Models in Management Science: Issues in Implementation

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Abstract

Based on an empirical analysis of several real-life case studies in this paper, we identify the key drivers for maximizing the chances of successful implementation of management science models. The choice of (technique) methodology used, model sophistication, top management involvement, training and orientation of middle management cadre in the organization, intensity of competition, perceived fear and anxiety in implementing the new solution procedure by the front-line staff, and the involvement of an implementation agency in the organization emerge as some of the key elements that influence the effectiveness of the implementation process. Based on the experience of these situations, we propose a broad framework for an effective implementation of management science model.

Introduction

The ultimate purpose of an Operations Research Practitioner (ORP) while suggesting solutions to problems is to see the implementation (and realization of the benefits anticipated) in a real-life context. Unfortunately, such a desirable and much sought after expectation does not get happen often, due to several reasons. It is easy to understand and correct problems of implementation if we conceptualize the real-life problem solving process in three different stages, viz., problem formulation and finding a desirable solution (professional assignment to the ORP), understanding the implications of the proposed solution in a given context (joint effort between the ORP and the organization) and the actual implementation (a special team formed within the organization specifically for this purpose).

Often, excellent models do not get implemented because of the complexity involved in implementing a solution in a given context, changed conditions in which the firm or organization operates, and the lack of enthusiasm in the organization in implementing the proposed solution. In the Indian context, implementation is at best complex and tedious. Only a small percentage (actual estimates are not available) of completed studies are actually implemented. Needless to add, such poor responses to implementation lead to lack of motivation among ORP in finding appropriate solutions to real-life problems. Consequently our discipline does not grow in stature and importance among business community and its credibility is eroded.

This paper is an attempt to identify (based on an empirical study) the key drivers that contribute to effective implementation of management science models in real life. Based on these observations, we propose a framework to facilitate their effective implementation.

This paper is organized in three sections. The work reported here is based on our experience (either as an ORP or as an academician) in dealing with several real-life situations. The first section, based on these experiences, identifies a set of critical drivers related to successful implementation of a management science model. In section 2, we

develop a framework to implement a formal model. We conclude this paper with a brief description of the situations used in the research.

To begin with, it may be useful to identify the key components of the implementation process of any management science model. They are (a) the model content and the nature of the proposed solution, (b) the organizational context (including the industry) to which the solution is proposed, (c) mechanisms / processes available in the context of the organization to implement a change management process, and (d) the motivation by the management for initiating such an intervention.

While these four components have a significant role in the implementation process, it is useful to realize that the ORP has a limited role in influencing all the stages of the implementation process. Often, the ORP is an outside technical expert who is invited to provide advice on addressing a real-life problem. In case the ORP is an in-house expert, often, implementation is influenced by the (revised) business priorities of the organization.

Implementing Models for Management Science: Key Drivers

- **Selection of an Appropriate Methodology in Modeling a Situation**

In resolving a real-life situation, the ORP is tempted to use the most sophisticated tool, technique or methodology in resolving a particular situation. Often, an ORP is driven by an ambition to exhibit his scholarliness, in-depth knowledge and expertise on the subject. So long as the end result and recommendations are easily understood by the relevant user, the choice of technology and its sophistication is irrelevant. When the users are involved in the design and development of the model, several other factors like the familiarity of the users with reference to a particular solution, the methodology, the involvement of the users, and the need for comprehensive detail in the modeling context would be relevant. The situation is characterized by conflicting demands and requirements. While the user is driven by the need to solve a problem, the ORP is motivated by the internal satisfaction of using a sophisticated technique. An appropriate choice balancing the interest of the user, the context, and the ability of the ORP would maximize the chance of successful implementation. An inappropriate combination or choice would reduce the chances of successful implementation.

This is best illustrated in the example of the supply chain realignment (redesign) of Revised National Tuberculosis Control Programme. The programme was characterized by multiple stakeholders, lack of goal congruence and objectives, and limited ownership and responsibilities. Consequently, the system had either too much of inventory (of drugs) or excessive shortage. The World Health Organization (WHO), which was piloting this programme, sought assistance for improving the system. In his excitement to improve and overhaul the system, the solution provider suggested a highly sophisticated solution by using a combination of new initiatives like strategic outsourcing, dispensing activities which are not adding value, and simplifying procedures with an extensive use of information technology. While the proposed solution was the best possible under the circumstances, the sophistication of the methodology and the lack of involvement of users contributed to limited interest in its implementation. For political and diplomatic reasons, WHO did not push for actual implementation. The ORP had a limited role in implementing the new system.

- **An optimal mix of contextual relevance, user sophistication, and professional satisfaction of ORP would maximize the chances of model implementation.**

In modeling a real-life situation, the ORP faces some difficult choices on the methodology and the selection of degree of model sophistication. The real trade-off is actually between the accuracy of the model (closeness to the real-life situation) and the model complexity. This manifests in making appropriate choices related to linear vs. non-linear approximation of relations used in the model; deterministic vs. stochastic nature of representing the variables, obtaining formal closed form solution vs. developing algorithmic procedures; and analytic formulation vs. simulation based models. Usually, the conflict is between the professional excitement of the ORP vs. the real need for such approaches. Again, the guiding factor in making the choice and trade-off is what is needed for the model - the user comfort in the proposed procedure, the additional insight obtained in the context of the model by using a sophisticated procedure. We are not advocating a crude approximation to the real-life situation (this may well be the case if a quick insight is needed), but propose a pragmatic orientation and approach.

Consider the following examples:

- The Tirupati Tirumala Devasthanam (TTD) management wanted to replace the physical queue of the pilgrims by a virtual queue. Under the new dispensation, a pilgrim was given a due time (date) for visit and darshan. This was made possible by considering a model based on the average load on the system and service rate, and arriving at an estimated time for darshan. While this model is approximate, it is good enough to deal with the situation. Any alternate model would have made the analysis possibly more detailed but surely would have complicated its implementation.

- Bajaj Auto Limited used simple spread sheet computations to estimate the reduction in the wastage for various combinations of metal sheet cutting plans. Usually, such applications are formulated as mixed integer programme. However, by exploiting the contextual information, a far more simple approach (based on spread sheet) was attempted.

- In the context of Sree Cement, in order to optimize the distribution cost, a planning model was formulated as an integer programming problem incorporating origin destination requirements and mode (rail / road) choices. However, keeping the user sophistication into consideration, a simple heuristic approach was developed to consider various alternatives related to logistics planning. While this could not ensure implementation, such an approach played an important role in reducing the inertia in adopting scientific approaches to logistics planning.

- A sophisticated simulation model to quantify the trade-off between the stock-outs and service level for various policy parameters in managing blood bank operations evoked very little response and enthusiasm from the blood bank administrators in a range of hospitals. Even though the ORP felt that the model was detailed, realistic (as it involved all appropriate stochastic elements), and was customized to specific blood banks, the priority of the blood bank administrators was completely different and was driven by efforts to augment supply (of blood) rather than managing demand and supply effectively. Again, an illustration of the disconnect between the model, priority of the administrator, the user, and the expectations and expertise of the ORP.

- **Top management involvement is critical to implementation**

Based on our experience and also the experiences reported in the literature, the single important driver to ensure smooth implementation of a management science model is the top management support. Actually, the top management support and the resultant leadership style sets the pace for the implementation exercise in the context of the organization. The following illustrations would support various dimensions related to this critical enabler.

- The merger between Standard Charted Bank and Grindlays Bank was piloted and monitored closely by the top management and was completed on time with expected benefits.
- The procedure related to the management of religious procession in Ahmedabad was substantially modified for enhanced effectiveness and institutionalized by the leadership of top management in the Ahmedabad police department.
- The simulation experiment which quantified the capacity augmentation of Indian Railways did not lead to any change in policy option due to lack of support from the top management.
- The top management judgment in Hindustan Industries Limited (guided by middle management) led them to explore seriously the resource augmentation option rather than the process simplification option proposed by the ORP.

It is useful to realize that the top management support is not always guaranteed or focused towards implementation of specific recommendation. It depends on the context and the organizational dynamics. Often, studies are commissioned to understand a phenomenon or delay a proposed solution or to manage conflicts within the organization. Also, the top management may not have the intention of changing the status quo. Lack of appreciation of these factors by the ORP would only lead to frustration.

- **The implementation pace and its impact is strongly influenced by the training and orientation of the mid-level executives in the organization.**

The involvement and participation of the mid-level executives in organizations are quite varied. Several organizations use them only to execute or implement the decisions that are made by the top management. Some organizations involve the participation and finding solutions to management issues. There are few very organizations that have developed an eco-system or organizational culture by which the middle management can participate in problem-solving. In such an environment, the middle management is endowed with skills related to problem-solving. This can accelerate the implementation of solution procedures proposed.

Unfortunately, in the Indian context, several organizations involve the middle management only at the execution level. There is an acute shortage of middle level management with appropriate skill sets in management models.

For example, Madras Refineries Limited (MRL) did not have adequate and competent staff to formulate and run a Linear Program model for blending operations which is a standard application in the international context. The Christian Medical College and Hospital (CMCH) at Vellore did not have appropriate talent in the department to manage its materials function. The same is true for Cholan Roadways Corporation (CRC) and the Indian Railways. The passenger reservation system of Indian Railways needed skills from outside the organization.

The limited skill level in formal management models of middle level management complicates the implementation process and is a drag on the realized effectiveness of the proposed solution procedure. For example, in the logistics distribution planning model for Sree Cements, the ORP was constrained to settle for a heuristic procedure to relate the model to the skill base and knowledge level of the functional executives of the organization. Obviously, this is a compromise on what can be achieved (an optimal solution was feasible).

- **The intensity of competition accelerates the adoption of effective management models.**

The intensity of competition usually triggers two different levels of responses. The first response focuses on enhancing the resource productivity resulting in better control on cost and consequently flexible pricing in the market place. Enhanced resource productivity is feasible by innovative methods of work or radically different ways of allocating resources. Management science models are immensely suitable for such interventions. The other response is to differentiate the product(s) and service(s) offered by the firm in the context of industry competition. Such efforts usually require a change in the delivery processes to identify and eliminate the inefficiencies in the system. Again, OR methodology is a potential route to realize this improvement.

Based on our examples, Western India Chemicals Limited (WICL) was trying to improve the cost of its logistics operations in response to the competitive environment in which it was functioning. While the models proposed were comprehensive, the lack of cooperation between marketing and logistics departments did not allow the organization to realize the full potential of the recommendations. The inability of the top management to co ordinate these two functions in the context of competition was an additional factor in not realizing the benefits of the proposed models.

However, in the context of TTD, the competitive environment and the aggression of the organization was replaced by the willingness of the management to convert TTD into a pilgrim-friendly town. This desire coupled with leadership which was action-oriented designed a new system to reduce the waiting time of the pilgrims and oversaw its implementation.

The SCB and GB amalgamation and consolidation is a direct response to emerging market opportunity and competitive banking environment in India. Again, as mentioned earlier, there was an organization-wide support for the project. Able leadership, well coordinated team work, and clear milestones led to the successful project implementation.

The materials management exercise initiated both at CMC, Vellore and CRC are direct responses by respective organizations to the competitive environment. In both the

situations, the respective organizations were attempting to contain cost without compromising on deliverables to the customer. In the implementation phase, CRC drifted away from its objective. CMCH felt that the first phase of the project was to sensitize the middle management on the need to control material cost and hence did not move to the second and final stage of implementation.

- **The management's effective handling of the perceived fear and anticipated accountability by the middle management in the context of the proposed new solution is a facilitator for implementation.**

Often, scientific methods (new or improved) tend to be system-based and are independent of individuals who are managing the system for a long time. Also, formal methods reduce the scope for customized solution as existed before. Usually, the middle management and front-line staff are unsure of how the proposed new system would impact them. There is a fear of unknown developments and improvements. There is anxiety. The combination of all or some of these parameters motivates the middle management team to work against the proposed solution and hence delay or derail the implementation process. The senior management should handle these anxieties by information sharing and a coaching process to smoothen the implementation process. Some of our experiences support this.

In the context of TTD, there were several apprehensions by the stakeholders like shop keepers, vendors, and security agencies regarding the impact of the proposed system on their day-to-day life. The management understood their anxiety and responded by detailed counseling and data support to assess the impact of the proposed system on the stakeholders which ensured smooth implementation.

In Bajaj Auto, the system driven optimized solution for metal sheet cutting plan was used as a benchmark to evaluate the performance of the machine operators. Since the operates believed in the superior performance of the proposed system, they readily adopted the proposed system. Further, the operators did not view the system as a threat to their authority but realized and positioned the new system as a win-win situation by which their productivity and performance can be improved and, at the same time, the trim losses can be minimized. This unique positioning of the proposed solution greatly facilitated its implementation.

The passenger reservation system of the Indian Railways and the ticket accounting system in road transport organizations were easily adopted by the front-end staff primarily because they eased their operational responsibilities and allowed them to reconcile accounts rapidly at the end of the work shift.

In the SCB and GB merger project, some redundancies in workforce was anticipated. This was handled by a transparent information sharing process and a generous severance package. By virtue of the uniqueness of the process, and involvement of stakeholders, implementation was easy.

In the context of Sree Cements, the proposed logistics planning was positioned as a bench-mark in monitoring the performance of the logistics group. The top management did not adequately address the concerns of the group nor clarified the expectations. Consequently, the implementation was not complete even though adequate training sessions and several trail runs were conducted for the plant staff.

A Framework for Management Science Model Implementation

In this section, we propose a framework by which the implementation methodology of management science models can be made effective.

- The ORP must assess the involvement and association of the top management in the proposed solution. It is also important to understand the motivation for the proposed intervention. In other words, seeking the involvement of the top management may be the first critical step in the subsequent implementation process. Unless the purpose of the study was only to understand a phenomenon, it may not even be advisable to be a part of the study without top management involvement and explicit support.
- The critical need for the proposed intervention should be assessed based on the competitiveness of the industry, the realized position of the unit, its ambitions, and the positioning of the application in the overall context of the organizational priority. Positive signals based on all these parameters would encourage the ORP to work on the proposed opportunity. Alternatively, the ORP should be able to clearly and convincingly argue the strategic importance or relevance of the proposed model in the

overall context of the organization and enlist the support of executives who matter in the organization.

- The ORP must assess the scientific maturity of the mid-level and senior executives. As explained and discussed earlier, the choice of the technique used in the proposed methodology would be decided based on this critical input. The ORP need to exercise his judgment between the usage of sophisticated procedures vs. useful and understandable solution procedures from the users' perspective.
- The ORP may want to advise and prepare the middle management regarding the challenges in implementation from the beginning. This can be done in several form, viz., by involving the users from the beginning on problem-solving and problem identification, using their role in obtaining relevant data, periodically sharing with them on the progress of the model, and, actively involving them in generating solution options and procedures.
- Periodic training and, orientation on the usage and maintenance of the system would be an added advantage during implementation.
- Responding to the uncertainty, anxiety, and apprehensions of the middle management related to the new procedure is critical. The ORP along with the implementation team should evolve a comprehensive plan and strategy to deal with this situation.
- Usually, implementation teams which are piloted by the internal team in the organizations have been found to be very effective. A recommendation or a solution procedure made by an ORP with very little support during the implementation phase would drift towards no implementation.
- There may be a need to form an implementation team specifically based on the complex nature of the application. The ORP may or may not be a part of the implementation team based on the specified terms and conditions of the engagement.
- The major risk for any implementation process is the relative priority to the new models in the scheme of things in the context of the organization. There is usually a gap between the ORP proposed solution, the role of the ORP, the absence of an implementation team, and the perceived organizational priority for the new procedure. For successful implementation, this gap should be bridged as early as possible.

A Brief Description of the Situations Used in this Research

1. **Cholan Roadways Corporation (CRC)**: In the context of this state-owned public transport utility, the basic purpose and felt need for the intervention was a need to have better control on cost of operations. Effective materials management (including spares and consumables) was considered to be a significant opportunity. It was proposed to computerize the material management system to get a better handle on the materials function by taking advantages of developments in information technology. The CRC has had very limited exposure of computer applications. Almost everyone in the middle and senior management had no exposure to management concepts, skills, and techniques. This initiative was proposed essentially by the top management. Once the materials management system was designed, the implementation was completely left to the departmental heads. When the implementation was at the early stages, there was a change in the top management of CRC. Eventually, the implementation drifted from a project to an activity of no major consequence. The ORP had a very limited role in accelerating the pace and scope of implementation.

2. **Capacity Planning in Indian Railways:** The Efficiency Bureau of the Indian Railways - the equivalent of operations research department - sponsored a project to study the impact of bunching of trains (passenger) of similar speed on the capacity to carry more passengers by the same infrastructure. The need for such a study was felt due to stagnant growth on rail network, congested rail network as a consequence of trains operating with wide range of speed, and emerging competition from road transport (to rail) on short distance travel of up to 200 kms. Simulation was used as a methodology to study and quantify the impact on the number of additional trains that can be run if the speed of the trains was made uniform or if trains with comparable speed departed in the same time window. The study showed an improvement of up to 60 percent in capacity in several railway sections. The Efficiency Bureau brought the details of the study, to the top management's attention with a hope that some policy changes on capacity management would be initiated. Unfortunately, this concept was not received by the top management enthusiastically. Due to lack of demonstrated political will, the follow up of the study to policy formulation did not materialize. At

the tactical level, the project met the stated objective of quantifying the benefits of bunched scheduling on capacity expansion.

3. **Madras Refineries Limited (MRL):** The MIS department of the state-owned oil refinery initiated and developed a linear programming model to plan the blending operations of the unit. While the application was developed in a span of few weeks, the attention of the top management was fully occupied with process automation-related activities in the refinery. In fact, there was a separate project team and eventually a department was created to plan and execute process optimization activities. While the benefits of process optimization were evident, the initiatives related to optimized blending operations, optimal crude sources, efficient distribution of product, and optimal mix of refined product would only enhance the competitive advantage of MRL. In fact, this is a standard scheme of several refineries in the international context. However, in the context of MRL, such a progressive view was not evident. In fact, the management decided to focus somewhat narrowly on process optimization and spent significant time and energy in perfecting this process. Inadvertently, what should have been a complementary set of initiatives became a somewhat marginalized initiative in the overall context of refinery activities. Partially, the state-owned nature of the organization contributed to these developments. Quite expectedly, the MIS department did not consider developing any such optimization models subsequently.

4. **Christian Medical College and Hospital (Materials Management System):** Being a charity organization, the ability to control cost is an important aspect of the hospital's functioning. A large number of items in various categories like consumables, pharmacy items, linen and laundry, surgical consumables, medical suppliers, etc. significantly contribute to the cost of patient care. Over a period of time, a large section of hospital team members like General Superintendent, Medical Superintendent, Head of the Departments, Finance, Nursing Superintendent, etc. were involved in managing these items. Consequently, the synergy that was possible among them in managing this function was not achieved. There was a felt need to bring various players together to improve the efficiency of the hospital supply system. The scope of this intervention was to identify an appropriate structure for the department, operating policies to manage inventory, a proper accounting system for

consumption monitoring, the effective ways of using information technology, and developing an appropriate vendor sub-system. This project was conceived and piloted by the top management of the hospital. When the recommendations were ready, a meeting of all the concerned members was held to explore how they can bring synergy in their working. The detailed implementation of the model was deferred. As expected, in the next one year after the report was presented, there was a change in the leadership with a completely new set of priorities related to the governance of the hospital.

5. **Hindustan Industries Limited (HIL) – Inplant Logistics Improvement:** A study was commissioned in HIL for improving the turnaround time of the trucks that arrive in the facility for loading material. In the current form of operation, the truck stopped at eight locations in the factory complex. It took a minimum of 1½ hours and a maximum of 10 hours for the turnaround time for the truck to load the material and leave the factory. Based on a detailed study and analysis of appropriate data, a revised procedure to reduce the turnaround time was proposed. The revised procedure envisaged empowered truck owners and operators, simplified accounting systems, minimal checks and counter-checks, and extensive use of web-enabled information technology. Under the new dispensation, a truck is expected to stop only once in the factory complex before material loading. The new procedure compared with the very best factory operations in the international context. The senior management team along with the CEO of the group discussed the proposed solution. While the merits of the proposed system were fully recognized and appreciated, the management chose to operate with the existing conservative management philosophy. Consequently, instead of adopting a dramatically new way of operations, the management decided to augment the resources and facilities at various locations to decongest the bottleneck section(s). In short, the management chose to deploy additional resources to the system in lieu of reengineered processes.

6. **Revised National Tuberculosis Control Programme (RNTCP):** In response to the poor implementation of NTCP, WHO redefined the programme objectives and implementation details. To facilitate the process, a study was commissioned to improve the availability of drug supply by fundamentally redefining the supply chain. The study recommended sweeping changes in the structure, material flow, and

information flow. It also recommended the classic demand forecast, order, receive, stock account and deliver the material system to be changed to a pull-based system based on market dynamics. Extensive use of information technology, vendor cooperation, decentralized focus of activities, and elimination of wasteful activities were also proposed. The document outlining the proposed system was commissioned by the WHO. However, neither the WHO nor the local implementation agency based at Delhi gave a serious consideration to the proposed change(s). Perhaps the implementation agency was not yet ready to handle a radical change in the process. Under the circumstances, an incremental approach might have been more appropriate.

7. **Bajaj Auto Limited: Metal Sheet Cutting Plan:** Bajaj Auto Limited, a leading player in the two-wheeler market in the Indian context, decided to explore the possibility of minimizing the trim looses in the metal sheet cutting plan activities. An inter departmental team consisting of members from sourcing, production planning and control, accounts, information technology and shift engineers, was formed to analyze and recommend a procedure. A simple spread sheet-based model was designed by the information systems department in cooperation with production planning control and sourcing. The solution was used as a guideline to be followed in the shop-floor. Performance incentives were designed based on the expected trim loss and the actual trim loss realized at specific machine locations. The savings projected were actually audited and certified by the finance department.

8. **Virtual Queue in Tirumala Tirupati Devasthanam (TTD):** Concerned by the long waiting time experienced by pilgrims and the inability to add capacity at the servicing location (because there is only one Balaji), the management of TTD decided to convert the physical queue as a virtual queue. Accordingly, a set of implementation issues was discussed, and a revised procedure was evolved and put into action. Under the revised procedure, a pilgrim would arrive at the centre, register electronically and show up in the main entrance of the temple at a recommended time. The physical waiting in the queue was completely dispensed with. The revised system required some rational choices related to hardware selection, an appropriate algorithm to compute the waiting time, and adequate data security measures to uniquely identify the pilgrim. The revised system also required resolving some emotional issues related to managing the stakeholders' (security, vendors, priests, temple management, etc.)

anxiety and expectation. By adopting a gradual approach to change and using data support to enhance the credibility of the revised procedure, the implementation process was completed. The new system is operational for the last five years even though the senior management has changed since then at least twice.

9. **The Annual Rath Yatra (religious tour) in Ahmedabad:** The annual Ratha Yatra held in Ahmedabad during March every year is an important social and religious function. Over a period of time, the rath yatra posed several challenges to the government related to law and order. Different political parties have used this as an opportunity to make specific political statements. The event was marked by violence, loss of life, and damage to property. Over a period, the top management of the police force has evolved a robust methodology by which the Rath Yatra can be made safe and peaceful. This involved a combination of measures including effective security planning and arrangement, preventive measures leading to safe conduct of the Yatra, close monitoring and effective contingency planning, and adequate deployment of security forces. This was complemented by measures such as involving the community, open door policy on implementation issues, stakeholders' involvement in the safe conduct of the Yatra, etc. As a consequence, the Yatra has been peaceful for the past several years.

10. **Western India Chemicals Limited (WICL):** In response to the increasing competitive environment and commodity nature of the product being sold, WICL commissioned a study to explore the means and methods by which the supply chain decisions can be better coordinated and optimized. Accordingly, an ORP developed a sequence of formal models and optimized solutions to areas related to raw material sourcing, deployment of trucks to ferry raw material, inventory management and planning related to raw materials, finished goods inventory flow, inventory location, refilling procedures, transportation mode choice, warehouse locations etc. was developed. The top management and the departmental heads pertaining to procurement, logistics, raw materials, and marketing discussed the proposed solution. However, in the context of perceived competition, the top management's effort was spent in retaining the market share and increasing profitability. Also, the communication gap between marketing and logistics was seen as a serious hurdle in

experimenting with the proposed optimized solution related to supply chain management.

11. **Decision Support System for Blood Banks:** A simulation-based decision support system was developed to demonstrate the impact of different ordering rules (procurement policy) on service levels and wastages. The model was extensive and incorporated several realistic measures related to stochastic nature of demand, componenting procedure of blood, substitutability, stochastic nature of supply, etc. The model was also customized to respond to the unique nature of individual blood banks. In spite of the accuracy of the model, its extensive nature, user-friendly features, and demonstrated applicability to improve the overall performance of blood banks, the administrators chose to follow the conventional strategy of augmenting supply (blood) to manage the affairs of the bank.

12. **Shree Cements Limited (SCL):** The top management of SCL identified operational efficiency in distribution planning as a source of cost advantage. Accordingly, they commissioned a study to improve the overall planning related to distribution of finished goods to market. A mixed integer programming model was developed incorporating the projected demand at retail location, the various tax considerations, freight charges and concessions applicable based on the quantity shipped, alternate mode choices possible, billing procedures, options and its consequences to profitability, choice of warehouse location, etc. The proposed solution indicated about 10 percent savings in the overall logistics cost. Since the technical expertise available in the logistics department was somewhat limited, a user-friendly heuristic was developed using spread sheets. The heuristic system was to be used as a reference to plan day-to-day operations. The incentives were based on the performance on distribution cost with reference to the heuristic solutions. Several training sessions, demonstrations, reconciliations, and hand-holding sessions were conducted. Even a user manual was prepared and handed over to the logistics team. The team experimented with the new system for a while and drifted back to the old way of planning and distribution of finished goods.

13. **Amalgamation of SCB and ANZ bank:** SCB purchased ANZ for strategic reasons and in response to market opportunity in Middle East and Asia. The managerial challenge

post-merger was to see how these two organizations can be integrated. There was a need to integrate products, processes, technology, structure, staff, customers, premises, incentive scheme, etc. Several complex issues related to regulation, taxation, customer retention, and staff redundancy were a consequence of this integration. The integration was conceived as a large project. The top management led the effort with the support of the staff and designated module managers. Constant de-risking and monitoring was done to ensure the project stayed on course. The involvement of the staff, celebrating success, transparent procedures, open and extensive communication, and responding to employee apprehensions enabled the integration. As a consequence, the SCB - ANZ integration is considered as one of the most successful merger proposals in the banking history which was completed as per the original time line with associated economic benefits.

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