisation determines a portfolio of computer-based applications to help it achieve its business objectives (Lederer and Sethi, 1988). It is an intricate and complex group of specific, interrelated tasks or activities that enable top management to identify the strategic applications in which to invest, to carry out the firm's existing business strategy and to define new technology policies and architectures.

SISP can also entail searching for applications with high impact and the ability to create an advantage over competitors; it could contribute to build barriers against new entrants, change the basis of competition, generate new products or change the balance of power in supplier relationships.

Hence, the failure to execute SISP might cause many problems: lost opportunities, duplicated efforts, incompatible systems, and waste of expensive resources.

Usually, to carry out SISP (especially in the alignment mode), an organisation selects an existing methodology and then conducts an intensive study. The organisation forms committees of users with IS specialists as members or advisors. A multi-step procedure is carried out over several weeks or months and the duration generally depends on the scope of the study.

In addition to identifying the portfolio of applications, the organisation prioritises them and defines databases, data elements, and a network of computers and communication equipment to support the applications. It also prepares a schedule for development and installation.

4.1 Methodologies

Organisations generally apply one of a number of methodologies in order to perform these SISP studies. Three of the most popular methodologies include: a) Business

Systems Planning (IBM, 1975; Lederer and Putnam, 1986); b) Strategic Systems Planning (Holland Systems, 1986); c) Information Engineering (Martin, 1982).

Business Systems Planning (BSP), developed by IBM, involves top-down planning with bottom-up implementation. In this case, a firm recognizes its business mission, objectives and functions, and how these determine its business processes. The processes are analysed for their data needs, and data classes are then identified. Databases are developed by combining similar data classes. The final BSP plan describes an overall information system architecture as well as the installation schedule of individual systems.

BSP places heavy emphasis on top management commitment and executive involvement. Top executive sponsorship is perceived as critical, whereas IS analysts might serve primarily in an advisory capacity.

Strategic Systems Planning (SSP), developed by Robert Holland, defines a business function model by analysing major functional areas. Data architecture is derived from the business function model by combining information requirements into generic data entities and subject databases. An IS architecture then identifies new systems and their implementation schedule.

Although the language differs slightly, the steps in the SSP procedure are similar to those in BSP. A major difference from BSP is SSP's automated storage, manipulation, and presentation of the data collected during the SISP process. Software produces reports in a wide range of formats and with various levels of detail. A data dictionary interface facilitates sharing SSP data with an existing data dictionary or other automated design tools.

Information Engineering (IE), developed by James Martin, provides techniques for building enterprise models, data models, and process models. These form a comprehensive knowledge base which then creates and maintains information systems. IE is considered by some to be a more technically oriented approach than other SISP methodologies.

5. The Balanced Scorecard's architecture: Performance Data Warehouse

Probably the most relevant feature of a Balanced Scorecard is the presence of a consistent number of interrelated indicators. These are strategic measures, linked by a causal relationship, and represent the synthesis of many data drawn by different source systems.

The implementation strategy of a Balanced Scorecard project is a gradual process; it may start either from the top management and going down along the organisational scale, or from a business unit and extending the use to the others SBU (strategic business unit) and to the top executives.

Whatever path will be chosen, an information system dedicated shall be implemented to ensure flexibility in the information flow and in the scorecards' building process. A computer-based solution that has received particular consensus in regard to its effectiveness has been the Data Warehouse technology.

Data Warehouse (DW) is a decision-support environment that leverages data stored in different sources, organising it and delivering it to decision makers across the enterprise, regardless of their platform or technical skill level. Further, it supports business analysis by creating an integrated database of consistent, subject-oriented, historical information (Inmon, 1997).

Thus, it is a separation structure among information systems that daily gather management data by single transactions, e.g. On-line Transaction Processing (OLTP), and systems that support the decision-making process.

Data Warehouse's role is partly explained by the different use of information within those two systems and by the requirement of integrating the data from them to enable consistent analysis and reporting.

Its effectiveness is proven by the many advantages that this kind of architecture has provided through the firms' experiences. Advantages are mainly related to problems solution like:

- Very long data processing due to the details of the information flows;
- Information volatility due to continuous changes of management data that hinders the short-term repetition of data analysis;

- Fragmented information both on many scorecards and on different information systems;
- Low data quality;
- Lack of on-line historical data that does not allow comparisons between outcomes linked to different periods.

Hence, significant cost benefits and time savings are associated with using a DW for information processing because it improves the productivity of corporate decision makers through consolidation, conversion, transformation, and integration of operational data and provides a consistent view of the enterprise.

To realise the full potential of the investment, such a tool must be readily available to the decision-making majority and users have to be able to share live reports that include not only text, but also the calculations and assumptions supporting the analysis.

The most important component of the DW is **metadata**. It is an ‘information’ about data and plays a special role because it is used as:

- A directory to help in locating the contents of the DW.
- A guide to the mapping of data as the data is transformed from the operational environment to the DW’s one.
- A guide to the algorithms used for summarisation between the current data and the summarised data, and so forth.

Another important component of the DW environment is the **Data Mining**, e.g. the process of extracting previously unknown but significant information from large databases and using it to make crucial business decisions. Daily ongoing operations generate huge amounts of sales transactions, inventory systems, billing procedures, and customer service activities. Data Mining leverages those data assets by transforming them into information, and information into reliable decisions. It has major implications across the enterprise for productivity, profitability, customer satisfaction, and overall competitiveness.

Data Mining analysis tends to be bottom-up, and the best techniques have been developed with an orientation toward large volumes of data. This is important in the

context of the DW, where a typical enterprise usually wishes to use as much of the collected data as possible to arrive at reliable conclusions and decisions.

Conclusions

This paper aimed to point out the importance of long-term investments on information technology with a specific regard to the adoption of the Balanced Scorecard project.

Many studies have demonstrated how an alignment of business strategy with IT strategy may impact on the organisational performance of a firm, regardless to its dimension. Most companies that have developed their business strategy (vision, mission, objectives, and so forth) and have aligned it with the IS objectives, are able to achieve better performance (Cragg et al, 2002; Chan et al, 1997; Venkatraman, 1989).

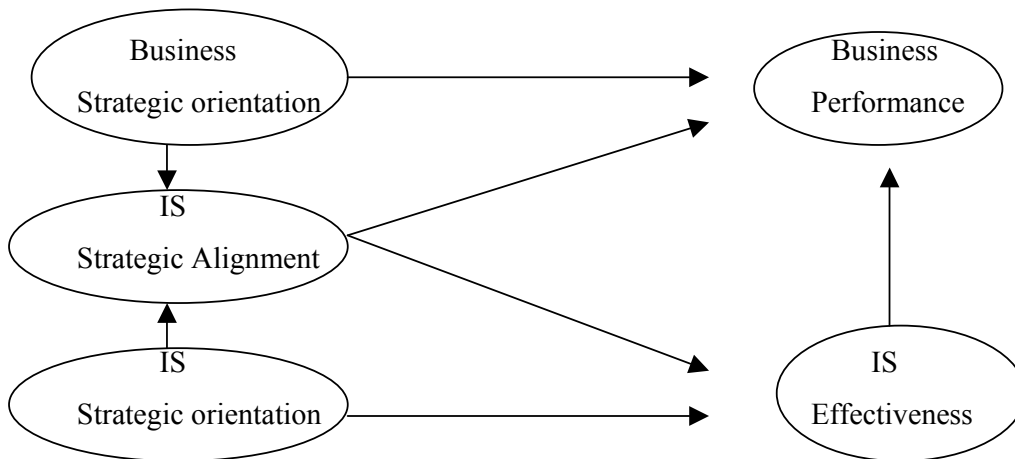


Figure 1. Chan, E., (1997) – Relationship between strategies and performance.

The Balanced Scorecard is both a performance appraisal tool and a strategic management system that places particular emphasis on the business strategy definition. Once the firm has defined its competitive strategy, the Balanced Scorecard needs an IS strategic orientation aimed to support the organisation and its information requirements.

The Performance Data Warehouse fits very well into this context because it enables any member of the organisation to read and to recognise aggregated data belonging to

different strategic areas. Furthermore, it provides a set of measures that represent the business process dynamic in order to monitor whether individual and departmental objectives are consistent with the companies objectives.

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