

Improving the Use of Information Systems for Hospital Management Using Balanced Scorecard Framework

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Abstract: Hospital management teams receive voluminous data from variety of sources; these teams are unable to extract these data into the essential information for strategic decisions. It is as a result of this that this study is using a framework called the Balanced Scorecard (BSC), the development of an iterative prototyping system, user survey and focus group methods based on BSC to improve the use of information systems for Hospital management at Suntreso Government hospital. The study described in this paper has analyzed performance management tools like the Baldrige, the lean and balanced scorecard. The main focus is on the balanced scorecard management tool as a result of the numerous advantages it has over the others. The study used Balanced Scorecard (BSC) as part of a management control system for implementing strategies in Suntreso Government Hospital. A case study was conducted using the maternity and children's ward unit to measure innovations. Data was collected from DHMIS at the hospital before and after the end of the study, the information prototyping software developed, displays graphical relationships between key indicators like the length of stay, the average waiting time which shows progress in the PSUs. The results of the study is that SGH has adopted the concept, PSUs now formulate their plans using BSC, focus groups are satisfied with ease of access and the format of the information prototyping system. The study identified problems for the two patients units, then solutions were proposed to the management unit. That is using the balanced scorecard framework, a proposed information prototype system to check the average length of stay, the average waiting time, complication rate among others was provided.

Keywords: Balanced Scorecard, Hospital, information, Suntreso, Patience, Critical Success factors

1.1 INTRODUCTION

The Balanced Scorecard (BSC) is a concept that has been widely accepted in organizations around the world. The environment of commercial restraint has forced healthcare organizations to consider all possible means for delivering services more effectively and efficiently. One such means has been the reorganization of hospitals along program management lines (Kaplan & Norton, 1992).

According to the medical superintendent of the Suntreso Government hospital (SGH), the hospital now faces substantial annual funding reductions with an expectation of declines and potential restructuring of the entire healthcare delivery system by the government. Hospital resources and personnel are organized around patients rather than around a multitude of specialized departments. Unit managers assume greater strategic decentralized responsibility for their business units.

Patient service units (PSUs) manage and coordinate the activities of several professionals and multi skilled staff all acting in performance to achieve the goals of their work unit. In general these unit leaders have far greater strategic, managerial responsibilities than they had under traditional centralized structures. This research will use the **balanced scorecard framework** to improve the use of information systems as a management strategy, modeled as a set of tasks for strategy formulation and implementation.

1.2 PROBLEM STATEMENT

At Suntreso Government Hospital, Average waiting time of patients is too long; this can lead to serious complications at the hospital and reduce productivity. It is against this background that the present study is looking at how to:

Transform unrelated cooperate data into information, and be able to communicate to other **units**

Front line staffs are called upon to take decisions that used to be the sole prerogative of upper management. In order to do this, they need ready access to information that can help them make decisions and provide information that is accurate and relevant to their tasks that traditional financial measures do not meet.

- The hospital Management needs information to deal with these challenges. The changing business environment has also brought about dissatisfaction with using solely traditional financial measures for performance measurement (Ittner et al., 1998). Traditional financial measures of performance are most useful in areas of relative certainty and low complexity, a condition that is typical for many of today's organizations (Malina & Selto, 2001). Models such as the "integrated performance measurement system" (Nanni et al., 1992), and performance prism (Neely et al., 2002) have been developed in response to the call for a more broad-based performance measurement system but less its reflection in information systems as a tool for providing managers with information like the average waiting time, length of stay and complication rate of patients in PSUs. This research work will focus on the Balanced Scorecard by (Kaplan and Norton, 2013) as a tool for providing managers with the right information.

1.3 PURPOSE OF THE STUDY

The study seeks to have a critical look at problems outlined in section 1.2 and to offer ways of improving information systems on Suntreso Government Hospital management systems. According to the business dictionary, Information System is the combination of hardware, software trained personnel and infrastructural organized to facilitate

planning, control, decision making and coordination in an organization. It is also an integrated set of components for collecting, processing and storing data for delivering information, knowledge, and digital products. But Suntreso Government Hospital is one establishment lacking these systems. Rockart (1986) has outlined four methodologies that are used to determine management information needs.

The research is focusing on another methodology called the BALANCED SCORECARD to help improve information system on hospital management at Suntreso Government Hospital. The first four methods supply an abundance of data, but do not provide a methodology for relating strategy to information. Managers are able to focus on the strategic vision and identify the handful of most critical indicators when a few measures are allowed in each perspective. The Balanced Scorecard provides vision into dynamically complex situations and allows managers to assess whether improvements in one area may have been achieved at the expense of another by graphically displaying information trends in time from four different perspectives. The objective of this study is to:

- Investigate a methodology based on the Balanced Scorecard, which helps hospital managers to define and make use of important information.
- Develop an information prototype system that makes information accessible and provides a context for decision making
- Investigate the impacts of the information prototype system on access to information at the Patients service unit.

These balanced set of measures reveals both the balances that managers have already made among performance measures and encourages them to achieve their goals in the future without compromising key success factors. Using Information Technology for delivering information to managers has advanced tremendously in recent times. The decision support system label covers a wide variety of information systems. Some are based on individual decision processes. Some provide analytical models that replace decision making and others also aim to support simple managerial tasks such as convenient data retrieval or selection of a single variable. These systems are often applied to the delivery of data.

2.1 RELATED WORK

This chapter reviews available literature related to the study. This will serve as useful guidelines to the current study. Balanced Scorecard (BSC) by Kaplan and Norton in 1992 has become very popular among academicians and practitioners. According to Chan & Ho (2000), Hoque & James (2000), Ittner & Larcker (2003), several organizations in private and public sectors have embraced the concept and implemented it in an attempt to improve performance.

The term balanced scorecard is subject to different interpretations. For instance, CMA Canada (1999) published a document saying, "if a performance measurement system includes financial and non-financial measures then it is a balanced scorecard" whereas Kaplan & Norton claim balanced Scorecard (BSC) is much more than just a collection of performance measures.

Chan & Ho, (2000) also stated in their limitations section that "The respondents may have mistaken their organization's performance measurement system to that of a true BSC," It is also possible that a company's performance measurement system has all of the attributes of a balanced scorecard but they do not consider it to be one.

Hoque & James, (2000) determined the use of a Balanced Scorecard (BSC) using a 20-item scale. They noted that their BSC measure might not pick up the strategic linkages of a real SC. As a result of that, companies in their study possibly had varying levels of BSC implementation which affected their results, especially considering the fact that BSC usage was the dependent variable in their regression model. According to (Chan et al., 2003), there are numerous studies on the balanced scorecard but only one study attempted to develop a conceptual model of the scorecard and used it to examine the extent of its adoption. Other performance management tool apart from the balanced scorecard includes Baldrige Excellence framework and the Lean.

According to M. Eastward 2012, Baldrige empowers an organization to reach its goals, improve results, and become more competitive. It helps to manage all the components of an organization as a unified whole, so that plans, processes, measures, and actions are consistent. The system's building blocks are the Criteria for Performance Excellence, the core values and concepts, and the scoring guidelines. The purpose of the Baldrige framework is to help an organization to improve and achieve excellence. The questions in the Criteria help you explore how you are accomplishing your organization's mission and key objectives in seven critical areas:

1. Leadership
2. Strategy
3. Customers
4. Measurement, analysis, and knowledge management
5. Workforce
6. Operations
7. Results

Beside all these great criteria's in the managerial processes, the Baldrige Framework do not prescribe how healthcare organizations should structure its operations. The lean is another performance management tool which is used to help in structuring business aims and objectives. Lean is systematic approach to identifying and eliminating waste through continuous improvement by flowing the product at the demand of the customer in the pursuit of perfection. According to C. M and, the lean has five (5) principles.

- Identify **value** from the standpoint of the customer.
- Identify the **value stream** through the steps required to create each product /service - from concept to launch and order to delivery - and remove the wasted steps.
- Make the process of value creation **flow** smoothly and quickly to the customer
- Demand (pull) comes from the customer.
- Pursue **perfection** by constantly improving the product or service and the value stream

But despite all the success of these principles, Lean is more of a culture than a method, and there is no standard lean

production model. Lean lacks strategic focus and human factors. One overarching problem is that many healthcare organizations adopting lean focus on tactics rather than on strategy. In doing so they lose sight of the big picture. The result is that the healthcare flounders, (Jonathan Davies, 2015) “disadvantages of the lean manufacturing”.

The relationship between these managerial tools is that:

1. Each performance management tool provides healthcare leaders with a tool to translate organizations mission and vision together with strategies.
2. They communicate strategy directions of the organizations to the staff
3. These tools are designed to help leaders to create and sustain organizations culture of continuous improvement and performance execution

However, upon considering at all these studies together with their drawbacks, and attempts to use the balanced scorecard theoretically, it is only (Kaplan & Norton, 2013) again, who used this same framework (balanced Scorecard) at Germany but was just a strategic management tool. This suggests the need for more research to help improve the use of information system for hospital management but this time as a managerial process. That is what led to this study with the topic “Improving the Use of Information Systems for Hospital Management Using a Balanced Scorecard Framework “

This study also considered:

- i. The edge towards the patient focused hospital and program management
- ii. Management roles
- iii. Strategic management
- iv. Providing managers with the right information
 - a. Critical Success Factors
 - b. The Balanced Scorecard

2.2 THE EDGE TOWARDS THE PATIENT AND PROGRAM MANAGEMENT

Galbraith (1973), has conceptualized organizations as information processing systems. His model considers the transmission of information as the central function of organizational structure. The volume of information needed to perform task is a function of inputs and outputs means. When making decisions, the following must be considered:

- a. The input resources
- b. Diversity of output resources
- c. Level of difficulties
- d. The tasks
- e. The greater the number of factors
- f. Interactions must be considered simultaneously

The above decisions signify the greater information required. Program structures decrease the diversity of the outputs by grouping like patients together.

The organizational design captures interconnections within the boundaries of a single work group (Chams & Smith, 1993) and decreases the amount of coordination that is required between different work units and the degree to which tasks performed by different work units are interdependent.

2.3 CRITICAL SUCCESS FACTORS

Critical Success Factors (CSFs) were introduced as a methodology for helping managers to determine precisely what information they need (Rockart, 1986). CSFs are defined as the limited number of areas in which satisfactory results will ensure successful competitive performance for the individual, department or organization. The technique helps managers make explicit and focus their limited attention on the few truly important areas in which favorable results are absolutely necessary. Critical success factors are not limited to accounting information and they are tailored to the particular management need.

The methodology of developing CSFs is to understand industry CSFs, economic and political environmental factors and the temporal circumstances. These provide input into the corporate CSFs for the organization. In turn, corporate CSFs become inputs into a similar CSF determination process for each subsystem of the organization. This top down influence pattern can be continued down through the organizational hierarchy to the individual manager level (Rockart, 1986). The CSF approach does not attempt to deal with strategic planning. It centers on information needs for management control where the data needed to monitor and improve existing areas can be more readily defined. The CSF method results in some useful sets of reports to monitor ongoing operations at the executive level. The method can also be used to prioritize the development of information systems, based on the gaps identified during the CSF development process.

But Rockart again failed to solve the problem which it was designed since there was no focus on the interaction between the factors. The study aims to use another performance management tool called the balanced scorecard to help PSUs to achieve their objectives.

2.4 THE BALANCED SCORECARD

The Balanced Scorecard is a framework for translating strategic objectives into a limited, coherent set of performance measures (Kaplan & Norton, 1992; Kaplan & Norton, 1993; Kaplan & Norton, 1996).

The scorecard presents managers with four different perspectives.

- a. Customer satisfaction
- b. financial measures;
- c. internal process metrics and;
- d. Organizational innovation and improvement measures.

The Figure below gives a vivid description of the balanced scorecard framework.

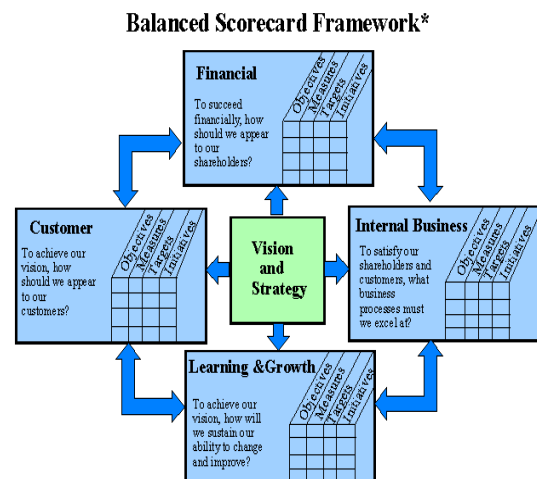


Fig 1: The four perspectives of the Balanced Scorecard.
Source Kaplan & Norton 1996, 1992-2013.

2.4.1 Vivid Description of the Balanced Scorecard Framework.

Balanced Scorecard methodology can be drawn to the interconnected managerial roles described in Figure 1. The technique helps the conceiving role by helping managers sharpen their structure; it also helps the communicating role by a shared understanding of the structure. The methodology identifies the central elements of the scheduling role; it helps managers in their linking role by providing a model to communicate with; the measures form the major part of the controlling system; developing a BSC is part of the manager's doing role. Selecting and agreeing on measures in each quadrant forces a management team to define what is strategically important to its organization. Limiting the number of allowable measures in each perspective obliges managers to focus their strategic vision and identify the handful of most critical indicators.

By graphically displaying information trends in time from four different perspectives, the balanced scorecard provides insight into dynamically complex situations and allows managers to assess whether improvements in one area may have been achieved at the expense of another. This balanced set of measures both reveals the tradeoffs that managers have already made among performance measures and encourages them to achieve their goals in the future without compromising key success factors. Understanding trends and the interrelationships between variables is particularly important when an action has one set of consequences locally and a very different set of consequences in another part of the system or when obvious interventions produce non obvious outcomes (Senge, 1990). In this way, the Balanced Scorecard helps managers develop their mental models. The healthcare industry has started to adopt a similar concept referred to as an instrument panel (Nelson et al., 1995), (Nugent et al., 1994). Another variation in healthcare is the report card - a comparative reporting system that allows healthcare purchasers and consumers to rank institutions. (Corrigan & Nielson, 1993).

The Balanced Scorecard has also been suggested as a framework for evaluating the performance of an integrated health delivery system (Leggat & Leati, 1997). Balanced Scorecards have been tried in a number of different healthcare settings - a community hospital (Nelson & Krywonis, 1997) and a regional healthcare system (Nelson 1997). No evidence has been presented in the literature evaluating these projects.

3.1 THE PROPOSED SYSTEM

Suntreso Government Hospital was built and commissioned as Suntreso Urban Health Centre on the 22nd November, 1963 by Mr. L R Abavana commissioner for Health. Later Maternity unit was added in 1973 and in 1985 it migrated to Polytechnic status and also in 2000 it got to District Hospital Status. The hospital has no affiliation and has 352 employees, with 130 Nurses and 15 Doctors. The hospital has over 2575 admissions annually.

3.2 METHODOLOGY DEVELOPMENT- THE BALANCED SCORECARD SYSTEM

It has been the first objective of this work to investigate a methodology, based on the Balanced Scorecard, which helps hospital managers define and use important management information. The methodology for this study is using an

iterative prototyping system, user survey and focus group. The methodology is graphically shown below:

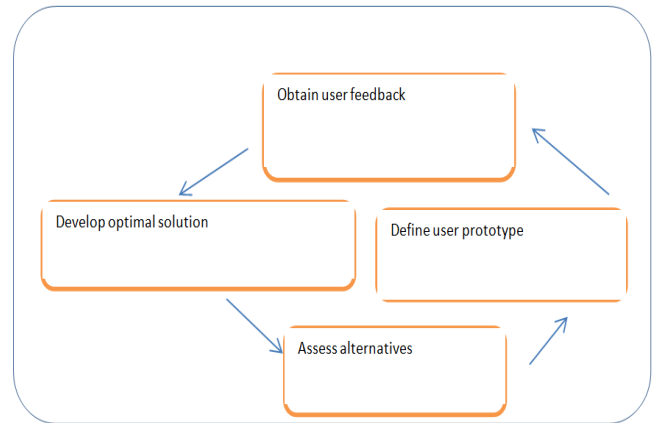


Fig 2: The Balanced Scorecard Development Methodology (Daniel B. Gordon 1998)

Below are the steps used in the development of the methodology of the study based on BSC.

3.3 FIRST STEP: SELECT THE PATIENTS SERVICE UNIT

Programs and patients Service were in their determinative stages at the start of the Balanced Scorecard Project. Program management had just been instituted in Suntreso Government Hospital. Measures for selecting the first PSU site were:

1. The researcher together with an effective management team (In-Charges) with power to make PSU comprehensive decisions.
2. An obligation of Data Driven Management decision making
3. A harmony, participative style of management
4. The willing to use an enabling technology for management purposes
5. Senior corporate and IS leadership approval

The table below demonstrates the composition of the various PSUs at the research setting and it shows the various team leaders of the unit.

Team composition of the balanced Scorecard

Table 1: The team composition of the Balanced Scorecard study.

Maternity	Children unit	Females ward	Male ward (lying in)
The In-Charge	Medical doctor	Medical doctor	Medical doctors
Midwives	In-Charge	In-Charge	In-Charge
Staff nurses	Staff nurses	Staff nurses	Staff nurses
Clinical educators			

The study considered Maternity ward and the children ward units for the development of the Balanced Scorecard. The study selected the Maternity PSU as the first site for developing the Balanced Scorecard since this unit at Suntreso Government Hospital meets the criteria described for the

study. The Maternity unit treats both surgical and medical patients. This unit takes care of patients at Labor, Lying In, Surgical, Scan, Antenatal and Postnatal care. This unit has a very large outpatient diagnostic practice too. All medicines given at the Maternity Unit are quantitative. The various Patient Service Units have many data sources. The In-charges (managers) are very comfortable with the idea of management with information.

3.4 INITIATE THE PROJECT IN THE PATIENTS SERVICE UNIT (PSU)

The following steps were considered in initiating the PSU (Patients Service Unit) project

1. The researcher together with the selected PSU leaders meeting and setting up the Balanced Scorecard development Team
2. Sensitizing the management team to the Balanced Scorecard Framework and its concepts
3. Ascertaining approval to continue.

3.4.1 SETTING UP THE BALANCED SCORECARD DEVELOPMENT TEAM

Getting the approval of the heads of the Patient Service Unit was a critical step. If the Principal Superintendent had not agreed to support the project, this research would not have received resources or support from within the Patient Service Units. In all cases the Medical Superintendent and In-charges found the framework very comfortable together with the project proceedings.

Getting the Balanced Scorecard development team was not easy. The Maternity PSU had two management teams:

- a. A Design team which dealt with PSU management concepts and
- b. An Operations team which managed the ongoing operations of the PSU.

The researcher chose to define the Maternity PSU Balanced Scorecard with the Design team. In perception, this approach was flawed. It meant that the developers of the Balanced Scorecard were not the ultimate end users. The researcher therefore did not transfer the Balanced Scorecard system to the Operations team effectively.

The Children ward PSU had only one management team (In-Charge) with a number of subcommittees and task groups. The In-Charge decided that all its members should be involved in developing the indicator. Specific detail tasks, such as the detailed data definitions could be done at the subcommittee or task group level.

3.5 INTRODUCING THE BALANCED SCORECARD FRAMEWORK AND ITS CONCEPTS

This step was aimed for the researcher to learn about the PSU and its management team (In-Charges) dynamics. Each PSU is basically different. For example, the Maternity PSU is a high profile unit in the organization, whose success is measured by the volume of cases that go through it. Many procedures and lengths of patient stay are predictable. Conversely, the Children ward PSU cares for patients until they are discharged. Length of stay and lots of cases has no meaning in this context.

The researcher found information about the PSU in her strategic plans; other documents; one on one meetings with team members; attending various team meetings; and by investigating PSU databases, reports and other data sources. A persistent theme throughout this project was to “determine whether currently supplied corporate data sources met the PSU needs”. It soon became clear that each PSU was, in fact, a “unit ward” with varying goals, and strategies. This translated into different measures and information requirements.

The mutual data which were standardized for all PSUs did not meet the researcher’s requirements. A byproduct of this step was that the information seeker (researcher) became integrated into the PSU management team and gained their trust.

3.6 ASCERTAINING APPROVAL TO CONTINUE

The last step in project initiation was for the researcher to make a formal presentation the PSU management team (In-charges). The staging brought together a summary of findings, a list of potential data sources, some thoughts on potential indicators and a review of PSU objectives.

At the end of the presentation, approval was given to develop the first Balanced Scorecard.

3.6.1 DEVELOPMENT OF A VERSION OF THE BALANCED SCORECARD

The researcher then developed a first version of the balanced scorecard. The objective of this step was to try and describe the strategically important goals using a limited number of measures. The important complexities to avoid at this stage of the project were:

1. The inclination to define each indicator in detail and
2. The tendency of teams and the researcher to limit the definition of needs based on current information sources only.

Depending on the researcher makeup, a number of dynamic issues arose together with the In-charges.

- ❖ Core challenge between the researcher and the team members or disciplines surfaced based on the indicator descriptions.
- ❖ The In-Charges who were not comfortable with management by measurement objected to the use of indicators, they thought they were misleading of actual goals.
- ❖ In-charges in some PSUs feared that the indicators would be misinterpreted and used against them and were unwilling to discuss indicators openly or to disclose data. It was necessary to discuss team mechanisms for interpreting and using the data on an ongoing basis. This was a confidence building exercise for the researcher and the team members.

Diverse management teams used various processes and degrees of procedure to get agreement on the indicators for their prospective scorecards. Because the intention was to develop the prototype system iteratively over time it did not require the management teams to commit to a final Balanced Scorecard at this point. Table 2 shows a sample Balanced Scorecard for the Maternity ward patient service unit.

Maternity Ward PSU Balanced Scorecard

Table 2: The Maternity Ward PSU Balanced Scorecard

<p><u>CUSTOMER</u></p> <p>The satisfaction of the patients in the MW</p> <p>Their Average Waiting Time, Annulment</p>	<p><u>INTERNAL</u></p> <p>The average length of stay, Turnaround time</p> <p>Complication Rate, Time to treatment</p>
<p><u>INNOVATIONS</u></p> <p>The various patients in the clinical studies</p> <p>The procedure in the day of admission</p> <p>Patient focused care objectives</p>	<p><u>FINANCIAL</u></p> <p>The average cost per case</p> <p>Productivity</p> <p>Profit per case</p>

3.7 DEVELOP PROTOTYPE USING AN ITERATING PROTOTYPING BASED ON THE SPIRAL DEVELOPMENTAL CYCLE

The spiral developmental cycle is a risk-driven process model generator for software projects. With the unique risk patterns of a given project, the spiral model guides a team to adopt elements of one or more process models; an example is in waterfall, incremental or evolutionary prototyping.

According to Watson et al., 1991, an Iterative prototyping is commonly used to develop decision support applications. Each prototype was developed based on an evolutionary prototyping spiral development cycle (Boehm, 1988). These prototypes loop through a spiral development moves through four (4) phases, these include:

1. Planning the prototype
2. Evaluating alternatives
3. Developing best solution with sample framework
4. Getting customer feedback.

Based on each iterations of the spiral model increasingly, more complete versions of the system are built.

3.7.1 PHASE 1: PLANNING THE PROTOTYPE

Planning involves determining objectives, alternatives and constraints. Initially this consists of requirements gathering and project planning. It was important for the researcher to understand underlying group issues around data. When the group (in-charges) proposed an indicator, it forced the researcher to agree on a strategic direction and PSU priorities. The process revealed underlying assumptions on the relative importance of different staff friction, programs and oppositions.

In a few cases, a Balanced Scorecard indicator became the focal point for discussions about the importance of one discipline versus another in the new program structure. The cost conscious environment combined with the move to multi

skilled staff made all disciplines insecure about their futures. Any attempts to define an indicator that implicitly recognized one discipline as being more important than any other was met with resistance.

Conversely, defining a discipline specific indicator was read as a control because of poor performance. Managing the various In-charges dynamics with sensitivity during this exercise was a key analyst function. The outcome of this step was a detailed set of indicators that could potentially be developed at this point.

3.7.2 PHASE 2: EVALUATING ALTERNATIVES

The second Phase analyzed on alternative development possibilities and allowed the researcher together with the team to balance the possible value of an indicator with the development difficulties of that indicator. This analysis included technical or data acquisition feasibility, data definition difficulty, economic factors and data sensitivity issues.

It was significant during this stage to determine approximately where the data would come from and how much effort it would take to implement the indicator. For example choosing an indicator that required a great deal of extra data entry work for staff with little information value was more dangerous than choosing in indicator that required little staff work, but had high value. Indicators that used well defined corporate data sources and established data definitions were lower risk than local data stores. The outcome of the assessment was a scope statement that identified what would be engineered in this prototype. Appendix 1 shows example statements for two Patient Service Units.

3.7.3 PHASE 3: DEVELOPING BEST SOLUTION WITH ITS SAMPLE FRAMEWORK

This phase consisted not only of developing definitions and data sources for each indicator, but also of developing software to extract and display each indicator. It was very important to clearly articulate operational definitions of indicators (Deming, 1982). Different ideas about the measures often were from differing concepts of the key success factors and which were most important. In addition, prototype generic software was developed across PSUs. A sample framework is depicted in Appendix 3. Figure 3 shows a sample indicator definition,

**Indicator Statement: Average LOS for maternity ward
 Definition of terms**

ALOS means Average Length of Stay. ALOS is the arithmetic 'AVERAGE' length of stay on all patients who were discharged during that period (i.e.: Total days stay/ total discharges);

Rationale

Average LOS is an indicator of the efficiency of care.

3.7.3.1 DESCRIPTION OF INDICATOR POPULATION

Numerator - Total days stayed;

Denominator - total discharges

SAMPLE INDICATOR

Display Average length of stay by financial period

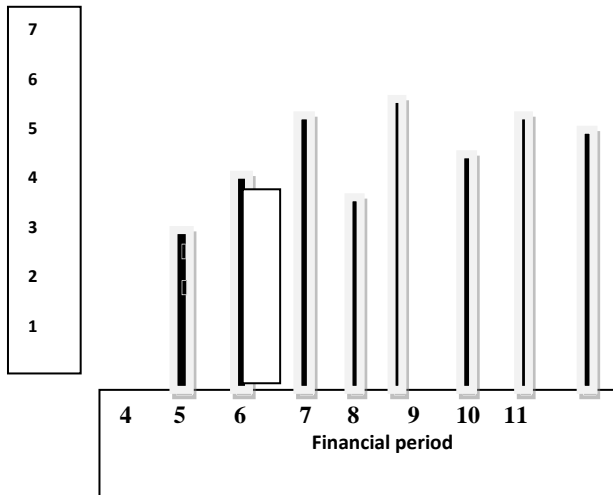


Fig 3: Sample indicator: maternity PSU average length of stay

3.7.4 PHASE 4: GETTING CUSTOMER FEEDBACK

The researcher on getting Feedback on the prototype from the management team guided the planning for subsequent stages of development. Iterative prototyping with frequent, ongoing contact with the PSU team and feedback ensured that the final system met the strategic needs of the PSU management team. Case Study 1 illustrates the indicator development methodology.

3.8 SOFTWARE DEVELOPMENT FOR THE BALANCED SCORECARD PROJECT

The study defines the information system broadly to include data manipulation and display software, indicator data and simple data acquisition tools using an information Prototyping system. This was because it had been the other objective of this study to develop an information prototyping system that makes Balanced Scorecard information accessible and which provides a context for decision making.

The study limited the scope of functionality to the presentation of aggregate data for each indicator. The scope of this research prototype did not include the implementation of robust production routines for regular monthly data updates. Since there are no designs for Balanced Scorecards reported in the literature, a model for implementing the Balanced Scorecards in software was developed. Each patient population had a variety of indicators associated with it. Functionally, users selected an indicator which brought up a context sensitive list of user populations to choose from. Users then selected an appropriate patient population using the interface shown in Figure 4.

User Interface of the Balanced Scorecard

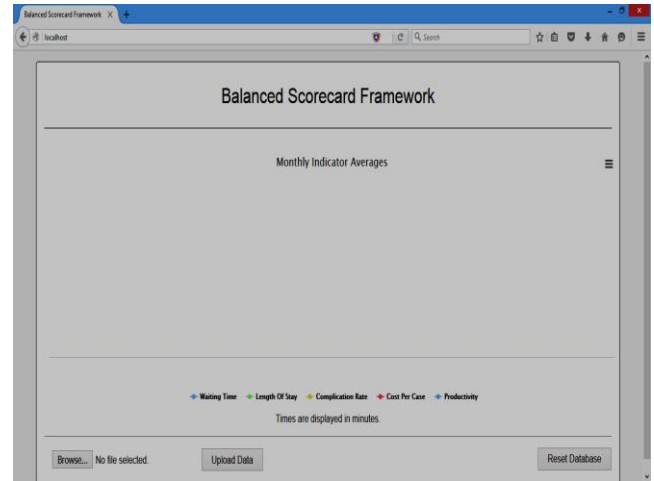


Fig 4: A Prototype User Interface of The Balanced Scorecard

Users viewed the indicator data as a trend comparing current and historical data or as a table. The below is a graphical representation of data collected for January to December 2015, January to December 2016, then variations from these representation. With the aim of testing to see whether the objective of the study has been achieved.

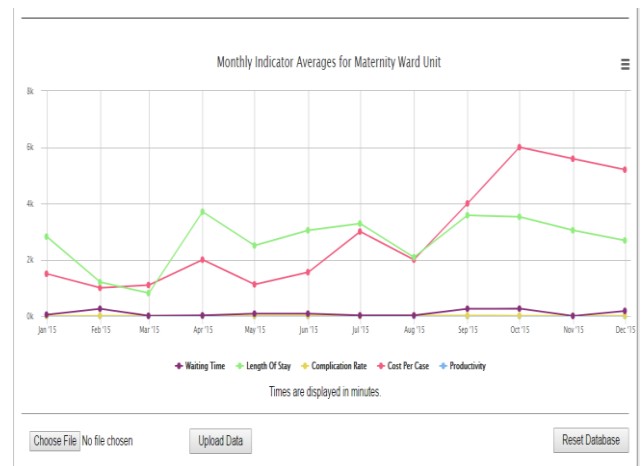


Fig 5. Graphical representation of data collected from DHMIS from January to December, 2015.

The various indicators could be displayed concurrently, facilitating the understanding of data patterns and their interrelationships. The researcher chose a microcomputer database product as our prototyping environment because it was simple to use, flexible and allowed for rapid prototyping. A major design principle was to develop generic software that could be customized for multiple PSUs.

3.9 PROGRESS IN BALANCED SCORECARD PROTOTYPE DEVELOPMENT

As of July 2015, the project was in its seventh month of development. There were two PSU Balanced Scorecards at various levels of complexity, and complete as information management systems and small departmental databases. The indicators requested by the management teams (in-charges),

had not been fully implemented as of July 2015. Patient satisfaction measures were also included. All Patients Service Units wanted to clearly measure patient satisfaction. In later part of July 2015, Sutoreso Government Hospital began to perform a monthly patient satisfaction survey, a thirty-five (35) item questionnaire that measures hospital quality as judged by the nurses and the In-Charges. As at the later part of August 2015, SGH had only completed and received two waves of patient satisfaction results. SGH also developed and administered a resident and family satisfaction survey.

The PSU management teams felt that four data points was still insufficient data to show as a development. In addition, most PSU management teams did not feel that monthly data would be significant on a Balanced Scorecard that displayed weekly data. Some PSUs did implement various types of patient satisfaction surveys, non-accurate surveys providing a snapshot of data. Several PSUs measured alternatives for patient satisfaction, such as waiting times or cancellations. Nevertheless, inadequate mechanisms for collecting and evaluating ongoing patient satisfaction data were a serious insufficiency when trying to understand the balance in management objectives.

4.1 EVALUATION OF THE BALANCED SCORECARD PROJECT, ANALYSIS AND DISCUSSION

The Balanced Scorecard project was intended at management groups rather than individual managers. The PSU management team was the most suitable unit of analysis for the Balanced Scorecard project assessment. The center of the evaluation was on common teams that unites the test PSU management in their adoption of the Balanced Scorecard project as well as variations between PSU management groups rather than on individual differences within a PSU management group.

The tools comprised:

1. A user survey
2. Focus group
3. Help from in charges

The study combined the results of all three (3) tools to provide a detailed view of the Balanced Scorecard concept, methodology and software. From this data, she developed a generalized theory related to Balanced Scorecard projects.

4.1.1 USER SURVEY

This survey was intended to establish how satisfied Balanced Scorecard users have been with the Balanced Scorecard project. The evaluation team comprising of the researcher, the In-charges at Reproductive Child Health (RCH unit) all are Information Services representatives and PSU representatives who assembled the user survey tool.

The survey instrument composed of four parts. The first part consists of Socio-Demographic Data. It comprises a set of four (4) questions. The second section in part one was also designed for the various patience service units. It also consisted of seventeen (17) questions. Aside this there was an inclusion of The Balanced Score card concept and process questions which forms the basis of the project and consisted of thirty-five (35) questions

The five points from Likert scaled answers, measured the overall attitudes toward the implementation of the Balanced Scorecard implementation as well as the specific factors shown in table 3.

Factors for Measuring Satisfaction with The BSC Project.

Table 3: Factors used For Measuring Satisfaction with The Balanced Scorecard Project.

Factor	Description	No.of questions
1	Effect of the project on manager's ability to understand PSU goals	9
2	Effects of the project on manager's job performance	11
3	Support the project has from senior leaders	12
4	Relationship between the developers and the management team	3
5	Importance of the project to the PSU management team	12

The second part of the questionnaire includes five reliant variables which measure the respondents possibility of using the system and their evaluation of its worth (Schultz & Slevin, 1975). The third part of the instrument measures end user satisfaction with the Balanced Scorecard software. This instrument was developed by Doll and Torkzadeh, (1988) and has well established reliability and validity.

End user satisfaction with the balanced scorecard software.

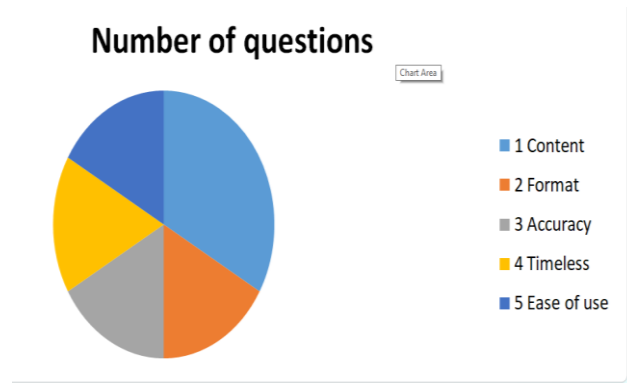


Fig 6. The graph representative of the Factors used for measuring end user satisfaction with the balanced scorecard software

The fourth part of the survey was developed by the authors. These include open ended questions which assess changes caused by the Balanced Scorecard system and bring out suggestions for improving the system. These questions were anticipated to serve two purposes. The first reason was to ensure that important items were addressed. The second reason was also to elicit for information about impacts and for which measures are difficult to develop.

The surveys were unidentified and categorized the respondent only as a manager or non-manager. The questionnaire was initially administered to a test individual and refined to eliminate inconsistent, uncertain or unclear questions. The

study was approved by the Sutoreso Government Hospital Ethics.

4.2 SURVEY PARTICIPANTS

Five (5) potential PSUs could have responded to the user survey. Purposeful sampling identified two management teams who had been involved in the BSC project for a period of months. This group was not a statistically representative sample of all PSU managers and therefore did not allow the evaluation team to generalize on a statistical basis.

However, the group did include the senior PSU managers as well as the most active front-line managers and represented the most significant users of the Balanced Scorecard. It thus constitutes a purposeful, information rich, adequate sample (Aydin, 1995). The researcher distributed 30 surveys to the maternity PSU and Children's ward PSU management groups, including a few ex-managers who had been involved in the project. Each survey was accompanied by an explanatory letter. The researcher explained the study during monthly management meetings when the questionnaires were distributed. The units used as a study were given three weeks to return the survey.

Twenty two people returned the study. Participants included fourteen (14) In-Charges and 16 Nurses at PSU. All participants had been exposed to the Scorecard for within the period of stay.

4.3 SCORING THE EVALUATION STUDY:

The five point Likert scale was converted to a numerical scale as shown in Table 4.

Scale Conversion of likert

Table 4: Scale Conversion of likert

STRONGLY AGREE	DISAGREE	AGREE	UNCERTAIN	STRONGLY DISAGREE
+ 2	-1	+1	0	-2

Scale Conversion

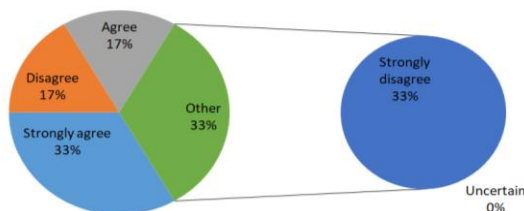


Fig 7: Scale Conversion of likert.
Note: Each section was scored separately

In section 1, the Likert factor score is computed by adding the scores for each questionnaire item which Schuitz and Slevin found weighted significantly on that factor. For example 12

items (questions 1,2,6,10,12,18,22,23,24,35,40,43) contribute significantly to Factor I - Effects on performance and so forth. Appendix D gives details of each question and the factor on which it loads. Each individual respondent then had a Likert factor score for each of the seven factors computed in this way. In addition, the team calculated a global Likert score for each individual by summing across all questions. This total score is an overall measure of the respondent's attitude towards the Balanced Scorecard project.

Table 3 depicts the mean score on each factor for each group along with the minimum and maximum values. The percentage of respondents who were positive for a factor (factor score >0) has been calculated as well as a 90% confidence interval. The self-assurance interval represents the minimum percentage of the management team who would have answered positively, had the entire management team returned their surveys.

For example: 16 out of 22 respondents returned their surveys: In one case 13 out of 16 or 81% were positive; Had all respondents returned their surveys, we could say, with 90% confidence that at least 69% or 15 out of 22 would have been positive.

4.4 DISCUSSION

According to Yin (1984), "The primary means for generalization of qualitative studies is not by arithmetical assumption to some defined population in space or time, but through the development of a theory that has an application beyond the setting studied." The researcher generalized from her experience at Sutoreso Government Hospital and evaluation results and has developed a

- Model of the Balanced Scorecard impact on the management process
- Theory of project success factors
- Influence of organizational structure on a Balanced Scorecard project
- Balanced Scorecard in relation to other similar healthcare performance management techniques including the Serial 'V' methodology and the clinical value compass
- Reviewed management decision support
- Related Balanced Scorecard theory to other management concepts such as core skills, capabilities, organizational learning, systems thinking and core competencies.

The management group pictures a frame reference by deciding

- Purpose and objectives of the system being managed. This consists of a large number of ill defined, interrelated subsystems. The Balanced Scorecard project firstly helps identify these subsystems and catalyze discussion about objectives, measures and targets. The project helps identify the correct 'listening channels', the process and outcome indicators that measure whether the system is achieving the desired objectives.
- The feedback system integrates feedback from a variety of sources, the Balanced Scorecard being just one of those.
- Analysis of indicator data and trends leads the management group to identify gaps between expectations and targets and identify opportunities for improvement.

4. This discussion leads the group to formulate decisions and plans for corrective actions
5. These plans must be implemented either internally or external to the unit and these lead to changes in the system.

4.5 SUCCESS FACTORS OF A BALANCED SCORECARD PROJECT

The successfulness of every Balanced Scorecard project is based on a number of factors including:

1. The development of interrelated objectives and strategies objectives. In this context, Sureso Government Hospital organizational structure and decentralized accountability were critical success factors of the Balanced Scorecard project as it was questioned by the researcher. Program management captures work interconnections and complete processes within a work unit. Decentralized accountability forces managers at less senior levels to think and act strategically.

By comparison, in a traditional functional structure, the management team does not have authority over as wide a range of resources nor over whole processes. They may also not be accountable for thinking strategically. But they will still need to measure their performance in each of the four perspectives.

The researcher therefore concludes that the Balanced Scorecard methodology could be applied in a traditional functional structure. However its impact on overall organizational success may be limited, depending on the management group's strategic accountability and span of control.

2. Recognizing the concept as a value and readiness among senior managers of the units to do such a project and commit the essential resources to the development of a Balanced Scorecard. Defining the scorecard, the data definitions and verifying the indicator data requires significant managerial effort. Key decision makers must support the concept of the balanced scorecard. In all cases, the PSU In-Charges strongly supported the balanced scorecard projects in their PSUs.

This translated into time at meetings, and support for the time intensive data definitions and data gathering activities that took place. These local line leaders (Senge, 1990) sanctioned significant practical experiments and designed and implemented new learning processes.

3. Current value: Value is measured in terms of the relevancy to their changing agenda. Among the means for ensuring sustained support is for the project to provide incremental value to the management team. This is not a critical success factor at the start of the project, but becomes much more significant as the project progresses. In this regard, the researcher's inability to provide fresh data was reflected in end user dissatisfaction. This also relates to the development methodology, in particular the "assess alternatives" step. Managerial abilities. Two models are important to consider: core skills (Irvin & Michaels, 1989) and core capabilities (Stalk, et al., 1992). Core skills are those skills that offer a business unit the most leverage in achieving their objectives. If core skills are promoted enough in pursuit of a particular strategy, the skills themselves, even more than the strategies become the basis for continued success. A second related model is that of center capabilities. Key processes are identified, invested in heavily and viewed as a primary object of strategic value. These processes are woven together to create a set of organizational capabilities. The

longer and more complex the string of processes, the more difficult it is to transform them into a capability - but the greater their value of that capability once built.

In all, the Balanced Scorecard concept, its methodology and software is relevant to any management group. A Balanced Scorecard project will only be successful if senior managers recognize the value of the concept and are ready to do a project.

The project must provide ongoing value to the management group and must have sufficient development resources applied to it. Balanced Scorecard project requires the development of some core capabilities for strategy formulations, implementations, and continuous quality improvements and information deliveries.

5. 1 CONCLUSION AND RECOMMENDATION

The study concludes that, the program management organizational structure requires managers to be much more responsible and accountable than they have traditionally been in the past. Managers perform many roles which require the right information. They have a great strategic involvement in the unit. Management information is produced as a byproduct of the operational processes.

Technology has advanced faster than the capability for understanding and how to apply it well. The study has:

1. Hypothesized that the Balanced Scorecard methodology has now been identified by end users as an effective tool for information management at SGH.
2. Helped hospital managers define and make use important information.
3. Developed a prototype information system (attached to the study) which has made this information accessible and which has provided a context for integrated decision making. The information system was functionally acceptable, but the indicator data was not timely enough or sufficiently detailed;

There has also been an investigation on the impacts of the prototype system on the organization.

Part one of the hypothesis is correct. The Balanced Scorecard methodology has provided an effective tool for healthcare business units to formulate their strategic information needs.

Part two of the hypothesis is also correct, but with qualifications. The Balanced Scorecard project has helped the management teams:

- a. Managed strategy implementation by providing information to track strategies
- b. Provided accountability mechanism
- c. Used instruments for providing additional work associated with their strategies.

The iterative prototyping development methodology keeps managers occupied in the process and then provides them with an ongoing value.

Balanced Scorecard project promotes significant organizational commitment in the form of time management and developmental resources. It requires organizational learning about critical processes, skills and capabilities required by business units for success. The primary phases of the concept are the focusing effects and the systems approach to balancing strategically relevant objectives.

Balanced Scorecard generates pervasive positive effects and catalyzes the developments of organizational capabilities for

strategy formulations, implementations, and process improvements and information delivery.

As an outcome of this work, the Principal Superintendent has decided to transform the research Balanced Scorecards and associated information technologies into production systems for the organization. She has also endorsed the preliminary design of a corporate Balanced Scorecard. In these ways, the Balanced Scorecard concept has proved its value for hospital management.

Future directions for this research pertain to the improvement of strategic capabilities, specifically, Balanced Scorecard development as a strategic management system and the development of information delivery systems.

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