Customer relationship based strategic planning using balanced scorecard - a case study

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Customer relationship based strategic planning using balanced scorecard – a case study

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Abstract: Balanced scorecards is strategic planning tool which can align the organisation to the vision of success, and get people working on the right things and focusing on results. Development of balanced scorecard system is like putting a puzzle together, where different pieces come together to form a complete mosaic. We developed a conceptual framework and model for the implementation of balanced scorecard with the focus on customer relationship based strategic planning. We successfully implemented the conceptual framework for a case company and it is discussed in detail with the focus on architecture for balanced scorecard.

Keywords: balanced scorecard; BSC; customer relationship; strategic planning; architecture.
1 Introduction

Planning is very much essential for any project. In the dynamic nature and competitive business world, a measurement tool is very much essential to measure the performance. This is a measurement system in which from individual to organisation can assess their performance. The entire task must be linked with vision, mission and objective of the
organisation. This will make the organisation a strategy focused organisation. Financial measures are inadequate for guiding and evaluating organisations’ trajectories through competitive environments. They are lagging indicators that fail to capture much of the value that has been created or destroyed by managers’ actions in the most recent accounting period. The financial measures tell some, but not all, of the story about past actions and they fail to provide adequate guidance for the actions to be taken today and the day after to create future financial value. That is why organisations look towards balanced scorecard (BSC) to sustain growth and to have a harmonious working environment.

1.1 Objective for strategy planning

Today, organisations are competing in complex environments so that an accurate understanding of their goals and the methods for attaining those goals is vital. Companies are in the midst of a revolutionary transformation; industrial age competition is shifting to information age competition. During the industrial age, from 1850 to about 1975, companies succeeded by how well this could capture benefits from economies of scale and scope. Technology mattered, but, ultimately, success accrued to companies that could embed the new technology into physical assets that offered efficient, mass production of standard products. The information age environment for both manufacturing and service organisations requires new capabilities for competitive success. The ability of a company to mobilise and exploit its intangible or invisible assets has become far more decisive that investing and managing physical, tangible assets. This information age organisations are built on new set of operating assumptions like cross functions, links to customers and suppliers, customer segmentation, global scale, innovation and knowledge workers.

1.2 Methods of strategy planning

Methods of strategy planning are detailed in Figure 1.

\[\text{Figure 1 } \text{Methods of strategy planning}\]
Total quality management (TQM), Six Sigma and EFQM (technically ‘the EFQM excellence model’) are among the methodologies and management systems that focus on non-financial measurements, which can stand as leading indicators of financial performance. Many case studies demonstrate impressive results following implementations of these systems. A second approach, taken by the ISO and the big public accounting firms, focuses on the internal processes by which the numbers are generated.

1.3 Team for strategy planning

The team for strategy planning is detailed in Figure 2.

Figure 2  Team for strategy planning (see online version for colours)

Chief executive officer (CEO) is the director of the company who will frame the strategy. Administrator makes the planning against the strategy and administers the progress and report to the CEO. Supervisor makes the specification and working progress to the next level. Operation in charge is the person who will carry over the project. The actual working will be done in this area.

1.4 Need for tool to assess the planning

The critical points are:

1  focusing the whole organisation on the few key things needed to create breakthrough performance
2  helping to integrate various corporate programmes, such as quality, reengineering, and customer service initiatives
3  breaking down strategic measures to local levels so that unit managers, operators, and employees can see what is required at their level to roll into excellent performance overall
4  fix stretched target for the measures created and monitor periodically to improve the results
5  attach these measures to individual performance measure.

The BSC is a tool for measuring a company’s activities in terms of its vision and strategies. Fundamentally, the scorecard is a management tool, which continuously reveals whether a company and its employees achieve the results set forth by the strategy. But it is also a tool that helps the company express the necessary objectives and initiatives to support the strategies.
1.5 Research methodology

1.5.1 Period of study

This study covers a period of one year from 2008–2009. The past records and base period records are chosen for the trend analysis. Adherence to delivery is based on the budget given by the sales departments. The primary data and secondary data are used for the study. The primary data were collected from the records directly. The source of secondary is from the journal publications. The data given here is extracted from Electronics Signals and Controls Private Limited.

1.5.2 Data particulars and analysis

The data elements include adherence to delivery, customer complaint rate, customer complaint resolution time, revenue from new products and revenue from new customers. The collected data are classified, rearranged and regrouped to suit the need for the study. Data sheets are used to collect the data. Balance score card tool is used for the review of the performance view.

1.6 Scope of the study

1.6.1 About organisation

Electronics Signals & Controls, ESICO, is one of the leading manufacturers of various industrial signal lamps catering to industrial needs for handling innumerable applications. Situated in the leading industrial City of Coimbatore, TamilNadu (India), ESICO was started in the year 1991 by a team of highly qualified, competent engineers and technocrats from various fields of electronics engineering. Over a span of 13 years with a strong and stable infrastructure consisting of a modernised workshop capable of manufacturing over 55 types lamps of various ranges and a dedicated work force, ESICO has grown steadily and is currently recognised as one of the leading industrial signal lamps manufacturers. The expertise derived in the field of design, manufacturing, research and development has been compiled and presented in the form of various products in the domestic market.

1.6.2 ESICO global presence

The organisation manufactures robust industrial signal lamps catering to various types of industries for intensive lighting in modern machine shops and suitable applications. A strong satisfied clientele of over 200 in domestic market believe strongly on the quality programme, strictly adhered to the commitment mission of ESICO. Tight tolerances and insistence on perfection, helps ESICO to continuously churn out signal lamps. It is an ISO 9000 certified company. ESICO’s commitment towards deliverance of superior quality products has been motivated by our core competency of successfully integrating and attuning its research and development standards with superior design and manufacturing capabilities.
Table 1  Product range

<table>
<thead>
<tr>
<th>Product Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conical type LED Lamp (L1)</td>
</tr>
<tr>
<td>Miniature conical type LED lamp (L2)</td>
</tr>
<tr>
<td>Dome type LED lamp (L3)</td>
</tr>
<tr>
<td>Reflection type LED lamp (L4)</td>
</tr>
<tr>
<td>Conical type (L6)</td>
</tr>
<tr>
<td>Halogen lamp cylindrical (L16)</td>
</tr>
<tr>
<td>Halogen lamp cylindrical with adjustable base (L17)</td>
</tr>
<tr>
<td>Pyramid lamp (L34)</td>
</tr>
<tr>
<td>Miniature dome type LED Lamp (L80)</td>
</tr>
</tbody>
</table>

1.6.3 Infrastructure
ESICO has been able to consistently produce and deliver world class products mainly due to its strong infrastructure base. Being a market leader in the manufacture of industrial signal lamps, the organisation ensure that our R&D facilities are constantly upgraded.
The state-of-the-art infrastructure facilities allow us to offer high quality products. The organisation is equipped with a modernised workshop which delivers varied types of lamps for industrial purposes. Excellent in-house training is offered to our work force on a periodic basis. The training imparted, greatly enhances the skill sets and enables ESICO to deliver many value added services to our customers. ESICO is strongly committed to adherence to international quality norms. Sophisticated infrastructure facilities help us to offer quality products at competitive pricing. Our openness to adoption of latest technological standards allows us to attain 100% customer satisfaction. Our infrastructure competence is matched with the excellent after sales service that we offer. This service network has enabled us to retain and at the same time widen our customer base.

1.6.4 Product range

The product range is shown in Table 1.

This study helps us to committing to performance-based management. Build a strategy for the dynamic situation and progress towards the strategy. “DO right things, DO things Right, DO things Different.” This will clearly explains and define each one in the organisation a clear role and responsibility towards their work. Ultimately, give the work satisfaction there by gain the monetary satisfaction also. Makes the future organisation as ‘strategy focused organisation’.

BSC will bring the following benefits into the organisation:

1. enhance strategic feedback and learning translates a company’s strategy into a balanced set of KPI’s
2. communicate these goals throughout the organisation
3. align individual, organisational, and cross departmental initiatives
4. enhance strategic feedback and learning.

2 Concept of BSC

2.1 Meaning of BSC

“The BSC provides executives with a comprehensive framework that translates a company’s vision and strategy into a coherent set of performance measures” by Drs. Robert Kaplan (Harvard Business School) and David Norton. Recognising some of the weaknesses and vagueness of previous management approaches, the BSC approach provides a clear prescription as to what companies should measure in order to ‘balance’ the perspective. The BSC is a management system (not only a measurement system) that enables organisations to clarify their vision and strategy and translate them into action. It provides feedback around both the internal business processes and external outcomes in order to continuously improve strategic performance and results. When fully deployed, the BSC transforms strategic planning from an academic exercise into the nerve centre of an enterprise. The BSC suggests that we view the organisation from four perspectives, and to develop metrics, collect data and analyse it relative to each of these perspectives as in Figure 3:
The goal of making measurements is to permit managers to see their company more clearly – from many perspectives – and hence to make wiser long-term decisions. The Baldrige Criteria (1997) booklet reiterates this concept of fact-based management: “Modern businesses depend upon measurement and analysis of performance. Measurements must derive from the company’s strategy and provide critical data and information about key processes, outputs and results. Data and information needed for performance measurement (PM) and improvement are of many types, including: customer, product and service performance, operations, market, competitive comparisons, supplier, employee-related, and cost and financial aspects. Analysis entails using data to determine trends, projections, and cause and effect – that might not be evident without analysis. Data and analysis support a variety of company purposes, such as planning, reviewing company performance, improving operations, and comparing company performance with competitors’ or with ‘best practices’ benchmarks.’

“A major consideration in performance improvement involves the creation and use of performance measures or indicators. Performance measures or indicators are measurable
characteristics of products, services, processes, and operations the company uses to track and improve performance. The measures or indicators should be selected to best represent the factors that lead to improved customer, operational, and financial performance. A comprehensive set of measures or indicators tied to customer and/or company performance requirements represents a clear basis for aligning all activities with the company's goals. Through the analysis of data from the tracking processes, the measures or indicators themselves may be evaluated and changed to better support such goals.” The basic principle of cause and effect linkage is indicated in the Figure 4.

**Figure 4**  Cause and effect linkages: the basic principle (see online version for colours)

[Diagram showing cause and effect linkages: If we have the right staff... Doing the right things... and doing things "right"... Customers will be delighted... We will keep / get more business... Profitability]

### 2.2 Balance score card concepts

This is a tool to view and analyse your organisation’s strategic information, including BSCs by organisation or function, key performance indicators, related cause and effect relationships, and associated graphic displays. The balance scorecard concepts and phases of balance scorecard are shown in Table 2 and Figure 5 respectively.

**Table 2**  Balance scorecard concepts

<table>
<thead>
<tr>
<th>Balance scorecard framework</th>
<th>Balance scorecard management</th>
<th>Organisational feedback and learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main views representing strategy objective and perspectives</td>
<td>Key performance indicators</td>
<td>Strategic resources</td>
</tr>
<tr>
<td>Cascading multiple scorecards associated with responsibility</td>
<td>Historical trends, comparison and contribution analysis for multiple organisational dimensions</td>
<td>Strategic communication tools</td>
</tr>
<tr>
<td>Cause and effect relationships</td>
<td>PM at KPI and scorecard level, with alarm colours representing actual and benchmark data</td>
<td>Qualitative assessment mechanisms</td>
</tr>
</tbody>
</table>

Comment [j1]: Author: Please note that Table 3 has been changed to Figure 5.
2.2.1 Architecture of the BSC

Oracle BSC uses three-tier architecture which comprised of a database tier, a web server tier, and a desktop tier. Users connect to BSC through any Java enabled web browser. The web server tier provides business logic and generates dynamic web pages. The presentation layer of the web server, which is part of the application tier, and the business logic for BSC are implemented as Java Servlets and Java Server Pages (JSP) running on Apache JServ. Apache JServ, a module of Apache web server, implements the Java Servlet API for running server side Java. The architecture of the balance scorecard is shown in Figure 6.

Figure 5 Phases of balance scorecard

- Obtain clarity and consensus about strategy:
- Achieve focus
- Leadership development
- Strategic intervention
- Educate the organisation
- Set strategic targets
- Align programmes and investments
- Build a feedback system

Figure 6 Architecture of the BSC

Comment [j2]: Author: Please note that Table 3 has been changed to Figure 5.

Comment [j3]: Author: Please note that Figure 5 has been changed to Figure 6.

Comment [j4]: Author: Please note that Figure 5 has been changed to Figure 6.
2.3 Architecture for BSC architecture modules

BSC architecture modules are installed in client-server mode connected to an enterprise database. The BSC architecture modules include:

- **BSC Setup**: this is the tool used to set up the BSC system after installation. It is used to register BSC systems, administer database privileges, import data, upgrade systems from previous releases, and migrate data between systems.

- **BSC Architect**: this tool is used to set up BSCs; create and configure indicators, groups and datasets; and set calculation and other options inside BSC tables where data is stored. There are three sub-modules:
  - **Builder**: used to create indicators and groups, and to assign KPIs to different BSCs.
  - **KPI Designer**: used to arrange how KPIs are viewed and categorised; configure the functionality of scorecard formulas and datasets; and generally tailor the design of the BSC for the user.
  - **Metadata Optimiser**: used to evaluate all the datasets and dimensions specified for a BSC KPI, and then create an input table structure for populating data to the BSC. This is run after changes are made in KPI Designer that affect the configuration of different indicators and groups.

- **BSC Manager**: this tool is used to load and configure the data in the BSC tables. There are two sub-modules:
  - **Loader**: used to physically load data into the tables used by the viewer from the input tables.
  - **Administrator**: used to assign and restrict access to BSCs (tabs) and KPIs according to responsibility title.

- **System Requirements**: this section outlines the system requirements for BSC, including requirements for the web browser, software, and BSC architect platform.

- **BSC architect platform requirements**: Pentium CPU, or equivalent, with a minimum processor speed of 266 MHz; Windows NT Version 4.0 and Service Pack 3; minimum disk space of 65 MB; minimum recommended memory of 64 MB; BSC architect requires Oracle 8.0.6 Client and Microsoft Excel 95 or above; Windows XP users must install the Oracle 9i Release 2 client and Oracle 8.0.6 client.

2.4 Process to implement the BSC

Using standardised non-financial measures will reduce the time, cost and risk of implementing the BSC. Targets and measures are the ‘medium of exchange’ for each of the four process steps involved in implementation (Figure 3) and the four processes to implement the balance scorecard is shown in Figure 7. 

Comment [J5]: Author: Please note that this has been changed from Figure 6 to Figure 7.
2.5 Need for the strategy

1. Excessive reliance on a single product (deposits).
2. A cost structure that made it unprofitable to service 80% of its customers at prevailing interest rates.

Strategy against the two needs: improve operating efficiency by shifting non-profitable customers to more cost-effective channels of distribution (e.g., electronic banking). Process and development of balance scorecard translated each of these strategies into objectives and measures in the four perspectives. The strategic objectives are shown in Figure 8.
2.6 Literature review

The literature review is detailed in Table 3 and Table 4.

Table 3  
<table>
<thead>
<tr>
<th>Business metric</th>
<th>Contribution of research</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intangible valuation</td>
<td>Intangible assets are evaluated to extract their value components and align them with business strategy.</td>
<td>Annie and Julie (2005)</td>
</tr>
<tr>
<td>Balanced score for BSC</td>
<td>Theory is used to calculate the relative weightage for each factor and comparison</td>
<td>Punniyamoorthy and Murali (2008)</td>
</tr>
<tr>
<td>New challenge for BSC</td>
<td>Organisations have quite different needs, market areas, people, products and services, and will end up with significantly different BSCs.</td>
<td>Chavan (2009)</td>
</tr>
<tr>
<td>Strategic planning</td>
<td>General concepts of strategies planning, system of management of quality and BSC, in order to assist it in the development of the model.</td>
<td>Goncalves (2009)</td>
</tr>
<tr>
<td>Performance measures</td>
<td>To analyse the efficiency and benefits of supply chain (SC) scientifically and validate the usability of methods on performance evaluation index system.</td>
<td>Yang (2009)</td>
</tr>
<tr>
<td>Mapping of knowledge management (KM) and business strategy</td>
<td>Impact and importance of KM activities in performance of BSC, such as financial, internal process as well as learning and growth perspectives.</td>
<td>Le Chen (2008)</td>
</tr>
<tr>
<td>BSC with greenness</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4  
<table>
<thead>
<tr>
<th>Application</th>
<th>Contribution of research</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finnish municipalities</td>
<td>Analyse of interrelations of the decision-making rationales around accounting PM adoptions in Finnish municipalities.</td>
<td>Rautiainen (2009)</td>
</tr>
<tr>
<td>Stock exchange</td>
<td>Analysis of BSC usage among companies on the Thai stock exchange</td>
<td>Kittiya and James (2009)</td>
</tr>
<tr>
<td>Electricity corporation</td>
<td>Importance of the rational analytical deliberation of legitimacy as a fundamental accompaniment to isomorphism in the continuing development of the new performance management system.</td>
<td>James (2009)</td>
</tr>
<tr>
<td>Logistic industry</td>
<td>From an SC perspective, the non-tangible measures such as customer satisfaction are most measured.</td>
<td>Chia et al. (2009)</td>
</tr>
</tbody>
</table>
Table 4  Application for BSC (continued)

<table>
<thead>
<tr>
<th>Application</th>
<th>Contribution of research</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance of SMEs</td>
<td>Integrated PM framework for SC evaluation and planning in SMEs.</td>
<td>Thakkar et al. (2009)</td>
</tr>
<tr>
<td>Performance of university</td>
<td>To maintain university operating standards, encourage individual universities to work on inadequacies, and promote university competitiveness, performance measure indicators (PMIs) was established</td>
<td>Chen et al. (2009)</td>
</tr>
<tr>
<td>Investment companies</td>
<td>A methodology for selecting strategic processes among the processes of investment company (IC) based on the BSC framework and the statistical analysis.</td>
<td>Hanafizadeh et al. (2009)</td>
</tr>
<tr>
<td>Finish food manufacturing</td>
<td>The integration of PMS and EMS issues into BSC</td>
<td>Lansiluoto and Jarvenpa (2008)</td>
</tr>
<tr>
<td>Cooperative bank</td>
<td>Case study shows how the selection of performance indices affects results and the evaluation of a firm's performance.</td>
<td>Chen et al. (2008)</td>
</tr>
<tr>
<td>Petroleum industry</td>
<td>Analytical hierarchy process (AHP) and BSC for evaluating performance of the petroleum SC.</td>
<td>Varma et al. (2008)</td>
</tr>
<tr>
<td>Performance in financial sector</td>
<td>To assess the improvements that relate to learning and growth, internal processes and customers in financial performance.</td>
<td>Cohen et al. (2008)</td>
</tr>
</tbody>
</table>

3 Customer perspective – case study

3.1 Adherence to delivery

Strategy: Reduce cycle time: The measure is based on the budgeted target value Vs the actual value for that month. This can be achieved only by satisfying the customer by knowing the needs of customer. Customer is the centre point of business. Concentrating the company’s reputation and the stockholder benefit. This can be achieved by proper monitoring the process from order to cash.

Formula:

Number of machined planned = sum of m/c’s whose scheduled shipment date falls on the given period

Number of machined dispatch = sum of m/c’s whose actual dispatch falls on the given period

- Data series: value
- Periodicity: monthly machine despatched data
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- Tolerance range:
  - Unacceptable < 90%
  - Marginal > 90
  - Acceptable >= 100%

- Alarm indicator
  - Red – Unacceptable
  - Yellow – Marginal
  - Green – Acceptable.

Assessment: Marketing should check the cause and effect for the results and effective measure should be taken for the improvement.

Data sheet for signal lamp and data flow diagram (DFD) symbol are shown in Tables 5 and 6 respectively.

Table 5  Actual data

<table>
<thead>
<tr>
<th>Base item</th>
<th>'2005'</th>
<th>'0'</th>
<th>'1'</th>
<th>Delivery %</th>
<th>Quantity on time</th>
<th>Total quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>L100</td>
<td>2005</td>
<td>0</td>
<td>1</td>
<td>100.00%</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>L600</td>
<td>2005</td>
<td>0</td>
<td>1</td>
<td>90.77%</td>
<td>59</td>
<td>65</td>
</tr>
<tr>
<td>L600</td>
<td>2005</td>
<td>0</td>
<td>2</td>
<td>71.64%</td>
<td>48</td>
<td>67</td>
</tr>
<tr>
<td>L600</td>
<td>2005</td>
<td>0</td>
<td>3</td>
<td>64.29%</td>
<td>36</td>
<td>56</td>
</tr>
<tr>
<td>L600</td>
<td>2005</td>
<td>0</td>
<td>4</td>
<td>66.00%</td>
<td>33</td>
<td>50</td>
</tr>
<tr>
<td>L600</td>
<td>2005</td>
<td>0</td>
<td>5</td>
<td>78.57%</td>
<td>44</td>
<td>56</td>
</tr>
<tr>
<td>L600</td>
<td>2005</td>
<td>0</td>
<td>6</td>
<td>90.63%</td>
<td>58</td>
<td>64</td>
</tr>
<tr>
<td>L600</td>
<td>2005</td>
<td>0</td>
<td>7</td>
<td>76.47%</td>
<td>52</td>
<td>68</td>
</tr>
<tr>
<td>L600</td>
<td>2005</td>
<td>0</td>
<td>8</td>
<td>79.10%</td>
<td>53</td>
<td>67</td>
</tr>
<tr>
<td>L600</td>
<td>2005</td>
<td>0</td>
<td>9</td>
<td>92.42%</td>
<td>61</td>
<td>66</td>
</tr>
<tr>
<td>L600</td>
<td>2005</td>
<td>0</td>
<td>10</td>
<td>86.27%</td>
<td>44</td>
<td>51</td>
</tr>
<tr>
<td>L600</td>
<td>2005</td>
<td>0</td>
<td>11</td>
<td>85.71%</td>
<td>42</td>
<td>49</td>
</tr>
<tr>
<td>L600</td>
<td>2005</td>
<td>0</td>
<td>12</td>
<td>92.63%</td>
<td>88</td>
<td>95</td>
</tr>
<tr>
<td>L100</td>
<td>2005</td>
<td>1</td>
<td>1</td>
<td>100.00%</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>L100</td>
<td>2005</td>
<td>1</td>
<td>2</td>
<td>100.00%</td>
<td>3</td>
<td>3</td>
</tr>
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<td>L100</td>
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<td>100.00%</td>
<td>3</td>
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<td>L100</td>
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<td>1</td>
<td>4</td>
<td>100.00%</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>L100</td>
<td>2005</td>
<td>1</td>
<td>5</td>
<td>100.00%</td>
<td>3</td>
<td>3</td>
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<tr>
<td>L100</td>
<td>2005</td>
<td>1</td>
<td>6</td>
<td>100.00%</td>
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<tr>
<td>L100</td>
<td>2005</td>
<td>1</td>
<td>7</td>
<td>100.00%</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>L100</td>
<td>2005</td>
<td>1</td>
<td>8</td>
<td>100.00%</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>L100</td>
<td>2005</td>
<td>1</td>
<td>9</td>
<td>100.00%</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>L100</td>
<td>2005</td>
<td>1</td>
<td>10</td>
<td>100.00%</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>
Table 7  Actual data (continued)

<table>
<thead>
<tr>
<th>Base item</th>
<th>‘2005’</th>
<th>‘0’</th>
<th>‘1’</th>
<th>Delivery %</th>
<th>Quantity on time</th>
<th>Total quantity</th>
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Table 6  Symbols in DFD

<table>
<thead>
<tr>
<th>Symbols</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Square, defiles a source or destination of system data</td>
<td></td>
</tr>
<tr>
<td>Arrow, identifies dataflow – data in motion</td>
<td></td>
</tr>
<tr>
<td>Circle or bubble, represents a process that transforms incoming data flow(s) into outgoing data flow(s).</td>
<td></td>
</tr>
<tr>
<td>Open rectangle, represents a data store – data at rest or temporary repository of data</td>
<td></td>
</tr>
</tbody>
</table>

3.2 Customer compliant rate

Strategy: Proactive management of customer’s maintenance schedules and retrofit promotions introduction of annual survive audit with customers, to have more control and supervision on the maintenance at customers end. This KPI gives an indication regarding the number of service request registered versus the number of machines within warranty period. The measure used to monitor is ‘number of complaints’, ‘number of machines’, and ‘customer complaint rate’.

Formula:

Customer complaint rate = number of service requests divided by the number of machines within warranty.
Customer relationship based strategic planning using balanced scorecard

- Data series: value
- Periodicity: monthly
- Tolerance range:
  - Unacceptable > 100% with respect to budget
  - Marginal > 90
  - Acceptable <= 90%
- Alarm indicator:
  - RED – Unacceptable
  - Yellow – Marginal
  - Green – Acceptable.

Assessment: Everyone’s effort must be focused to bring down the customer complaint rate to zero level.

3.3 Customer compliant resolution time

Strategy: Minimise resolution time. The measure is based on the budgeted target value Vs the actual value for that month. The success of the business is based on after sales service. We must have an effective system to hear the customer complaint either by call centre service or online complaint registration. The KPIs gives the entire details about the organisation’s response in resolving the customer complaint against his call. The measure used to monitor is ‘total number of service request’, ‘time taken to resolve’, and ‘complaint resolution time’.

Formula:

\[
\text{Complaint resolution time} = \frac{\text{total time taken to resolve the complaint during a specific period}}{\text{the total number of complaints registered}}
\]

- Data series: value
- Periodicity: weekly resolution time
- Tolerance range:
  - Unacceptable > 100% with respect to budget
  - Marginal > 90
  - Acceptable <= 90%
- Alarm indicator:
  - Red – Unacceptable
  - Yellow – Marginal
  - Green – Acceptable.

Assessment: Customer service shell should check the cause and effect for the results and effective measure should be taken for the improvement.
3.4 Linkage with corporate strategy

All the strategies are connected with the key indicators, so that the benefits and the effects can be seen with drill down facility.

Steps involved in link:
1. main corporate objectives definition with main code
2. sub-objectives defined for the departments and divisions align for the main objectives
3. the data are taken in such a way to achieve the objectives
4. the main objectives are shown with drill down facility
5. all the KPI are concentrated with four perspectives

The linkage hierarchy is shown in Figure 9.

Figure 9  Linkage hierarchy

Chief executive officer – corporate objective KPI

Process owners – sublevel objective KPI

Operation level owners – process level KPI

The CEO defines the corporate strategy. The items were distributed across the four perspectives of the BSC as

- **Customer**
  - Adherence to delivery, customer complaint rate, customer complaint resolution time, revenue from new customers and revenue from new products.

- **Financial**
  - Increase sales revenue, increase net margin, maintain overall margins, asset turnover, return on capital employed and sales export analysis.

- **Internal business process**
  - Cost of quality, optimise human capital, reduce cost and inventory control system and manufacturing lean time, learning and growth, training hours per employee and value added per employee.

This will be grouped to the corporate objectives, and attached to the individual scorecard. Each month performance will be updated. This will again linked with the master scorecard where the CEO can see the achievement of that period, and he can also make comparison with the budget value.
4 Findings and recommendations

4.1 Findings

This study titled ‘Strategy Planning’ covers a period of one year. The primary and secondary data were collected for the study. The primary data were collected from the records of the mill and the secondary data were collected from the trade journals. The balance scorecard viewer will give the true positions, and the assessment sheet will give what next and how to proceed further.

4.1.1 Adherence to delivery

From the one year data analysis we have noticed the adherence to delivery (delivery of products as per the sales schedule shipment date) was not maintained. We could able to see the machines scheduled were not delivered, instead some other unplanned machines delivered to account the production volume.

4.1.2 Customer complaint rate

From the one year data analysis we have noticed the customer complaint rate was more within the warranty period of six months to one year. This is due the reason of wrong supply and short supply of components. The compliant are occurring because of the urge in attaining the production target.

4.1.3 Customer compliant resolution time

The customer compliant resolution time period varies from minimum three days to maximum thirty days. This should de minimised to six working days as per the management decision.

4.2 Recommendation

The above finding, initiates four general areas of strategic management activities, as follows:

1. Learning and growth is fostered by knowledge management activities and initiatives. These include strategic recruiting, hiring, training (both formal and informal), team development, document management, collaborative communication systems, knowledge and skills audits of employees, knowledge base developments, and fostering of communities of interest within the organisation.

2. Business process improvements may range from moderate and localised changes to wide-scale changes in business processes, the elimination of paperwork and steps in processes, and the introduction of automation and improved technology. Deployment of the BSC measurement system itself is one of these processes.

3. Customer loyalty cannot any longer be taken for granted within the government, nor is it sufficient to manage it in an ad hoc or anecdotal way. Rather, customer relationships are becoming increasingly structured and measured. Not only must the agency work closely with customers on a personal level, it must also gain
documented and continuous feedback on customer perceptions and loyalty. These efforts come under the general heading of customer relationship management (CRM).

4 Financial management – in the passive sense of ‘bean counting’ – is giving way to proactive initiatives in activity-based costing (ABC), functional economic analysis (FEA), earned-value management (EVM) and other practices by which managers can learn more from financial data, in order to track projects more closely and make better cost estimates. Also, innovations in budgeting – including the GPRA’s goal of linking performance to budgets – are replacing zero-based budgeting and other earlier techniques in government agencies. The availability of improved database technology with more business intelligence capability is turning financial management into an active part of an agency's overall strategy for success.

In conclusion, management experts agree that learning and growth are the keys to strategic success, the foundation for the future. Learning and growing organisation is one in which knowledge management activities are deployed and expanding in order to leverage the creativity of all the people in the organisation. The linkage between cause and strategic activities is shown in Figure 10.

**4.3 Enhance strategic feedback and learning**

Finding of the ‘gap analysis’ which will analyse the comparison of the desired performance goals with current levels established the performance gap that strategic initiatives can be designed to manage it. Thus, the balance scorecard not only measures change; it fosters change. The strategy planning is shown in Figure 11.
5 Fundamentals design concepts

5.1 Data flow diagram

DFD is a charting tool which traces a network of data flows through a system by symbol representation like rectangle arrows, circle and double lines. DFD is a documentation technique, which is primarily used in the requirement analysis stage. A DFD can be used at any level of detail. DFD are quite valuable for establishing naming conventions and names of system components such as subsystem, files and links. It describes what flow (logical) rather than how they are processed, so it does not depend on hardware, software and data structure or file organisation.

DFD consists of a series of bubbles joined by lines. The bubbles represent data transformation and the line represents data flow in the system. It is also known as ‘bubble chart’.

5.1.1 Objective of DFD

Easy understanding of the present flow of the business for which the system is built for and DFD reveals any neglected loopholes in the present business operations and presents a clear picture of the user requirements. The DFD is detailed in Figure 12.

5.2 Database design process

5.2.1 Database

A database is a collection of interrelated data stored with minimum redundancy to serve many quickly and efficiently. The database serves as a repository of data; as well designed database environment, common data are available and used by several users.

The design of a database is one integrated step in a whole process of system design. The process of database design is split into three phases.
5.2.2 Conceptual design

Take all the requirement specifications that have come and create a design from end users and create a design that is independent of any hardware or software concern. The entity relationship model is most popular.

5.2.3 Logical design

Map the conceptual model into a logical model suitable for RDBMS used.

5.2.4 Physical implementation

This is a final phase of creating a database. Implement the physical data tables and make decision to enhance the usefulness of the database with the proposed application. The database design is shown in Figure 13.
5.3 Summary of BSC design

The summary of BSC design is indicated in Figure 14.

6 Implementation and maintenance

6.1 Testing

The testing process focuses on the logical internals of the software, assuring that all statements have been tested and on the functional externals conducting tests to uncover errors. This process also ensures that defined input will produce actual results that agree with required results. Various testing strategies adopted in testing the system are explained in this chapter. The strategies for testing include unit testing, integration testing and system testing.

6.1.1 Unit test

In unit testing, all the programme units that make up the system are tested. Unit testing focuses first on the modules, independent of one another to locate errors. This enables to detect errors in coding and logic within the module alone. In unit testing, control paths are tested to uncover errors within the boundary of the module. This testing is also used to ensure the integrity of data stored temporarily. Some of the various test cases used to test the system are as follows: giving inconsistent data for the base table items in the module level, raising unhandled exception cases explicitly and underflow and overflow.

Figure 14 Summary of BSC design (see online version for colours)
6.1.2 Integration Test

Integration testing is a systematic technique for constructing the programme structure, while at the same time, conducting test to uncover errors associated with interfacing. Incremental sandwich integration is adopted in integration testing. That is, the programme is constructed and tested in small segments, which makes easier to isolate and correct. The sandwich approach combines the top-down strategy for the upper levels of the programme structure coupled with a bottom-up strategy for the subordinate levels.
The interfacing of the software was tested by taking compatible sample data. The interfaces were tested and measures to reduce the response time were taken.

6.1.3 System test

System testing is actually a series of different tests, whose primary purpose is to fully exercise the computer-based system. Although each test has different purpose, all work should verify that all the system elements have been properly integrated and perform allocated functions. The types of system tests are discussed below.

6.1.4 Recovery test

Recovery testing is a system test that forces the software to fail in a variety of ways and verifies that recovery is properly performed. If the recovery is done by the system itself, re-initialisation, checkpoint mechanisms, data recovery and restart are evaluated for correctness.

6.1.5 Security test

Security testing attempts to verify that protection mechanisms are built into the system. Protection mechanisms at OS level, RDBMS level and application level are tested to avoid improper penetration. This will protect the system from improper penetration and allows authentic personnel only.

6.1.6 Stress test

Stress testing is designed to confront programmes with abnormal situations. Stress testing executes a system in a manner that demands resources in abnormal quantity, frequency, or volume. This helps us in fine tuning the system.

6.1.7 Performance testing

Performance testing is designed to test the run-time performance of software, within the context of an integrated system. Run time performance of the system is tested for all modules and wherever the performance was poor, alternate simple procedures were adopted.

6.2 Implementation

System implementation is the process of making the newly designed system fully operational and not simply installing the software. Following steps are considered in the implementation stage:

1. implementation planning
2. user training.

- Implementation planning: this planning is a logical starting point to manage different activities that must be covered. A pre-implementation meeting with the personals
from all departments is arranged. The software is implemented in the month of April 2009.

- **User training**: hands-on training to user is essential to make them comfortable with the system. Accordingly, two or three day demonstration and practical training with the past data are given to the users who will be the specific users of the system.

### 7 System security measures

#### 7.1 Access protection

Users are provided with separate user-id and password and different responsibilities are attached to different users based on the level of access allowed to them. This is the first and primitive way of restricting the user to handle only their data and also effectively ensuring that the user is constraint by not being able to know any other thing other than what is available or shown to them.

#### 7.2 Auditing

User login history is stored in a separate file and also in the changed record and can be retrieved on the need basis. This ensures that user logins can be monitored and also the changes made by them can be located.

In some critical data where more advanced level of security is needed, triggers are built, which writes the changes made in the record to another file with who changed the record with time, old value and new value. This is called audit trail and can be generated on need basis to analyse.

#### 7.3 Backup and recovery

Periodically, backups are taken and stored in archive and can be recovered on need basis. Different techniques like incremental and full backup are taken based on the strategy designed by the backup and recovery methodology.

### 8 Conclusions

Plan, set targets and align strategic initiatives. Senior executives should establish targets for the scorecard measures, three to five years out, that, if achieved will transform the company. To achieve ambitious financial objectives managers must identify “stretch targets for their internal customer to satisfy the real external customer.” Once targets are established managers can align their strategic quality, response time and reengineering initiatives for achieving the break through objectives. The planning and target setting management process enables the organisation to quantify the long-term outcomes it wishes to achieve, identify mechanisms and provide resource for achieving outcomes, establish short-term milestones for the financial and non-financial measures on the scorecard, management experts agree that learning and growth is the key to strategic success, the foundation for the future. Learning and growing organisation is one in which
knowledge management activities are deployed and expanding in order to leverage the creativity of all the people in the organisation.

9 Scope for future enhancement

The BSC system is an open system. We can incorporate any KPI according to the organisational requirement. The entire system is KPI driven and user friendly, which is useful when worked by all levels of organisation. The GUI based output is elegant and easily visualised by all levels. Any system may also have its own drawbacks and can be modified further to incorporate the required changes.

References


