Development of a balanced scorecard

An integrated approach of Interpretive Structural Modeling (ISM) and Analytic Network Process (ANP)

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Abstract

Purpose – The purpose of this paper is to propose an integrated qualitative and quantitative approach to the development of a balanced scorecard (BSC) for a real life case company KVIC (Khadi and Village Industries Commission, organic food sector, India).

Design/methodology/approach – In this paper the semi-structured interviews with director, managers, professional consultant, review of published reports and observations made during research work are considered as basis.

Findings – This paper illustrates how the use of a mix approach of cause and effect diagram, Interpretive Structural Modeling (ISM) and Analytic Network Process (ANP) can address some of the shortcomings related to the development of BSC in the light of a real life case company KVIC (Khadi Village and Industry Commission, organic food sector India). The paper delivers a complete framework of BSC for the case company.

Research limitations/implications – The paper outlines the limitations of proposed approach in regard to validity of present logical relationships among various objectives of organization in the futuristic environment and indicates the need for a computer software system, which can improve the efficiency of proposed approach.

Practical implications – In the paper a number of case studies report the fact that companies have attempted to derive measures from strategy, based on cause-and-effect reasoning, but the claimed link between strategy and measures appeared weak in analysis (Malmi, 2001). The paper establishes the basis for integrating organization’s strategic intent with the identification of performance measures and at large development of BSC.

Originality/value – The paper shows that present work demonstrates the use of an innovative approach to the development of performance measurement system at one end while to deliver a workable framework of balanced scorecard for a real life case company is the objective of the other end. The present work encapsulates the philosophy of strategy maps using a mix of quantitative and qualitative approach for a real life case.

Keywords Performance measures, Balanced scorecard, India

Paper type Research paper

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Introduction
Performance measurement can be defined as the process of quantifying the efficiency and effectiveness of action. It is “the periodic measurement of progress toward explicit short-run and long-run objectives and the reporting of the results to decision makers in an attempt to improve program performance” (Neely *et al.*, 1995). Development of an effective measurement system is a crucial task for any organization exposed to tough competition. Effective measurement, however, must be an integral part of the management process. It is simply good management practice to find out how well programs are doing and to use this information for program planning, implementation, and improvement. In order to ensure that this relevance is maintained, organizations need a process in place to ensure that measures and measurement systems are reviewed and modified as the organization’s circumstances change. Measurement is difficult in organizations because it is not an exact science with hard rules and predictable interrelationships between variables (Brown, 2000). One of the critical reasons for this is the impact of so many variables on organization’s performance and hence difficulty in understanding interactions exists between those different variables. Each framework has its own view of classifying and relating performance measures but effectiveness varies on how qualitative and quantitative perspectives are dealt with. The broader frameworks are well researched and described but the choice of technique for the development of framework is left to the convenience of researcher. Few gaps are identified while evaluating the literature related to performance measurement. They are highlighted and their significance is indicated in the subsequent section (section 2). The effectiveness of the framework depends on issues like how systematically information are collected, in what way interrelationships among objectives and measures are understood and how these objectives are correlated to mission and vision of organization. A significant development is the use of business models (Eccles and Pyburn, 1992) or success maps (Kaplan and Norton, 1996, 2000). These translate the concept of “leading” and “lagging” indicators (in our case “driver” and “dependent” variables) into a testable cause and effect diagram where each element of performance is linked to another.

The present work is based on a real life case of Khadi and Village Industries Commission (KVIC). The paper makes an attempt to develop a balanced scorecard framework for a case company using cause and effect analysis, Interpretive Structure Model (ISM) and Analytic Network Process (ANP), which provides a means to address some of the shortcomings of the development process of the performance measurement system. ISM is a well-established methodology for identifying and summarizing relationships among specific items, which define an issue or problem (Mandal and Deshmukh, 1994; Jharkharia and Shankar, 2004). It helps to impose order and direction on the complex relationship among elements of system (Warfield, 1974; Sage, 1977). ISM, is primarily intended as a group-learning process, but it can also be used, by individuals working alone (Sharma *et al*., 1995). On the other side, ANP is a comprehensive decision-making technique that has the capability of including all the relevant criteria – tangible and intangible without bothering about their linear hierarchy in arriving at a decision (Saaty, 2001). ANP is competent enough to capture the interrelationships among the decision variables for prioritizing the various alternatives. Here, we aim to take advantage of the complementary nature of both the techniques for the development of BSC. More is elaborated on their individual, as well
as integrated, use and relative merit-demerit in the subsequent sections of the paper.

Here we summarize the following as the main objectives of the research:

1. To develop and demonstrate the use of an integrated solution approach to the
development of BSC and as a part of it:
   - To explore the usefulness of proposed approach against some of the research
gaps identified;
   - To identify performance measures for four various perspectives of BSC for a
case company; and
   - To understand the interrelationships among the organization’s objectives
   and their implications in the development of performance measurement
   framework.
2. To provide a set of guidelines to the case company for an effective use of the
developed framework.

The paper is structured as follows: section 2 develops understanding on the
performance measurement system and evaluates the reported literature with special
attention on the balanced scorecard framework. In section 3, we justify the use of the
adopted approach. In section 4, we demonstrate the use of the selected approach to the
development of the balanced scorecard framework for a real life case. In section 5, we
provide a complete framework of BSC with key guidance. In section 6, we conclude by
outlining some key observations, gained insights and scope for future work.

Understanding basics and evaluating problems

Well-rehearsed adages such as: “what gets measured gets done” and “You get what
you measure” suggest that implementing an appropriate performance measurement
system will ensure that actions are aligned to strategies and objectives (Lynch and
Cross, 1991). Increasingly, research evidence is demonstrating that companies that are
managed using integrated balanced performance measurement systems outperform
and have superior stock prices (Gates, 1999) to those that are not “measure managed”.

No doubt, it is notable to say that organization’s objectives and severity of measures,
varies, depending upon the people, culture and past experiences of the organization.
Here, we provide a mapping of purposes of measurement systems (Table I), which
outlines and relates objectives of measurement system with characteristics of
measures.

Authors such as Bititci (1994); Olve et al. (1999); and Robson (2004) supported the
fact that “look to strategy first – rather than actual output of the process” and; hence
measures should be directly related to the firm’s manufacturing strategy and should be
chosen from the company’s strategic objectives. Attempts have been made and
performance measurement frameworks are proposed by various authors to support
this fact. A brief summary of various performance measurement frameworks is
presented in Table II.

Santos et al. (2002) tried to capture the dynamics of organization in the development
of performance measurement system using system dynamics and multi-criteria
decision analysis. Neely et al. (2000) presented a process-based approach to the
performance measurement system. Framework proposes 12 phases with real life
application in the area of manufacturing and service. Attempts are also reported,
### Table I.
Mapping of purposes of measurement systems

<table>
<thead>
<tr>
<th>Objectives of performance measurement system</th>
<th>Probable relationship of objectives with characteristic of PM</th>
<th>Desire characteristics of performance measures (PM)</th>
</tr>
</thead>
</table>
| Effective internal and external communications (Neely, 1998, a,b) | C2, C4, C6, C7, C11, C12, C16, C17, C18, C19, C20 | C1. Derived from company’s strategy and objective (Globerson, 1985; Maskell, 1989; Bititci et al., 1997; Neely, 1998a)  
C2. Simple and easy to use (Maskell, 1989; Neely, 1998a)  
C3. Timely and accurately feedback (Maskell, 1989; Neely et al., 1995; Martins, 2000)  
C4. Transparency (Neely et al., 1995)  
C5. Based on quantities that can be influenced, or controlled, by the user alone or in co-operation with others (Neely et al., 2000)  
C6. Reflect the “business process” i.e. both the supplier and customer should be involved in the definition of the measure (Neely et al., 1995)  
C7. Related to specific goals (targets) (Neely et al., 1995)  
C8. Part of a closed management loop (Neely et al., 1995)  
C9. Visual impact (Neely et al., 1995)  
C10. Focus on continuous improvement (Maskell, 1989; Moullin, 2004; Neely et al., 2000; Martins, 2000)  
C11. Consistency with time (Neely et al., 1995)  
C12. Explicit purpose (Neely et al., 1995)  
C13. Based on an explicitly defined formula and source of data (Neely et al., 1995)  
C14. Should employ ratios rather than absolute numbers (Globerson, 1985; Neely et al., 2000)  
C15. Should use data which are automatically collected as part of a process whenever possible (Neely et al., 1995)  
C16. Simple consistent format for recording (Neely et al., 1995) |
| Facilitate understanding of cause and effect relationships regarding performance (Kaplan and Norton, 1996, 2000; Martins, 2000) | C1, C5, C6, C7, C8 |  |
| Clarity on accountability for results (Neely et al., 2000; Martins, 2000) | C1, C2, C4, C8, C9, C18, C19, C20 |  |
| Intelligence for decision makers, not just compile data (Neely et al., 2000; Martins, 2000) | C2, C3, C5, C10, C11, C13, C14, C15, C16, C17 |  |
| Link compensation rewards, and recognition with performance measurement system (Neely et al., 1995) | C1, C3, C7, C8, C9, C11, C18 |  |

(continued)
towards the development of integrated, multidimensional and balanced performance measurement frameworks. For example, Keegan et al. (1989) proposed a balance between the internal and external measures and between the financial and non-financial measures; Cross and Lynch (1989) describes a pyramid of measures which integrates performance through the hierarchy of the organization; Fitzgerald et al. (1991) distinguishes between the results and their determinants and Kaplan and Norton (1992) between the four perspectives of their “balanced scorecard” and more recently, the performance prism (Neely et al., 2002) are developed.

Researchers have highlighted the importance of various dimensions in the development of performance measurement system. For example, Bititci et al. (1997) have exploited two dimensions of performance measurement – integrity and deployment. They refer integrity as the ability of the performance measurement system to promote integration between various areas of the business and realized the latter necessary to match the performance measures used at various levels with the business objectives. Drucker (1990); and Russell (1992) emphasized on alignment of financial and non-financial measures. As a result, various authors, most notably Kaplan and Norton (1992), have argued that this problem can be overcome, if a firm adopts a balanced set of measures. The balanced scorecard approach provides a comprehensive framework that translates a company’s strategic objectives into a coherent set of performance measures. The biggest strength of the balanced scorecard, compared to other frameworks, lies in its ability to link performance among different classes of business performance – financial and non-financial, internal and external. The link to strategy is subtle, but powerful. Measures that are aligned with strategy, not only provide information on whether the strategy is being implemented, but also encourage behaviors consistent with the strategy, and also support the progress against pre-determined objectives, without sub-optimization (Neely, 1998a; Amaratunga et al., 2002). Indeed, the essence of the balanced scorecard is the acceptance that some performance criteria conflict, and thus, the task of management is to resolve these conflicts, to achieve a balance of objectives. The balanced scorecard provides answers to four basic questions:

<table>
<thead>
<tr>
<th>Objectives of performance measurement system</th>
<th>Probable relationship of objectives with characteristic of PM</th>
<th>Desire characteristics of performance measures (PM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM measurement systems should be positive, not punitive (Martins, 2000)</td>
<td>C1, C2, C4, C6, C7, C12, C20</td>
<td>C17. Based on trends rather than snapshots (Maskell, 1989; Neely et al., 1995)</td>
</tr>
<tr>
<td>Results and progress toward program commitments should be openly shared with employees, customers, and stakeholders (Neely et al., 1995, 2000)</td>
<td>C2, C3, C4, C6, C8, C16, C18</td>
<td>C18. Transfers useful information (Neely et al., 1995)</td>
</tr>
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<td></td>
<td></td>
<td>C19. Precise, be exact about what is being measured (Neely et al., 1995)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C20. Objectivity – not based on opinion (Globerson, 1985; Neely et al., 2000)</td>
</tr>
</tbody>
</table>

Table I.
How do customers see us?

Internal perspectives.

Can we continue to improve and create value?

How do we look to our shareholders?

The comprehensive understanding of all these four aspects is presented in Figure 1. Each organization is unique and so follows its own path for building a balanced scorecard. The typical process in developing BSC is iterative in nature. The brief understanding of the steps involved in the development of the balanced scorecard framework is presented in Table III.

In the area of strategically oriented performance measurement the Balanced Scorecard (BSC) has been one of the most debated suggestions for developing a framework for performance measurement and management (Kaplan and Norton, 1992, 1993, 1996, 2001, 2004). A good balanced scorecard contains several strategic or future-focused metrics, that tell the organization how it is doing, on its path towards its vision (Brown, 2000). Ironically, this feature can in practice be a major obstacle to the implementation of the balanced scorecard. The usefulness of BSC as a practical theory has been questioned by referring to some of its assumptions, especially the cause-and-effect relationship (Norreklit, 2000, 2003). Some authors (Norreklit, 2000, 2004; Brignall, 2002) have, however, questioned the logic of the cause-and-effect relationship.

Table II.
Selected frameworks and models of performance measurement attributes

<table>
<thead>
<tr>
<th>Selected frameworks</th>
<th>Illustrative models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthony (1965) – strategic planning,</td>
<td>Forrester (1968) – industrial dynamics control</td>
</tr>
<tr>
<td>management control, operational control</td>
<td>Beer (1985) – viable systems model</td>
</tr>
<tr>
<td>Altman (1979) – data, analysis, action</td>
<td>Flamholz (1983) – core control system,</td>
</tr>
<tr>
<td>Keegan et al. (1989) – cost/non cost,</td>
<td>organizational structure, culture and environment</td>
</tr>
<tr>
<td>external/internal</td>
<td></td>
</tr>
<tr>
<td>Cross and Lynch (1989) – external/internal</td>
<td>Nanni et al. (1992) – organisational policies,</td>
</tr>
<tr>
<td>cascading measures around market, product ion</td>
<td>systems, practices</td>
</tr>
<tr>
<td>Beischel and Smith (1991) – measures linking CSFs</td>
<td>Bititci et al. (1997) – performance measures within the</td>
</tr>
<tr>
<td>(quality, customer service, resource management, cost,</td>
<td>viable systems model</td>
</tr>
<tr>
<td>flexibility) to process drivers</td>
<td></td>
</tr>
<tr>
<td>Fitzgerald et al. (1991) – results – determinants</td>
<td></td>
</tr>
<tr>
<td>Kaplan and Norton (1992) – scorecard of financial,</td>
<td></td>
</tr>
<tr>
<td>customer, internal, learning and growth</td>
<td></td>
</tr>
<tr>
<td>Smith (1997) – value and n on-value adding, drivers</td>
<td></td>
</tr>
<tr>
<td>Otley (1999) – objectives, strategies, performance targets, incentives, information flows</td>
<td></td>
</tr>
<tr>
<td>Kennerley and Neely (2000) – performance prism:</td>
<td></td>
</tr>
<tr>
<td>stakeholder satisfaction, strategies, processes,</td>
<td></td>
</tr>
<tr>
<td>capabilities, stakeholder contributions</td>
<td></td>
</tr>
</tbody>
</table>

Step 1: Define organizational vision, mission and strategy
This ensures that the performance measures developed in each perspective support accomplishment of the organization’s strategic objectives.
It also helps employees visualize and understand the links between performance measures and successful accomplishment of strategic goals.

Step 2: Develop performance objectives, measures and goals
To identify what the organization must do well (i.e. the performance objective) in order to attain the identified vision.
For each objective that must be performed well, it is necessary to identify measures and set goals covering a reasonable period of time.
A properly constructed BSC should identify and make explicit the sequence of hypotheses about the cause-and-effect relationship between outcome measures and the performance drivers of those outcomes.

Step 3: Procurement of performance management plan
Following down the strategic planning process, more and more refined performance measures are utilized. This plan can be the document that provides the specific link to the strategic and performance plans.
The foundation of the procurement performance measurement plan stems from the goals, objectives and measures of strategic and performance plans.

Step 4: Evolve with experience
It takes time to establish measures, but it is also important to recognize that they might not be perfect the first time.
Performance management is an evolutionary process that requires adjustment as experience is gained in the use of performance measures.
principle. They have questioned the practicality of the BSC as a method on the premise that no cause and effect relationship exists between measurement areas. Nørreklit (2000) questions the reliability of BSC by arguing:

1. that there should be a time dimension in the BSC in order to be able to talk about causality;
2. that there is no cause-and effect relationship between some of the suggested areas of measurement in the BSC; and
3. that the four dimensions are not independent.

Further, Kennerley and Neely (2000) consider:

- the absence of a competitiveness dimension;
- failure to recognize the importance of aspects such as human resources, supplier performance; and
- no specification of the dimensions of performance that determine success as the few shortcomings of balanced scorecard.

Pfeffer and Sutton (2000) in their book “The knowing-doing gap: how smart companies turn knowledge into action” finds poorly designed, or unnecessarily complex, measurement system amongst the biggest barriers to turning knowledge into action. Measures focus attention on what is measured. Because, what is measured is presumed to be important, measures affect what people do, as well as what they notice and ignore. As a consequence, what gets measured gets done, and what is not measured tends to be ignored.

In summary, an evaluative review of the literature uncovers the following research gaps (RG):

**RG1:** Brown (2000) in his book “winning strategy” criticizes the development process of BSC adopted by many companies on few dimensions like:

- Ignoring the interrelationships among variables.
- Non separation of vision and mission related measures.
- Inability to predict the impact of leading indicators on lagging indicators.

Further, in interviews with Finnish firms in 1998 about their use of BSC, Malmi (2001) found that although most interviewees stated that they have derived their measures from strategy, based on cause-and-effect reasoning, the claimed link between strategy and measures appeared weak in most companies. Also, it appeared from the interviews, that the initial idea of linking measures, was often not well understood. An attempt is made by Van Aken and Garry (2002) on a structured process to define end-result and driver metrics. In general, literature reports only few attempts on linking measures with strategy for the BSC development.

**RG2:** It seems that changes in business strategies, and objectives and measuring performance, are the activities of two parallel lines, which do not aim to achieve common goal. Organizations are implementing new measures to reflect new priorities but failing to discard measures reflecting old priorities (Meyer and Gupta, 1994). The new performance measurement frameworks may have answered the question “what types of measures should a company use?” but they did not provide specific advice to a company implementing a performance measurement system (Bourne et al., 2000).
Often scorecards are only composed of a collection of indicators sorted in four dimensions without any attempts to map the relationships between the indicators, and thus, they resemble more the kind of scorecards that Kaplan and Norton (2001) term KPI scorecards. In an introduction stage, higher motivation prompts the inclusion of maximum performance measures and makes the system bulky, but with time, activity becomes tedious and expensive. This initiates an immediate change in approach for making the system thinner and leaner without much logic. This is because of the lack of awareness on driver-dependent (leading-lagging indicator) relationships of the objectives of the organization.

Here, our attempt is to address the above issues using an integrated approach of ANP and ISM in the context of the case company.

**Approach to measurement development**

Forman (1996) found the use of Analytic Hierarchy Process (AHP) and its extension models more appropriate, in the design of the performance measurement systems. On the same ground, Yurdakul (2002) attempted to provide a solution, using AHP and its extension system, with feedback (SWF), which has accommodated both tangible, and intangible aspects, but questions of obtaining interrelationships among objectives and linking performance measurement system with strategic objectives of organization are found to be somewhat unresolved. Bititci *et al.* (2000) put thrust on the dynamic performance measurement system (Meyer and Gupta (1994); and Bourne *et al.* (2000)); advocate the use of a structured approach, which allows organizations to:

- differentiate between improvement and control measures; and
- develop causal relationships between competitive and strategic objectives and processes and activities.

Here, we have attempted to accommodate both the issues by providing an integrated qualitative vs quantitative solution. The issue is also supported by Santos *et al.* (2002) who have explored the scope of system dynamics and multi-criteria analysis, in the development of the performance measurement system. Kennerley and Neely (2002) find two issues important for the development of dynamic performance measurement system:

1. Drivers of change (those factors that cause change to be necessary).
2. Barriers to change (those factors that must be overcome if change is to be effective).

The present approach develops interrelationships among objectives, using ISM, which identifies driver and dependent issues, while separating linkage and independent aspects. Although many organizations have undertaken projects to design and implement better performance measures, little consideration appears to be given to the way in which measures evolve and measurement system remains dynamic with time, following their implementation (Waggoner *et al.*, 1999; Lynch and Cross, 1991). The inclusion of leading indicators on scorecards is only helpful if you can predict how they will impact on the lagging indicator (Brown, 2000). Companies rarely define correlations between leading and lagging and soft and hard measures. In the present work, by linking ISM outcomes to ANP models and using ANP results for BSC framework, a seamless development of the performance measurement system is
demonstrated. A review of the earlier research has mainly uncovered three practical problems associated with the development of BSC:

(1) Is it possible to develop an integrated solution to the BSC development, wherein measures could be linked to the strategic intent of organization and the impact of interrelationships between the measures could be considered?

(2) Is it possible to quantify the issues related to importance of objectives and related measures, leading-lagging indicator relationships, weightages of various perspectives (financial, customer, internal and innovation) etc.? If yes, then can it be a mix of approaches or single approach?

(3) How the confidence of managers or practitioners could be retained in this new solution?

As a result, we aim to address the following research questions (RQ) in the context of real life case examples.

*RQ1*: How organizational strategic intent can be linked to the development of the BSC system?

*RQ2*: How the basis for updating the BSC system could be developed?

*RQ3*: What is the impact of driver-dependent (leading-lagging indicator) relationships existing among various objectives of organizations on deriving the performance measures and the weightages for different perspectives?

*RQ4*: How logic of “cause and effect” could be utilized for the identification of appropriate measures?

*RQ5*: How a quantitative solution to the development of the BSC for real life cases could be proposed without overlooking the valuable managerial insights and intuitions?

We believe that the integration of cause and effect, Interpretive Structural Modeling (ISM) and Analytic Network Process (ANP) can set an appropriate basis for the development of the balanced scorecard on following reasons:

- Approach begins from understanding strategic intent and keeps that as a base for the rest of the analysis.
- The measures are identified, for each objective, using a systematic logic of cause and effect, and hence, provides a logical flow for the purpose.
- Approach develops an ISM model to identify driver, autonomous, linkage and dependent issues, which, makes the development process more focused. ISM helps to impose order and direction on the complex relationships among elements of a system, and this is one of the requirements to be addressed for the development of an efficient performance measurement system.
- ANP is a multi-attribute decision-making approach, based on knowledge, experience, and perceptions of experts in the field. Even though it does not provide an optimal solution (from a cost perspective), it is valuable for decision-making, involving intangible attributes that are associated with strategic factors present in the study. Use of approach in the present case
provides the means to accommodate interrelationships of organizational objectives, for determining the weightages for various BSC perspectives, and this makes the results more valuable and realistic.

- The present approach needs a larger number of inputs from decision-makers, and hence, instead of marginalizing the real life experiences, it derives the maximum out of it, in a more systematic manner. This mix of a quantitative and qualitative treatment provides a platform to select and incorporate measures on a trade-off basis, rather than relying on ad-hoc decisions.

Specifically, a combination of ISM and ANP is attractive in a way that ISM can satisfy the input demand of ANP and output of ANP results in a more usable outcome, which is sometimes not possible with the use of any one technique. A comprehensive understanding of the measurement development approach is presented in Figure 2.

The present work is based on the research project undertaken by authors at case organization KVIC organic food sector, India. The case organization works under the regulatory norms of Indian government, supervision of Indian Institute of Technology Delhi (IITD) and brand consultant. To collect the information, semi-structured

![Figure 2: Measurement development approach](image-url)
interviews, and discussions, were conducted, at various levels (top, middle and
operational) of people from the case organization. Generally, prior appointments were
taken, to conduct the interviews with the director (one); and the deputy directors (two)
of the project. Mainly, this has focused on discussing their motivation, and short-term
and long-term objectives of the project. Also, during the discussion, various difficulties
that they have been faced with were uncovered. Case organization has set their quality
conformance set up at IIT Delhi. Their discussion with the head of the quality control
department has provided insights into the quality problems related to vendors, and the
reasons behind customer dissatisfaction. The company had hired a professional
management consultant and a discussion/interview with them further uncovered the
hidden problems. Mainly, the discussion was restricted to the main consultant and two
other people from his team. The case company has various outlets in Delhi. Almost, six
outlets were visited and the owner and customers were interviewed, to assess the
problems related to the availability, quality and customer satisfaction to related details.
However, we have not developed any kind of customer satisfaction index, so is not
within the purview of this paper. Information was collected during the interviews
through the researcher making detailed notes, as the interview was in progress.
Further, the organization has outsourced some of its product processing and
transportation and hence, interviews with outside service providers were conducted to
understand the related issues. These subjective opinions and other relevant
information were then written during the interview and then later used as the basis
for analysis. The interviews were conducted over the course of one-year, and research
project work sporadically. Sometimes, previously interviewed aspects were repeated to
check the consistency of subjective opinions. In the next section, we present the
development of BSC for a case company KVIC, in India with implementation
guidelines.

Designing of balanced scorecard for KVIC organic food sector
KVIC is a statutory body created by an Act of Parliament in India, established in April
1957; it took over the work of the former all Indian Khadi and Village Industries Board.
The broad objectives that KVIC has set before it are:

- The social objective of providing employment.
- The economic objective of producing saleable articles.
- The wider objective of creating self-reliance amongst the people and building up
  of a strong rural community spirit.

The KVIC product portfolio includes:

- **SARVODAYA**: consists of day-to-day use items and is aimed at domestic
  consumer market.
- **KHADI**: exclusive products have been developed to cater to the high-end market
  as well as exports.
- **DESI AHAAR** (organic food products): includes products like pulses, cereals and
  spices powder, etc. which are pure, natural and desi, in the sense of being
  traditional and ethnic in nature.
The KVIC organic food sector is in an inception stage and continuous monitoring and measurement of business functions are essential. A few major problems the company is facing are:

- KVIC has invested a significant amount in infrastructure and machineries but output is much less.
- The organization is also facing problems related to quality and interrupted flow of food grains from the supplier side.
- The food products are highly perishable and the improper handling of these has led to poor customer satisfaction and customer services.

The improvement in these areas is not possible. By focusing only on traditional financial perspectives, the consideration of other aspects, like customer perspective, innovation and learning, internal perspectives, etc. are of the prime concern. With an aim to bring improvements in identified areas, present work is directed towards deriving strategic intent of KVIC organic food sectors, finding relationships among objectives, identifying measures through cause and effect analysis, determination of weightages using ANP, and the development of the complete framework of the balanced scorecard. A step-by-step procedure is followed and presented below.

**Strategic intent: vision, mission and strategic objectives**

The government’s overall aim behind the project of the KVIC organic food sector is to initiate the move in the direction of organic farming. At present, only a few competitors are present and potential exists to enable the project to grow without many hurdles. But less know-how of organic farming; farmers’ expectations for quick returns and poor approach to working; changing loyalty of farmers for marginal gains; frequent variations in the quality of raw material; disturbed distribution channel; delays in government procedures, etc. have created serious problems in meeting the overall vision. The top management of KVIC has set few strategic objectives ahead of them. The list of which include the objectives related to all the four perspectives of BSC. These are summarized in Table IV.

**Interpretive structural modeling for strategic objectives of KVIC**

Recent developments in the performance measurement system shows that companies have developed strategy maps and defined the relationships between the main drivers using historical performance measurement data (Rucci et al., 1998; Najjar and Neely, 1998). This provides managers with a set of “levers” to manage the business. Confidence in the levers (in present case “drivers”) is enhanced through a development of logical relationships among indicators/variables, based on experience and intuitions of managers. In the present section, we develop relationships among objectives using ISM methodology, which leads to identification of various performance measures and their weightages.

The objectives listed in the previous section are not independent of each other. For example, motivation of sales outlets, may lead to better sales, and in turn lead to an enhanced market share. Similarly, proper quality management, at various levels of the supply chain, will lead to a better customer service and it may also lead to a bigger market share. So there is a “leads to” relationship existing between and among the objectives. Understanding of these relationships is extremely helpful, in deriving
appropriate performance measures through cause and effect diagram. Hence, a first attempt has been made to derive relationships among strategic objectives, using ISM methodology.

Interpretive Structural Modeling (ISM) is a methodology for identifying and summarizing relationships among specific items, which define an issue or problem. It provides a means, by which a group can impose an order on the complexity of the items (Mandal and Deshmukh, 1994). ISM offers a variety of advantages like:

- It incorporates experts’ subjective judgments and their knowledge base in a most systematic manner;
- Provides ample opportunity for revision of judgments; and
- Computational efforts involved are very less for objectives (items) ranging in ten to 15 numbers and it can be used as a handy tool in real life applications. Some useful work on this technique is summarized in Table V.

A step-by-step procedure for the development of an ISM model is in the following.

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<tr>
<th>Vision</th>
<th>Mission</th>
<th>Objectives</th>
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<tbody>
<tr>
<td>To expand the business through improved customer services and proper integration of supply chain echelons</td>
<td>To streamline supply chain functions by motivating farmers, sales outlets and employing a reliable third party logistics (contractor)</td>
<td>To recover the investment made on machineries and infrastructure through percent increase in revenue growth</td>
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<td>To improve customer service through uninterrupted flow of better quality products and consistent price</td>
<td>To motivate and identify new farmer sources</td>
<td>To expand the business outside the territory of Delhi</td>
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<tr>
<td>To establish long-term relationship with farmers</td>
<td>To motivate farmers for uninterrupted flow of good quality food grains</td>
<td>To establish long-term contracts with new contractor (3 PL)</td>
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<td>To motivate farmers for uninterrupted flow of good quality food grains</td>
<td>To maintain and monitor quality at every level (farmer, processor and customer level) of supply chain</td>
<td>To motivate the government for the expansion and growth of organic food sector</td>
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<td>To establish long-term relationship with farmers</td>
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<td>To enhance marketing function for building the brand image of “Desi Ahaar” in market</td>
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<td>To improve customer service through uninterrupted flow of better quality products and consistent price</td>
<td>To motivate and identify new farmer sources</td>
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Table IV.
Vision, mission and objectives of KVIC
Structural Self-Interaction Matrix (SSIM)

For analyzing the objectives, which drive the development of measures and their weightages, a contextual relationship of “leads to” type is chosen, meaning that one variable leads to another. Keeping in mind the contextual relationship for each variable, the existence of a relationship between any two sub-variables (i and j) and the associated direction of the relationship is questioned. Four symbols are used for the type of relation that exists between the two sub-variables under consideration:

- **V** for the relation from i to j but not in both directions.
- **A** for the relation from j to i but not in both directions.
- **X** for both directions, relations from i to j and j to i.
- **O** if the relation between the variables does not appear valid.

Based on this contextual relationship, a SSIM (Warfield, 1974) is developed. To obtain consensus the SSIM was discussed in a group of experts, and opinions of the top management, working staff, brand consultant and perceptions developed during the visits of case company KVIC organic hub, are incorporated to derive the initial SSIM. The completed matrix is shown as Table VI.

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Table V. ISM as reported in literature

Table VI. Structural self-interaction matrix (SSIM)
Reachability matrix

The SSIM has been converted into a binary matrix, called the initial reachability matrix by substituting $X$, $A$, $V$ and $O$ by 1 and 0. Then its transitivity is checked (which means if element $i$ leads to element $j$ and element $j$ leads to element $k$, then element $i$ should lead to element $k$ (Mandal and Deshmukh, 1994)) and the final reachability matrix as shown in Table VII is obtained.

Classification of criteria

Different objectives have been classified into four sectors (Mandal and Deshmukh, 1994, Warfield, 1974), namely autonomous, dependent, linkage and driver/independent, based on their driver power and dependence. It has been presented in Figure 3 as a driver power-dependence matrix.

Level partition and canonical matrix

From the reachability matrix, the reachability set and antecedent set (Warfield, 1974) for each objective is found (Table VIII). The reachability set consists of the element itself, and other elements to which it may reach, whereas the antecedent set consists of the elements itself and the other elements, which may reach it. Then the intersection of these sets is derived for all elements. The elements are considered as top-level elements for which the reachability and intersection sets are the same. Physically, these top-level elements of hierarchy will not reach any higher than their own level. To obtain the next level of elements, top-level elements are separated out from other elements and the same process is repeated. The whole process of partitioning is based on establishing the precedence relationships and arranging the elements in topological order (Thakkar et al., 2005). Finally, the reachability matrix is converted into the canonical (lower triangular) format (Table IX) by arranging the elements according to their levels (Table VIII).

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Table VII.
Final reachability matrix

Note: $1^*$ shows transitivity
Development of digraph and formation of ISM

From the canonical matrix form of reachability matrix (Table VIII), the structural model is generated by means of vertices or nodes and lines of edges. If there is a relationship between element \( i \) and \( j \), this is shown by an arrow which points from \( i \) to \( j \). This graph is called a direct graph or digraph. Next, the elements descriptions are written in the digraph to call it the ISM (Figure 4).

Discussion and managerial implications

(1) Final reachability matrix (Table VII) shows that to motivate government (7) is the key criterion with maximum driver powers. Next is to motivate and identify
Table IX.
Canonical matrix

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Figure 4.
Interpretive structural model for KVIC
new farmer sources (3). Case organization is working under the direct influence of The Government of India. Political uncertainty and poor communication often delays the implementation of new initiatives and hence, it is necessary, to establish a proper communication channel with government offices, and subsidiaries.

(2) Driver power-dependence matrix (Figure 3) depicts that better utilization of machinery (12) and motivating sales outlets (10) are autonomous variables in the list of KVIC strategic objectives. These aspects are in direct control of the case organization and require only an adoption of regular monitoring and review of performance measures to initiate corrective actions at the right time.

(3) Dependent variables are recovering investments (1), improved customer service (2), business expansion (8), long-term relationships with contractors (9), and increased market share (11). These attributes are weak drivers but strongly dependent. These are the issues, which decide long-term profitability and growth of organizations. Improper attention to them may lead to many adverse effects like poor market image, disturbed distribution channel, and low customer service, and restricted business growth, etc.

(4) There is no linkage variable identified, also there is no variable found, which can cause unpredicted destruction to the system.

(5) Variables like motivated farmers (3), long-term relationships with farmers (4), uninterrupted flow from farmers (5), maintain and monitor quality (6), motivated government (7), and enhanced marketing function (13) are the strong drivers. They condition the rest of the system and are called independent variables or drivers.

Dependent objectives (1, 2, 8, 9 and 11) appear at the top of ISM hierarchy and they are important to maintain the status quo of the present performance of businesses. Driver objectives (3, 4, 5, 6, 7, 13) appear at the base of hierarchy and they need to be measured for futuristic growth. Driver variables also improve quality, and generate greater awareness about the potentiality of products in the market. Driver metrics may be measured more frequently, and if expected cause and effective relationships between leading and lagging indicators are not observed, then the driver metrics, and/or initiatives focused on driver metrics, may need to be adjusted. In this sense, driver metrics are more dynamic, often relatively temporary in nature. More information on this is reported in Van Aken and Garry (2002). Development of ISM for the objectives of KVIC organic food sector has provided insights into the relationships existing among the different objectives. The following section identifies various performance measures, using series of cause and effect diagrams. Further, these results are utilized as inputs for determining the weightage using an ANP model.

Measures identification through cause and effect diagram
In most presentations of the balanced scorecard, the cause-and-effect principle has been a core feature of the BSC. They are also known as fishbone diagrams because of their appearance (in the plotted form). Basically, cause and effect diagrams are used to identify and systematically list the different causes that can be attributed to a problem (or an effect) (Ishikawa, 1976). The cause-and-effect principle has been developed with inspiration from the service management literature, towards a generic business model,
in the form of the strategy map (Kaplan and Norton, 2001, 2004). Generally, the cause-and-effect relationships are argued to be the feature that distinguishes a balanced scorecard from other kinds of scorecard, whether they are labeled stakeholder scorecards or KPI scorecards (Kaplan and Norton, 2001, pp. 102-104). Kaplan and Norton (2001, p. 77) argue that the four generic balanced scorecard perspectives are fundamentally also related in a causality chain. Both Nørreklit (2000, p. 75) and Brignall (2002) have pointed out that the linear causal relationships between the four perspectives should more correctly be seen as interdependent perspectives. A strategy is a set of hypotheses about cause and effect (Kaplan and Norton, 1996). They argue that a BSC should contain outcome measures and that the performance drivers should be linked together in cause-and-effect relationships (ibid, p. 31).

Trying to identify factors affecting performance and to explicitly represent their relationships, Suwignjo et al. (2000) suggested the use of cognitive maps and Kaplan and Norton (2001) the use of strategy maps. These cause and effect diagrams are very valuable to capture and make explicit the managers’ “theory of the business”, and consequently, they may prove very useful in identifying appropriate performance measures (Kaplan and Norton, 1996). The chain of cause and effect should pervade all four perspective of a balanced scorecard. For example, recovery of investment is one of the strategic objectives in the financial perspective. The driver of this objective could be increased customer service, which is a customer perspective, which is in turn dependent on the response of the sales outlet, machine utilization, etc. which are internal perspectives, as shown in ISM (Figure 4). Likewise, a specific effect may have the various causes pertaining to four different areas (finance, customer, internal and innovation) of BSC. Evaluation of various objectives using “cause and effect” analysis helps to identify the mix of measures, which can take care of the organization’s performance on all the four perspectives. For example, the measures are identified for the strategic objective – “uninterrupted supply chain” as shown in Figure 5. This represents only a subset of one perspective. Likewise, a set of performance measures, are derived for all the four perspectives of BSC.

Figure 5. Cause and effect diagram for uninterrupted supply chain
Weightages of performance measures using Analytical Network Process (ANP)

Saaty (1980) introduced the analytic hierarchy process (AHP) for choosing the most suitable alternative, which fulfils the entire set of objectives in a multi-attribute decision-making problem. The AHP is a mathematical theory of value, reason, and judgment, based on ratio scale for the analysis of multiple-criteria decision-making problems (Saaty, 2001). AHP, premising independent elements, face certain limitations when the complexity of decision problems increase and interactions among criteria and sub-criteria are not implicitly covered. The ANP is a more general form of AHP, incorporating feedback and interdependent relationships among decision attributes and alternatives. This provides a more accurate approach when modeling a complex decision environment. ANP (Saaty, 2001) is a comprehensive decision-making technique that has the capability of including all the relevant criteria – tangible and intangible – in arriving at a decision. However, the technique is built on the seven pillars of AHP technique and serves as a starting point (Saaty, 1999). ANP draws attention to the analytic hierarchy process (AHP) by incorporating interdependencies without a need to specify levels as in a hierarchy. ANP model building requires the definition of elements and their assignment to clusters, and a definition of their relationships (i.e. the connections between indicating the flow of influence between the elements). Like AHP, ANP is founded on a ratio scale measurement and pairwise comparisons of elements to derive priorities of selected alternatives. In addition, relations among criteria and sub-criteria are included in evaluations, allowing dependencies, both within a cluster (inner dependence) and between clusters (outer dependence) (Saaty, 2001).

To determine the relationship of a network structure on the degree of interdependence is the main function of ANP. In addition to highlighted features, this technique has two outstanding advantages:

1. Loosely connected network structure of the ANP makes the representation of any decision problem possible, without concern for what comes first and what comes next as a hierarchy.

2. ANP prioritizes not just elements, but also groups, or a cluster of elements, as is often necessary in the real world.

Much work has been reported on the application of ANP. A brief summary of reviewed papers is outlined in Table X.

Once the measures are identified, the second most important question is that what weightage should be given to each particular measure in the designing of BSC. As discussed earlier, measures are derived from the interrelated strategic objectives of the organization, and hence, in deriving their weightages, these relationships are quite useful. In this section, an analytical approach of ANP is used for the determination of the weightages. Relationships obtained through the development of ISM, are utilized as inputs for the construction of the ANP model. Here an attempt has been made to derive total weightage for each category – financial measures, customer measures, internal measures, and innovation and learning measures. A further split of each weightage for various measures (within categories) is necessary. This requires the assessment of the prevailing market situations and business conditions and hence this task of fine-tuning is left to the case organization as a future aspect. However, in the present situation we assume the equal weighting within categories for the completion of framework.
Steps of the ANP model and its applicability in various areas, are well documented (for example, Meade and Sarkis (1999); Saaty (1999, 2001); Sarkis (2003)). The manual method of determining priorities is lengthy even in a layer-wise made hierarchies. Here, we demonstrate an unusual approach to accommodate ISM results as an input to the ANP. A pictorial view depicting an integrated use of ISM and ANP (adopted: Thakkar et al. (2005)) is presented in Figure 6. To invest more time on analysis and maintain accuracy in accommodating results of one model to another we carried out analysis using a beta version of the ANP software “Super Decision”. For the development of the ANP model (Figure 7) an identified strategic objective of the KVIC organic food sector are clustered under four categories of: financial objectives, customer objectives, internal objectives and Innovation and learning objectives. These are the objective clusters, which have relationships (as established using ISM) within the cluster and between the clusters. For the purpose of this, mainly functions of “Design” and

**Table X.**

ANP as reported in the Literature

<table>
<thead>
<tr>
<th>Reference</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meade and Sarkis (1999)</td>
<td>Organizational project alternatives for agile manufacturing process are analyzed</td>
</tr>
<tr>
<td>Lee and Kim (2000)</td>
<td>Used the integrated approach of ANP and Goal Programming for interdependent information system project selection</td>
</tr>
<tr>
<td>Sarkis (2003)</td>
<td>Application is demonstrated for SBC’s quantitative model for performance measurement system. Further, the scope is extended to enhance the dynamic evaluation of BSC’s manufacturing strategy performance evaluation model</td>
</tr>
<tr>
<td>Niemira and Saaty (2004)</td>
<td>Developed an imbalance-crisis turning point model to forecast the likelihood of a financial</td>
</tr>
<tr>
<td>Saaty (2004)</td>
<td>Importance of rank preservation and reversal are discussed in multi-criteria decision-making problem</td>
</tr>
<tr>
<td>Chung et al. (2004)</td>
<td>Proposes an application for the selection of product mix for efficient manufacturing in a semiconductor fabricator</td>
</tr>
</tbody>
</table>

**Figure 6.**

Integrated approach of ANP and ISM

*Source: Thakkar et al. (2005)*
Development of a balanced scorecard

Figure 7.
ANP model formulation
“Network” are utilized from the toolbar of the software “Superdecision”. Further, these objective clusters are linked with four perspectives of BSC. Four representative segments of performance measures – financial measures, customer measures, internal measures, and innovation and learning measures are considered as alternatives.

On the basis of collected subjective judgments, synthesis is carried out and results are obtained. Toolbar features “Compare” and “Compute” are used to carry out pairwise comparisons and priority computation for each stage. Formation of super-decision matrix and final synthesis has helped to obtain the final priorities for various alternatives. These features are available within toolbar function “compute”. The results suggest that KVIC should give more weighage (30 percent or 0.30) to customer related measures. Financial measures and internal measures have more or less equal weighage, 0.27 (or 27 percent) and 0.25 (or 25 percent) respectively, and can be considered with equal importance in the designing of BSC. Innovation and learning is of the lowest priority with weighage of 0.18 (or 18 percent).

KVIC is in a phase of streamlining its day-to-day functioning of the organic food sector. In the present situation, disturbed supply chain of organic food – “Desi Ahaar” has demoralized the customers and retail outlets. Looking to the present realistic scenario, KVIC is required to concentrate more on providing better services to the customers and towards the stabilization of internal processes. The results obtained through the ANP model are also supporting this argument and the highest weighage is assigned to the customer measures (i.e. 0.30). After achieving some stabilization of the new set up and financial matters, KVIC can think to expand business boundaries by undertaking some innovative ventures. Results also depict that in the present situation, innovation should be given the least weighage in the BSC based evaluation of KVIC performance.

Complete framework of balanced scorecard for KVIC organic food sector

The outcomes of cause and effect analysis and ANP model are presented in a tabular format of BSC as shown in Table XI. The salient features of developed framework are:

- Consideration of all the four – financial, internal, customer and innovation and learning perspectives.
- Clearly defines units, frequency, and responsibility of each measure.
- Defines weighage for each perspective.
- Provisions are made for setting target values and measure evaluation (on five-point rating scale).

The use of developed framework is self-explanatory. However, we provide following guidelines for its effective use:

1. Understand the relationships existing among the various strategic objectives. Here an ISM model is developed for this purpose. It involves a number of subjective judgments and perceptions developed during the study and hence due to modifications should be accepted as results are tracked and adequate data becomes available in the future.

2. Check and analyze the utility of measures developed through the cause and effect diagram. These measures are identified on the basis of present situations and some short-term future goals of the KVIC organic food sector, which are
<table>
<thead>
<tr>
<th>SN</th>
<th>Strategic objective</th>
<th>Measures</th>
<th>Weightage (out of 100)</th>
<th>Unit</th>
<th>Frequency</th>
<th>Responsibility</th>
<th>Target</th>
<th>Excellent</th>
<th>Very good</th>
<th>Good</th>
<th>Average</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Recover the investment through increased revenue growth</td>
<td>Cash flow</td>
<td>27</td>
<td>Rs.</td>
<td>Yearly</td>
<td>KVIC</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2</td>
<td></td>
<td>Return on investment (ROI)</td>
<td></td>
<td>Ratio</td>
<td>Yearly</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Profit – Net income</td>
<td></td>
<td>Rs.</td>
<td>Yearly</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Sales growth</td>
<td></td>
<td>%</td>
<td>Quart.</td>
<td></td>
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<tr>
<td>5</td>
<td></td>
<td>Revenue growth</td>
<td></td>
<td>%</td>
<td>Quart.</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>6</td>
<td></td>
<td>Market share</td>
<td></td>
<td>%</td>
<td>Yearly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Customer perspective</td>
<td>30</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Customer satisfaction</td>
<td>Customer satisfaction index</td>
<td></td>
<td>Index</td>
<td>Quart.</td>
<td>KVIC, sales outlet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Percent sales from existing and new customers</td>
<td></td>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Product availability</td>
<td>Percent availability of products out of total (of products at sales outlet)</td>
<td></td>
<td>%</td>
<td>Monthly</td>
<td>Sales outlet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Range of volume variety available out of whole range</td>
<td></td>
<td>%</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>5</td>
<td>Price stability</td>
<td>Percent decrease or increase in price</td>
<td></td>
<td>%</td>
<td>Yearly</td>
<td>KVIC</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

(continued)
<table>
<thead>
<tr>
<th>SN</th>
<th>Strategic objective</th>
<th>Measures</th>
<th>Weightage (out of 100)</th>
<th>Unit</th>
<th>Frequency</th>
<th>Responsibility</th>
<th>Target</th>
<th>Excellent</th>
<th>Very good</th>
<th>Good</th>
<th>Average</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Responsiveness</td>
<td></td>
<td></td>
<td>Ratio</td>
<td>Monthly</td>
<td>Contractor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Proper response of sales outlet</td>
<td>Total (of orders/total (of shipments per unit time)</td>
<td>%</td>
<td>Quart.</td>
<td>Sales outlet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal business perspective</td>
<td></td>
<td>Percent increase or decrease in (of customers)</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Uninterrupted supply from farmers</td>
<td>Percent retention of existing customer</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Participation of KVIC in joint venture</td>
<td>Percent increase in sales</td>
<td>%</td>
<td>Yearly</td>
<td>Contractor</td>
<td></td>
<td></td>
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</table>

Table XI.
<table>
<thead>
<tr>
<th>SN</th>
<th>Strategic objective</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Initiative taken by KVIC for increasing motivation of sales outlet</td>
<td>Number of training and awareness program conducted, Incentive provided on increased sales, Recognition given to sales outlet</td>
</tr>
<tr>
<td>5</td>
<td>Machine utilization</td>
<td>Number of units produced per total capacity, Running expenditure of machinery, Rate of return</td>
</tr>
<tr>
<td>6</td>
<td>Infrastructure utilization</td>
<td>Overhead distribution of investment, Maintenance expenditure</td>
</tr>
<tr>
<td>1</td>
<td>Readiness of farmers for business expansion</td>
<td>Quantity produced and supplied by farmers, Number of times quality check failed for a particular farmer</td>
</tr>
<tr>
<td>2</td>
<td>Readiness of KVIC for business expansion</td>
<td>Number of employees recruited</td>
</tr>
</tbody>
</table>

Table XI. Development of a balanced scorecard

<table>
<thead>
<tr>
<th>Weightage (out of 100)</th>
<th>Unit</th>
<th>Frequency</th>
<th>Responsibility</th>
<th>Target</th>
<th>Excellent</th>
<th>Very good</th>
<th>Good</th>
<th>Average</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Initiative taken by KVIC for increasing motivation of sales outlet</td>
<td>No.</td>
<td>Yearly</td>
<td>KVIC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Machine utilization</td>
<td>%</td>
<td>Quart.</td>
<td>KVIC, contractor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Infrastructure utilization</td>
<td>Rs.</td>
<td>Yearly</td>
<td>KVIC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Innovation and growth perspective</td>
<td>18</td>
<td>Kg</td>
<td>Quart.</td>
<td>KVIC, contractor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 2 Readiness of KVIC for business expansion | No. | KVIC | | | | | | | | (continued)
<table>
<thead>
<tr>
<th>SN</th>
<th>Strategic objective</th>
<th>Measures</th>
<th>Weightage (out of 100)</th>
<th>Unit</th>
<th>Frequency</th>
<th>Responsibility</th>
<th>Target</th>
<th>Excellent</th>
<th>Very good</th>
<th>Good</th>
<th>Average</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Better interaction with government</td>
<td>Number of meetings arranged with other regional offices No.</td>
<td>No.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Number of new farmer sources identified No.</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>4</td>
<td>Readiness of 3PL</td>
<td>Number of proposals sent to government No.</td>
<td>No.</td>
<td></td>
<td>Yearly</td>
<td>KVIC</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Number of meetings arranged with ministry of food and government officials No.</td>
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<tr>
<td></td>
<td></td>
<td>Time taken by government for the approval of any new proposal Month</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Enhancement of marketing function</td>
<td>Number of trained logistics personnel No.</td>
<td>No.</td>
<td></td>
<td>Yearly</td>
<td>KVIC</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Number of vehicles (transportation facility) available No.</td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>Available financial back-up per annum Rs.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Percent deviation in demand and supply %</td>
<td></td>
<td></td>
<td>Yearly</td>
<td>KVIC</td>
<td></td>
<td></td>
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</tbody>
</table>
subjected to change from time to time. Over a period of time, KVIC can drop some of the measures and incorporate new measures from the given generalized framework of BSC.

(3) Revise the columns of frequency and responsibility with changing situations of the organization.

(4) Here weightages for main perspective categories are obtained using ANP, but further splitting of the weightage for sub measures is left to the decision maker. For example, total weight of 27 is assigned to the financial perspective. This perspective itself has the category of survive, succeed and prosper. Further total weightage has to be divided into these categories and then for the measures. For this purpose we suggest these following options:

- Relative weightages of measures could be obtained on a pairwise comparison.
- Decision-makers or managers can split-up total weightages on their own experiences.
- Equal weightage could be given to all sub measures by dividing total weightage of the perspective by the number of measures.

(5) Find the overall performance score by using the following formula.

\[
\text{Performance score for measure } i = \text{Rating of measure } i \times \text{weightage of measure } i
\]

**Rating of measure:** Excellent = 5, Very good = 4, Good = 3, Average = 2 and Poor = 1

Total PS (Performance Score) = \( \sum \text{Score of measure } i \). – – – – – – – (i)

Where \( i = 1 \) to \( n \) performance measures.

**Closing on managerial insights and scope for future**

The basic idea behind the use of an integrated approach is to correlate the strategic objectives with performance measures, identify relevant measures and determine weightage for various perspectives towards effective system (means measures, which can relate the vision and mission of organization (Brown, 2000)) development. Particularly, it is recognized that approaches which can assist decision makers to visualize and evaluate the overall objectives of an organization through performance measurement and develop the faith in any modification on a logical facts, can provide valuable insights on present performance, leading to futuristic directions for an organization.

Present approach seeks the insights and opinions of decision makers throughout the process on objectives of the organization, the relationship among objectives, and the separation of leading-lagging indicators. This does not only set a systematic way of designing, but fosters understanding about the problems, about value and also objectives of the different stakeholders may be internal or external about organizational priorities. Further, at many places decision makers need to work with tradeoffs on cost, effectiveness, sensitivity, implementation difficulties, etc. In this regard, proposed approach, specifically the use of ANP and ISM models, enables decision makers to take explicitly into account multiple and conflicting criteria in the decision making process. This paper has several salient features that are unique. This paper makes four contributions, as follows:
(1) Proposes an integrated, quantitative, solution, based on ANP and ISM models to the development of BSC.

(2) Links measures with organization’s objectives.

(3) Demonstrates the use of the “cause and effect” diagram in the context of a real life case company.

(4) Determines the weightages for various perspectives of BSC based on “leading-lagging” indicator relationships.

Finally, it is necessary to note that the proposed approach is not without its own limitations. However, more operational comments can only be made once the developed framework is utilized for some duration of time. Here, we outline few issues which mention some precautions to case organizations while relying on the proposed approach:

(1) It is always necessary to analyze the market trends, customer preferences, competitor’s practices and internal dynamics of an organization before implementing this framework.

(2) The model requires a number of subjective judgments on various issues like financial, customer, internal and innovation learning. The behavioral accuracy of the model further depends upon the care taken in their collection. For which, the techniques like group discussion, Nominal Group Technique (NGT), Strength, Weakness, Opportunity and Threat (SWOT) and Political, Environmental, Social and Technological (PEST) analysis, etc. can be utilized in an open and interactive environment. The presented framework may have the influence of perceptions developed during the short-term study of organization and hence it is advisable to once review the parameters in due consultation with top management before implementation.

(3) Further, due care is required while arranging the variables (in this case strategic objectives) in a proper template (software provides various kinds of templates for clustering the variables, selection of an appropriate kind is necessary to generate the right kind of pairwise comparisons) available in beta version of Super Decision (ANP) software. This will assist the software in generating the series of questions in an appropriate manner for the collection of subjective judgments. It is observed that thorough analysis of the situation at an early stage improves the consistency index in the ANP model.

(4) The use of the cause-and-effect principle with the BSC may not necessarily prove beneficial if:

- An organization does not have a clear strategy.
- There is no understanding or agreement on the underlying causalities, i.e. what actions will produce desired outcomes.
- A strategy is about improvements in general with no priorities.
- A strategy is conceived as a set of decisions or “soft success criteria”.

The proposed work is comparatively a new initiative in the direction of designing performance measurement system. Current knowledge, in the form of used models and frameworks are well tested and they are sufficiently mature to facilitate the development of efficient performance measurement system. Only exception exists in an integration of
these tools for present work. Further development of more sophisticated interface integration using computer programming could increase the efficiency (reducing the labor input required to utilize both the tools) of proposed approach. According to Neely (1998), performance management is an evolutionary process that requires adjustments, as experience is gained in the use of performance measures.

We understand the need to remember a few critical issues while implementing any type of performance measurement system. The scope of these issues includes:

- Identify and keep focus on a few key measures.
- Try to quantify and relate the issues of system development, which might be understood in a separate manner.
- Use measures that employees can control.
- Keep the lines of communications open and revise the programme often, with changes in corporate structure and strategy (McKenzie and Shilling, 1998).

References


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**Further reading**


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