Conceptual Demand Planning for Siam Cement Industry Co., Ltd.

by

Mrs. Nittaya Rodsawaeng

A Final Report of the Three-Credit Course
CE 6998 Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Computer and Engineering Management
Assumption University

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Project Title	Conceptual Demand Planning for Siam Cement Industry Co., Ltd.
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The Graduate School of Assumption University has approved this final report of the three-credit course, CE 6998 PROJECT, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer and Engineering Management.

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ABSTRACT

This project examines the design and implementation of a Conceptual Demand Planning for Siam Cement Industry Co., Ltd. for implementing one part of the total Supply Chain System.

The project gathered the requirements with a work shop method whose first session was to study the existing processes; the second session was to find out the gap and the opportunities to close the gap, and then coordinating with users to design the expected process based on a scenario basis. Demand Planning processes is categorized into two plans that are Annual Plan and Monthly Plan. The starting point of both demand planning processes is preparing statistical forecast using the historical data from SAP source. The system will use simple statistical forecasting techniques such as moving average and triple exponential smoothing by varying the three factors (a, (3, and y) then use the "PickBest" function that 12 Demand Planning provides to find the least MAPE from all of the pre-defined models. The statistical forecast will be the base forecast data. Then Planner will plan both bottom-up and top-down planning and then have consensus of the plan. The consensus planning will be the output of Demand Planning System and will be the input of Supply Planning Process and Sales and Operation Meeting.

The statistical forecasting accuracy of Tiger cement is pretty good (more than 90% for year June 2002 — September 2003) because the actual demand of Tiger cement is a clean demand. Tiger cement uses "Pull Strategy" that causes the demand pattern seems like a stationary demand. On the contrary, Elephant cement uses "Push Strategy" by sales force to achieve growing the market share. Elephant cement is sold through direct channel for big project. Hence, the Elephant cement needed to re-estimate demand by sales and operation meeting.

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I am indebted to the following people and organizations. Without them, the project would not have been possible.

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I. INTRODUCTION

1.1 Overview of Business

Siam Cement Industry Co., Ltd. (SCI) is a business unit of Siam Cement Group of companies that manufactures grey cement and grey clinker. SCI operates in both, domestic (Thailand) and export market. The domestic sale is handled primarily by Cementhai Sales and Marketing (CSM - a separate sales & marketing organization for the entire group) through its dealer network. SCI handles the sale to the direct customers and other group companies like Siam Fiber Cement (SFCC), The Concrete Products and Aggregate (CPAC), etc. The sale in other countries (exports) is managed by Siam Cement Trading Co., Ltd. (SCT- a separate company to handle all the exports of the entire group).

1.1.1 Manufacturing & Distribution

SCI has 5 manufacturing facilities to make cement and clinker. There is one each in the northern and southern part of **the** country and 3 in the central part of the country. Most of the finished goods inventory is planned and maintained at the factory warehouses. Apart from the factory warehouses, there are also 4 additional warehouses in the central part of Thailand (close to the 3 factories in the central part), which are used for stocking finished goods. The warehouses serve more as an extension of storage at the factory warehouses than as distribution centers. The finished goods are shipped from all these warehouses to the customers.

The cement manufacturing consists of 2 major stages. The first major stage is the clinking operation in a kiln in which the raw material (primarily lime & clay) is burnt at a very high temperature to make the clinker. The second stage is the cement making in the cement mill in which the clinker is converted to cement after grinding and addition of a few more components.

1.1.2 Products

The main products of SCI, as mentioned earlier, are grey cement and grey clinker. The grey cement is used primarily in all type of construction activities. The grey clinker is an intermediate in the cement making and can be used only to make cement. The clinker, due to its long shelf life, is primarily exported to other countries where it is converted to cement by the buyer. Sometimes, the clinker also gets sold in the domestic market to other cement companies, when SCI runs short of cement making capacity. Both, grey cement and clinker are further classified on the basis of their grade. The grade (more commonly known as "type") depends on certain properties of cement (like compressive strength etc) and also implies adherence to certain industry standards. The end use of cement varies based on its type. Some of the examples of type of cement are Type I, Type I/II etc. The clinker too is available in different types. The products are sold and shipped in both, bulk and packed form. The packed form is in the form of bags of size 50kg, 25kg, etc. (50kg is the most common bag size). The bulk cement is shipped loose though some of the export consignments are shipped as big bags (called "Jumbo" bags of size 1Ton, 2Ton, etc.)

For each type of cement, SCI has its own brands. Some of the examples of SCI's brands are Elephant, Tiger, Rhino, Erawan. The branding is such that each brand necessarily corresponds to a unique type of cement (e.g. Elephant cement essentially is Type I cement from SCI). Thus, there is no brand that spans across different types of cement. Typically, most types of cement will have one brand each though there are some exceptions to this (e.g. Admix Type cement has 2 brands namely Tiger and Rhino).

1.1.3 Market

SCI's products are sold in both, Thailand (domestic market) and other countries (export market). Both the markets have been described briefly in the following sections (as of year 2002.)

(1) Domestic Market (about 50% of total business)

The domestic market of SCI is reached via 3 sales channels namely Direct, Dealer & Affiliate. There is a set of personnel responsible for managing each of these channels. The "Direct" channel reaches the big customers of SCI (e.g. large contractors, construction manufacturers) who prefer to deal with SCI directly because of the volume of business. This accounts for about 5% of domestic market and is managed totally by SCI. The "Affiliate" channel takes care of the cement needs of other group companies (e.g. SFCC — the company that makes roof tiles, CPAC — the company that makes ready mix concrete products). This channel accounts for about 20% of domestic market and is managed by SCI. The "Dealer" channel is essentially the dealer network (managed by CSM) that accounts for about 75% of domestic market. The dealers buy cement from CSM and sell it to sub-dealers and end consumers.

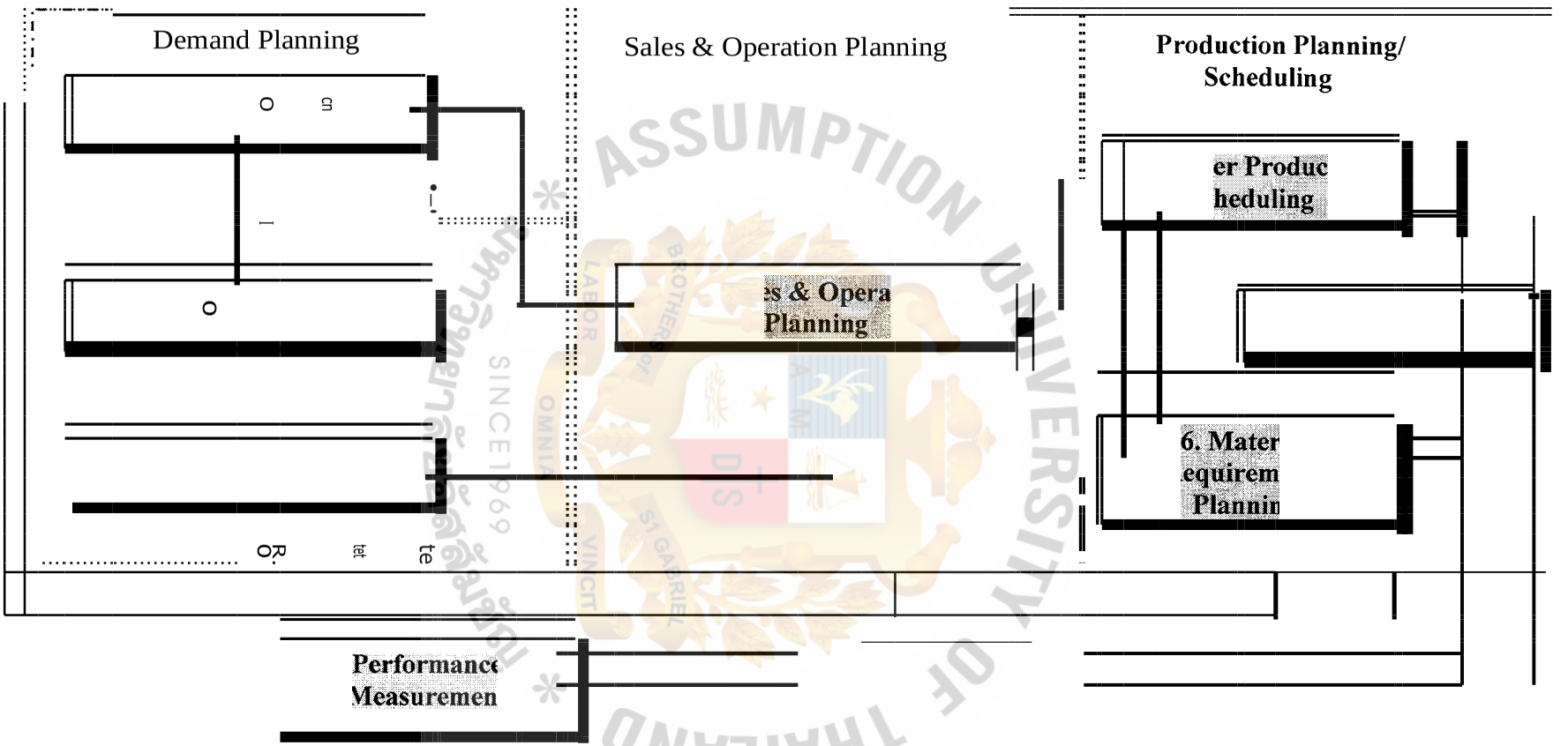
Geographically, the domestic market is divided into "Regions" (e.g. North, South, East etc) and each of the regions is further divided into "Sub-Region" and then to "Provinces" (e.g. Bangkok, Saraburi etc). There are regional managers (in CSM sales) responsible for sales of a region. There are sales representatives (in CSM sales) responsible for sales of a province. These sales representatives are people in the field that deal with the customers in a province and report to the regional managers.

Within CSM, there are also CMP marketing officers and analysts who are the ones taking care of local marketing activities such as promotions, co-developing channel strategy with CSM SRs in the fields.

(2) Export Market (about 50% of total business)

The export market of SCI emerged during the economic crisis in Thailand as a result of efforts to find market outside Thailand while the demand in the domestic market went down substantially. The export market is jointly managed by a company called SCT and SCI export personnel. Activities and decisions on market strategy are jointly decided by SCI Export and SCT. Geographically, the market is divided into "Regions" which represent groups of countries (e.g. North America, Africa, South East Asia etc). Each region gets further divided into countries to which SCI exports its products (e.g., Vietnam, Laos, Cambodia, USA etc).

Since 2001, SCI set the Supply Chain Management Assessment Project, determined opportunity to apply the Supply Chain Management for improving SCI logistics process. Up to now SCI implemented the Integrated Supply and Demand Planning Implementation Project (ISDP) that consists of Demand Planning (DP), Supply Planning (SP), and Inventory Management Planning (IP). Along with *Conceptual Demand Planning for Siam Cement Industry Co., Ltd,* the Project focuses only on demand planning processes based on the Business Requirement Definition of ISDP. The project will deliver demand planning business process, architecture design, detail design and KPI based on the 4 views of balance score card theory. All of the design stage documents will be proposed by feasibility to implement on SCI infrastructure and relevant environment.



Supply Chain Planning Process.

1.2 Significance of Demand Planning

1.2.1 Supply Chain Planning Process

Figure 1.1 represents the supply chain process in which the first process is Demand Planning or Demand Forecasting. Output from the first process is sent to Inventory Planning process and consolidated with the output from Supply Planning process for the consensus of the plan in Sales & Operation Planning meeting. The Supply Planning output and Demand Planning output (final planning) are set after Sales & Operation Planning meeting. After that the final planning will be sent to Production Planning process in order to setup the Material Requirement Planning, Production Scheduling, and Managing Order. Operators will execute the operation activities according to the plan which is to be measured by the sets of KPI. The measurement results will serve as feedback to the planning cycle.

The project will cover only the first process (Demand Forecasting). It is the significant path of Supply Chain System because if Demand Planning output has low accuracy, it will affect overall Supply Chain result.

1.2.2 What are the results of poor Demand Planning?

(1) On-time delivery problem: The delivery problems usually occur when there is unplanned high demand volume.

(2) Excess inventory: SCI has constant volume of production planning that sometime causes excess inventory.

(3) Low asset utilization: The excess inventory causes low inventory turn over that results in low asset utilization.

(4) Disconnected process and information: The chain of cement business activities that include SCI — Manufacturer, CSM — Domestic Channel

Marketing, SCT — Export Channel Marketing, CTL — Transportation Management has no connection of planning process between them.

(5) Dissatisfied customer: The delivery problem with a lack of information sharing can dissatisfy customer.

(6) Stock-outs

(7) Untapped product mix profit

(8) Overall chaos in supply chain

1.2.3 Why do we need Demand Planning?

(1) Islands of analysis: Spreadsheet based planning, multiple groups responsible for the plan, little or no integration of demand plans, and no collaboration between various stakeholders

(2) Lack of scientific techniques: Homegrown methods using spreadsheets, and intuition based planning

(3) Limited data management capability: Limited view of data, and no fast & intelligent aggregating-disaggregating techniques

(4) Lack of visibility and accountability: Minimal tracking of manual intervention, no common measurements for forecast accuracy, and minimal exception reporting

1.2.4 What are the results of the improved Demand Planning?

(1) Demand Planning triggers the entire supply chain into action

(2) An accurate demand plan results in rationalized inventory in the organization

(3) A long term demand plan can guide strategic supply chain decisions

1.2.4 Demand Planning's Objectives

To develop an accurate, reliable view of market demand by identifying market trends and predicting changes in customer preferences

1.3 Project Objectives

The objectives are to analyze the Demand Planning System of SCI and comply with the business requirement and demand forecasting theory. After delivering the architecture design, detail design will introduce KPIs and simulated result that can retrieve the data from Demand Planning System and present in the 4 views of balance score card.

The main objective is to find the methodology to determine the high accuracy demand forecasting of Demand Planning Scenario.

1.3.1 Consolidation of Planning Activities and Plans

The present planning is primarily enabled by a set of spreadsheets maintained by different planners and pertinent to their own responsibilities. A major improvement in sheer efficiency of planning can be achieved by having a single planning system with a central database.

1.3.2 Planning at different level of granularity

The present planning involves a number of steps that break down or aggregate demand plans at different levels of granularity in Geography, Product and Time dimension. Automation of these steps is going to help the planning process significantly. Also, a common interface to plan any level of gratuity will help.

1.3.3 Communication of Plan

In the current planning process, the monthly adjustments to the plan are handled in an informal way outside the planning system. The reason for this is both, the process and the MIS system (MIS system allows changes to the plan only 2 times a year). This

issue can be very easily resolved in the new planning system and a unique final plan will get communicated to everyone — BU, the sales people, the supply planning group.

1.3.4 Statistical Forecasting

The new system brings in a set of sophisticated statistical tools, which can be easily configured and used to do statistical forecasting at any level with very little effort. This is going to be a marked improvement over the existing spreadsheet based statistical forecasting with a lot of human intervention.

1.3.5 Forecast Accuracy Measurement

The present process of demand planning does not have a clear and formal way of tracking the forecast accuracy. The new process will have a systematic tracking of the forecast accuracy as its integral part. The flexibility of the tool (Demand Planner) shall enable tracking of multiple forecasts independently and the same can be fed back to the process to have a continuously improving process.

1.3.6 Improved Decision Support

Demand Planner, with its easy to use tools for analysis and exception handling, will help the demand planner make better decisions in future than in the current scenario wherein the context of analysis is heavily restricted by the spreadsheet, availability of data and sheer effort required to do any useful analysis.

1.4 Project Scope

The Project scope covers to ensure the architecture design, detail design and business scenario in accordance with the client's requirements and feasibility for actual implementation. The contents of this document consist of

(1) Significance of Demand Planning

(2) Supply Chain Management Concept

(3) Demand Forecasting Technique

(4) Requirement Definition

(5) Business Scenarios for The Expected To-Be Process

(6) Architecture Design

(7) Detail Design

(8) Evaluation and Recommendation

II. ITERATURE REVIEW

2.1 Overview

Forecasting is a necessary pre-requisite to most operational activities. Without an estimate of the future it is not possible to plan for the level of activity which is to be expected and, hence, not possible to estimate the resources that need to be designed, planned and controlled to fulfill that level of activity.

Independent demand describes the type of demand for a product or service which is independent of demand for other apparently related products or services. Many services organizations, public utilities and retail organizations display such independent demand characteristics.

However, generally within manufacturing organizations, where a planned level of production of finished products is the norm, the demand for sub-assemblies, components and raw materials that make up the finished product is clearly highly dependent on that planned level of production.

2.2 Supply Chain Management Concept

Typical manufacturing planning software takes in a model of the factory, status information on its current state, and demand information on what needs to be satisfied. Its job, along with the human planners, is to plan the activity of the factory such that the demand is satisfied efficiently and effectively (least cost, most profit, least inventory, highest service level, etc.).

Fundamentally however, the manufacturer's job is not to satisfy the incoming demand orders. It is to satisfy the end customers. It does not matter if ABC manufacturing satisfies or misses the due dates on its incoming orders. It does not matter if their finished goods inventory stocks out or if their distribution center stocks out. What matters is that their product never stocks out on retail store shelves. Running

out of input materials from their suppliers is no excuse. ABC's real planning problem involves all the members involved in keeping the retailers' shelves stocked: the retailer, the distribution centers, the warehouses, the factories, and the suppliers.

This path, from raw materials through finished product and into customers' hands, has been termed the "supply chain", "supply-demand pipeline", "market channel", "distribution network", "virtual corporation", and so on. Managing that supply chain in an optimal way has taken on elevated importance as flexibility and responsiveness have become key differentiators in today's increasingly global marketplace.

2.3 Demand Forecasting Technique

2.3.1 Forecasting versus prediction

In general terms, forecasting is interprets as being a scientific process of estimating a future event by casting forward past data. The past data are initially analyzed to establish the underlying trends which characterize the data and this information is then used in a predetermined way to obtain an estimate of the future. Prediction, however, is generally interprets as a process of estimating a future event based on subjective considerations. However, a scientifically produced forecast, established on the assumption that characteristic trends identified in past data will continue into the future, should always be open to alteration in the light of changes in market conditions. Example of such change could be, it is predicted, in advance of the event, that such trends are unlikely to be continued due to legislative changes which are assumed to affect future demand, or after the event, some extraneous causal effect is detected which invalidates the assumption of continuity of demand.

However, because predictions are predominantly subjective, they are generally more expensive to produce on a routine basis than forecasts.

2.3.2 Different types of forecasting methods

One way of classifying or categorizing forecasting methods is to define the type of forecasting on the basis of the time period associated with the demand data which are being analyzed, as illustrated in Table 2.1.

Table 2.1. Categorisation of Type of Forecast Based on the Underlying Time Unit of Data Involved.

Category of type of forecast	Time period associated with the data being analyzed	Example of forecasting application	Forecasting techniques used
Immediate-term	¼ hr to 1 day	Electricity demand forecasting	Various
Short-term	1 week to 1 month	Demand forecasting in industry and commerce	Exponentially weighted averages and derivatives
Medium-term	1 month to 1 year	Sales and financial forecasting	Regression, curve fitting, time series analysis
Long-term	1 year to 1 decade	Technological forecasting	DELPHI, think tanks, etc.

(1) Short-term forecasting

It is generally assumed that short-term forecasting will often be associated with many product lines or items, as typically occurs in an inventory control environment. Within an inventory environment, it is also true that the demand patterns being analyzed are relatively fast moving with an average per period in excess of twenty such that the normal probability distribution can be assumed to represent the distribution of demand per unit time. The forecasting models used when operating in such an environment must be simple and relative cheap to operate while still being robust. The family of forecasting models based on the exponentially weighted average, originally suggested by Holt, has proved to meet these criteria more satisfactorily than any group of models and has traditionally become the basis for forecasting in many inventory control situations because of its:

(a) Computational cheapness in terms of processing time and storage requirements

(b) Robustness and ability for the forecasting process to be monitored so that 'out of control' situations can be detected

(c) Ease of 'starting up' when including new items with no previous demand history

(d) Adaptability in terms of changing sensitivity in line with the characteristic of the demand data encountered

(e) Flexibility in terms of ability to cope with stationary, growth and seasonal demand pattern

(2) Medium-term forecasting

Increasingly as computer power becomes cheaper, more sophisticated forecasting models, which require more complicated calculations than the

exponentially weighted average family of forecasting for many stocked items have emerged as forecasting methods such as:

(a) Curve fitting and regression

(b) Fourier analysis

(c) Bayesian forecasting

2.3.3 Forecasting horizon, fitting and forecasting

The forecast horizon is the number of time periods ahead of the known data over which forecasts are calculated (i.e. extrapolation). In many situations, the maximum forecast horizon is about six periods ahead, since the confidence with which forecasts any further ahead of this can be made is likely to be low. An exception to this general rule is when a strong seasonal influence is known to exist, in which case forecasts up to a whole season ahead might well be justified i.e. up to twelve months for monthly data.

Fitting is the process of producing a forecasting model which fits known data (i.e. interpolation) whereas forecasting is the process of extrapolation a fitted model into the future, i.e. ahead of known data. Within an environment where forecasting models are based on parameters which can be adjusted, a good fit is usually established by adjusting the value of those parameters to minimize the Sum of Squared forecasting Errors (SSE) or the Mean Squared forecasting Error (MSE).

Characteristics of customer demand patterns requiring forecasting

In practice, in ascending order of complexity, it is assumed that the following demand patterns can exist:

(1) Stationary demand (level) — assumes that although customer demand per unit time fluctuates, there is no long-term underlying growth or seasonal trend. Figure 2.1 illustrates the basic stationary character of such data but also identifies the fact that variability in demand exists. Because no growth

or seasonality is assumed in stationary demand patterns, forecasts ahead are the forecast for any number of periods ahead.

These are presumed to be short-term in nature, such as:

(a) Impulses — individual demands which are significantly higher or lower than normal. Such impulses are best ignored by a forecasting system.

(b) Step changes — a series of successive demands which are significantly higher or lower than normal. The ideal response of a forecast to a step change in demand is that it should react as quickly as possible.

Demand with growth characteristics — where a demand pattern exhibits growth characteristics over the longer term, the forecasting models required to accommodate that growth become more complex than those used in the stationary demand situation discussed earlier. Figure 2.1. illustrates a demand pattern where demand is growing long term. It is recognized that demand may decline rather than grow, in which case this continual drop in demand can be regarded as negative growth.

(2) Demand with seasonal characteristics — many demand series are influenced by the seasons of the year and by other events which occur annually. In such situations it is possible to establish the degree to which demand in any particular period of the year (i.e. month, quarter or accounting period) is higher or lower than for a typical average period. Hence the aim of forecasting models taking seasonality into account is to establish this relationship for each and every period within the year and to use the de-seasonalising factors that are identified by this process to produce forecasts.

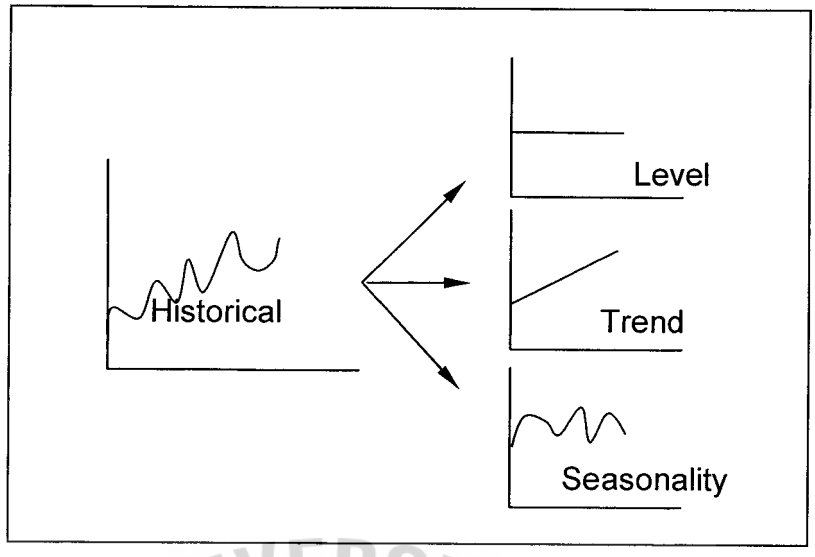


Figure 2.1. Demand Patterns.

2.3.4 Forecasting in stationary demand situation

The basic inference within a stationary demand process is that there is variation about a relatively stationary average demand value and that any change in the average value (i.e. a movement upwards or downwards) is due to a special, one off cause rather than to overall growth or seasonality.

Assuming that the demand value has just been collected for the month of March, and that a forecast is required for April, the timing in Table 2.2 would apply. In a stationary demand situation, because no growth or seasonality is assumed, the forecast for one period ahead is the forecast for any number of T periods ahead, where T is any specified forecast horizon. Hence, in the stationary demand situation only the forecast for T periods ahead ft+T is given by:

$$f_{t+T} = f_{t+i}$$

Table 2.2. Relating Demand Values and Forecasts to Time Periods.

Month	Jan	Feb	Mar	Apr
Time period	(t-2)	(t-1)	(t)	(t+1)
Demand values	40	44	36	
Forecasts				40

2.3.5 The moving average as a forecast model

Referring to Table 2.2, the forecast of 40 for next month (April) f_t4.1 based on a moving average, m_t, calculated this month (March i.e. now at time, t) could be evaluated as:

f_{t+T} m_t = $(1/3)d_t$-F($^1/_3$)d_{t-i}+(1/3)4$_2$

(1/3)40+(1/3)44+(1/3)36

40

The more general from of the moving average as a forecasting model would be:

f_{t+T} mt $(1/n)d_t+(1/n)d_{t-}1+...+(1/3)d_{t-n+1}$ [2.1]

where n = 2, 3, ...12, etc, and where the sum of the n weights of 1/n will always sum to one; this being the definition of a true average.

The simple exponentially weighted average as a forecasting model

The definition of average, u_t, with weights declining exponentially with time would be of the general form:

$$u_t = a(1-a)d_{t-}1+a(1-a)^2d_{t-}2+a(1-a)^3\mathbf{4}_3+a(1-a)^4\mathbf{4}_4... \quad [2.2]$$

Where (alpha) a is an exponential weighting constant (EWC) whose value must be between zero and one; given that the sum of weights must sum to one (at infinity). A value of a = 0.2 is a good compromise figure.

However, it is possible to show the equation [2.2] can be simplified to the simple statement such that a one-period-ahead forecast f_t-F1 would be of the form:

$$f_{t+i} = \dot{a}_t = ad_t + (1-a)u_{t-1} \quad [2.3]$$

2.3.6 Growth forecasting models

As was discussed in the previous topic, the simple exponentially weighted average is not a suitable forecasting model if the data being analyzed is subject to growth since it:

(1) Lags behind the data

(2) Produces forecasts ahead of the know data which are fixed value

Because of these problems, modifications to forecasting models based on the simple exponentially weighted average model are necessary to cope with growth situations where demand increase (or decrease) over a period of time.

A variety of forecasting models have been developed to cope with demand data which exhibit growth. In this section Brown's double smoothed model is considered together with Holt's model which is also incorporated in the Holt Winters seasonal forecasting model.

(a) Brown's double smoothed model

Of the many forecasting models which have been proposed to cope with growth situations, Brown's double smoothed exponentially weighted average forecasting model for growth has the advantage that only one parameter (alpha) a is involved. This makes searching for the optimal forecasting model much simpler than if two or more parameters were involved which would require a two dimensional search procedure. Brow's double smoothed exponentially weighted average (EWA) of the form:

$$u_t = ad_t + (1-a)u_{t-1} \quad [2.4]$$

The double smoothed EWA forecasting model is based on the assumption that:

(1) The demand data are draw from a population with a stationary element, p, anda growth factor, 2, and is of the general form d_t = p, + Xt + s where s represents random errors with zero mean

(2) In the state that the lag of u_t behind d_t is equal to k(1-a)/a

Estimate b_t for the growth of factor X of:

$$bt = a(u_t-u_t)/1 -a$$

from which it follows that the forecast for T periods ahead, f_t+T is given by:

$$_{ft+T} = ft+bt+T \qquad [2.5]$$

The main advantage of Brown's double smoothed growth model is that only one exponential weighting constant a is required. This simplifies the search procedure required to find the optimal value of a which minimizes the Mean Squared Error.

(b) Holt's two parameter model

Holt's proposal for an exponentially weighted average forecasting model capable of coping with growth data also accepts the fact that a simple EWA lags behind a growth trend but proposes that b_t — the estimate of the growth factor X - can be evaluated as the exponentially weighted average of the difference between the current and immediate past simple exponentially weighted averages, hence:

$$b_t = 13(ut-ut-i) + (^{1-} mbt\_i \qquad [2.6]$$

where 13 is an exponential weighting constant which must take a value between 0 and 1

(1) Seasonal forecasting

Where a strong seasonal influence is expected, one approach of forecasting is to assume that the seasonal pattern is defined by a set of 'de-seasonalising factors' with one for each period within the overall seasonal cycle. Thus for the twelve calendar months in a year, twelve de-seasonlising factors are required and these could be defined as the ratio between the expected demand for each month and the estimate of the stationary element.

The seasonal element of the Holt Winters' model is established as a set of L, de-seasonlising Ft, Ft-1, • • • , Ft-L. The current value of the latest de-seasonalising factors F_t is evaluated as the exponentially weighted average of the ratio of the current demand value, d_t, to the most recently estimated value of the stationary element, u_t, hence:

$$Ft = Y(dthit) + (1-y)Ft-L \qquad [2.7]$$

Within the three equations describe the Holt Winters' model, the exponential weighting constant, a, 13, and y, clearly must all adopt values between 0 and 1. To obtain an optimal forecast it is necessary to undertake a complicated three dimensional search procedure, but a combination of value of 0.2, 0.05 and 0.5 respectively has been found to produce reasonably consistent good forecasts.

2.4 12 Demand Planner

2.4.1 What is 12 Demand Planner?

12 Demand Planner is a Microsoft Windows-based forecasting and demand planning decision support system. Planner can create projections into the future based on history, past events, and planned (or estimated) future events.

The demand planning process requires input from various groups within the supply chain planning process. Demand Planner supports these different approaches

through the use of custom-designed spreadsheets (called "bookmarks") to provide information unique to each user of the system.

Planner can work in Demand Planner while either connected or not connected to the network. Through the Disconnect Mode of the Extended Manual Adjust Matrix (XMAM), planner can carve out a session, download it, make changes, log back in, and upload the changes to the server.

Demand Planner supports all forecasting methodologies (such as top-down, bottom-up, and middle-out) through its "customizable" toolbox approach. It comes with a wide range of predefined forecasting techniques, including:

(1) Exponential smoothing

(2) Moving averages

(3) Multiple regression

(4) Fitting straight lines to the data

(5) Adjusting for effects such as trends and seasonality

(6) A "PickBest" function that helps to select the best forecasting technique for a demand pattern.

In addition to the pre-defined forecasting techniques, Demand Planner comes with its own modeling language which allows the user to create custom models to support the unique needs of each company's demand process.

Changing the forecast is always a necessary part of the demand planning process. The ability to track these changes through the use of comments is integral to Demand Planner. Planner can create comments at any location in the hierarchy, and they can even insert pictures and attach files to comments.

Forecast cycle times can be dramatically reduced through the Demand Planning Batch Client function. By defining groups of processes to run consecutively, planner can reduce manual intervention and speed the process.

2.4.2 Summary of Major Feature

(1) Multidimensional forecasting, with as many views of each dimension as necessary

(2) Customizable toolbox approach to forecasting

(3) Ability to use top-down, bottom-up, and middle-out forecasting methodologies

(4) User can use separate allocation and forecasting techniques

(5) Provides for "scorecard" performance measurements for each technique

(6) User can create powerful customized models to handle unique business situations

(7) Easy to learn

(8) Supports both on-network and off-network use

(9) User can create customized spreadsheets and save them for future use

(10) Many "canned" forecasting techniques available

(11) Reporting capability through its companion application, analyzer for Demand Planner

(12) Easily links forecasting data with other Windows-based software applications

2.4.3 Client-Server Technology

There are two components to the Demand Planner system: the server, and the client. The server component generally runs on a powerful central computer, with

plenty of storage space and memory. All Demand Planner users share this computer and the services it provides.

All database operations are performed on the server, since it is more powerful than the personal computer on your desk, which is called client. The Demand Planner client is considered a "thin" client, in that it does not take up a great deal of disk space, nor do many Demand Planner processes take place on the client side.

A client is connected to the server through a network: a Local Area Network (LAN), or a Wide Area Network (WAN). Users can also access the server through such alternative means as dial-in via modem, or the Internet.

2.4.4 Modeling

As mentioned earlier, if you want to experiment with techniques beyond those that come with the standard Demand Planner software package, Demand Planner provides a rich set of tools that allows you to develop customized models. These models are automatically executed as databases are updated. This full-featured modeling environment is especially useful for advanced users. You may define any relationship, causal or otherwise. Unlimited nesting of if-then-else and case constructs, and full Boolean capabilities permit the technically oriented user to build sophisticated models that would otherwise be the domain of highly skilled programmers

2.4.5 The Database

Demand Planner is based on a database which contains the historical and current information you use to create forecasts.

2.4.6 Dimensions

Dimensions are the main categories of data in your database. There are two definable dimensions, which most companies define as:

(1) Geography (where an item is sold)

(2) Product (what is sold)

Time is considered an implicit third dimension in that it is always present in a Demand Planner configuration. One of the strongest features of Demand Planner is its ability to perform multidimensional forecasting. For example, you might want to see Sales Dollars for 1996. "1996" is in the (implicit) Time dimension. You may want to see 1996 Sales Dollars for the Northern region. "The Northern region" is in the Geography dimension. You might want to narrow down your search even more, to Sales dollars for the Northern region for widgets only. "Widgets" is in the Product dimension. It is now clear that the data we see in Demand Planner is identified by its position in all three dimensions.

2.4.7 Trees and Nodes

Dimensions are seen as inverted trees. As an example, look at the Geography dimension. Assume that you want to view Sales Dollars for a specific Territory. In the following window, see all the members of the Geography dimension.

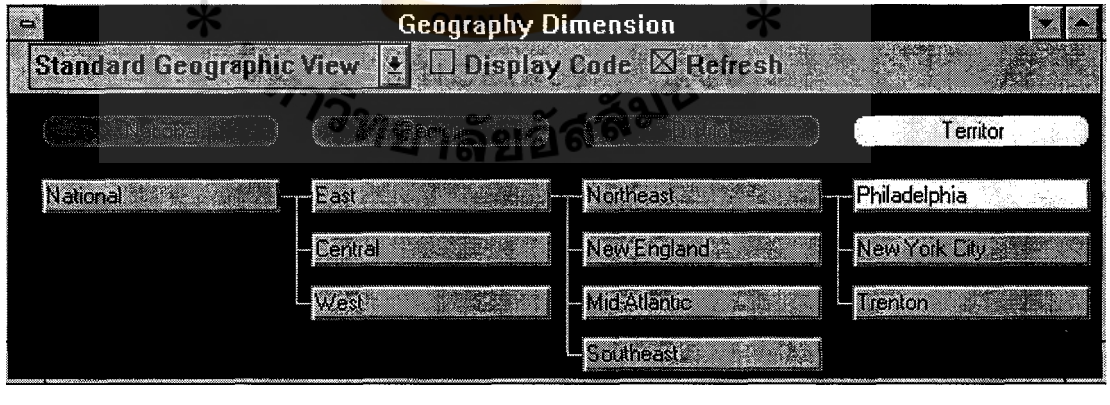


Figure 2.2. 12 Demand Planning: Tree and Nodes.

The highest level of this structure is the National level. (Dimension levels are displayed in oval boxes; their members are displayed in rectangular boxes.). Numbers at this level are composed of all the numbers at the subordinate level, or Region level (East + Central + West). Each subordinate level, in turn, is composed of *its own* subordinate levels (the Region level East = Northeast + New England + Mid-Atlantic + Southeast). This continues until we reach the lowest level of the tree, the Territory level (Philadelphia, New York City, and Trenton). The flow of data, from National to a specific Region, to a specific District, to a specific Territory, is a branch of the tree, or node. You can trace a node by following the lines in the example above, from parent to child. The levels in a dimension have a parent-child relationship. National is the parent to East, Central, and West; Northeast, New England, Mid-Atlantic, and Southeast are children of East

2.4.8 View

A view is the way data in a dimension is sorted and presented to the user. Demand Planner offers multiple views within a dimension. In the sample Geography dimension, the data for a Territory can be summarized not only to its District (in the Standard Geographic View), but also to the Distribution Center (DC) that serves the Territory. This view may be called the Distribution Center View, and indicates the product volume to be stocked at the various Distribution Centers. We see that the way items are grouped depends on the view.

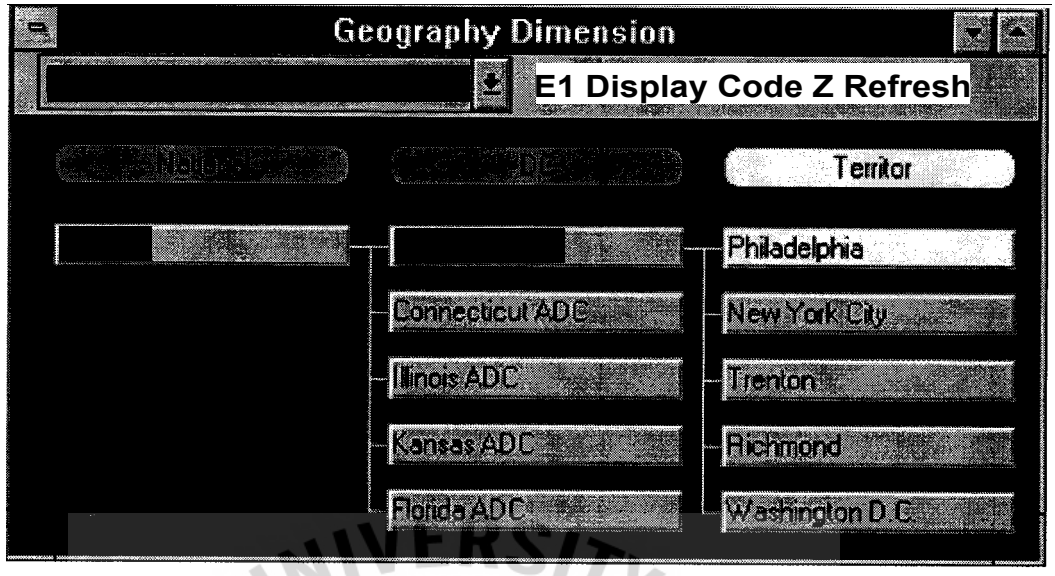


Figure 2.3. 12 Demand Planning: View

2.4.9 Data Distribution

You can edit the data in a dimension, and then distribute the changes among the dimension members.

(1) Top-Down Forecasting (Allocation)

You may change a parent's data, and the new value can be divided among all its children. This process is repeated for the children's children, and so on, until the children at the lowest level have been given new data. This is called Allocation and is sometimes referred to as Top-Down Forecasting.

(2) Bottom-Up Forecasting (Percolation)

You can change a child's data, and its parent's data can be increased or decreased to reflect the change. This process is repeated for the parents' parent, and so on, until the highest level is reached. This is called Percolation, or Bottom-Up Forecasting.

(3) Middle-Out Forecasting

Often, the process of changing data begins in the middle of a view (such as at the District level). In this case, allocation can be performed for all children *below* the current node, and percolation can be performed for all parents *above* the current node. This process is called Middle-Out Forecasting.

2.5 Summary

Supply Chain System is the system that synchronies the activities move and store products along the supply chain. The main objective to manage supply chain is optimizing the overall cost of total supply chain and match with the customer service level policy.

Demand Planning System is a starting point to manage a good supply chain. Low accuracy of demand forecasting will distort the real figure of needed quantity and magnify the problem along the chain. Hence, the main objectives of demand planning process are high accuracy forecasting with collaborative of every parties.

12 Demand Planning System is one tool that uses the simple statistical concept but strong in the collaborative thinking. The successfully implemented 12 Demand Planner System needs the cooperation of users both management level and operation level.

III. REQUIREMENTS DEFINITION

3.1 Gather Requirement Method

The project should gather the requirements with a work shop method whose first session was to study the existing processes; the second session was to find out the gap and the opportunities to close the gap, and then coordinating with users to design the expected process based on a scenario basis.

According to ISDP gathering requirement process, there are three deliverables as follows:

3.2 The As-is Process

The existing process of demand planning consists of 3 major steps that can be distinguished from one another on the basis of the planning horizon. They are Medium Term Planning (MTP), Annual Planning and Monthly (Rolling) Planning. Each of them has been described briefly in the following sections.

3.2.1 Medium Term Planning

Detailed Process

The medium term planning is done primarily to decide the broad direction for SCI's business in the future. Apart from the historical demand data, the planners take into account a lot of other factors like economic conditions, government policies, GDP trends etc to assess the overall cement market. Based on this and SCI's own strategies about the desired share of the market, an estimation of SCI's domestic business for next 5 years is done. These estimates for the domestic market and the overall manufacturing capacity (for next 5 years) decide the demand to be targeted in the export market. There are also some inputs from SCT (based on the information they have about specific customers) while deciding the overall export demand to be targeted. The medium term

planning activities also decide about the overall marketing strategies for the domestic market to achieve the desired share of the market.

Table 3.1. Medium Term Plan.

Horizon	**5 years in future**
Frequency	Once every year (month of May)
Planner	SCI, CSM
Granularity	Yearly buckets, Region-SKU level planning for domestic, Overall targets for export market
Major Inputs	Historical Sales, Economic conditions, Expectations about future (GDP, Construction industry, Government policies etc), SCI's ambitions & growth strategies
Use of output	Annual planning uses medium term plan Decisions regarding overall marketing strategies Rough cut cash flows by finance / accounting Supply planning optimization

The medium term plan is used by the supply planning people to do an overall optimized supply planning. The finance function gets an idea about the expected cash flows for the next few years. The medium term plan for the next year also serves as a starting point in the annual planning exercise.

3.2.2 Annual'Planning

Table 3.2. Annual Planning.

Horizon	**1 year in future**
Frequency	2 times every year (month of November for the next year, month of May for adjustments to the annual plan for the rest of the current year)
Planner	SCI, CSM, CTL
Granularity	Monthly buckets, Customer-SKU level planning for domestic, Primarily overall export target with some details about country/customer for SKUs
Major Inputs	Medium term plan, Historical sales data, Desired market share, Demand estimates from customers, Overall manufacturing capacity
Use of output	Monthly planning uses annual plan as a starting point Annual plan essentially serves as the formal plan to be chased by the CSM sales people Supply planning uses the annual demand plan to decide on the kiln operations for the entire year

Detailed Process

At present, the annual plan essentially serves as the formal plan to be achieved by the sales force during the year. The planning is done in a system called "MIS" and the

plan can be changed only twice a year. The major steps in the annual planning are as follows.

SCI, based on the medium term plan, decides an overall target for the domestic market. There are considerations like the desired market share and growth planned by SCI apart from the historical demand pattern. The domestic target is broken down into 3 channels namely Direct, Affiliate & Dealer. For the Direct and Affiliate channels, the respective planners from SCI get reliable estimates of demand from the customers. These inputs are primarily responsible for the overall target for the 2 channels. There is a "target setting meeting" in which these targets for all the 3 channels are discussed and finalized. CSM comes to the meeting with its own estimate of the dealer channel target for discussion. The export target is decided on the basis of the overall capacity, domestic target and inputs from SCT. All the target numbers are at product level for the entire year.

The target for the year for the Dealer channel is passed on to CMP. There are 6 CMP personnel (for each region) and 1 analyst and 1 statistician who break down the yearly target into monthly region-sku targets based on the historical data. These targets are in both, tonnage & value. The value figures are sent to finance/accounting to estimate the cash flows. The region level targets (only tonnage) are broken down into province level targets on the basis of the historical data, growth objectives for the province, last year's split etc. The province targets are given to respective sales representatives (SRs) and they break the numbers further into customer level targets. This is done on the basis of the past performance of the customers, special objectives for customers and focus on the key customers. These customer-sku level targets are chased by the sales force throughout the year.

The target for the export market is passed on to SCT for detailed breakdown and planning. This is done primarily on the basis of the customer level input SCT gets from its customer base abroad. The export plan, though done at month level, changes a lot from month to month because of changes in the customer requirements and transportation schedule (schedule of ships used for exports).

The annual demand plan is sent to supply planning at region-sku level in monthly buckets and supply-planning group uses a LP (linear programming) based tool to derive an optimal supply plan, which decides the kiln operations for the entire year.

3.2.3 Monthly (rolling) Planning

Detailed Process

The monthly planning essentially does some adjustments and refinements to the annual plan. The same is used by supply planning for making adjustments to the supply plan. The major steps are as follows

Every month, towards the end of week 2 or beginning of week 3, there is an S&OP (sales & operations planning) meeting which is attended by SCI, CMP (marketing arm of CSM), CTL & supply planning group. Both, SCI & CMP have their latest understanding of the market as an input to the meeting. There is fresh customer level information available for the Direct and Affiliate channels. Also, SCI may have other inputs about promotions and other marketing activities planned for the next month to achieve a desired market share. Supply planning group gets the supply constraints from the factories. Based on all these inputs, the targets for the next 3 months are suitably revised at region-SKU level. Based on the revised domestic targets and the input from SCT about the export market, the export targets may also get adjusted.

Table 3.3. Monthly (rolling) Planning.

Horizon	3 months in future
Frequency	Once every month (end of week 2 or beginning of week 3)
Planner	SCI, CSM, CTL, Supply Planning group
Granularity	Weekly plans for the first month & monthly plans for the subsequent 2 months Region-SKU level revised figures
Major Inputs	Annual Plan, Inputs about the market from SCI & CSM, Promotions
Use of Output	Monthly plan is used by supply planning for production and distribution planning If the revised target from the monthly plan is higher than the annual target, the same is used by CSM for actually chasing the sale Monthly plan (along with the split between "Pickup" and "Delivery") is used by CTL for planning transportation

The revised targets are broken down into weeks (for the first month) by CMP based on historical data. The targets are also broken down into "Pickup" (Ex-works) and "Delivery" (CFR) and then into plant level figures by CMP. The plant level new figures are used by supply planning group to adjust the manufacturing and distribution plan. CTL uses the "Pickup" v/s "Delivery" breakup for planning the transportation.

The revised targets, if higher than the annual plan targets, are only informally communicated to the CSM sales people. The revised targets are not maintained formally in the MIS and are available only informally in spreadsheets.

The monthly plan is primarily used by the supply planning group and CTL to refine the production plan and transportation plan respectively.

3.2.4 Promotions Planning

SCI makes the decisions about the promotions to be offered to the market. Following are the main types of promotions used by SCI to influence the market

(1) Trade promotions: Member card is used for trade promotion. The cardholders get some points when they buy SCI products. During the promotion period, the cardholders earn more points than normal. The accumulated points are finally converted to some monetary benefits for the customer.

(2) Consumer promotions such as give Away: SCI distributes free shirts, jackets, etc during the promotion period based on the volume of business done by a customer.

(3) Special discount (pricing): A direct discount is given to the customers during the promotion period based on the volume of business.

Promotions are initiated on an agreement of both SCI and CMP and then they are executed by CMP. In the S&OP meeting, the promotional activities for the next month get discussed while deciding the new targets for the next month. Promotions of type 1 & 3 can get planned anytime during the year. Type 2 promotions are usually planned in the beginning of the year for the entire year. The promotions are mostly offered at region-product (type of cement + brand) level though there could be exceptions to this.

Most promotions (especially the ones planned during the year) are offered primarily after assessing the current market situation to achieve the targeted sales.

It is very strongly believed (by both SCI and CSM) that the major factor that influences the demand for SCI cement (or SCI's market share) is the "Price Gap" — the difference between the price of SCI products and the price of the products from the competitors. Owing to this belief, the price is changed very frequently to grab the desired share of the market. Despite the fact that SCI does have an image for its brands and can command some brand premium, it is felt that the customer is very sensitive to the premium he needs to pay for the SCI brand.

3.2.5 Prediction of Demand Split into Ex-works (Pickup) and CFR (Delivery)

As a part of the monthly planning, besides planning the total volume of business, the split of the total domestic demand plan into "Ex-works" demand and "CFR" demand is also predicted. In case of "Ex-works", the customer picks up the material from one of the warehouses (either factory warehouse or the outside warehouse) and is also responsible for the transportation arrangements. The choice of warehouse depends totally on the customer, though sometimes SCI influences the choice (certain products being made available only at certain warehouses, compensating for the higher transportation costs by offering attractive price at a warehouse etc). In case of "CFR", the onus of transportation is on SCI and SCI hires the services of CTL (another company of the Siam Cement group) to get the goods transported. Thus, the "Ex-works" and "CFR" split is useful primarily to CTL for planning the transportation requirements. The "Ex-works" demand is also allocated to each of the plants and the same is used for supply planning.

The splitting of demand plan into "Ex-works" and "CFR" is done on the basis of the actual split observed in the recent past (previous quarter). There is no data analysis

available to verify the accuracy of the split. There are apparently no clear business reasons to believe that there exists a pattern in "Ex-works" demand and "CFR" demand individually. The rough estimates of the volume of business of each type are as follows.

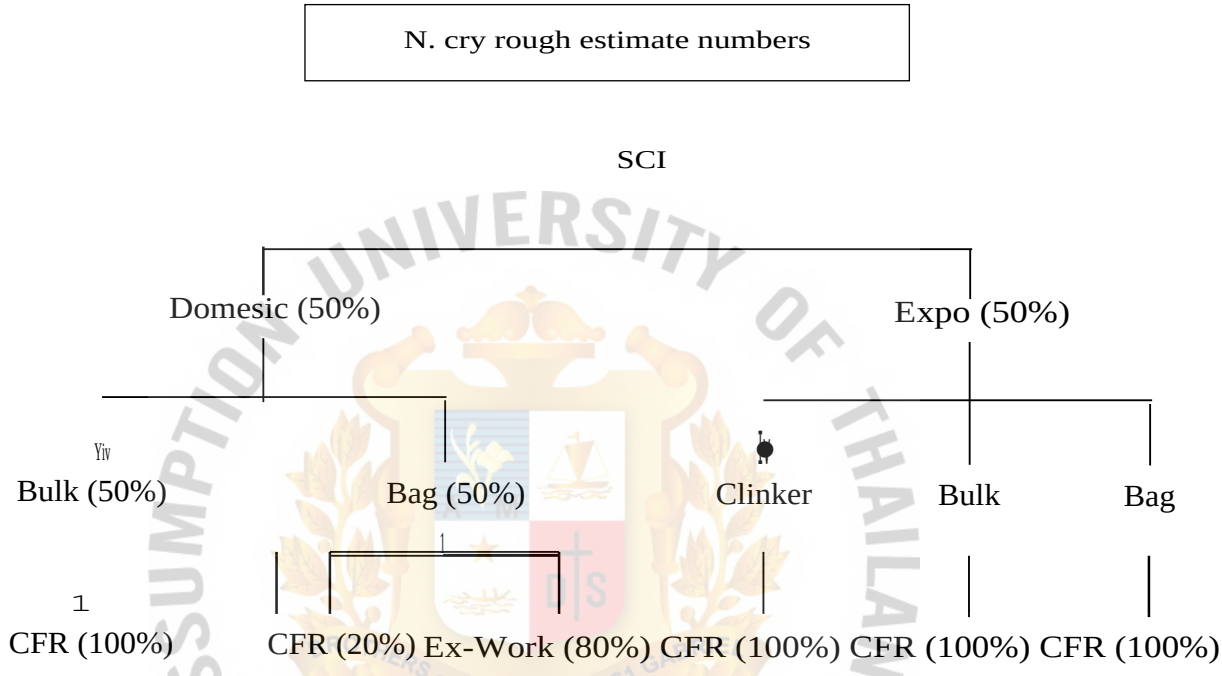


Figure 3.1. Estimated Marketing Channel.

Note: All percentages are with respect to the immediate parent.

3.2.6 Transportation Planning

The transportation for the group is handled by a separate SCG subsidiary called CTL (Cementhai Logistics). CTL acts like an agent for the rest of the group and hires the transportation services of inividual fleet operators from the market. CTL has some notion of transportation capacity for a period of time (typically by destination region), which is an estimate of the volume of business they can manage in that period at a reasonable cost of transportation when the volume is known in advance. At the same

time, additional fleet can be hired at the last minute with some difficulty and at higher cost.

3.2.7 Other Information

The demand for cement is seasonal with a common overall seasonal pattern for all the products. The period from November to March is the high season with the demand peaking in March. The period from April to October is the low season with the demand reaching its lowest point typically in October.

Typically, a province is a manageable sales aggregation point and there is a sales representative (SR) responsible for the sales in the province. The exception to this is Metro region, which is divided into what is called a "sub-region" because some of the provinces in Metro region (e.g. Bangkok) are very large (based on the volume of business for SCI). Thus, sub-region represents a group of customers manageable by a sales representative. Thus, Bangkok, for example, has 4 subregions managed by 4 SRs.

After the target setting is done and the targets are broken down into provinces by CMP, the province level figures are broken down into customer level numbers by the sales people (SRs) for their respective provinces. Subsequent to this, the SRs and CMP also do some kind of incremental planning for some key customers in order to achieve higher than normal growth for them. This incremental planning may result in the province level plan exceeding the target. This information does not flow back to SCI and CTL. This incremental plan is called PRM program where dealers are categorized into 6 groups based on the cost-to-serve margin and business fit model.

(1) SRs are evaluated mainly against the annual plans for their provinces as far as the achievement of sales targets is concerned. At the same time, they are expected to chase the targets revised from month to month, especially if the revised targets are higher than the annual targets for the month.

(2) There is no formal tracking of the accuracy of demand plans done anywhere in the system.

(3) The tools used for all the planning activities are essentially spreadsheets maintained by the respective planners and only the final annual plan gets saved to the MIS. Monthly revisions are not stored in any system and essentially remain in some spreadsheets.

(4) New products are introduced very infrequently, possibly once in 3-4 years.

3.3 Detail Requirements Summary

3.3.1 Annual Demand Planning

REQ-ANNUAL-1 Annual Demand Planning — Estimate of total cement market

The business needs to know the estimate of total cement in order to decide the volume of business SCI wants to do in the following year.

REQ-ANNUAL-2 Annual Demand Planning — Statistical Forecast for Dealer Channel

The business needs to know the estimate of demand for the dealer channel based purely on the historical sales, the patterns in the same and their projection in future

REQ-ANNUAL-3 Annual Demand Planning — Estimation of Demand by CSM sales personnel (SRs) in collaboration with the customers

The CSM sales personnel (SRs), being the people active in the field, interface with the dealers to get estimate of the dealer's volume as part of their annual sales planning. This information needs to be captured.

REQ-ANNUAL-4 Annual Demand Planning — Estimation of demand by SCI for direct and affiliate channel

SCI gets a part of their domestic business from direct customers (big customers that interact with SCI directly and not with the dealers) and affiliate customers (other

group companies like SFCC, CPAC). The demand planning for these customers needs to be done)

REQ-ANNUAL-5 Annual Demand Planning — Estimation of demand by SCI for export channel

About 50 percent of of SCI's business is from the export market (customers in other countries). The annual planning activity has to plan the demand in the export market.

REQ-ANNUAL-6 Annual Demand Planning — Demand estimation for dealers by CSM

A large part of SCI's domestic business (about 75%) is done through a network of dealers developed by the sales and marketing company called CSM. The annual planning needs to address the demand planning for the dealer network.

REQ-ANNUAL-7 Annual Demand Planning — Demand estimation for dealers by SCI

SCI, as a part of its overall annual demand planning, plans for the dealer network. This activity is done based on SCI's overall business strategy for the next year, growth plans and other marketing activities.

REQ-ANNUAL-8 Annual Demand Planning — Consensus annual plan by SCI and CSM

It is essential, as a healthy business practice, to have a common business objective for the SCI and CSM. The demand planning solution needs to address this requirement.

REQ-ANNUAL-9 Annual Demand Planning — Calculation of value forecast

It is required to project the demand for the next year in units of value (Baht) to enable the Accounting and Finance function to plan the cash flows for the year.

3.3.2 Monthly Demand Planning

REQ-MONTHLY-1 Monthly Demand Planning — Estimation of total cement market

The business needs to know the estimate of total cement market in order to decide the volume of business SCI wants to do in the following year.

REQ-MONTHLY-2 Monthly Demand Planning — Statistical baseline forecasting for dealer channel constrained by previous rolling plan and annual plan

It is required to capture the latest trends / patterns in SCI's demand based on the latest historical data available with the business. Also, the monthly plan needs to incorporate the input from annual plan.

REQ-MONTHLY-3 Monthly Demand Planning —Revision of demand estimates by SCI for direct and affiliate customers

The SCI planner for the direct and affiliate customers need to plan for the next 3 months.

REQ-MONTHLY-4 Monthly Demand Planning — Estimation of demand by SCI for export channel

About 50% of SCI's business is from the export market (customer in other countries). The monthly planning activity has to plan the demand in the export market.

REQ-MONTHLY-5 Monthly Demand Planning — Estimation of Demand by CSM sales personnel (SRs) in collaboration with the customers

The CSM sales personnel (SRs), being the people active in the field, interface with the dealers to get an estimate of the dealer's volume as part of their monthly *sales planning. This information needs to be captured.*

REQ-MONTHLY-6 Monthly Demand Planning — Demand Estimation for Dealer by CSM

A large part of SCI's domestic business (about 75%) is done through a network of dealers developed and managed by the sales and marketing company called CSM. The monthly planning needs to address the demand planning for the dealer network.

REQ-MONTHLY-7 Monthly Demand Planning — Consensus monthly plan by SCI and CSM

It is essential, as a healthy business practice, to have a common business objective for the SCI and CSM. The demand planning solution needs to address this requirement.

3.3.3 Other Requirements

REQ-OTHER-1 Weekly Revision of Plans (exceptional case)

Sometimes, because of some unanticipated events in the market, business has to change the monthly plan during the month to react to the latest situation.

REQ-OTHER-2 Outputs to Downstream Planning — CFR Demand

It is required to give the demand plan as an input to supply chain planning system (SCP). The CFR demand (for which the responsibility of transportation is with business) needs to be specified separately so that the transportation planner can estimate the transportation requirement and plan the fleet of vehicles accordingly.

REQ-OTHER-3 Outputs to Downstream Planning — EXW demand

It is required to give the demand plan as an input to supply chain planning system (SCP). The EXW demand (for which the responsibility of transportation is with the customer) needs to be specified separately at the warehouse (both plant warehouse and external warehouse) level primarily because the customer makes the choice of the warehouse from where he picks up the material.

IV. ARCHITECTURE DESIGN

12 Demand Planning system needs to start design process at Structure Hierarchy Design because the 12 Demand Planning database is hierarchical data base and manipulate data via view concept. At the same time the integration part needs to design interface between source of data and 12 application, and linkage between Demand Planning, Supply Planning, Inventory Planning and Production Scheduling Planning. Architecture Design

4.1 Structure Hierarchy Design

SCI is a business unit of the Siam Cement group of companies. The business unit is in the business of manufacturing grey cement and clinker (an intermediate in cement making.) SCI operates in both, the domestic market and export market.

SCI manufactures about 40 products (different SKUs), which can be grouped into a few groups like Type I Cement, Type I/II Cement, etc. The cement is sold as both, bulk and packed (in bags). The BU has 5 manufacturing factories, which make and stock material at the factory warehouses. There are also some (3 — 4) warehouses apart from the factory warehouses. The material is dispatched upon receiving the customer orders. The sales happen primarily through 4 channels — direct (sale to the end customer directly), affiliate (sale to other group companies), agent (sale to the dealer through CSM) and export (sale to customers abroad through SCT).

As a part of one of the improvement initiatives in the area of Supply Chain, SCI has embarked upon a Supply Chain project called "ISDP" (Integrated Supply and Demand Planning) and decided to implement the supply chain management products from i2 Technologies.

The solution from i2 Technologies in the area of demand planning (called "Demand Planner") requires a basic database structure (called "DP hierarchy" in DP jargon), which serves as the business context in which demand planning happens. This document covers the DP hierarchy design for SCI along with the business justification for the same.

4.1.1 Geography Dimension

(1) Views

(a) Channel View

This view will be used by most demand planners i.e. SCI, CSM and SCT. This view presents the entire business of SCI in the form of different sales channels, each channel being planned by a set of personnel. Each channel is further divided into geographic regions, subregions, provinces and finally customers. The demand planning activity at SCI happens primarily by channels and this view is used in the same.

(b) Region View

This view divides the SCI business on the basis of geography alone (independent of sales channel) and is useful in providing a demand plan input to the supply planning. This view can also prove useful in any analysis that needs to be done purely by Geography, without any channel consideration.

(c) Customer View

This view presents the SCI business directly in terms of its customer groups and customers. Any customer analysis (independent of region or channel) can be done using this view. This view is also used by demand planners that do the customer level (bottom-up) planning for the Direct, Affiliate and Export channels.

(2) Levels

(a) Business Unit

This is the topmost level in the Geography dimension. This covers the entire business of SCI from the point of view of geographic spread. The only instance of this level is "SCI".

Instances: SCI

(b) Market

This level divides the entire business of SCI into the domestic market and exports market. The sales organization for the 2 markets is separate and the demand planning happens separately and differently for the 2 markets.

Instances: Domestic, Export

(c) Channel

The BU does business through 4 different sales channels. 3 of the channels namely Dealer, Direct and Affiliate target the domestic market. The fourth channel is the export channel for the customers in other countries. The channel essentially defines who the customers are and who influences the sale and hence is responsible for planning.

Instances: Dealer, Direct, Affiliate, and Export

(d) Dealer

This is the biggest (in terms of volume of sale handled) channel of SCI that operates in the domestic market. The customers are essentially dealers who stock cement and sell it to the end-customer. The entire dealer network is managed by CSM and CSM is primarily responsible for the planning of demand that moves through this channel. This channel accounts for about 75% of domestic market (which is about 50-60% of the total business of SCI.)

(e) Direct

The direct channel essentially targets the big customers — construction companies / contractors — who prefer to buy directly from SCI instead of buying from the dealers. This channel accounts only for about 5% of domestic market and it is managed totally by SCI.

(f) Affiliate

This channel takes care of the needs of the other group companies like SFCC, CPAC. These companies need cement as one of the raw materials in their business (SFCC makes roof tiles, CPAC makes ready mix, concrete products.) The channel is managed by SCI and accounts for about 15% of total domestic market.

(g) Export

This channel, as the name suggests, takes care of the export market of SCI, the export being primarily to neighboring countries. The export market, at present, contributes about 40-50% of the total business of SCI. The channel is managed by SCT.

(h) ChannelRegion

The channelregion essentially divides each of the channels geographically into separate regions. For the 3 domestic channels (dealer, direct, affiliate), channelregion indicates essentially the 6 regions that the country is divided into. These are North, South, East, West, NorthEast , and Metro under each of the 3 domestic channels. For the export channel, this level represents groups of different countries in which SCI does business (e.g. Asia-Pacific, North America etc.)

Instances: North, South, East, Metro, West, NorthEast (for domestic channels)

Asia Pacific, North America etc (for the export channel)

(i) ChannelSubRegion

The channelsubregion divides the regions into smaller areas, which are managed by the sales personnel. This level is meaningful only for the "Dealer"channel. For the other channels, the channelsubregion is going to be a dummy level with its value equal to that of the channelregion. For all the regions except Metro, this level typically represents a collection of channelprovinces. For Metro region, the channelsubregion actually represents a group of customers manageable by individual sales representatives.

Instances: 111,112,113, etc.

Please note that the concept of subregion is relevant only to CSM because they look at the market at this level and also do sales planning at the level. Consequently, for the other channels, this level holds dummy values that can be neglected.

(j) ChannelProvince

Each channelsubregion is further divided into channelprovinces, which represent a finer geographic division of each of the subregions. This also represents a manageable volume of business for sales people in the field. For the export channel, this level represents the countries to which SCI exports its products.

Instances: Saraburi, Bangkok, Chiang Mai etc (for each of the domestic channels)

Cambodia, Laos, Vietnam etc (for the export channel)

Please note that for the Metro region, this level holds values of the parent subregions themselves because there is no clear hierarchical relation between subregion and province in the Metro region.

(k) Region

Region divides the business only on the basis of geography, independent of the channel. This level has the 6 domestic regions (North, South, East, NorthEast, West, and Metro) and a few export regions (groups of countries like Asia Pacific, North America, etc.) as its member instances.

Instances: North, South, East, Metro, West, NorthEast (for domestic market)

Asia Pacific, North America, etc. (for the export market)

(l) Province

Each of the regions is further divided into provinces — smaller geographic units, which make up a region. The sales people in the field are typically responsible for 1 or more provinces. In case of export market, province essentially represents the countries to which export happens.

Instances: Saraburi, Bangkok, ChiangMai etc (for the domestic market)

Combodia, Laos, Vietnam, etc. (for the export market)

(m) CustomerGroup

The customergroup represents, as the name suggests, grouping of customers based on attributes like direct / agent / export etc and facilitates any analysis based on the same. The level gets its instances purely on the basis of customer properties.

Instances: Direct, Agent, Export, etc

(n) Customer

This level, as the name suggests, represents the customers. This is the lowest level in the geography dimension. The historical sales data comes into the system at this level and is summarized all the way up. Each customer gets mapped to a province and in turn, also gets mapped to region. Similarly, each customer gets mapped

to a channelprovince and in turn, to a channelregion. The customers are also grouped into different customer groups for ease of handling and hence, each customer also belongs to a unique customer group.

A lot of customer level information (provided by customer as well as obtained by sales people) gets used in the demand planning. In fact, for the direct, affiliate and export channels, most demand planning happens bottom-up i.e. the customers give reliable estimates of their needs in future and the same are used in demand planning.

This level has the domestic dealers and customers in the other countries as its members for the "dealer" and "export" channels respectively. For the direct channel, the end customers' sites (like contractors' sites, construction companies' sites) are the instances of this level. In case of affiliate channel, customers essentially mean group companies' plants like SFCC Plant, CRTC Plant, CPAC Province (only CPAC maintained at this level, for all other affiliates, maintained at Plant level), etc.

Instances: Rongkit Vasadu, Heng Yong Seng, etc.

Note: Direct customers' bag cement sales will not be included in DP as the total volume of the direct customers cement sales is considered small when compared to the total volume.

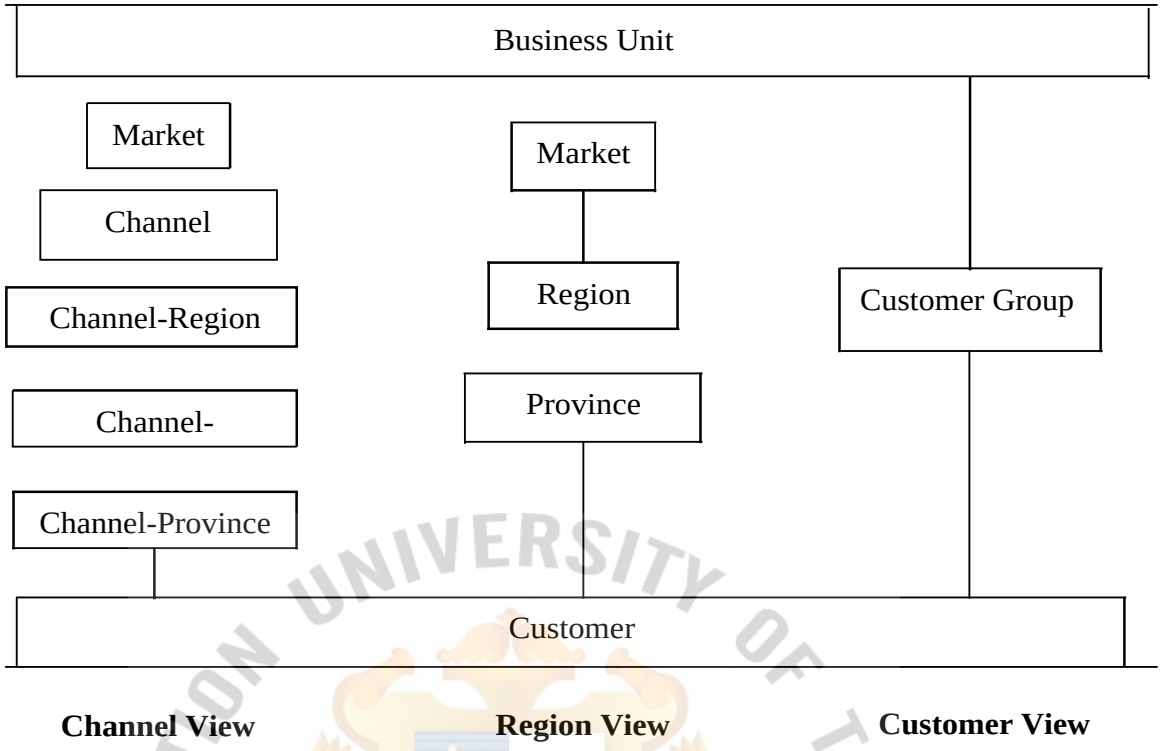


Figure 4.1. Geography Dimension.

4.1.2 Product Dimension

(1) Views

(a) Category View

This view, essentially describes all the different groupings of products on the basis of the broad category (cement / clinker), subcategory (type/grade of cement), product (type/grade of cement and brand), the productpack (product and bulk / bag) and finally the SKU. This view is used for all the demand planning activities.

(b) Pack View

The view is required primarily for reporting. It groups all the products on the basis of the pack type and pack first before going down to SKU level. The view is particularly required by exports function for some specific reporting.

(c) SKU View

This view is for doing any SKU level analysis like contribution of an SKU to total business etc.

(2) Levels

(a) All Products

This is the topmost level in the product dimension and covers all the products of SCI under it.

Instances: AllProducts

(b) Category

This level classifies the products into primarily 2 major categories at present. They are grey cement and grey clinker. Clinker is essentially an intermediate in cement making and it is also sold as finished good (mainly in the export market.)

Instances: Grey Cement, Grey Clinker

(c) Subcategory

This level divides the category further based on the type / grade of cement / clinker. The type/grade of cement / clinker is an indicator of the quality (compression strength, etc.) of cement and typically has to meet some industry standards. Hence, the grade also dictates the type of use cement can be put to.

Instances: Type I, Type I/II, Type V, Admix, etc.

(d) Product

The product level captures both, the type (or grade) of cement and the brand too. The way the branding is done, the brand and the grade of cement are inseparable from each other for SCI in most cases. (E.g. Elephant grey cement necessarily means Type I cement from SCI and type I cement from SCI implies Elephant grey cement.)

Instances: Elephant Type I cement, Tiger Admix Cement, etc.

(e) ProductPackType

The level, as the name suggests, represents a combination of product and pack type. There are 2 basic pack types, "bulk" and "bag" in which cement and clinker are sold.

Instances: Elephant Type I cement bulk, Tiger Admix cement bag, etc.

(f) PackType

This level, contrary to intuition, captures a unique way of classifying the products as "Bulk", "Bag" and "Clinker". The first two point to a classification on the basis of pack type and the third one separates the clinker from cement. The level is useful primarily for reporting information and a number of high-level reports for the top management are in this format.

Instances: Bulk, Bag, and Clinker

Though there is no logical justification for this kind of classification, this level is a part of the DP hierarchy because people at SCI are used to looking at business in this fashion.

(g) Pack

The level represents actual packs under the pack types in which the goods are packed and shipped. In case of packtype "bulk", there is nothing like a pack in reality. But exports identifie "bulk" and "jumbo" as the packs under "bulk" pack type. For pack type "bag", there are packs of different sizes like 50kg, etc. are available. For pack type "clinker", there is only bulk pack.

Instances: Bulk, Jumbo, 50kg, 100kg etc

(h) SKU

This represents the final SKU, which is stocked and sold. Thus, the SKU is a combination of a product and pack and captures all the attributes at different levels relevant in the business to make itself indivisible any further. The demand at SKU level is given as an input to supply planning.

Instances: Elephant Type I Cement 50kg, Tiger Admix Cement Bulk, etc.

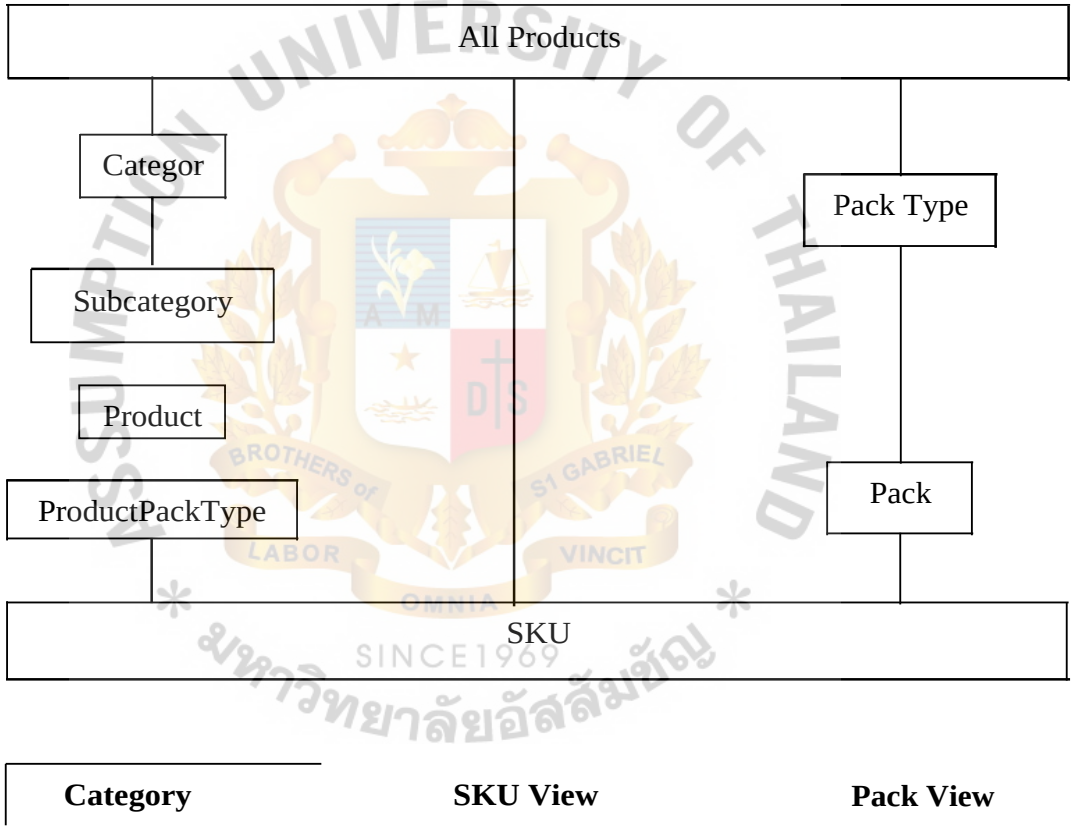


Figure 4.2. Product Dimension.

4.1.3 Time Dimension

The time dimension has only one view as depicted earlier in this document. The Demand Planner looks at the time dimension in a purely bucketized manner and does

not understand real time. The mapping between different levels of time is explicitly defined for Demand Planner on the basis of the understanding / interpretation of the planning buckets done by the user outside Demand Planner.

(1) Level

The levels in time dimension essentially represent the different levels of granularity in time dimension that are available to demand planning.

(a) Year

This is the highest level of aggregation in time dimension and serves primarily in medium term planning. It also serves as an important level from the point of view of reporting. The year, defined here, is essentially the fiscal year for SCI and also coincides with the calendar year (period between January and December).

Instances: 1999, 2000, 2001, etc

(b) HalfYear

A year gets divided into 2 halves called "HalfYear". The level is required primarily for reporting and sending information to accounts accounting / finance. The HalfYears in a year map to the first 6 calendar months (Jan-June) and last 6 calendar months (July-December).

Instances: H1 99, H2 02, etc.

(c) Quarter

Each HalfYear is divided further into 2 parts called "Quarter". This level is required for reporting and sending information to accounts accounting/finance/top management. The Quarters map to groups of 3 calendar months: January-March, April-June, July-September and October-December.

Instances: Q1 99, Q4 00, etc.

(d) Month

This level represents the key level in the context of Demand Planning. Most of the planning happens at month level. The target setting for sales also happens at month level. The month level defined here essentially maps to the calendar month.

Instances: Jan 99, Sep 00, Dec 01, etc.

(e) Week

This is the lowest level in the time dimension and divides the month into **4** parts. The level is required for any changes done to the demand plan during the month. The 4 weeks of a month map to calendar as follows

Table 4.1. Time Weekly Bucket.

Demand Planner	**Calendar**
Week 1 of a month	1St of the month — 7th of the month
Week2 of a month	8th of the month — 14th of the month
Week3 of a month	15th of the month — 21st of the month
Week4 of a month	22nd of the month — end of the month

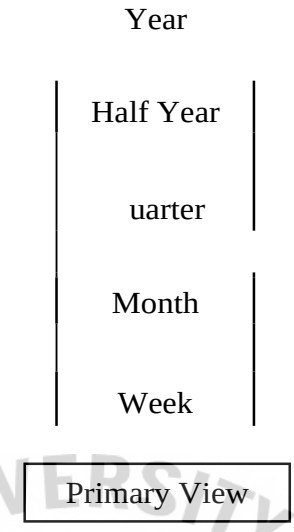


Figure 4.3. Time Dimension.

4.2 Infrastructure and planning processes of SCI-Supply Chain System

Demand Planning process started by extracting historical data from SAP and some master data are maintained by access UI and Excel screen. Informatica application manages the integration between external data sources (SAP, Access, Excel, and other) and 12 Supply Chain System. Overall infrastructure is shown in figure 4.4 Infrastructure.

ODS database (Oracle Technology) is a central database to support the interface between module in Supply Chain System. For example, demand planning output from Demand Planning will be exported to ODS table then the Supply Planning will import it for using in Supply Planning process.

Siam Cement has fire wall protection the outside campus network users. For the internal users that work outside campus network must authenticate themselves via Citrix system.

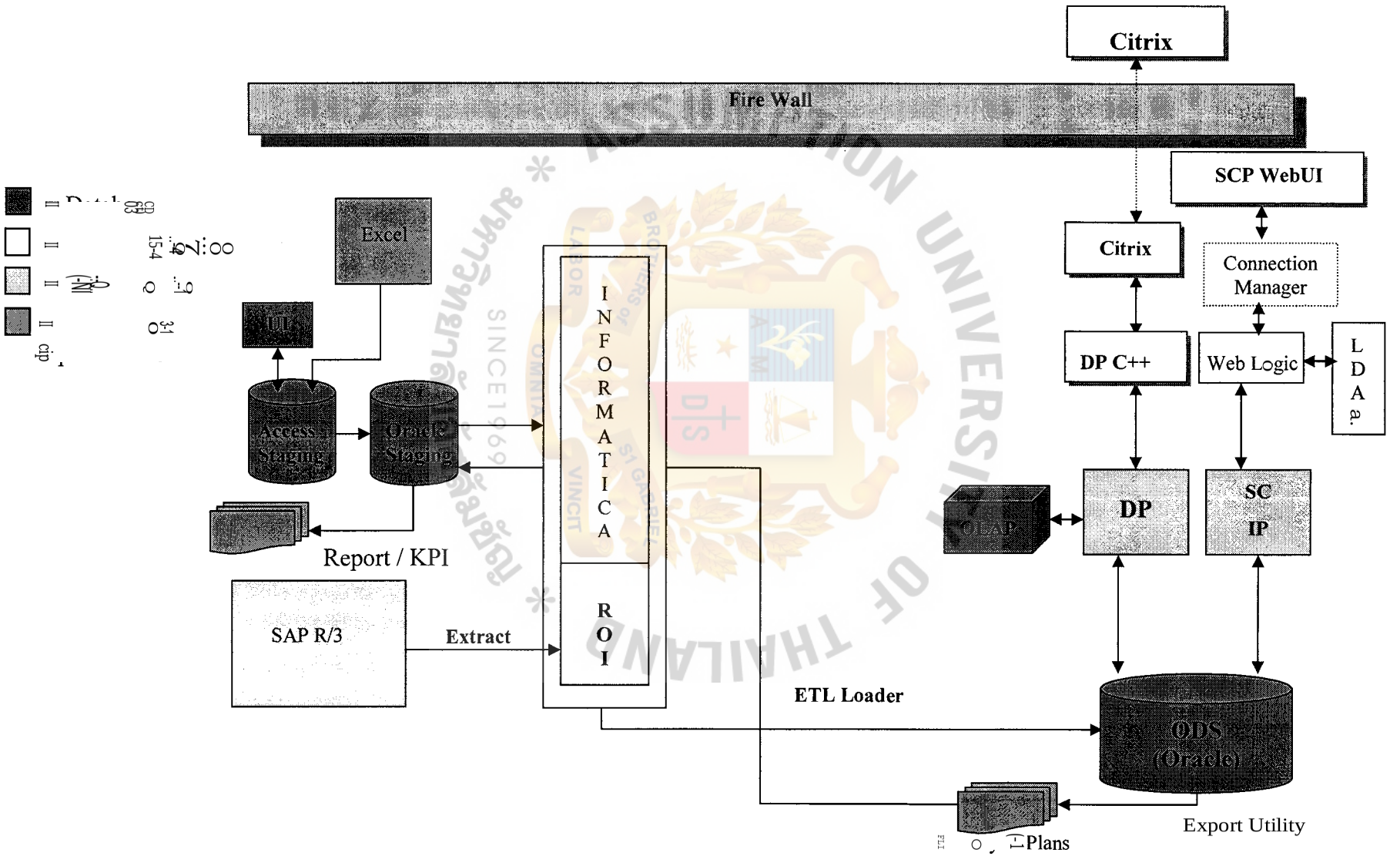


Figure 4.4. Infrastructure.

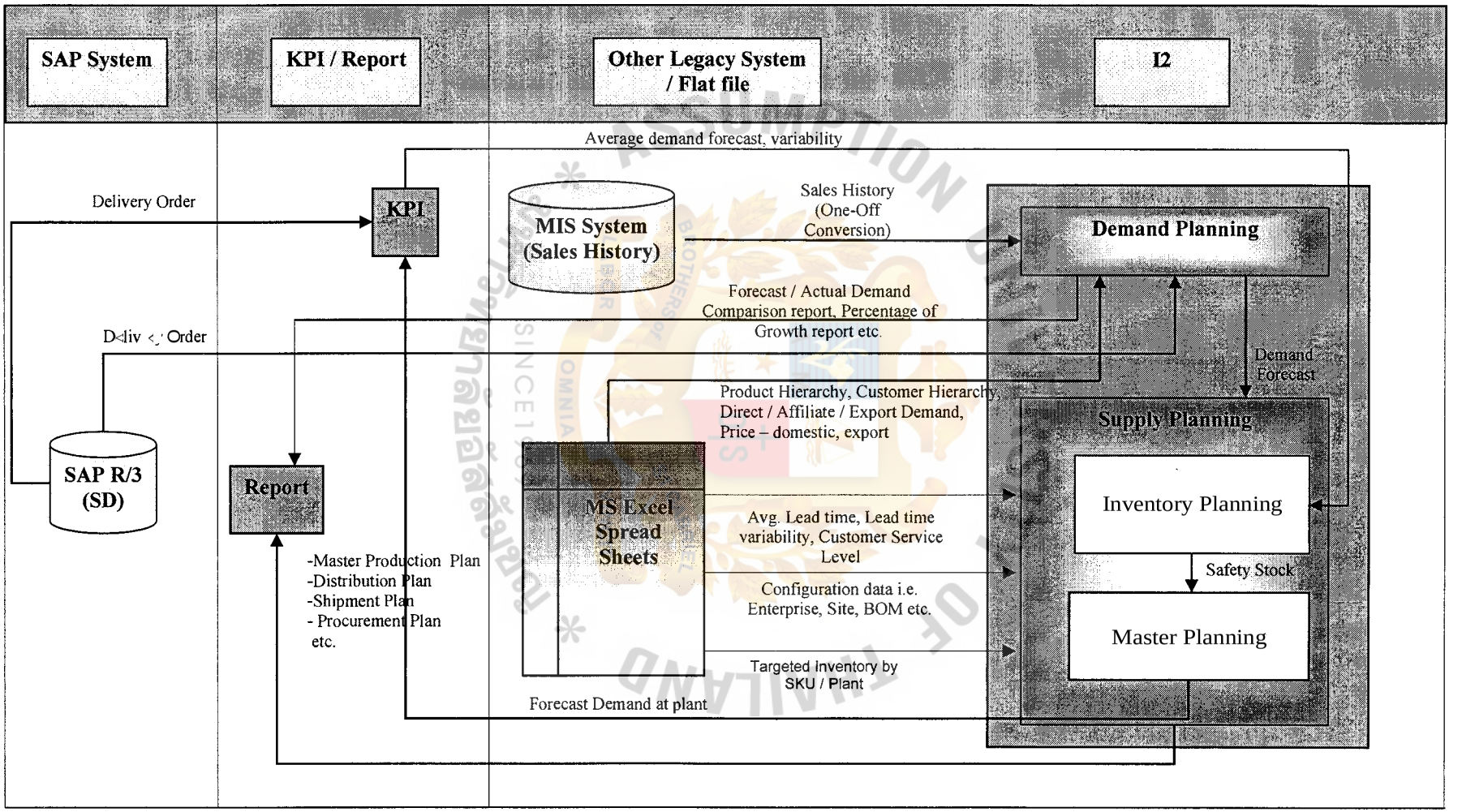


Figure 4.5. Logical Planning Linkage.

V. DETAIL DESIGN

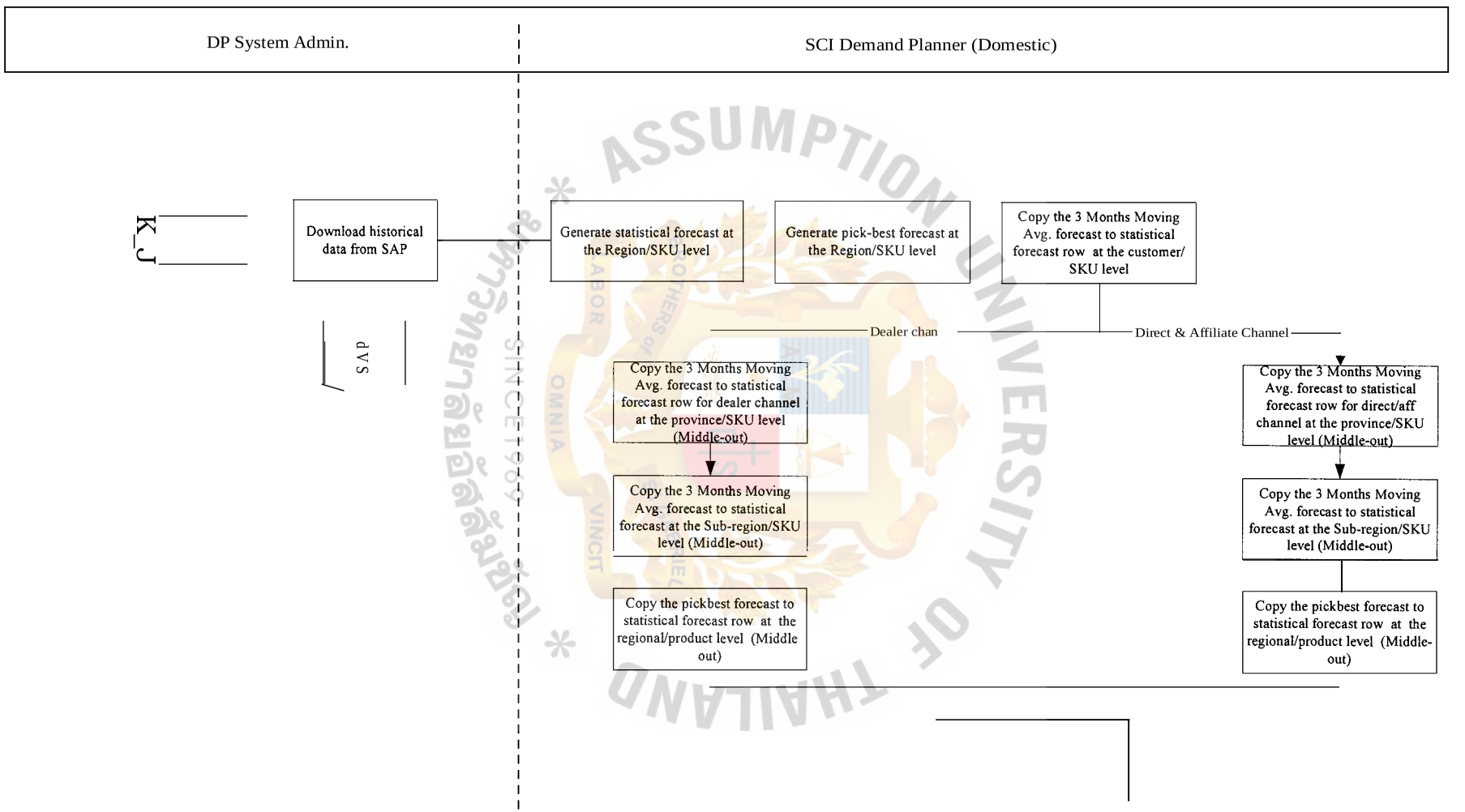
5.1 Demand Planning Process

It is necessary to define the requirements of all planning task before deciding on Demand Planning task and their application. The structure of the forecasting part of Demand Planning depends heavily on the results one wants to get from it. Additionally the selection of forecasting methods requires knowledge of the corresponding forecasting horizon and the level of detail.

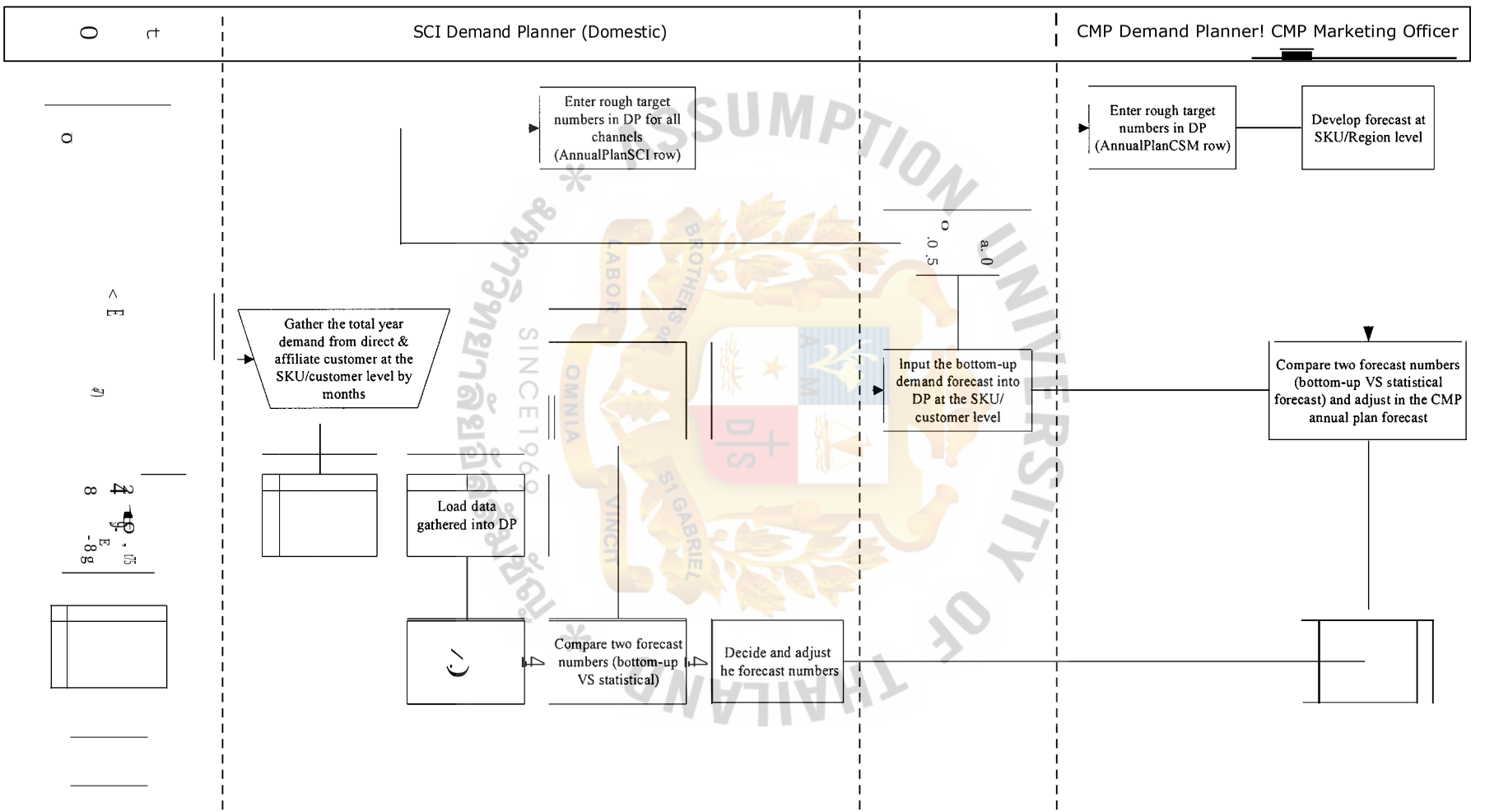
Demand Planning means predicting future sales. Therefore, it is necessary to incorporate all information available in a supply chain which could be relevant. But this information is often only specific and stored de-centrally. All information pieces finally should be added to a forecast which covers the whole demand served by the supply chain. One the other hand one must be able to retrieve forecasts aggregated for special purposes, like demand figures aggregated to product groups and weeks for Master Planning.

Demand Planning process is composed of two plans that are Annual Plan and Monthly Plan. The two processes start with statistical forecasting process. Both planning processes are shown in Figure 5.1 (Statistical forecast for Annual Plan Process), Figure 5.2 (Annual Plan Process), Figure 5.3 (Statistical forecast for Monthly Plan Process), and Figure 5.4 (Monthly Plan Process).

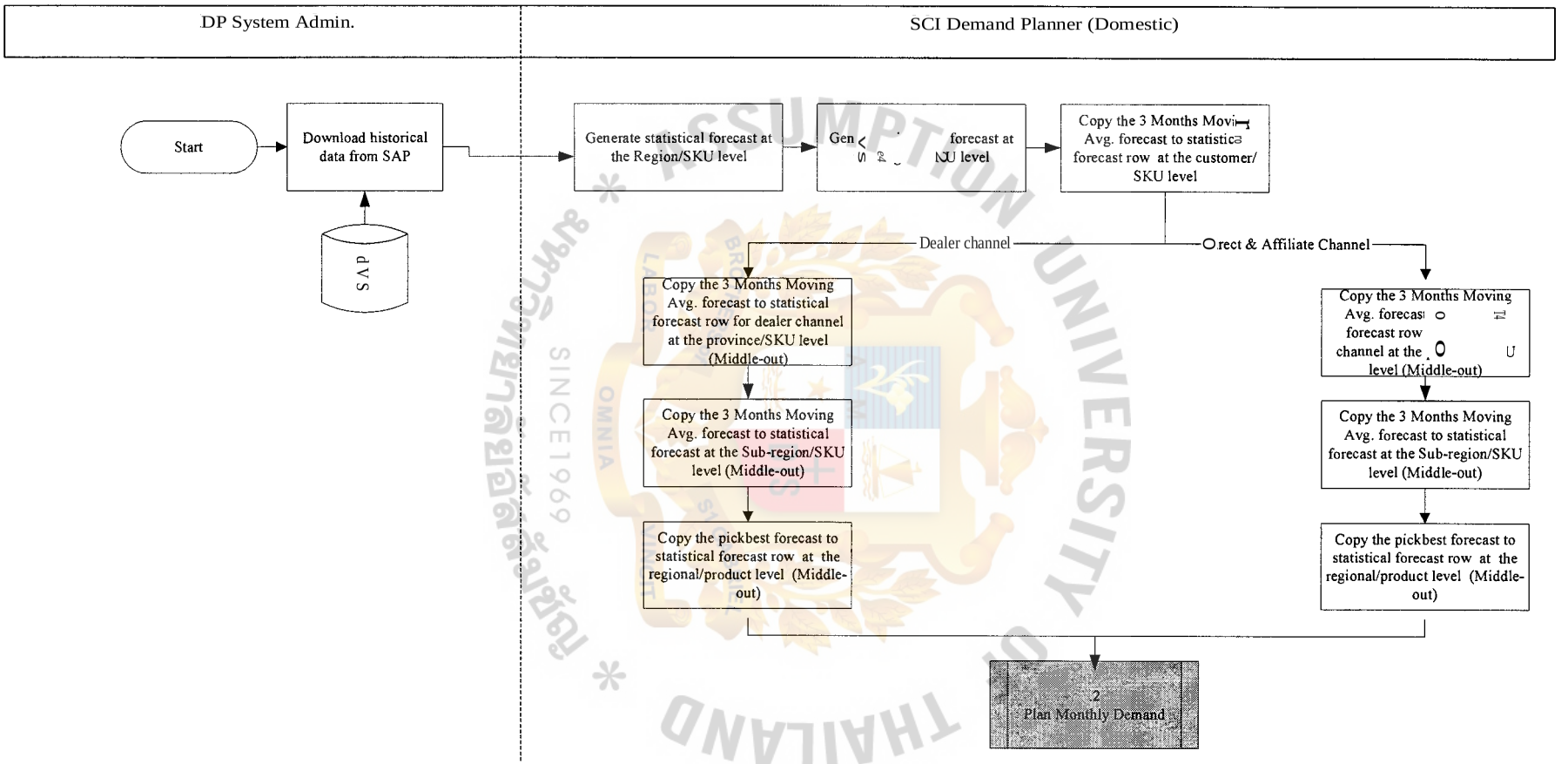
The starting point of both demand planning processes are preparing statistical forecast and using the historical data from SAP source. The statistical forecast will be the base forecast data. Planner will plan both bottom-up and top-down planning and then have consensus of the plan.



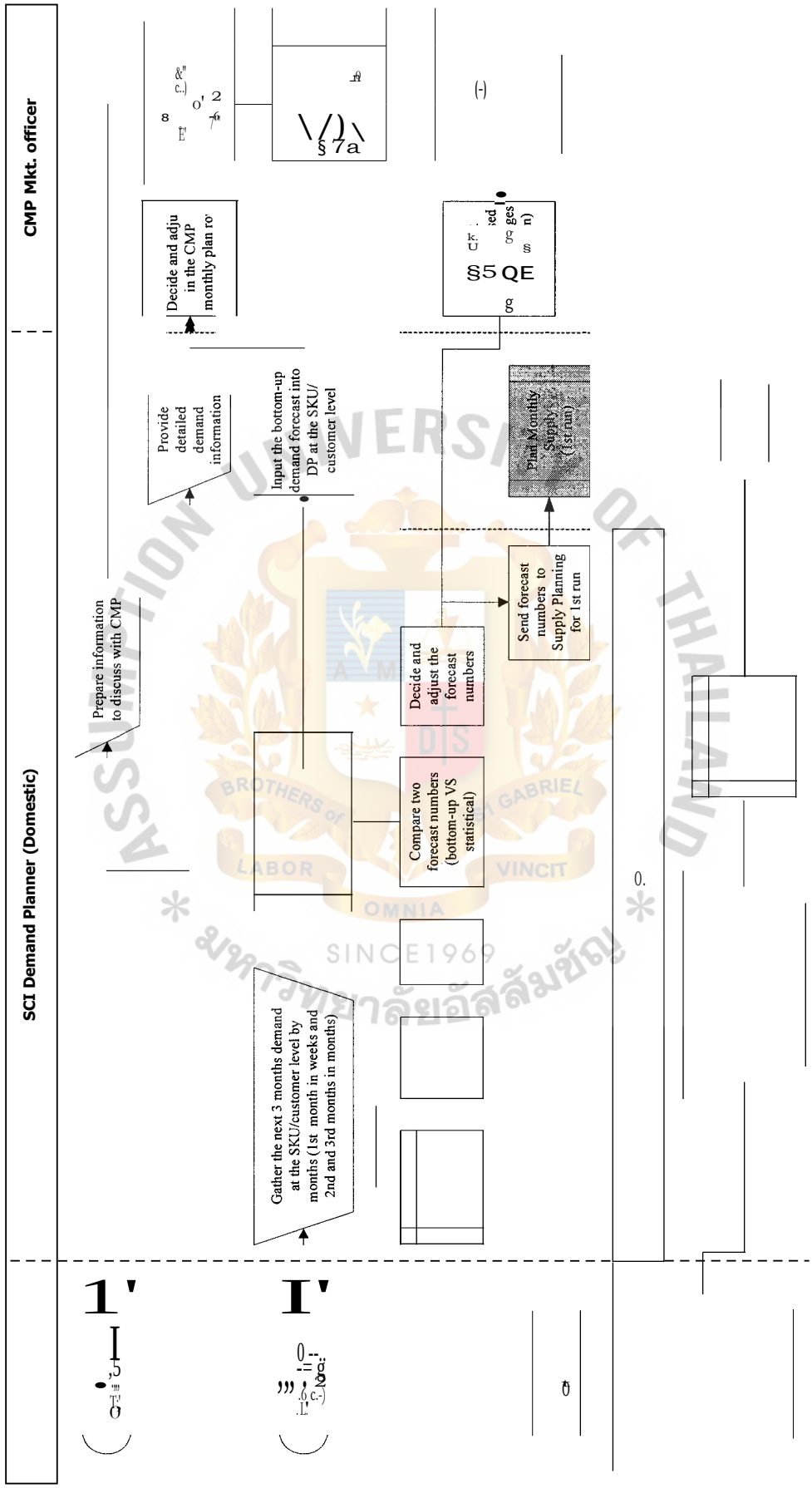
Statistical forecast for Annual Plan Process.



Annual Plan Process.



Statistical forecast for Monthly Plan Process.



5.2 Business Scenarios for The Expected Process

The expected process flows will be represented by the scenario view that is separated into 2 main scenarios. First scenario is Monthly Plan and the second scenario is Annual Plan. Monthly plan approaches short-range planning to medium-range planning and Annual Plan approaches to long-range planning.

Table 5.1. Business Scenarios Summary: Annual Planning.

Categories of Scenarios	Target User Scenarios within Category (ultimately may converge to more specific scenarios)	Comment
Annual Planning	Statistical Forecasting	Mathematical forecasts for the dealer channel
	Planning by SCT	Plan for export market
	Planning by SCI	Overall BU plans, Plans for affiliate and direct channel
	Planning by CSM	Plan for the dealer channel
	Consensus Planning	Agreement on final annual plan
	Management Approved demand plan	Management approves demand plan after consensus meeting

Table 5.2. Business Scenarios Summary: Monthly Planning.

Categories of Scenarios	Target User Scenarios within Category (ultimately may converge to more specific scenarios)	Comment
Monthly Planning	Statistical Forecasting	Mathematical forecasts for the dealer channel
	Planning by SCT	Plan for export market for next 3 months
	Planning by the BU	
	Planning by CSM	
	Consensus Planning	Agreement on monthly plan
New Product Launch	New Product Launch	

5.2.1 SCENARIO 1: Annual Planning

(1) Planners Involved:

SCI (Marketing, Planners for Affiliate and Direct channels), CSM (CMP & sales), SCT, Supply Planner from SCI

(2) Causes

Annual planning will be done to get a good idea about the business for the coming year. The plan will give a good estimate of the demand for the year. The same will be used by the supply planning group for rough cut capacity planning. The annual plan will also be used by accounting/finance to estimate the cash flows for the year. The annual plan will also serve as a starting point in the monthly planning so that the planner can keep track of the progress throughout the year against the annual plan.

(3) Frequency

The annual planning will be done 2 times a year. In the month of November, horizon for planning will be 12 months (next year) while in the month of May; the planning activity will refine the plan for the second half of the year.

(4) Decisions to be made

(a) Overall demand plan for the business unit for the next year

(b) Plans for the domestic and export market

(c) Regional split of domestic demand, demand for all the channels

(d) Decisions about promotions during the year

(e) Decisions about special program for big dealers

Note: All the demand plans are expected to be at an aggregate level like product category or sub-category and for every month.

(5) Input Data Requirements

(a) Years' historical demand data at customer — sku — month level (sold to customer)

(b) Historical demand data at province-sku-month level (ship to province)

(c) Years' historical data for the total market (at an aggregate level)

(d) Next year's plan from medium term planning activity

(e) Price data (for generating value forecast)

(6) Information Requirements for Decision

(a) Business objectives of the BU

(b) Broad promotions strategy for the year

(c) Statistics about the demand history like growth,

(7) Major Steps in Planning

(a) Statistical Forecasting

(i) Shall take care of time series components namely trend and seasonality.

(ii) Shall automatically choose the best of a set of statistical models based on the performance of the models in the past at each instance of geography and product at the specified levels.

(iii) Shall aggregate up and break down the forecasts from the level at which it is generated.

(iv) Medium term plan for the next year broken down on the basis of historical proportion (last 12 months) will also be available. And this will be the starting point for annual plan.

(v) A statistical forecast for the entire market will be available at an aggregate level for decision support.

(b) A collaborative forecast for the export market by SCT based on their interaction with customers.

(i) SCT, being in charge of the export market, will interact with the export customers and get rough estimates of their demand for the next year in monthly buckets. These will mostly be the contracts that SCT have with some of the customers.

(ii) This information will be given at the destination country level.

(iii) The estimates will be keyed into the Demand Planner system at the destination country level.

(c) A collaborative forecast for the affiliate and direct channels based on the input from the customers.

(i) The planners from BU responsible for the affiliate channel and direct channel shall get the rough estimates from the respective customers for the year in monthly buckets.

(ii) This demand information will be given at the ship-to level for direct customers case and will be at the plant level for the affiliates case (except CPAC — will be given at the province level.)

(iii) The estimates will be keyed into the Demand Planner system.

(d) Planning by SCI to decide on the overall targets for each of the channels based on 1, 2 and 3.

(i) SCI will decide the overall business objective for the BU for the year. This activity will be guided by steps 1,2 and 3. The affiliate, direct and export channels are expected to depend more on the collaboration with the customers wherein most of the demand inputs will be given by the customer. SCI will decide the targets for each of the direct, affiliate & export channels in consultation with the respective planners.

(ii) SCI will break down the dealer channel into regions/provinces. This will be primarily guided by the statistical forecast. SCI shall also use other inputs like objectives for the region/province, promotions strategies for different regions/province.

(iii) Planning by CSM based on statistical forecast, collaborative planning by sales people with the customers.

(iv) CMP, the marketing arm of CSM, will do its own planning for the next year only for the dealer channel. This planning will be primarily guided by statistical forecasts.

(v) CSM sales people will help CMP in adjusting the statistical forecasts based on their market intelligence. This will include the customer level sales planning done by the sales representatives in the beginning of the year.

(e) Consensus Planning involving all the parties to freeze the annual plan

(i) The consensus planning will happen in a meeting called the "target meeting" and SCI, SCT, CTL, CSM and supply planning group will participate.

(ii) The annual plans for all the channels will be agreed upon by all the parties. The consensus process will use the statistical forecasts and the inputs from each of the participants to decide on the final plan.

(iii) The final plan will be sent to supply planning for the Supply Planning run. Then after getting the Supply Planning output, accounting will derive account statement based on both demand plan and supply plan. The statement will be sent to SCI executive for review. If SCI executive decides to change demand forecast at some particular region, it will be done and update in DP.

(iv) The final plan will be saved in the demand planner and frozen for the year (only to be revised in month of May for the second half year.) The final plan

will also be converted to equivalent value based on the price data available in the system and the value plan will be used by the accounting/finance for their cash flow planning.

If it is found that there is a substantial difference between the "sold to" and "ship to" demand at province level, the final consensus plan will be aggregated at the country level and shall be broken down on the basis of historical "ship to" demand before exporting the demand to supply planning.

Please note that annual planning is going to focus on aggregate level planning (region — product subcategory — month).

(8) Description of Deliverable

A single annual plan at aggregate levels (product subcategory and region) in monthly buckets

(9) User Interface/ Reporting Requirements

The statistical forecasting will be automated through execution of batch jobs to be run by System Administrator. For the manual adjustments to the plan, the planners will have workspaces designed specially for each of them depending on their role and responsibility in the planning process. The workspaces will be designed to provide maximum decision support to the demand planner. All the manual adjustments to the plan will be directly entered into the Demand Planner system.

The annual planning will result in a set of routine reports that can be used by the entire organization. The reporting will be primarily in soft form — i.e. the users will be expected to log into the Demand Planner system and use the specially designed workspaces for their information needs. Optionally, they will have a choice to print them too, if it is really needed.

The need for hard reports is expected to go down significantly with the implementation of the new demand planning system wherein all the information about the demand plans will only be a few mouse clicks away from the user.

User Access to data and interfaces

The demand planner will be able to adjust the demand plan at any level (in geography and product dimensions) for the planning horizon provided the geographies and products fall under his domain of planning. The collaborative plans based on the inputs from the customers shall be manually entered into the Demand Planning system. The annual planning will focus primarily on region-product subcategory level plan.

5.2.2 SCENARIO 2: Monthly Planning

(1) Planners Impacted

SCI (Marketing, Planners for Affiliate and Direct channels), CSM (CMP & sales), SCT, Supply Planner from SCI

(2) Causes

The monthly demand planning will be done to essentially drive the operations of SCI. The plan will present a reliable picture of the next 3 months of which the first month plan will be frozen. The monthly plan will account for the latest market information available to the demand planner and will also reflect the business objectives promotion strategies for the immediate future. The supply planner will use this monthly plan to drive the manufacturing and distribution operations at the factories. CTL will plan the transportation based on the monthly plan.

(3) Frequency

The monthly planning, as the name suggests, will happen every month. Every month, typically towards the end of 3rd week, the monthly planning activities

will plan for the next 3 months and the plan for the next month will be final. The plans for month 2 and month 3 will get revised in the subsequent cycles.

(4) Decisions to be made

(a) Overall demand plan for the business unit for the next 3 months

(b) Detailed demand plans at region/province — SKU level for next 3 months (with more focus on the next month)

(c) Decisions about promotions during the next month

(d) Detailed sales planning at customer-SKU level for the next month by the sales people (Sales Representatives)

(5) Input Data Requirements

(a) Historical demand data for last 4 years at customer-SKU-week level

(b) Historical demand data at province-SKU-week level (ship to province)

(c) years' historical data for the total market (at an aggregate level)

(d) Plan at region-product subcategory-month level for next 3 months from annual planning activity

(6) Information Requirement for Decision

(a) Annual Plan for the next 3 months

(b) Business objectives of the BU for next month e.g. desired market share, growth targets

(c) Promotions planned for the next month

(d) Market information available to SCI, CSM

(e) Growth objectives for provinces / customers

(7) Major Steps in Planning

(a) Statistical Forecasting

(i) Shall take care of time series components namely trend and seasonality (even in the recent past)

(ii) Shall automatically choose the best of a set of statistical models based on the performance of the models in the past at each instance of geography and product at the specified levels

(iii) Shall aggregate up and break down the forecasts from the level at which it is generated

(iv) Plan for next 3 months from annual planning activity will be broken down on the basis of statistical forecast and will be available for decision support

(v) A collaborative forecast for the export market by SCT based on their interaction with customers

(vi) SCT will interact with the export customers and plan the demand for the next 3 months. The demand plan for the first month will be frozen at weekly level while the demand plan for the subsequent 2 months will be tentative.

(vii) The demand plan will be given at the destination country level.

(viii) The estimates will be keyed into the Demand Planner system at the destination country level.

(ix) A collaborative forecast for the affiliate and direct channels based on the input from the customers

(x) The planners from BU responsible for the affiliate channel and direct channel shall get the detailed estimates from the respective customers for the next 3 months (firm for the next month and tentative for next 2 months). The plan for

the 2 channels from the annual planning activity will be available as an input to this activity and will be treated as final plan if there are no changes made to the same.

(xi) This demand information will be given at the ship-to level for direct customers case and will be at the plant level for the affiliates case (except CPAC — will be given at the province level.)

(xii) The estimates will be manually keyed into the Demand Planner system.

(b) Planning by SCI to decide on the final targets for the next 3 months based on 1, 2 and 3

(i) SCI will decide the overall target for the BU for the next 3 months of which the first month target will be frozen. This activity will be guided by steps 1, 2 and 3. The affiliate, direct and export channels are expected to depend more on the collaboration with the customers wherein most of the demand inputs will be given by the customer. SCI will decide the targets for each channel.

(ii) SCI will also break down the dealer channel into regions. This will be primarily guided by the statistical forecast. SCI shall also use other inputs like objectives for the region, promotions planned for the next month etc.

(iii) Planning by CSM based on statistical forecast, collaborative planning by sales people with the customers

(iv) CMP, the marketing arm of CSM, will do its own planning for the next 3 months only for the dealer channel. This planning will be primarily guided by statistical forecasts.

(v) CSM sales people will do a detailed customer-SKU level planning for next 3 months and help CMP in adjusting the statistical forecasts based on

their market intelligence. The customer level plan will essentially help the sales representatives chase their targets more effectively.

(vi) Consensus Planning involving all the parties to freeze the monthly plan

(vii) The consensus planning will happen in a meeting called the "S&OP" and SCI, SCT, CTL, CSM and supply planning group will participate.

(viii) The monthly plan (and primarily next month's plan) for all the channels will be agreed upon by all the parties. The consensus process will use the statistical forecasts and the inputs from each of the participants to decide on the final plan.

(ix) The final plan will be saved in the demand planner and frozen for the next month. The final plan will also be broken down into weekly figures for the sake of supply planning.

(x) After S&OP, export monthly plans for current month and for next month cannot be changed. Export monthly plan will be kept in the system as the master plan.

(8) Description of Deliverable

Demand plan at province — SKU level for next 3 months (the next month in weekly buckets and the rest in monthly buckets) to supply planning. Demand plan at province level (for the domestic market) broken down into EXW and CFR to CTL

Demand plan at province/customer-SKU level for the sales representatives to chase in the market

(9) User Interface/ Reporting Requirements

The statistical forecasting will be automated through execution of batch jobs to be run by System Administrator. For the manual adjustments to the plan, the

planners will have workspaces designed specially for each of them depending on their role and responsibility in the planning process. The workspaces will be designed to provide maximum decision support to the demand planner.

The monthly planning will result in a set of routine reports that can be used by the entire organization. The reporting will be primarily in soft form — i.e. the users will be expected to log into the Demand Planner system and use the specially designed workspaces for their information needs. Optionally, they will have a choice to print them too, if it is really needed.

(10) User Access to data and interfaces

The demand planner will be able to adjust the demand plan at any level (in geography and product dimensions) for the planning horizon provided the geographies and products fall under his domain of planning. The collaborative plans based on the inputs from the customers shall be manually entered into the Demand Planning system. The monthly planning will focus primarily on customers-SKU level plan.

5.2.3 SCENARIO 3: New Product Launch

(1) Planners Involved

SCI (Marketing), CSM (CMP & sales)

(2) Causes

When a new product is to be launched by SCI, the launch will be have to be planned by SCI in terms of the launch volumes, the target market etc.

(3) Frequency

Every time a new product is launched, its initial demand will be planned until it reaches a steady market level and stabilizes.

Note: New products are introduced at SCI very infrequently (possibly once in 3-4 years). Also, the product life cycles in cement industry are very long with the

established products continuing almost forever unless there is a fundamental breakthrough in the domain of material used in construction.

(4) Decisions to be made

(a) Market in which to launch the new product (specific region or province or even customers)

(b) Demand Plan for the launch period

(c) Communication strategy for the new product

(5) Input Data Requirements

(a) Historical data for a similar existing product

(6) Information Requirements for Decision

(a) Launch strategy for the new product

(b) Inputs from the sales people about the market

(7) Major Steps in Planning

The new product will be launched primarily using a launch strategy. The qualitative inputs from the market and the launch strategy of SCI will essentially drive the demand plan for the launch. Historical data for a similar product will also aid in decision-making. Based on these inputs, decision will be made about the market in which to launch the new product and the initial launch volume. The volume will be decided also on the basis of inputs from the customers. These demand plans will be entered into the Demand Planner system at the appropriate level. The same will get passed onto the supply planner for the production planning.

(8) Description of Deliverable

A demand plan for the new product at an appropriate level for the next 3 months

(9) User Interface/ Reporting Requirements

The demand planner system shall maintain an indicator to separate out the new products from the rest so that they can be conveniently planned during their launch period.

VI. IMPLEMENTATION

6.1 Overview

The solution design is focused on the DP database components, the user configurable models, computation and forecasting algorithms, the workspaces and the DP database processes required to meet the business requirements in the best possible way.

This section addresses the DP application design for the following business requirements in detail

Annual Demand Planning

(1) Estimation of total cement market

(2) Statistical forecasting for Dealer Channel

(3) Estimation of demand by CSM sales personnel in collaboration with customers

(4) Estimation of demand by SCI for the direct and affiliate customers

(5) Estimation of demand by SCI (along with SCT) for the export customers

(6) Demand estimation for dealers by CSM

(7) Demand estimation for dealers by SCI

(8) Consensus annual plan by SCI & CSM

(9) Calculation of value forecast

Monthly Rolling Planning

(1) Estimation of total cement market

(2) Statistical baseline forecasting for dealer channel constrained by previous month rolling plan (next 2 months) and annual plan (third month)

(3) Revision of demand estimates by SCI for the direct & affiliate customers

(4) Estimation of demand by SCI (along with SCT) for the export customers

(5) Estimation of demand by CSM sales personnel in collaboration with customers

(6) Demand estimation for dealers by CSM

(7) Consensus monthly plan by SCI & CSM (including promotions input)

(8) Weekly revision of plans (exceptional case)

Outputs to downstream planning systems

(1) Demand plans (CFR) at ship-to province + sku level to Supply Chain Planner

(2) Demand plans (ExW) at warehouse + sku level to Supply Chain Planner

Performance measurement

For each of the business requirements mentioned above, the DP solution design will cover the following

(1) Business solution

(2) DP design

(3) Workspaces

(4) DP database processes

Note: This document will show only some examples of screen and the detail of each implementation will be explained.

6.2 DP Functional Solution Design

6.2.1 REQ-ANNUAL-1 Annual Demand Planning — Estimation of total cement market

Business solution

The SCI has the market intelligence to gather data about the total market size in the past. The information is available at market-product level. Assuming that this information is reliable, it is expected to reflect the broad trends / patterns in the cement market. The patterns can be projected in future to get an estimate of the overall cement market, which can, in turn, be used to decide SCI's own business targets and strategies for the year.

DP design

The DP database maintains a separate data measure (MarketDemand) to store the information about the total market demand in the past. The data is entered by SCI manually using their market intelligence. The information is available at product subcategory level.

This historical cement market data is projected in future using statistical tools from DP. A multitude of methods (like simple moving average, exponential smoothing etc) are used with varying parameters and the best among them is chosen (based on the performance of each in the past). This statistical forecast is calculated at Market+Product level and stored in the DP database in a separate database measure (MarketForecast). The market forecast is calculated for next 12 months and the next month forecast is unaltered.

Workspaces

Category: 1 Market Demand

Workspaces: 1.1 Capture Mkt Demand

Category: 0 Statistical Forecasts

Workspaces: 0.3 Total Market Fcst

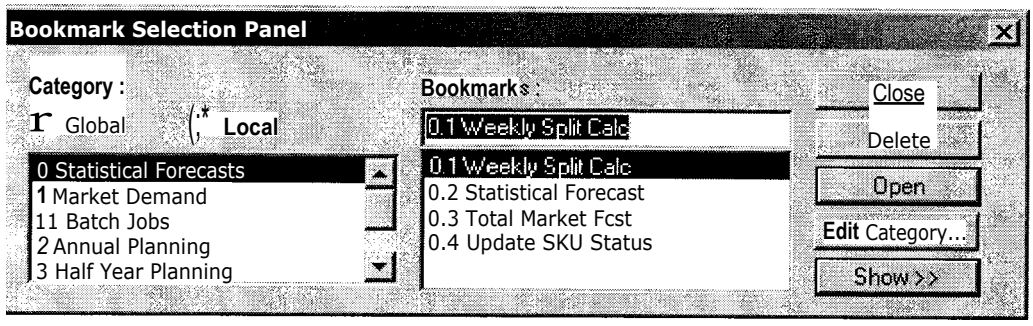


Figure 6.1. Bookmark Structure (Work Space).

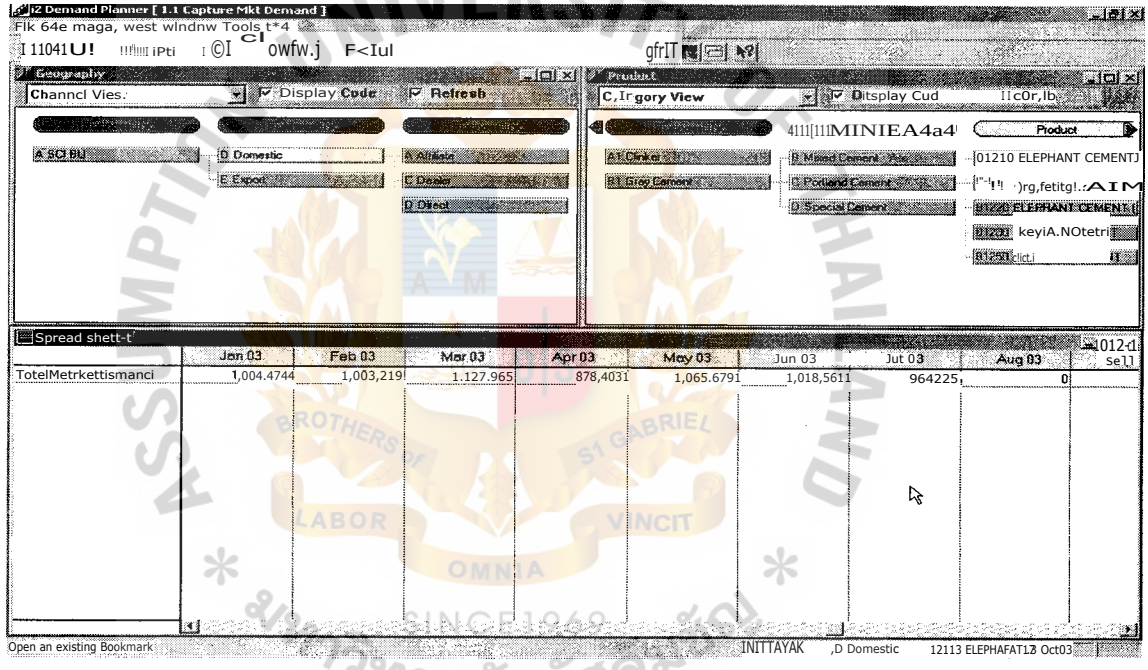


Figure 6.2. Market Demand

Database Processes

The capturing of the market demand history is achieved through manual entry of the data and saving it to the demand planner database manually.

The calculation of forecast for the market is achieved through a single database operation (CVLL: Copy Value Lowest Level) which copies the best statistical forecast model into the database measure.

6.2.2 REQ-ANNUAL-2 Annual Demand Planning: Statistical Forecasting for Dealer Channel

Business solution

It is believed (to be verified through data analysis) that the sales through the dealer channel exhibit some definite patterns over a period of time (like trends, seasonality) that can be predicted for future using some very basic statistical tools. The tools used essentially capture the patterns like the demand level, trend, and seasonality without getting into the complications of the factors themselves (which could be numerous) that cause the demand. The historical demand is treated as a series of data points in time and processed using statistical techniques to project the patterns of the past in future.

It is also necessary to ensure that certain minimum no of data points have to be available for reasonably accurate prediction of demand using statistical tools. When the historical demand is intermittent in nature, very simple averaging models are employed manually to get a rough estimate of the demand in future. Also, the statistical forecasting will be done at a level where the data is available as a continuous series and hence can be used for statistical processing. The same is then broken down into lower levels using some basis of break down.

The best approximation to historical demand that is available with SCI is the delivery data of the past. This is likely to have some issues especially in times when there are supply problems. At the same time, the present order management has forced

the business to use the delivery data of the past as a surrogate for the demand. The delivery data is captured at the customer-SKU level by the transaction system (SAP).

DP design

The DP database maintains a separate business measure (ActualSale) to hold the historical demand information. This information is extracted from the transaction system every week and loaded into DP database.

The demand history (in monthly buckets) is processed using statistical tools to generate forecast for the next 12 months. Multiple techniques are used to calculate the forecast and the best among them is chosen as the final forecast.

There are 2 databases measures for statistical forecasts — one for storing the bottom up forecast (forecast computed at customer-SKU level) and one for storing the middle out forecast (forecast computed at a suitable intermediate level and broken down on the basis of the statistical bottom up forecast). The middle out forecast serves as the final statistical forecast. This way, the final statistical forecast benefits from the inherent accuracy of computation at an intermediate level without losing the fine patterns at the lowest level, breakdown being dependent upon it. The 2 database measures are StatFcstBottomUp & Stat Forecast. Both the measures have time basis defined for them namely WeekSplit.

The calculation of statistical forecasts in done once every month for the next 12 months. Thus, only the next month statistical forecast is unaltered. The computation uses monthly buckets and the final forecast nos are broken down into weeks based on average weekly pattern in the past calculated separately.

Workspaces

Category: 0 Statistical Forecasts

Workspaces: 0.1 Weekly Split Calc

0.2 Statistical Forecasts

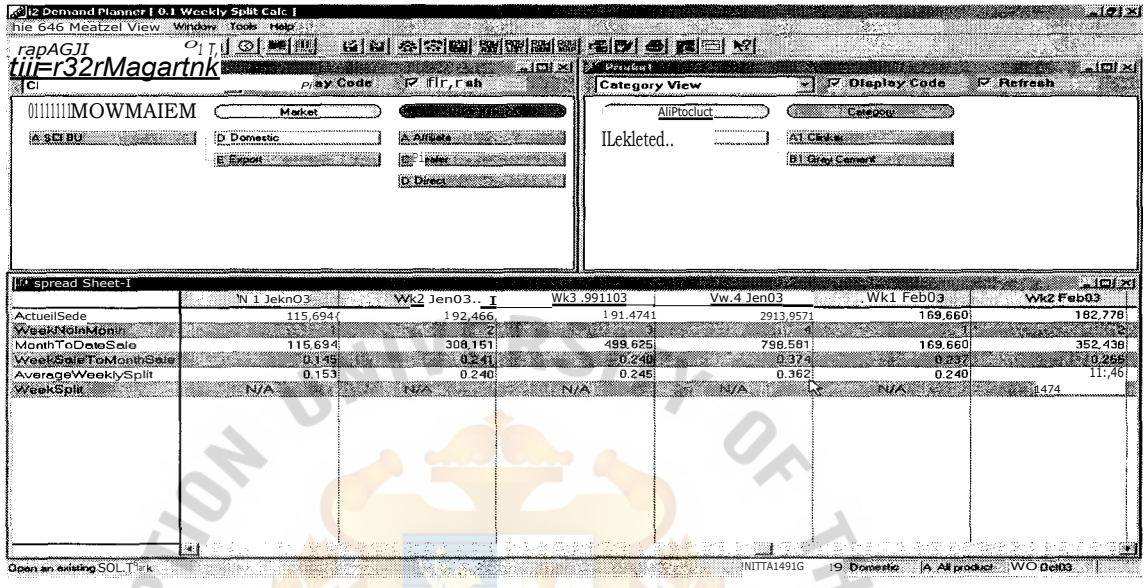


Figure 6.3. Weekly Split Calculation.

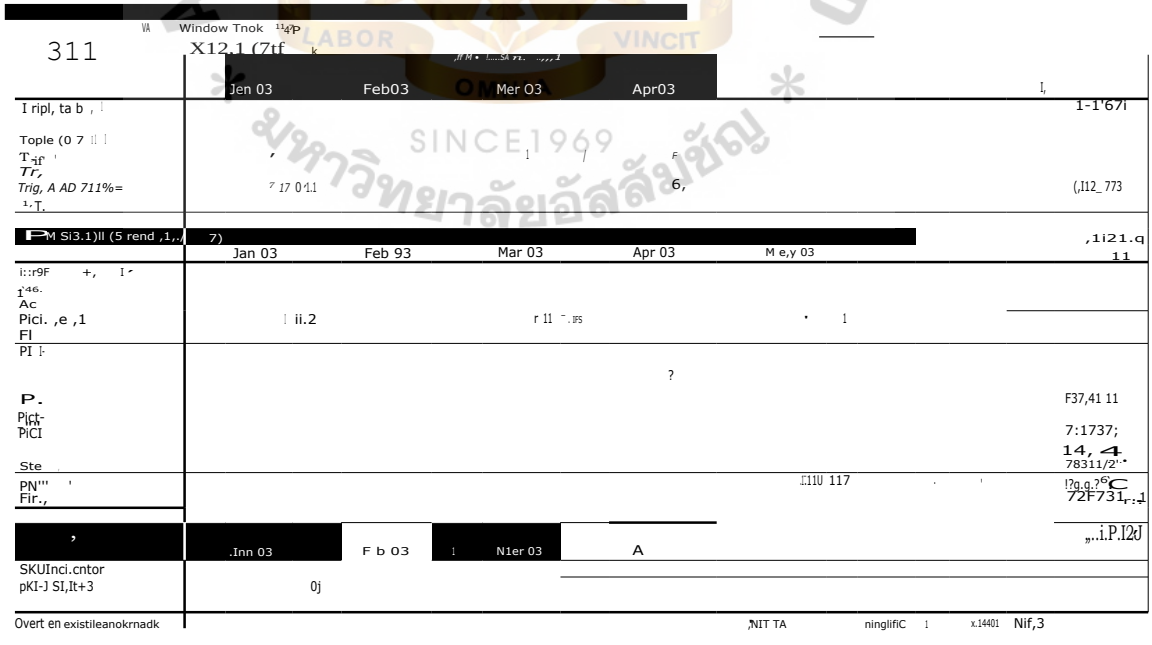


Figure 6.4. Statistical Forecasting.

Database processes

There are 2 database processes to arrive at the statistical forecasts. The first process calculates the average weekly split based on the historical demand data and saves it to the database measure WeekSplit. This is CVLL (copy value lowest level) operation that copies the model for weekly split into the database measure.

The calculation of statistical bottom up forecast copies the final forecast model to both the statistical forecast measures namely StatFcstBottomUp and Stat Forecast. This is a CVLL (copy value lowest level) operation.

The calculation of statistical middle out forecast copies the final forecast model at intermediate levels to the database measure Stat Forecast.

6.2.3 REQ-ANNUAL-3 Annual Demand Planning: Estimation of Demand by CSM sales personnel (SRs) in collaboration with the customers

Business solution

The grey cement, being a product that goes typically into a construction project, has a reasonably predictable demand if the dealers have some idea about the projects in their area. The SRs, as a part of their annual sales planning, interact with the dealers to capture this valuable information. This collaborative input obtained by the SRs can help in the overall annual planning activity. This will also help, in future, to move on to a total collaboration with the dealers, if the input from the dealers is found to be reasonably accurate.

As a starting point for planning, the SRs get visibility into the statistical forecast for the year. It is expected that the SRs alter the statistical forecast based on their interaction with the customers.

DP design

The DP database maintains a separate business measure (Annual Forecast-SR) to store the input obtained from the dealers. The input is available at customer-SKU level for the next year in the total figures and the SRs will enter these values using the DP interface for all the dealers under their purview.

Workspaces

Category: 2 Annual Planning

Workspaces: 2.1 Annual Forecast SR

Category: 3 Half Year Planning

Workspaces: 3.1 Half Year Forecast SR

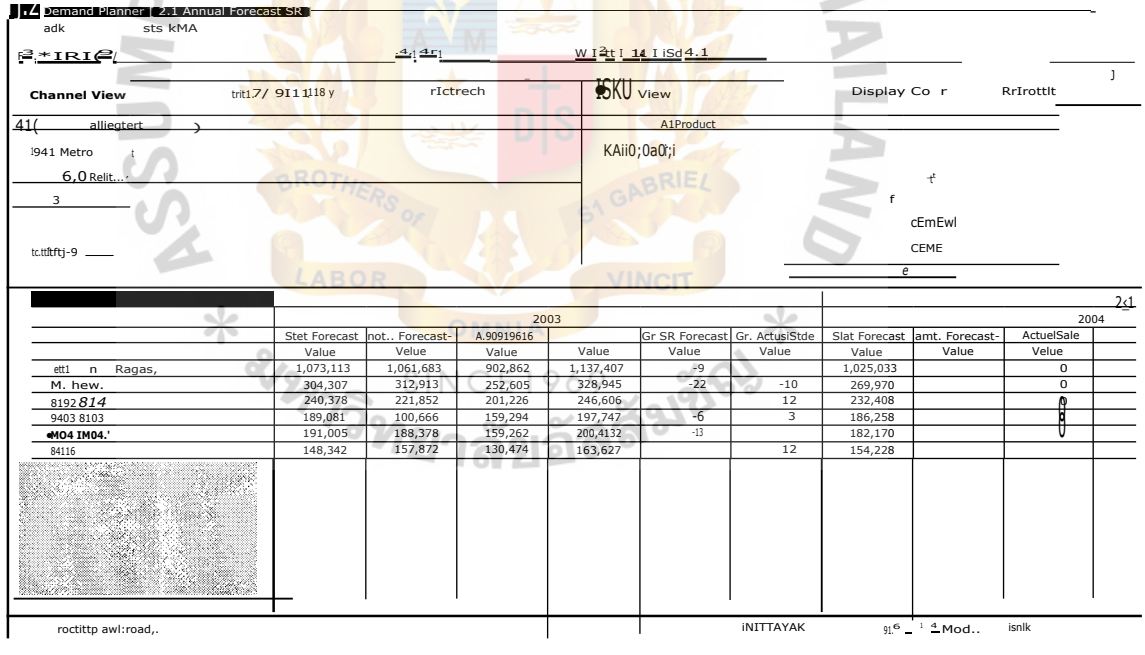


Figure 6.5. Annual Plan 1.

Database processes

The annual planning activity begins by initializing the planning row for SRs using the statistical forecast. As a first step in planning, the statistical forecast is copied to the annual plan measure for CSM (Stat Forecast -> Annual Forecast-SR). This operation is a CVLL (copy value lowest level) operation.

The SRs enter the demand estimates for the next year for their dealers at SKU level (thus altering the statistical forecast suitably) and save the same to the DP database.

Note: In the half yearly planning, the same activity is performed for a planning horizon of 6 months (second half of year) of the current year.

6.2.4 REQ-ANNUAL-4 Annual Demand Planning: Estimation of demand by SCI for direct and affiliate channel

Business solution

The affiliate customers, being other group companies, have their own business plans based on which they can project their cement needs to SCI. Thus, SCI gets rough estimates of the cement demand from the affiliate customers for the next year in monthly buckets at SKU level. The same is incorporated in SCI's annual planning activity.

The direct customers, typically big construction companies & contractors, deal directly with SCI for their cement needs. Even these customers give a rough idea about their cement needs to SCI for the next year in monthly buckets.

DP design

The DP hierarchy, in its geography dimension, separate the customers based on whether they are direct, affiliate or dealers in one of its views called Channel View.

This view helps the planner focus on his set of customers (direct or affiliate / dealer) and enter the estimates obtained from the customers. The DP database has a database measure called AnnualPlanSCI to store the demand plans made by SCI. The SCI planner for affiliate and direct customers enters the plans for the customers (at SKU level) for the next year in monthly buckets in this database measure and save the same to the DP database.

Most of the demand estimate data is prepared and sent by the customer in soft form (spreadsheet) after discussing the plans with SCI. To avoid manual re-entry of this data, an interface is provided to convert the data into desired format and directly load into DP database. The loaded data is checked by the demand planner using DP user interface. If required, the data is adjusted manually.

Workspaces

Category: 2 Annual Planning

Workspaces: 2.7 Affi Plan Cust (Y)

2.8 Affi Plan SKU (Y)

2.9 Direct Plan Cust (Y)

2.10 Direct Plan SKU (Y)

Category: 3 Half Year Planning

Workspaces: 3.7 Affi Plan Cust (H)

3.8 Affi Plan SKU (H)

3.9 Direct Plan Cust (H)

3.10 Direct Plan SKU (H)

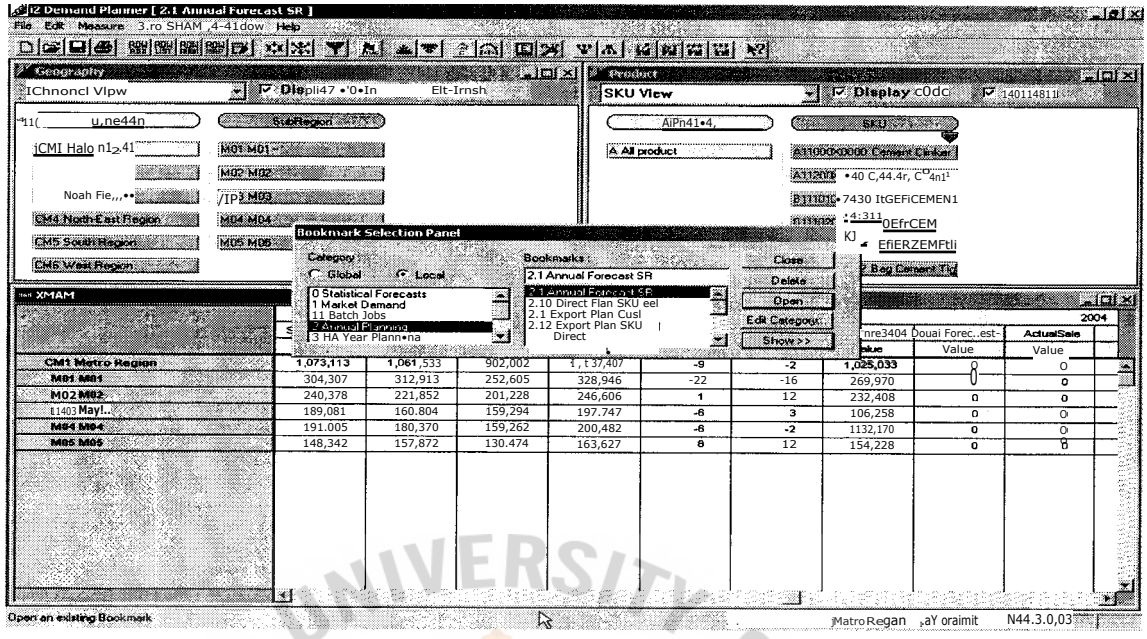


Figure 6.6. Annual Plan 2.

Database processes

The annual planning for affiliates & direct customers being a manual activity of entering the demand plans into the DP solution, the only database process is essentially that of saving the manually entered plans into DP database. The demand planner manually enters the demand plans and saves it to the DP database.

Note: In the half yearly planning, the same activity is performed for a planning horizon of 6 months (second half of year) of the current year.

6.2.5 REQ-ANNUAL-5 Annual Demand Planning: Estimation of demand by SCI for export channel

Business solution

The export customers are managed by SCI Marketing and SCT in terms of planning. SCT and SCI Marketing personnel are in touch with the export customers and have a rough idea about their demand for the next year. In many cases (about 70% of export business), there is some kind of contractual understanding with the customers

about the total volume of business both the parties are committed to. Based on the contractual obligations and the inputs from the customers, SCI obtains rough estimates of the demand for the export market at the customer-SKU level for the next year in monthly buckets.

DP design

The DP hierarchy, in its geography dimension, has a region view which divides the total market of SCI into domestic and export market. The export market is further divided into the groups of countries (regions like Asia, Africa etc) and countries before finally reaching the customer level. DP maintains a separate database measure (AnnualPlanSCI) for holding SCI's annual plan.

The demand planning activity for export channel will still be done in the external system. However, after the annual plan is finalized by all parties, SCI export planner (currently will still be the supply planner himself) will be prepared in excel spreadsheet and directly loaded into DP database to be kept as a master plan for export channel. The loaded data is checked by the export planner using DP user interface. If required, the data is adjusted manually.

Workspaces

Category: 2 Annual Planning

Workspaces: 2.11 Export Plan Cust (Y)

2.12 Export Plan SKU (Y)

Category: 3 Half Year Planning

Workspaces: 3.11 Export Plan Cust (H)

3.12 Export Plan SKU (H)

Database processes

The demand planning for export customers being a manual activity of entering the demand plans into the DP solution, the only database process is essentially that of saving the manually entered plans into DP database. The demand planner manually enters the demand plans and saves it to the DP database.

Note: In the half yearly planning, the same activity is performed for a planning horizon of 6 months (second half of year) of the current year.

6.2.6 REQ-ANNUAL-6 Annual Demand Planning: Demand estimation for dealers by CSM

Business solution

As mentioned earlier in this document, the sales through the dealer network are expected to exhibit some patterns and hence are amenable to statistical forecasting. The statistical forecasting simply extends the past patterns in the demand data to future, thus generating a base statistical forecast (covered by requirement 2 above) that serves as a good starting point for the entire planning activity. The statistical forecast captures the various trends / seasonality for different geographies / products effectively and automatically without any manual intervention.

Having got a good starting point in the form of statistical forecast, CSM incorporates the collaborative input obtained by the SRs (at customer-sku level wherever applicable) and alters the statistical forecast to that extent.

Subsesquently, CSM does a typical top-down planning. The demand plans (or rather the sales target) for the entire dealer channel is fixed based on the basis of growth in the past, field intelligence of CSM, growth targets etc. The target is set for the entire year (yearly bucket). The annual target for the dealer channel is broken down into

regions based on the regional demand history, growth plans for the region etc in consultation with the regional sales managers. The regional managers, in turn, in consultation with the SRs, do planning for the subregions/provinces. As a final step, the SRs adjust the nos at customer level for the subregions/provinces under their purview. At each step in the top-down planning, as the name suggests, every planner confines the demand plans to the target coming from the top and only alters the distribution of the target to the next level based on his feel & experience. (for example : a regional manager agrees to a target for his region and alters the plans for different subregions/provinces while keeping the region level plans constant, an SR agrees to an overall target for his subregion/province and alters the plans for the dealers while keeping the province/subregion level plan constant.)

Finally, the yearly nos which are broken down by DP automatically into monthly nos are adjusted at the month level by the CSM (sales and marketing). Any alteration because of this in the total annual number is corrected at the annual level again.

The entire process ensures that the CSM (both mktg and sales) ends up with a demand plan for the dealer network that incorporates inputs from all the relevant demand planners and hence is, in a way, accepted by the whole of CSM.

DP design

The DP database maintains 2 database measures — one to capture the dealer input obtained by SRs during their market survey and the other to capture the overall CSM plan for the year. The measures are called AnnualForecast-SR and AnnualPlanCSM respectively. The dealer channel is a separate channel identified through the channel view.

The controlled top down planning is achieved through an interface built using the Scenario Workbench of DP. The interface displays, apart from the database measures to be edited, the projected (planned) growth over last year and the % contribution of children to their parent. The planner can alter either the demand plan volume itself or the % figure and the other figure will adjust accordingly. While editing the nos, the planner locks the parent target and any alterations done by the planner at child level are automatically redistributed by DP among the relevant children.

Workspaces

Category: 2 Annual Planning

Workspaces: 2.2 Annual Forecasts CSM

2.4 Regnl Breakdn (Y)

2.5 Subregnl Breakdn (Y)

2.6 Dealer Breakdn (Y)

Category: 3 Half Year Planning

Workspaces: 3.2 Annual Forecasts CSM

3.4 Regnl Breakdn (Y)

3.5 Subregnl Breakdn (Y)

3.6 Dealer Breakdn (Y)

Database processes

The annual planning activity begins by initializing the planning row for CSM using the statistical forecast. As a first step in planning, the statistical forecast is copied to the annual plan measure for CSM (Stat Forecast -> AnnualPlanCSM). This operation is a CVLL (copy value lowest level).

The top down process of planning involves only manual adjustments to the demand plans at various levels and the changes are saved to the DP database manually

by the demand planner. The aggregation and breakdowns resulting from the changes are done by DP automatically.

Note: In the half yearly planning, the same activity is performed for a planning horizon of 6 months (second half of year) of the current year.

6.2.7 REQ-ANNUAL-7 Annual Demand Planning: Demand estimation for dealers by SCI

Business solution

As mentioned earlier in this document, the sales through the dealer network are expected to exhibit some patterns and hence are amenable to statistical forecasting. The statistical forecasting simply extends the past patterns in the demand data to future, thus generating a base statistical forecast (covered by requirement 2 above) that serves as a good starting point for the entire planning activity. The statistical forecast captures the various trends / seasonality for different geographies / products effectively and automatically without any manual intervention.

The statistical forecast serves as a starting point for the demand planning by SCI for the dealer network. Based on their market intelligence and growth plans for different regions / products, SCI adjusts the statistical forecasts primarily at the region-product level in a yearly bucket. SCI typically follows a top-down adjustment wherein the overall demand for the dealer channel is fixed and then broken down into region level demand. At the region level, SCI may do adjustments to plans of different products based again on the overall objectives of the BU. Essentially, the output of SCI's planning for dealer channel is a region-product level plan.

DP design

The DP hierarchy, in its geography dimension, maintains a channel view to separate the dealers from others. The channel view further divides the dealer channel into regions and subregions based on the geographic location of end customers. There is a separate database measure called AnnualPlanSCI that holds the demand plans adjusted by SCI.

The controlled top-down planning is achieved using an interface built using the Scenario Workbench of DP. The interface displays, apart from the database measure to be edited, the projected growth over last year and the % contribution of children to their parent. The planner can alter either the demand plan volume itself or the % figure and the other figure will adjust accordingly. While editing the nos, the planner locks the parent and any alterations done by the planner at child level are automatically redistributed by DP among the relevant children.

Workspaces

Category: 2 Annual Planning

Workspaces: 2.3 Annual Plan Consensus

Category: 3 Half Year Planning

Workspaces: 3.3 Half Year Plan Consensus

Database processes

The annual planning by SCI for the dealer channel involves, as the first step, copying of statistical forecast to the demand plan measure adjusted by SCI. This is a CVLL operation (Stat Forecast -> AnnualPlanSCI).

The controlled top-down planning involves adjustment to the plans by the demand planner and saving of the same to the DP database.

Note: In the half yearly planning, the same activity is performed for a planning horizon of 6 months (second half of year) of the current year.

6.2.8 REQ-ANNUAL-8 Annual Demand Planning: Consensus annual plan by SCI and CSM

Business solution

SCI and CSM, with their market intelligence and objectives, do the annual planning independently. In order that SCI, CSM and the supply chain chase the same objective, it is essential that there is an agreement /common understanding on the overall objectives for the year. This is achieved through a meeting (called target setting meeting) between SCI and CSM (also attended by CTL , SCT and supply planning group). A consensus is reached on the overall objectives for the next year for the export and the domestic markets. For the domestic market, the objectives are also firmed up for individual channels. For dealer channel, the targets are agreed upon for individual regions. For the affiliate and direct channels, as the demand plans are already firmed up in collaboration with the customers, the plans are not altered much. At the end of the meeting, the final annual plan acceptable to all emerges.

Sometimes, the top management desires a change in the total business target even after the target meeting. In such a case, SCI alters the overall target for the business and maintains the record of the same along with the reason for the change.

DP design

Apart from having separate database measures for SCI and CSM, DP database maintains another database measure to store the final consensus annual plan (AnnualPlanConsensus). The consensus will be reached at region-product level for the dealer channel. The DP interface designed for this shows the demand plans entered by

both SCI & CSM along with the consensus plan. The consensus plan, to begin with, is populated with the SCI plan for the direct, affiliate and export channels while for the dealer channel, the CSM demand plan is available in the consensus plan database measure. The final plan by consensus is entered into the consensus plan database measure. The consensus plan, thus arrived at, is frozen for the next 6 months.

In case of top management intervention after target meeting, SCI alters the annual plan (AnnualPlanConsensus) again and notes the change as a comment in the comment row defined for the same (AnnualPlanComment).

Workspaces

Category: 2 Annual Planning

Workspaces: 2.3 Annual Plan Consensus

Category: 3 Half Year Planning

Workspaces: 3.3 Half Year Plan Consensus

Database processes

The consensus planning requires, for the target meeting, an initial consensus plan that can be discussed in the meeting. This is achieved through batch database operations. The batch operations copy SCI plan for export, direct and affiliate channels to consensus plan database measure. Another database process copies the CSM plan for the dealer channel (AnnualPlanCSM) to the consensus plan row (AnnualPlanConsensus) at channel-province + sku level to be broken down on the basis of the SR plan (Annual Forecast-SR) at customer level already populated in the consensus plan row.

Batch jobs: direct-apcon, affiliate-apcon, export-apcon, dealer-apcon

Note: In the half yearly planning, the same activity is performed for a planning horizon of 6 months (second half of year) of the current year.

6.2.9 REQ-ANNUAL-9 Annual Demand Planning: Calculation of value forecast

Business solution

The business uses an estimated average price (calculated separately based on the market conditions and overall pricing strategy) for the entire year for converting the volume forecast into value forecast. The price is calculated at SKU level for each channelprovince.

DP design

DP database maintains a database measure to store the estimated price data in Baht/Ton (Price). It also maintains a separate measure to store the value forecast (ValueDemandPlan). The price data is loaded during the annual planning activity (data is loaded for the first week of the year) and the same is used for the entire year. After the freezing of annual consensus plan, a model measure computes the value forecast (multiplication of the consensus plan and the price) and the same is stored in database measure ValueDemandPlan.

Workspaces

Category: 11 Batch Jobs

Workspaces: 11.1 SCI-AllProd-Week

Database processes

The calculation of value forecast requires, as a first step, copying of the price data (available only in the first week of year in the DP database through loading activity) from the first week to the rest of the year. A model row copies the price data through a CVLL operation.

Subsequently, another model computes the value forecast (multiplication of volume forecast and price) and stores the same in the desired target row (ValueDemandPlan). This too is a CVLL operation.

Note: In the half yearly planning, the same activity is performed for a planning horizon of 6 months (second half of year) of the current year.

6.2.10 REQ-MONTHYLY-1 Monthly Demand Planning — Estimation of total cement market

Business solution

The SCI has the market intelligence to gather data about the total market size in the past. The information is available at region-product subcategory level. Assuming that this information is reliable, it is expected to reflect the broad trends / patterns in the cement market. The patterns can be projected in future to get an estimate of the overall cement market, which can, in turn, be used to decide SCI's own business targets and strategies for the future.

DP design

The DP database maintains a separate data measure (MarketDemand) to store the information about the total market demand in the past. The data is entered by SCI manually using their market intelligence. The information is available at market-product level for the domestic market.

This historical cement market data is projected in future using statistical tools from DP. A multitude of methods (like simple moving average, exponential smoothing etc) are used with varying parameters and the best among them is chosen (based on the performance of each in the past). This statistical forecast is calculated at Market+Product level and stored in the DP database in a separate database measure (MarketForecast). The market forecast is calculated for next 12 months and the next month forecast is unaltered.

Workspaces

Category: 1 Market Demand

Workspaces: 1.1 Capture Mkt Demand

Category: 0 Statistical Forecasts

Workspaces: 0.3 Total Market Fcst

Database Processes

The capturing of the market demand history is achieved through manual entry of the data and saving it to the demand planner database manually.

The calculation of forecast for the market is achieved through a single database operation (CVLL: Copy Value Lowest Level) which copies the best statistical forecast model into the database measure.

6.2.11 REQ-MONTHYLY-2 Monthly Demand Planning — Statistical baseline forecasting for dealer channel constrained by the previous rolling plan and annual plan

Business solution

The market situation for cement being dynamic, it is possible that new trends / patterns in demand emerge throughout the year. These new patterns are expected to reflect in the sales data of SCI. In order to incorporate these new patterns, a statistical forecast is computed every month for the dealer channel based on the historical data available till last month. The unconstrained statistical forecast is constrained by the monthly rolling plan (for the next 2 months) and annual plan (for the 3rd month) at region — product level. This ensures that the input from the annual plan becomes the starting point for the monthly planning. The constraining is done at region — product level primarily because of the fact that most of the monthly planning activities happen at the region-product level. The constrained plan is presented to sales

people (SRs), CMP and SCI as a starting point for their own planning activities during the month.

The actual delivery (shipments) data in the past is used as a surrogate for demand. This is the best option available to business at present as the ordering process does not reflect the true demand picture.

DP design

The DP database maintains 2 rows to hold pure statistical forecasts (StatFcstBottomUp and Stat Forecast) as mentioned earlier. The monthly plans for the dealer channel by SCI, CSM and SRs (collaborative planning) are stored in 3 separate business measures in DP database namely (MonthlyPlanSCI, MonthlyPlanCSM, Monthly1Forecast-SR).

The DP database maintains a separate business measure (ActualSale) to hold the historical demand information. This information is extracted from the transaction system every week and loaded into DP database.

The demand history (in monthly buckets) is processed using statistical tools to generate forecast until the end of horizon. Multiple models are used to calculate the forecast and the best among them is chosen as the final forecast.

There are 2 databases measures for statistical forecasts — one for storing the bottom up forecast (forecast computed at customer-SKU level) and one for storing the middle out forecast (forecast computed at a suitable intermediate level and broken down on the basis of the statistical bottom up forecast). The middle out forecast serves as the final statistical forecast. This way, the final statistical forecast benefits from the inherent accuracy of computation at an intermediate level without losing the fine patterns at the lowest level, breakdown being dependent upon it. The 2 database measures are StatFcstBottomUp & Stat Forecast. Both the measures have time basis

defined for them namely WeekSplit. The WeekSplit database measure holds the average proportion of a week's demand based on the past data. This proportion, calculated dynamically every month, decides how the monthly nos are broken down into weeks.

The calculation of statistical forecasts in done once every month for the entire future period in DP. Thus, only the next month statistical forecast is unaltered. The computation uses monthly buckets and the final forecast nos are broken down into weeks based on average weekly pattern in the past calculated separately.

Workspaces

Category : 0 Statistical Forecasts

Workspaces : 0.1 Weekly Split Calc

0.2 Statistical Forecasts

Category : 11 Batch Jobs

Workspaces : 11.2 Dealer-AliProd-Week

Database processes

There are 2 database processes to arrive at the statistical forecasts. The first process calculates the average weekly split based on the historical demand data and saves it to the database measure WeekSplit. This is CVLL (copy value lowest level) operation that copies the model for weekly split into the database measure.

The calculation of statistical bottom up forecast copies the final forecast model to both the statistical forecast measures namely StatFcstBottomUp and Stat Forecast. This is a CVLL (copy value lowest level) operation.

The calculation of statistical middle out forecast copies the final forecast model at intermediate levels to the database measure Stat Forecast.

Having arrived at the statistical forecasts, they are first copied to the monthly planning rows at the lowest level and then the previous monthly consensus plan (for next 2 months) and the annual plan for the 3rd month are copied to the monthly planning rows for SCI, CSM & SRs at channelregion-product level. This is achieved through 3 database operations (CVLL & 2 CVML) for each of the 3 destination rows.

6.2.12 REQ-MONTHYLY-3 Monthly Demand Planning — Revision of demand estimates by SCI for direct and affiliate customers

Business solution

In the beginning of the year, the affiliate customers indicate the rough estimates of their cement needs for the entire year to SCI. These estimates are revised for the next 3 months in the monthly rolling plan. The revision of estimates is again based on the inputs from affiliate customers who can provide a much better demand estimate for the next 3 months. Thus, the monthly planning for affiliate customers essentially involves the adjustments in the annual plans based on the latest inputs from the customers.

Similarly, for the direct customers, SCI receives the inputs from the customers for the next 3 months and the same are incorpoarated in the monthly plan for direct channel. It is expected that the direct channel planner from SCI collaborates with the customer to arrive at a reliable demand estimate for the next 3 months.

DP design

The DP database maintains a separate database row for storing the monthly plans by SCI (MonthlyPlanSCl). The direct & affiliate channel planner adjusts the customer-sku level estimates (copied from previous monthly plan and annual plan) by

entering the new inputs. These are the final demand estimates for the direct channel. Every month, the estimates for next 3 months are adjusted.

Most of the demand estimate data is prepared and sent by the customer in soft form (spreadsheet) after discussing the plans with SCI. To avoid manual re-entry of this data, an interface is provided to convert the data into desired format and directly load into DP database. The loaded data is checked by the demand planner using DP user interface. If required, the data is adjusted manually.

Workspaces

Category: 4 Monthly Planning

Workspaces: 4.7 Affi Plan Cust (M)

4.8 Affi Plan SKU (M)

4.9 Direct Plan Cust (M)

4.10 Direct Plan SKU (M)

Database Processes

In case of manual entry of demand estimates, the demand planner saves the data to DP database manually using DP interface. When the data is loaded through the interface, there is a data loading that happens through Demand Planner Administrator and the loaded data is checked / adjusted (if required) by the demand planner using DP interface.

6.2.13 REQ-MONTHYLY-4 Monthly Demand Planning: Estimation of demand by SCI for export channel

Business solution

The export customers are managed by SCI Marketing and SCT in terms of planning. SCT and SCI Marketing personnel are in touch with the export customers and

have a rough idea about their demand for the next 3 months. In many cases (about 70% of export business), there is some kind of contractual understanding with the customers about the total volume of business both the parties are committed to. Based on the contractual obligations and the inputs from the customers, SCI obtains rough estimates of the demand for the export market at the customer-SKU level for the next 3 months in monthly buckets.

DP design

The DP hierarchy, in its geography dimension, has a region view which divides the total market of SCI into domestic and export market. The export market is further divided into the groups of countries (regions like Asia, Africa etc) and countries before finally reaching the customer level. DP maintains a separate database measure (MonthlyPlanSCI) for holding SCI's annual plan. The SCI planner for export channel enters the plan for the export market at customer-sku level in monthly buckets and saves the demand plans to the DP database.

Most of the demand estimate data is prepared by SCI Marketing after discussing the same with the customers over a period of time using spreadsheets. To avoid manual re-entry of this data, an interface is provided to convert the data into desired format and directly load into DP database. The loaded data is checked by the demand planner using DP user interface. If required, the data is adjusted manually.

Workspaces

Category: 4 Monthly Planning

Workspaces: 4.11 Export Plan Cust (M)

4.12 Export Plan SKU (M)

Database processes

The demand planning for export customers being a manual activity of entering the demand plans into the DP solution, the only database process is essentially that of saving the manually entered plans into DP database. The demand planner manually enters the demand plans and saves it to the DP database.

6.2.14 REQ-MONTHYLY-5 Monthly Demand Planning: Estimation of Demand by CSM sales personnel (SRs) in collaboration with the customers

Business solution

The grey cement, being a product that goes typically into a construction project, has a reasonably predictable demand if the dealers have some idea about the projects in their area. The SRs, as a part of their monthly sales planning, interact with the dealers to capture this valuable information. This collaborative input obtained by the SRs can help in the overall monthly planning activity. This will also help, in future, to move on to a total collaboration with the dealers, if the input from the dealers is found to be reasonably accurate.

Thus, the SRs estimate the demand for the dealers in their area for the next 3 months (in monthly buckets) as a part of the monthly planning activity.

DP design

The DP database maintains a separate database row for storing the monthly plans by SRs (Monthly Forecast-SR). The input is available at customer-SKU level for the next 3 months and the SRs will enter these values using the DP interface for all the dealers under their purview.

Workspaces

Category: 4 Monthly Planning

Workspaces: 4.1 Monthly Forecast SR

Database Processes

The demand planner manually enters the demand estimates into the demand planning system and saves the data to DP database using DP interface.

6.2.15 REQ-MONTHYLY-6 Monthly Demand Planning — Demand Estimation for Dealers by CSM

Business solution

The monthly planning process for the dealer network is very similar to the annual one. The horizon for the monthly planning activity is 3 months in future of which the first month is planned in detail in weekly buckets.

As mentioned earlier in this document, the sales through the dealer network are expected to exhibit some patterns and hence are amenable to statistical forecasting. The statistical forecasting simply extends the past patterns in the demand data to future, thus generating a base statistical forecast (covered earlier in this document) that serves as a good starting point for the entire planning activity. The statistical forecast captures the various trends / seasonality for different geographies / products effectively and automatically without any manual intervention.

At the same time, it is also desirable that the annual plan and the last monthly consensus plan (plan from the previous S&OP) reflect in the monthly planning activity. Hence, the monthly consensus plan (previous S&OP) for the next 2 months and the annual plan for the third month at region-product level are broken down using the new statistical forecast. Thus, the starting point for the monthly planning activity is the latest plans for the next 3 months (at region-product level) broken down using the new statistical forecast.

Having got a good starting point, CSM incorporates the collaborative input obtained by the SRs (at customer-SKU level) while the statistical forecast acts as a guideline. The SRs interact with the dealers in their subregion and collect information about the demand estimates as projected by the dealers. The dealers estimate on the basis of their knowledge of the market, the ongoing / expected projects in the area etc This is a kind of collaboration between the SRs and their dealers to arrive at the best possible estimate of the dealer demand.

Parallel, CMP (marketing arm of CSM) does its own planning using historical data, growth targets as indicated by SCI and market intelligence. CMP also interacts with the sales personnel (regional managers) on an ongoing basis to get the latest field information. When SRs finish the collaborative planning, CMP reviews the same and makes changes in its own plans (if required). CMP usually plans at region level with occasional specific adjustments at subregion/province level. The regional plans of CMP are broken down into dealer level plans using the collaborative planning done by SRs. There is an agreement on the plans for the next 3 months at the end of the process.

DP design

The DP database maintains a separate database measure to capture the CSM plan for the next 3 months. The measure is called MonthlyPlanCSM. The dealer channel is a separate channel identified through the channel view.

The controlled top down planning is achieved through an interface built using the Scenario Workbench of DP. The interface displays, apart from the database measures to be edited, the % contribution of children to their parent. The planner can alter either the demand plan volume itself or the % figure and the other figure will adjust accordingly. While editing the nos, the planner locks the parent target and any

alterations done by the planner at child level are automatically redistributed by DP among the relevant children.

Workspaces

Category: 4 Monthly Planning

Workspaces: 4.2 Monthly Forecast CSM

4.4 Regnl Breakdn (M)

4.5 Subregnl Breakdn (M)

4.6 Dealer Breakdn (M)

Database Processes

The only database processes involved here are the manual updates to the planning row to be done by the CMP personnel. CMP makes changes to the planning row MonthlyPlanCSM typically at region — product level and at any lower level if they feel the need to do so. The updates are saved to the database by CMP manually.

6.2.16 REQ-MONTHYLY-7 Monthly Demand Planning: Consensus monthly plan by SCI and CSM

Business solution

SCI and CSM, with their market intelligence and objectives, do the monthly planning independently. In order that SCI, CSM and the supply chain chase the same objective, it is essential that there is an agreement /common understanding on the overall objectives for the next 3 months. This is achieved through a continuous dialogue between SCI and CSM. In the monthly planning activity, SCI's involvement is primarily for the direct and affiliate channels. The dealer channel demand is planned mainly by CSM. While doing so, CSM continuously interacts with SCI for inputs on the marketing activities, promotions etc and incorporates those inputs in the demand

plans for the dealer channel. At the same time, for a customer level breakdown, CSM uses the collaborative planning done by SRs.

The demand for direct and affiliate channels is planned based on the inputs from the customer and the same is finalized by SCI as mentioned earlier.

Once the independent planning by SCI and CSM is over, the finalized plans are converted to something called consensus plan. Here, essentially the SCI plan for the direct and affiliate channels & CSM plan for dealer channel become the final plans.

It is assumed that both, SCI and CSM, agree with this final plan. Subsequently, in the S&OP meeting, the consensus plan may undergo some change if there is a supply side constraint. This is unlikely to happen for the domestic market given the present business scenario.

DP design

Apart from having separate database measures for SCI and CSM, DP database maintains another database measure to store the final consensus monthly plan (MonthlyPlanConsensus). When the individual planning by SCI and CSM is over, the SCI plan (for the direct and affiliate channel) and the CSM plan for the dealer channel for the next 3 months is copied to the consensus plan row.

In the S&OP meeting, the consensus plan may get altered based on the latest market situation and supply side constraints.

After the S&OP, when the monthly plan is frozen completely, the same is copied to weekly planning row (WeeklyPlanConsensus) so that the same can be modified on a weekly basis during the next month.

Workspaces

Category: 4 Monthly Planning

Workspaces: 4.3 Monthly Plan Consensus

Category: 11 Batch Jobs

Workspaces: 11.1 SCI-AliProd-Week

11.2 Dealer-AliProd-Week

11.3 Aff-AllProd-Week

11.4 Dir-AliProd-Week

11.5 Exp-AllProd-Week

Database processes

The consensus planning requires, for the S&OP meeting, an initial consensus plan that can be discussed in the meeting. This is achieved through batch database operations. The batch operations copy SCI plan for export, direct and affiliate channels to consensus plan database measure. All the operations are CVLL. For the dealer channel, the CSM plan is copied to the consensus plan at channelprovince-SKU level after first copying the SR plan at the lowest level. After S&OP, there could be manual adjustments to the consensus plan if required. There is a separate database operation (CVLL)that copies the monthly to weekly plan after the monthly plan is completely frozen.

Batch jobs: direct-mpcon, affiliate-mpcon, export-mpcon, dealer-mpcon, mpcon-to-wkcon

6.2.17 REQ-OTHER-1 Weekly Revision of Plans (exceptional case)

Business solution

During the month, CSM continuously monitors the actual sales in the market and takes corrective action in consultation with SCI to change the monthly plan (confirmed in the S&OP) for the current month for the remaining weeks. The key decision made here is a possible change in the monthly target based on the performance

in the current month and the decision is taken jointly by SCI and CSM while it is executed by CSM (CMP planner). To aid such a decision, it is essential to evaluate the current month to date performance vis-à-vis the monthly plan so that the plans for the remaining weeks of the current month can be adjusted. The adjustment of the plans will be done manually by CSM (CMP planner.)

Whenever such a change in the plan happens during the month, the sales people chase the new plan for the rest of the month. Also, any such change in the plan during the month triggers a fresh supply planning cycle to take care of the new plan. There can be a change in the demand plan of direct and affiliate channels too and the same is handled by the SCI demand planner (manual adjustment in DP), if required.

DP design

DP database maintains a separate database measure (separate from that for monthly plan) to store the weekly changes to the monthly plan (WeeklyConsensusPlan). During the month, CSM monitors the sales performance and makes changes to the weekly plans (by default the measure holds the S&OP plans) by updating this measure. There is a separate workspace in the analysis workbench of DP designed to assist this decision. The workspace displays the actual sales up-to-date; the S&OP plan (MonthlyConsensusPlan) and the required sale in remaining weeks to achieve the month target, if not changed. Based on this information and the market feedback, CSM, if required, makes changes to the weekly plans. This is the final plan that is chased by the sales personnel as well as the supply chain.

Workspaces

Category: 5 Weekly Planning

Workspaces: 5.1 Weekly Update

Database processes

After the S&OP meeting during which the next month's plan is finalized, the same is also copied to the weekly plan. Thus, the monthly consensus plan is copied to the weekly consensus plan through a batch database operation (CVLL).

When the weekly plans are changed during the month, the CSM user manually updates the plan and saves it to the database manually.

6.2.18 REQ-OTHER-2 Outputs to Downstream Planning: CFR Demand

Business solution

The CFR demand is that demand in which the customer just indicates the destination / location of the demand and expects the business (SCI with the help of CTL) to deliver the goods at the desired location. The estimation of this demand is essential for transportation planning. Also, it is essential that the CFR demand is planned by the destination (ship to location) so that the supply chain can produce and make the goods available at the right place so as to optimize on the transportation cost.

It is very clear from this document that the entire demand planning process focuses on the demand from sales and marketing perspective without getting into the delivery type (ExW/CFR). So the only solution possible is the conversion of the total demand plan (arrived at by SCI and CSM) into the CFR demand and ExW demand.

There are certain assumptions (backed by historical data in a separate document) which simplify this conversion to an extent. The assumptions are as follows

(1) It can be safely assumed that the entire bulk cement demand in the domestic market is CFR. There is a data justification for this based on the history. Also, the bulk cement transportation needs special vehicles which are usually not available with the fleet operators. Data in the following table justifies this assumption.

Table 6.1. Actual Sales 1999 — May 2002.

Actual Sale (Bulk Cement) - Tons	Year 1999	Year 2000	Year 2001	Year 2002 (up to May)
CFR	560788	926405	2502908	1258464
ExW	6744	1275	1949	1005

(2) It can also be assumed that the demand for the direct and affiliate channels is CFR. There is a data justification for this based on the history.

Based on the above assumptions, the following logic is used for converting the total demand plan into CFR and ExW demand.

(1) All the bulk cement demand is mapped to CFR demand.

(2) All the demand for direct and affiliate channels is mapped to CFR demand. There will be separate customer groups for direct and affiliate EXW proportion in case that SCI needs to plan EXW demand for these 2 channels.

(3) The bag cement demand is split into CFR and ExW based on historical data (last month's proportion at channelprovince-SKU level in case of Monthly Planning, and last year's proportion at channelprovince-SKU level in case of Annual Planning). The data analysis indicates that the CFR/ExW split has changed over a period of 3 years for some of the regions and the same can be attributed to changes in selling policies on part of SCI. Thus, the CFR/ExW split is primarily influenced by the business policies and need to be manually altered whenever there is a change in policy. Thus, for the Monthly Plannig case, the initial split (using last month's proportion at channelprovince-SKU level) will work as long as there is no change in the selling strategy for the province. If there is change in policies manual intervention is needed.

As for the Annual Planning case, however, it is to use last year's proportion without allowing manual intervention to be more conservative on the CFR/ExW proportion.

For the dealer channel, the CFR component of the demand is manually altered (if required & only during the monthly planning cycle) by CSM planner.

The following logic is used for converting the total CFR demand to CFR demand by the destination (ship to) province.

(1) The customers of direct and affiliate channel are, in fact, the ship to customers and hence are directly mapped to the ship to provinces in the region view of DP geography dimension. Hence, simple aggregation of the demand of these customers will be the CFR demand by ship to province.

(2) The CFR demand for dealer channel is also available at the province through the region view of the hierarchy.

The CFR demand by destination (ship to) province for the dealer, affiliate and direct channels is finally added up at the province — SKU level and sent to the downstream supply chain planning system.

DP design

DP database captures the historical sales data, both CFR and ExW separately. The rows are ActualSalesCFR and ActualSalesExW. These rows are used to split the total demand plan into CFR and ExW.

For converting the total demand plan into CFR demand by ship to province, the DP database maintains a separate set of database rows for storing intermediate calculations as well as the final result. A row called AnnualPlanCFRDir&Aff stores the annual demand plan only for the direct and affiliate channels. The same gets aggregated to province along the region view in DP geography dimension. A row called AnnualPlanCFRDealer stores the CFR component of the demand plan for the dealer

channel (this of course is a demand plan by the sold to customer). The final annual CFR demand plan (by ship to province) is stored in a database row called AnnualPlanCFR.

A similar conversion of demand plan into its CFR component is done for the monthly and weekly plans as well. The corresponding rows are called MonthlyPlanCFRDir&Aff, MonthlyPlanCFRDealer, MonthlyPlanCFR, WeeklyPlanCFRDir&Aff, WeeklyPlanCFRDealer & WeeklyPlanCFR.

Workspaces

Category: 11 Batch Jobs

Workspaces: 11.11 Aff-AllProd-Month

11.8 Dealer-Bag-Month

11.7 Dealer-Bag-Week

11.12 Dealer-Bulk-Month

11.10 Dir-AllProd-Month

11.9 Dom-Allprod-Month

11.13 Dom-AllProd-Week

Database processes

The calculation of the CFR plan for direct and affiliate customers involves copying the annual demand plan itself selectively for direct and affiliate channels to the row that stores the CFR demand plan for the direct and affiliate channels. This involves 2 CVLL (copy values lowest level) operations (one each for the 2 channels) that copy the row AnnualPlanConsensus to row AnnualPlanCFRDir&Aff only for the 2 channels. A model row decides the split of the consensus annual plan for dealer channel into CFR demand based on the history (last month's proportion). The same is copied at the

channelprovince-sku level to the database row AnnualPlanCFRDealer. This is a CVML (copy values lowest level) operation.

The CFR annual demand plans for all the channels are aggregated and stored in the row AnnualPlanCFR at the province-sku level. This is a CVLL operation.

At the end of the process, the database row AnnualPlanCFR holds the total CFR demand plan by shipto province at province-sku level.

An identical process happens for the monthly planning and weekly planning (whenever it happens). Only the database row names and the horizon for planning are different in these cases. In case of monthly planning cycle, there is a manual adjustment made to the CFR plan for the dealer channel based on the marketing activities planned by the BU before aggregating the CFR plan for all the channels.

6.2.19 REQ-OTHER-3 Outputs to Downstream Planning : ExW Demand

Business solution

The ExW demand is that demand in which the customer chooses the warehouse (plant warehouse or external) from which he wants to pick up the material while raising the order and expects the material to be available there. Hence, the estimation of this demand at the plant level needs to be done.

It is very clear from this document that the entire demand planning process focuses on the demand from sales and marketing perspective without getting into the delivery type (ExW/CFR). So the only solution possible is the splitting of the total demand plan (arrived at by SCI and CSM) into the CFR demand and ExW demand.

The CFR demand is computed as mentioned earlier in this document. The total ExW component of the demand plan is calculated by subtracting the CFR component from the total plan (this is done for dealer channel for bag SKUs).

The following logic is used for converting the total ExW demand to ExW demand by plants.

The DP solution captures the historical ExW demand by plant. It is assumed that the customer preference in terms of choosing a plant for ExW demand has a pattern. Hence, the historical split of a customer's ExW demand into warehouses (over past 6 months) is used to split the future ExW demand plan into different plants.

The ExW demand at plant — SKU level is finally sent to the downstream supply chain planning system.

DP design

DP database captures the historical sales data, both CFR and ExW separately. The rows are ActualSaleCFR and ActualSaleExW. These rows are used to split the total demand plan into CFR and ExW.

Since a customer can place an ExW order on more than one plants, the DP hierarchy can not be used to map a customer to a plant. Hence, the mapping of a customer ExW demand (historical or planned) to one or more plants is achieved through a set of database measures.

DP database maintains a set of rows to capture the historical ExW demand by plant. The database measures are (HorizonPlan + Shipping Condition+ Plant Number: for example, AnnualPlanExWl8A1)

Actual S aleExWl8A1, Actual SaleExWl8C1 , ActualSaleExW1311,

Actual S aleExW1321 , Actual S aleExW1411, Actual S aleExW1911,

Actual S aleExWl8D1 , ActualSaleExW18E1, ActualSaleExW18F1,

ActualSaleExW1511.

The row names have been defined to capture the warehouse code. The rows store the historical ExW sales data for sales at the particular warehouse.

Similarly, for demand plans (annual, monthly and weekly), there are database measures defined to capture the demand plan for ExW demand by plant. The database measures are

AnnualPlanExW 18A1, AnnualPlanExWl8C1, AnnualPlanExW1311, AnnualPlanExW1321, AnnualPlanExW1411, AnnualPlanExW1911, AnnualPlanExW18D1, AnnualPlanExW18E1, AnnualPlanExW18F1, AnnualPlanExW1511 (all for annual plans), MonthlyPlanExWl8A1, MonthlyPlanExW18C1, MonthlyPlanExW1311, MonthlyPlanExW1321, MonthlyPlanExW1411, MonthlyPlanExW1911, MonthlyPlanExW18D1, MonthlyPlanExW18E1, MonthlyPlanExW18F1, MonthlyPlanExW1511, WeeklyPlanExW18A1, WeeklyPlanExW18C1, WeeklyPlanExW1311, WeeklyPlanExW1321, WeeklyPlanExW1411, WeeklyPlanExW1911, WeeklyPlanExW18D1, WeeklyPlanExW18E1, WeeklyPlanExW18F1, WeeklyPlanExW1511

The overall ExW demand for the dealer channel is captured by another set of database measures called AnnualPlanExW, MonthlyPlanExw and WeeklyPlanExW.

Workspaces

Category: 11 Batch Jobs

Workspaces: 11.7 Dealer-Bag-Week

11.8 Dealer-Bag-Month

Database processes

The calculation of the final ExW plan (by plant) involves the following database operations.

A model row calculates the ExW demand by subtracting the CFR component from the total annual plan for dealer channel for bag SKUs. The same is

copied at the customer-sku level to the database row AnnualPlanExW. This is a CVLL (copy values lowest level) operation.

A set of model rows decide the fraction of total ExW demand to be linked to each of the plants based on the historical data. These model rows are copied to the respective plant level ExW demand rows at the channelprovince-sku level. This is achieved through a set of CVML (copy values middle level) operations.

At the end of the process, the ExW demand plan rows (by warehouse) mentioned above hold the ExW demand plan for the respective warehouses. The same is exported to supply chain planner at domestic market level to capture the total ExW demand at a warehouse.

An identical process happens for the monthly planning and weekly planning (in exceptional cases when S&OP plan is changed during the month). Only the database row names and the horizon for planning are different in these cases.

VII. EVALUATION

7.1 Comparing Actual Sales and Demand Plan before Implementing the Project

Before the project was implemented, marketing plan was managed by each responsible organization. CSM planed the domestic demand in dealer channel, SCI planed the domestic demand in direct and affiliate channel and SCT planned the export demand. All of the plans will be consolidated by SCI. After the annual plan distributed to each party, the plan have not been changed even though some party needed to change the plan. Hence, they will internally change.

The Table 7.1 shows the past demand plan at years' 2000 compared with actual demand of domestic market and the figure 7.1 presents the percentage of demand plan accuracy in year 2000. The table and the graph shows the percentage of accuracy fluctuate between 50% and 90%. The fluctuation of accuracy is very high and causes the company to keep at high inventory level. So, the inventory cost is higher than appropriate level.

Table 7.1. Comparing Domestic Actual Sales and Plan of Year 2000 ('000 Tons).

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dealer	Plan	41	40	52	42	46	50	54	53	59	52	47	45
	Actual	33	36	40	32	40	36	33	35	32	35	28	36
	'Yo Accuracy	80.49	90.00	76.92	76.19	86.96	72.00	61.11	66.04	54.24	67.31	59.57	80.00
Affiliate	Plan	163	168	169	110	122	114	151	158	155	134	135	133
	Actual	146	147	153	111	141	135	124	145	146	146	133	147
	% Accuracy	89.57	87.50	90.53	99.09	84.43	81.58	82.12	91.77	94.19	91.04	98.52	89.47
	Plan	29	27	30	25	30	29	24	24	23	23	23	23
	Actual	20	21	24	17	23	24	21	25	24	24	22	22
Direct	%Accuracy	68.97	77.78	80.00	68.00	76.67	82.76	87.50	95.83	95.65	95.65	95.65	95.65

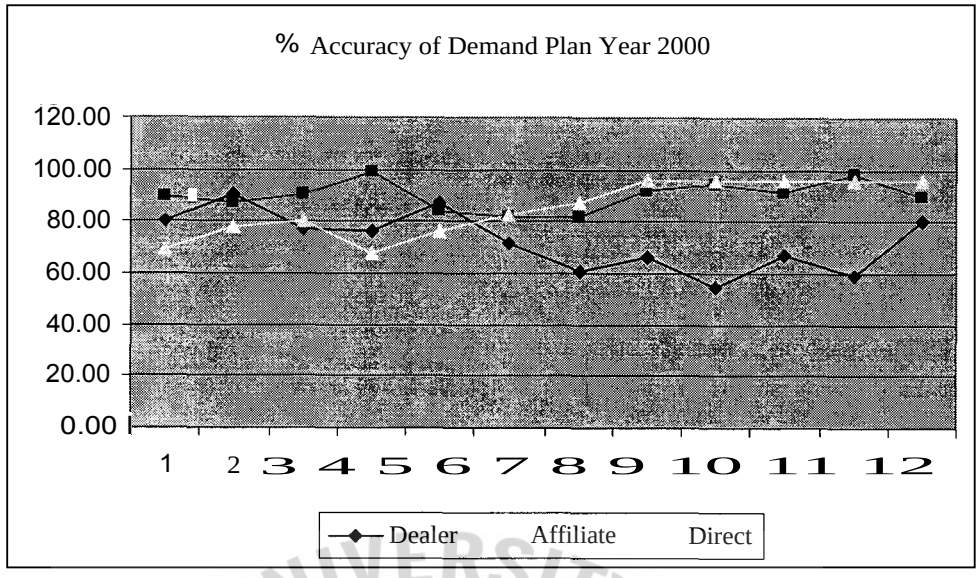


Figure 7.1. Percent Accuracy of Demand Plan Year 2000.

7.2 **Comparing Actual Sales and Demand Plan after Implementing the Project**

By year 2002, the 12 Demand Plan System was implemented and started to use the full scale of demand planning process on January 2003. The project improves the capability of demand planning process both quantitative and qualitative side.

Table 7.2 shows the comparison of domestic actual sales and demand plan in the dealer channel and analysis based on the "AliProduct" level of year 2002. After launching the first stage of the system on January 2002 to March 2002, the accuracy of statistical forecast is low, the average for three months being 51.83 percents. The first stage represented low accuracy because it was a tuning step to change to the new demand planning process. Hence, some data is wrong. After the first three months of year 2002, the statistical forecast accuracy is pretty good with the average forecast accuracy of 87.68 percents.

Table 7.2. Comparing Domestic Actual Sales and Plan of Year 2002: Dealer Channel.

„ o8raphy 1411neat,c,			Channel									
	lath Jnre		Dealer									
Product Wawa, ,,,	I		All Product									
	luni licr		A									
NIonil,Aur			.11,lr	ki,r	116,	lun	Jul	All,				LIe,
4,,i1 "ale, 11Q1,6	567,567	610,094	876,380	469,197	535,979	473,923	497,791	536,416	492,436	486,712	433,359	459,088
‘t.. IUZICYll (1,1,/	396.031	473.223	508,716	527.347	687,03(1	583,366	519,218	511,190	492,837	529,544	512,821	623,517
,, 51.1 101,1,	56.69	71.08	27.73	88.97	78.01	81.24	95.87	95.07	99.92	91.91	84.51	73.63
,, \ CCM AC \ "-.1,,. lop	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
'- 1,t1. (511 N1m,lhl,. l'1,1	((.00	0.00	0.00	(1.00	0.00	0.00	0.00	0.0(1	0.00	0.00	0.00	((.00
,. ,..,u 1unual PI," 1 mr,_A	61.57	60.74	34.20	91.09	91.43	97.91	99.66	94.28	95.17	99.60	99.06	95.99
- , ;L , , a,, -&111. 1 dr," l	85.15	98.32	60.72	81.76	97.37	97.13	93.56	86.05	97.46	95.55	90.58	95.72

Table 7.3 shows the comparison of domestic actual sales and demand plan in the dealer channel and analysis based on the "AliProduct" level of year 2003. This year, the project was implemented in full scale by using the statistical forecast based on forecast for Sales Representative (SR: bottom-up forecasting) and Demand Planner (CSM: top-down forecasting). The final demand plan was established against both bottom-up and top-down forecasting. Overall results of statistical forecast, SR forecast, CSM forecast and S&OP forecast are more than 80 percents of forecast accuracy.

Table 7.3. Comparing Domestic Actual Sales and Plan of Year 2003: Dealer Channel.

Geography Dimension,	1.e\ el	Channel							
	I n ';tance	Dealer							
Product Dmienshitr,	1 e‘el	All Product							
	hr,tance	A							
Vlaffith-1 ear	Jail	I eh	Mar	-\.l.ll-	'lay:	.llllll	Jul _	due	_Sep _
XellIal Steles 1 L1111'0	j83,689	514,696	600,096	514,332	591,473	541,799	515,699	537,595	535,121
Stall 1 orcv,i,t (I on.)	512,798	456,420	582,823	509,739	573,596	526,483	556,315	568,935	556,878
',, Vuurac';, slat 1.orecwo	86.18	87.23	97.04	99.10	96.88	97.09	92.70	94.49	96.09
8.ccurac SR Input	99.81	96.33	99.60	94.70	97.95	96.26	98.54	97.82	92.60
" . Neeu Cs N1 NImirlik Ilan	91.87	93.20	91.55	92.27	90.92	99.04	95.71	94.87	91.99
Accil Annual Ilan Target	97.21	81.21	78.97	89.91	86.78	85.06	95.40	95.16	98.73
% Accut ac';, s&op Tax p'ɪ.	96.21	81.18	86.06	98.68	92.90	98.28	95.60	99.31	97.09

First year, the project was decided to leave the quantitative demand planning in direct channel because the nature of selling product in this channel is based on sales force and policy. We needed to follow up the result of statistical forecast and it looked quite well with the average of statistical forecast accuracy over twelve months of 92.54 percents.

Table 7.4. Comparing Domestic Actual Sales and Plan of Year 2002: Direct Channel.

())..ogra ph v Dinwnsions:	I xvol	Channel									
	h,rance	Direct									
Product Rinten.i,us	Level	All Product									
	luso nc										
Month-1 c4r	.).i n	Feb	NT:ir	Ipt		it i	Jill		Ski,	(hr		
.1.clual ‹alc:.)Tuns)	...3,900	21,745	23,943	16,700	19,625	21,819	21,770	22,138	20,784	21,794	22,171	21,451
:•siat FOrt.C,11((I ons)	22,722	23,102	23,298	22,903	23,338	20,848	20,094	19,347	20,989	21,782	21,407	21,407
l] :N cc uracy Slat I·))) ec),-.1.	95.00	94.00	97.00	73.00	84.00	95.00	91.66	85.57	99.02	99.95	96.43	99,79
) Accu race !:,I4 Input	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
\CI.1 CS:VI MIIIIIII, PI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Y. Nccu Annual 1%0 I :tr.·el	0.00	' 0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
„ Accuracy !•1& 01' 1 417et	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

By year 2003, after considering both nature of selling product in direct channel and statistical forecast accuracy of year 2002, SCI decided to use statistical forecast to be a base value for the consensus of the demand plan and to avoid SR input and CSM input.

Table 7.5. Comparing Domestic Actual Sales and Plan of Year 2003: Direct Channel.

Geography Dim	Le‘ CI	Channel							
	flCC	Direct							
Product Dimensions	cl	All Product							
	ho,tance	A							
klonth-1 cal	.1411	Feb	\lac	Apr	)1a}	- ,Jun	Jul	Aug,	Sep ,
Actual Sale·i (Iwo	25,785	26,036	25,622	19,251	25,166	26,894	28,681	30,442	26,895
Slat Forecast (Tons)	21,649	22,144	23,141	22,514	26,482	24,643	22,172	26,389	26,363
Aeenrac Stat I oreca.1	80.89	82.42	89.28	85.51	95.03	90.87	70.64	84.64	97.98
1ccurneN SR Input	95.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
keen Nlouthly Plan	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
keel .1nnual Plan Fa rgei	94.73	97.96	94.55	83.61	97.96	98.84	84.93	92.33	95.01
Accu ruck s).“ 11' I))))2.O	90.60	82.83	94.90	77.01	78.65	92.65	99.61	94.48	87.18

Affiliate channel has the nature of selling product the same as direct channel, hence we use the same scenario to forecast as direct channel. So, the first year after implementing the project, we ignored the SR input, CSM input, and consensus process. The average statistical forecast accuracy is 90.90 percent in year 2002. Hence, by year 2003 the qualitative forecast was implemented only in the consensus process.

Table 7.6. Comparing Domestic Actual Sales and Plan of Year 2002: Affiliate Channel.

r,t 1. ·10 169,1669,	1,,c1		Channel									
	Ind., c		Affiliate									
Pi cdli, i 0.16,,,,	list		All Product									
	Ino mut,-		A									
Mnf1,11.1',.,	Jess	fel		Apr	11.,	Joe						Dec
,011.1i •:Alr,	23900.51	21745.57	23943.83	16700.12	19625.33	21819.7	21,77(1	22,138	2(1,784	21,794	22,171	21,451
,I a,	22722.71	23102.37	23298.31	22903.33	23338.93	20848.63	20,094	19,347	2(1,989	21,782	21,407	21,407
1. cur.,, Slot	83	83	68	97	98	94	98.73	8504	97.89	98.90	90.56	96.63
1.cLurao 'so Inpli,	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0,00	0.00	0.00	0.00	0.00
1,11 (.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0,00	0.00	0.00
,II	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S.,,r,,, ,N.I.t1.	0.00	0.00	0,00	0,00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 7.7. Comparing Domestic Actual Sales and Plan of Year 2003: Affiliate Channel.

(; phy Dimuroton,	.o. I	Channel							
	trodunce	Affiliate							
Product Diniiiio ions	I eii el	All Product							
	I etai,								
151 on 1- Year	- Jau	. refs	NI	AL_	\ fay	stun-	.101		SeE
\r16:11 ',les 1 f ull, ,	25,785	26,036	25,622	19,251	25,166	26,894	28,681	30,442	26,895
C.)1 I. o,r•s1 i 1 ,50,)	21,649	22,144	23,141	22,514	26,482	24,643	22,172	26,389	26,363
•111,., Sur Porreso	94.17	99.82	85.71	82.23	99.54	95.49	80.40	83.43	75.60
Arearaer 5)) lupin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arun t :iii!iri Miniihli Pl.o,	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
.User A IIIIII:1i Noll 1 arut	97.08	89.90	93.50	78.84	89.02	80.69	93.39	99.54	77.82
, i Accuracy S&OP Fargo	97.48	92.09	94.38	81.10	89.86	97.58	91.42	84.13	91.94

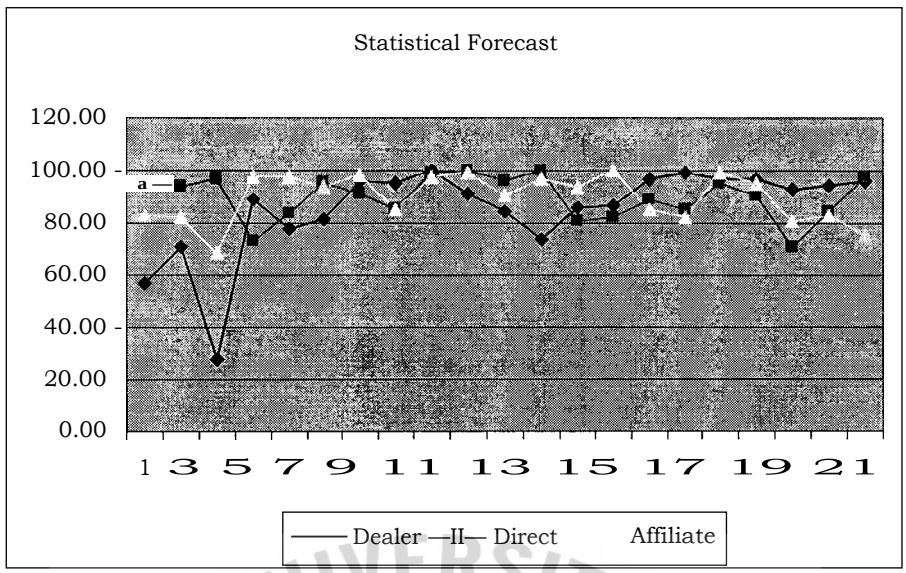


Figure 7.2. Percent Accuracy of Statistical Forecast Year 2002-2003.

Percentage of statistical forecast accuracy and S&OP demand plan accuracy fluctuate in year 2003 between 70% and 90%. The fluctuation of accuracy is lower than year 2000.

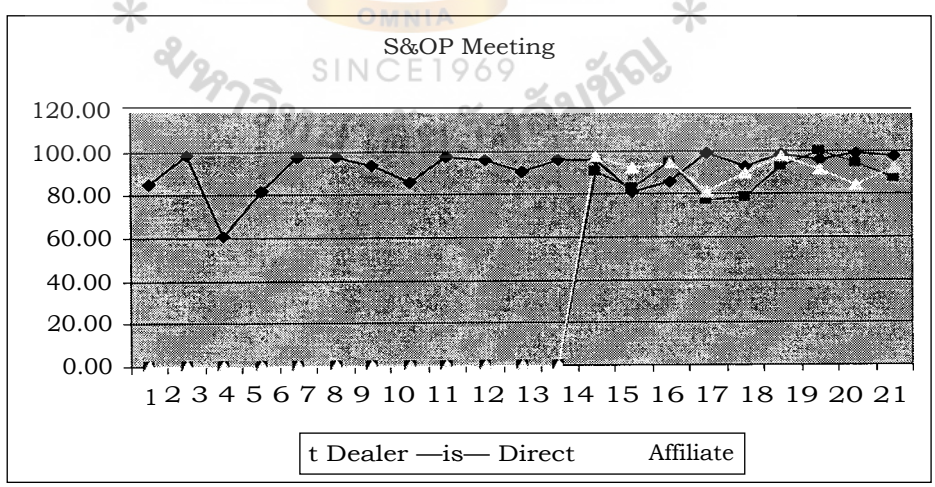


Figure 7.3. Percent Accuracy of S&OP Demand Plan Year 2002-2003.

The statistical forecasting accuracy of Tiger cement that are presented in table 7.8 and table 7.9 is pretty good (more than 90% for year June 2002 - Sep 2003) because the actual demand of Tiger cement is a clean demand (almost all of tiger cement distributes through dealer channel and the demand represents the retail market demand). Tiger cement uses "Pull Strategy" that causes the demand pattern seems like a stationary demand or a continuous trend.

Table 7.8. Comparing Domestic Actual Sales and Plan of Year 2002: Tiger Cement.

;cortAphy D1111,111101.:	I'-'T'l		Market									
	Int,,,,,,,		Domestic									
n,,,Mici rumrn·icu,	E.,,r,		Product									
	ht,t•rnr		Tiger Cement									
ylmn11-1 car	Ic	Frb	NI,	46,-	VI,	.Jun		116:,		t	Not	It,.
0,6,1 ',Ic, crr,,,	363,856	374.82(1	495,630	271.923	348,836	302,159	315,561	340.958	313,818	313,714	280,070	311,169
,, Fur,,..4.1 ill.',	294.819	355.942	342,847	349.491	392,005	311,193	294,216	310.163	305.730	335,064	320,257	388,735
era 0 Sot I tme,..ut	76.50	94.70	5544	77.81	88.99	97.10	92.75	90.07	97.36	93.63	87.45	80.05
a,·_,. .,I·t Inptii	18.97	5.04	30.83	28.53	12.38	2.99	6.76	9.03	2.58	6.81	14.35	24.93
'.. ',,,,I 54 M.10 hl, 1'1,1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
.. .0,cti '1111,1.111%11 ⁞ -;;,1	0.00	0.00	0.00	0(01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
o ,,,-.6.3 ',NOP 1, ,,:t	82.59	85.95	74.66	83.07	96.36	91.79	95.48	96.92	91.44	95.07	97.09	96.70

Table 7.9. Comparing Domestic Actual Sales and Plan of Year 2003: Tiger Cement.

I;coglaptiy Duncnsion,	Level	Market							
	I (1)0000	Domestic							
l'endmi Duni:11,111S	1.„-eve1	Product							
	[mimic,'	Tiger Cement							
NInntit-3rnr	Jan	felt	Mar	Apr	,0t		Jul	4uJ	Sri)
Ar1.41 Salt, t I tlt,.t	370,289	325,796	371,697	330,084	362,222	331,436	316,715	328,827	330,413
',tat F0r0o3st t (anti	315,177	308,118	391,720	314,803	354,609	321,437	340,875	349,142	340,128
ceurAcy ?tat En0ec.10	82.51	94.26	94.89	95.15	97.85	96.89	92.91	94.18	97.14
"ı Acctu·aco 611 Input	14.88	5.43	5.39	4.63	2.10	3.02	7.63	6.18	2.94
"•,, ..t roil (•ti VI N1011114i. I'lli 1 i	93.48	96.66	96.51	91.59	97.48	97.51	97.73	97.51	93.00
o (0 .0 notml Plan ·La 2,l'i	91.85	91.35	91.90	90.23	94.87	96.49	95.27	95.93	92.55
%Accuracy 7, S.. (.11' TArget	96.70	86.05	82.02	96.32	88.67	86.51	94.24	94.05	98.24

On the contrary, Elephant cement uses "Push Strategy" by sales force to achieve growing market share. Elephant cement is sold through direct channel for big project. Hence, the Elephant cement needed to re-estimate demand by S&OP meeting.

Table 7.10. Comparing Domestic Actual Sales and Plan of Year 2002: Elephant Cement.

Cit.'',t Aplly 0111,6,',,.	1.4.,c1			Market								
	liotAiii ir			Domestic								
1 ,luct 6,1111,1,,,,,,	I,, ,:1			Product								
	111.mo.			Elephant Cement								
Nttllit11-11C-It	1,11				11	.161,	Jul			i		
1c1,...,I.S111,:m 11 .,,,,,,	299,472	337,738	454,109	314,830	336,963	341,481	342,840	370,881	340,635	336,305	305,833	312,188
4.,1 FH,,,,411 :1v1111	238,312	249.735	288,508	286,312	386,866	369,407	337,202	345,874	345,113	361,596	357,700	399,701
,,,,wean Sr.,, 0.,,,..1,	74.34	64.76	42.58	90.04	87.10	92.44	98.33	92.77	98.70	93.01	85.50	78.11
ir .l :;11 111,11	20.42	26.06	36.48	9.06	14.81	8.18	1.64	6.74	1.31	7.52	16.96	28.03
(SM Nto,11111,. (.1,1,	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
".. 1,11 A111111.11 Phil 1.11',-t	0,00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1 At y S5,111r 14rj,,,	0,00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.110

Table 7.11. Comparing Domestic Actual Sales and Plan of Year 2003: Elephant Cement.

(;coi4raph) Ihmen'jons:	l c';c1			Market					
	Instance			Domestic					
PrndIncl Diincn,ion...	1 6.\, c1			Product					
	Instance			Elephant Cement					
Mont((-'\ ear	.lan	1-61)	Nlar	Apr	'day	J un	Jul	Aug	Scp
Actual 5alc; (Cons)	366,919	334,005	383,242	295,045	376,949	351,890	340,108	376,219	381,537
',tat 1. orccast (Ions)	357,986	306,354	333,686	338,602	365,976	343,494	389,027	419,422	355,359
kccura Stat Forecast	97.51	90.97	85.15	87.14	97.00	97.56	87.43	89.70	92.63
"" &cc SR Input	2.43	8.28	12.93	14.76	2.91	2.39	14.38	11.48	6.86
o ·cr'n c","1 Niunthly Plan	95.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
kccu Annual l'hin I a rget	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
.. A ccu, acy S&OP "Catgut	91.93	81.29	83.24	78.64	87.17	83.53	98.78	96.95	86.45

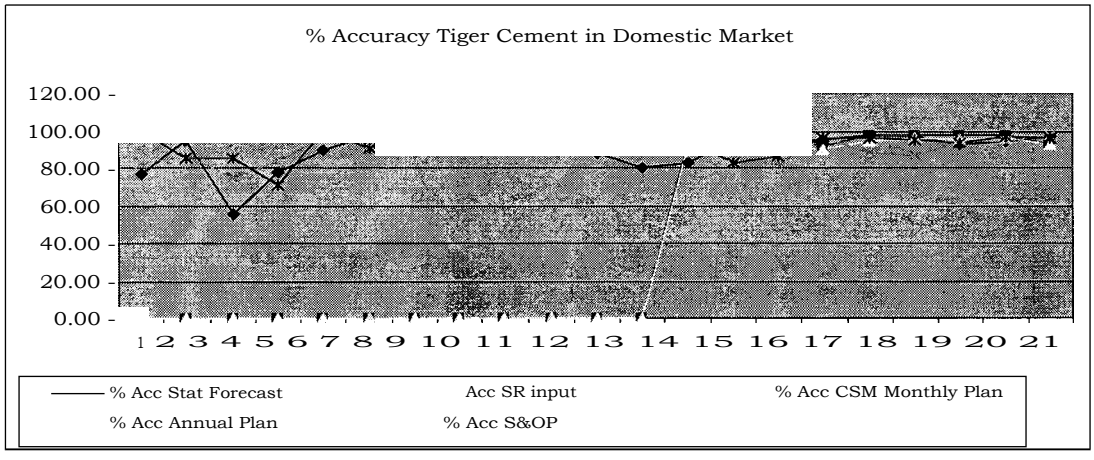


Figure 7.4. Percent Accuracy of Tiger Cement Demand Plan Year 2002-2003.

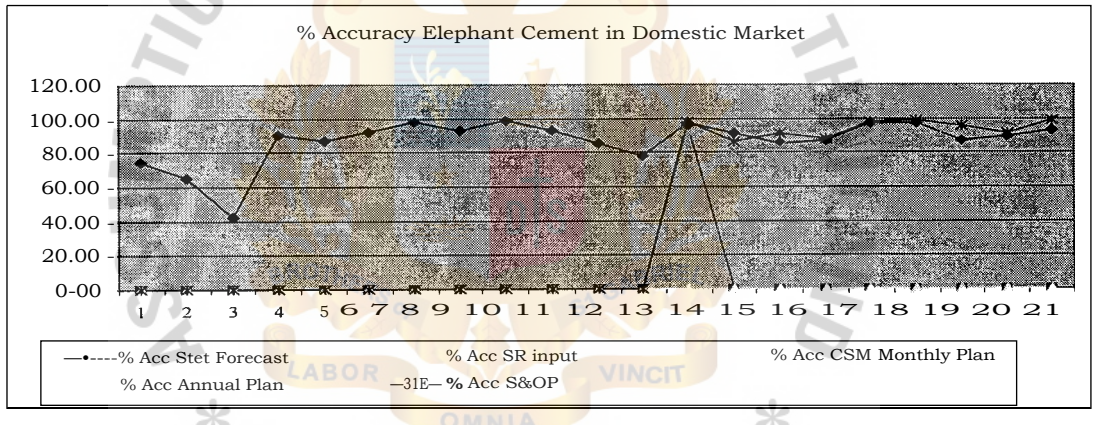


Figure 7.5. Percent Accuracy of Elephant Cement Demand Plan Year 2002-2003.

The real benefit of supply chain implementation comes from repairing broken business processes. The Conceptual Demand Planning for Siam Cement Industry CO., LTD. project is the starting point of supply chain system. Accuracy of the data becomes a crucial factor of the system's successes. The success of the project needs the coordination of every party: SCI — manufacturer, CSM-domestic marketing, SCT-export marketing and CTL-Transportation planning.

VIII. CONCLUSION AND RECOMMENDATION

8.1 Conclusion

This project examines the design and implementation of a Conceptual Demand Planning for Siam Cement Industry Co., Ltd. for implementing one part of the total Supply Chain System. The implementation process consists of 5 steps as follows: analyzing the requirements definition, architecture design, detail design, implementation and project evaluation.

The project gathered the requirements with a work shop method whose first session was to study the existing processes; the second session was to find out the gap and the opportunities to close the gap, and then coordinating with users to design the expected process based on a scenario basis.

The architecture designing started by design the three dimensions of 12 demand planning system. First dimension is Geography Dimension that consists of 3 views (Channel View, Region View, and Customer View) and 14 levels (Business Unit, Market, Channel, Dealer, Direct, Affiliate, Export, ChannelRegion, ChannelSubRegion, ChannelProvince, Region, Province, CustomerGroup, and Customer). Second dimension is Product Dimension that consists of 3 views (Category View, Pack View, and SKU View) and 8 levels (All Products, Category, Subcategory, Product, ProductPackType, PackType, Pack, and SKU). Last dimension is time dimension that consists of 1 view (Primary View) and 5 levels (Year, HalfYear, Quarter, Month, and Week). The linkage of input and output of the Demand Planning System was designed base on SCI infrastructure.

Demand Planning processes is categorized into two plans that are Annual Plan and Monthly Plan. The starting point of both demand planning 'processes are preparing

statistical forecast using historical data from SAP source. The system will use simple statistical forecasting techniques such as moving average and triple exponential smoothing by varying the three factors (a, (3, and 7) then use the "PickBest" function that 12 Demand Planning provides to find the least MAPE from all of the pre-defined models. The statistical forecast will be the base forecast data. Then Planner will plan both bottom-up and top-down planning and have consensus of the plan. The consensus planning will be the output of Demand Planning System and will be the input of Supply Planning Process and Sales and Operation Meeting.

Before the project was implemented, marketing plan was managed by each responsible organization. CSM planned the domestic demand in dealer channel, SCI planned the domestic demand in direct and affiliate channel and SCT planned the export demand. All of the plans will be consolidated by SCI. After the annual plan is distributed to each party, the plan have not been changed even though some party needed to change the plan. Hence, they will internally change. Past demand plan at year 2000 is compared with actual demand of domestic market. Percentage of accuracy fluctuated between 50% and 90%. The fluctuation of accuracy is very high and causes the company to keep at high inventory level. So, the inventory cost is higher than appropriate level.

By year 2002 the 12 Demand Plan System was implemented and started to use the full scale of demand planning process on January 2003. The project improves the capability of demand planning process in both quantitative and qualitative sides. The statistical forecasting accuracy of Tiger cement is pretty good (more than 90% for year June 2002 — September 2003) because the actual demand of Tiger cement is a clean demand. Tiger cement uses "Pull Strategy" that causes the demand pattern seems like a stationary demand. On the contrary, Elephant cement uses "Push Strategy" by sales

force to achieve growing market share. Elephant cement is sold through direct channel for big project. Hence, the Elephant cement needed to re-estimate demand by sales and operation meeting.

8.2 Project Recommendation

A good practice to successfully implement demand planning system consists of 7 principles

(1) Integrated Forecasting, Planning and Execution

(2) Cross-Functional Forecasting Process

(3) Top-Down, Bottom Up, and Adjustment Capabilities

(4) Pull-Based Demand Signals

(5) Statistical Forecasting Techniques

(6) Performance Monitoring and Tracking

(7) Product Life Cycle Library

The project was implemented by starting on the principle number four. It extracts actual demand from SAP and generates statistical forecast by "PickBest" function to select the best forecasting among pre-defined models such as moving average method and triple exponential smoothing that satisfy principle number five. All parties concerned, SCI-Manufacturing, CSM-Domestic Sales and Marketing, SCT-Export Sales and Marketing, and CTL-Transportation Management cooperate to share the internal constraint, give the demand forecast of each party view, and execute operation by following the consensus plan that serves principle number two, number one and some part of number three. Percentage of demand plan accuracy will be reviewed by every party in S&OP meeting then they will contribute the solution in case of having any problem. The last one of the 7 principles is Product Life Cycle that is executed

when the company launches the new product. They can use the historical data from the same characteristic of product for forecasting the future demand.

The project reaches all of the 7 principles except principle number three because at downstream side of cement product chain is end-customer who purchases cement for building their house and other purposes. The project can implement the end chain of bottom-up forecasting based on the information from the Siam Cement dealers.

8.3 Future Project

This future project will set the KPI project for SCI Supply Chain System related to accuracy of demand planning process. The potential to establish the next KPI project for monitoring and finding the gap of demand accuracy problem in the case of demand forecasting accuracy is low. Large benefits achieved by Supply Chain Management are the reduction of inventories, especially in the decrement of safety stocks. Demand uncertainty is one of the important factors influencing the safety stocks control. The purpose of Demand Planning is to improve decisions affecting demand accuracy and calculation of buffer or safety stocks to reach a predefined service level. Demand Planning means predicting future sales. Forecasting methods were developed to incorporate information on the history of a product/item in the forecasting process for future figures.

The four perspective views of KPI should establish to comply with the company strategies that support specific vision. KPI of each perspective view must support each of perspective view.

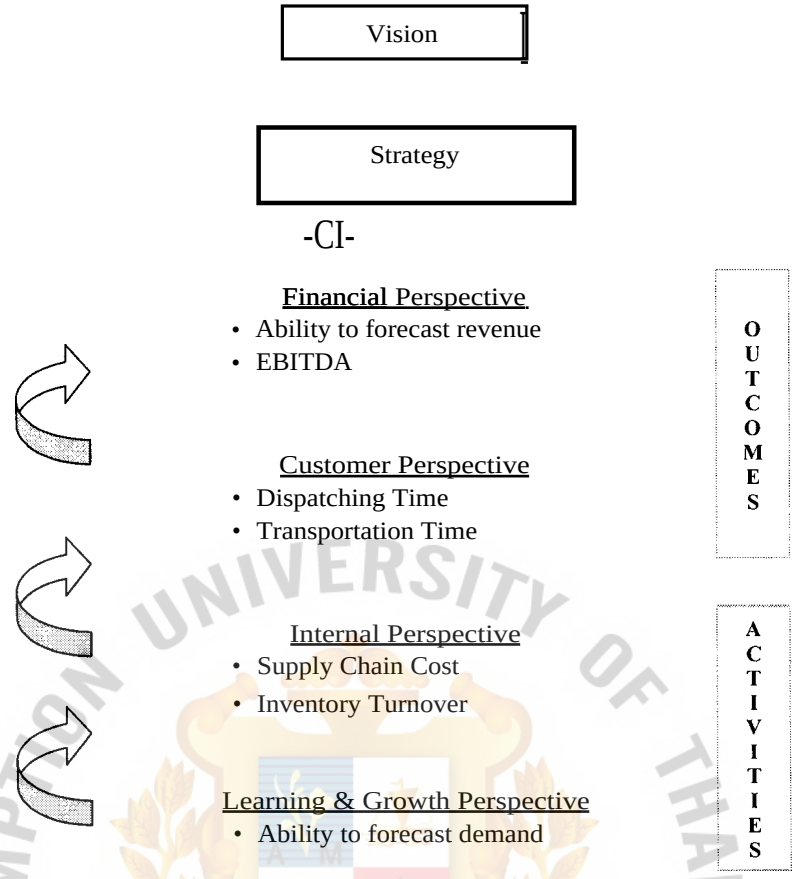


Figure 8.1. Suggested KPI.

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