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Managing hospital supplies: process reengineering at Gujarat Cancer Research Institute, India

K.V. Ramani
Indian Institute of Management, Ahmedabad, India

Abstract

Purpose – Aims to give an overview of the re-engineering of processes and structures at Gujarat Cancer Research Institute (GCRI), Ahmedabad.

Design/methodology/approach – A general review of the design, development and implementation of reengineered systems in order to address concerns about the existing systems.

Findings – GCRI is a comprehensive cancer care center with 550 beds and well equipped with modern diagnostic and treatment facilities. It serves about 200,000 outpatients and 16,000 inpatients annually. The approach to a better management of hospital supplies led to the design, development, and implementation of an IT-based reengineered and integrated purchase and inventory management system. The new system has given GCRI a saving of about 8 percent of its annual costs of purchases, and improved the availability of materials to the user departments.

Originality/value – Shows that the savings obtained are used not only for buying more hospital supplies, but also to buy better quality of hospital supplies, and thereby satisfactorily address the GCRI responsibility towards meeting its social obligations for cancer care.

Keywords Business process re-engineering, Hospitals, Hospital management, India

Paper type Technical paper

1. Introduction

The idea to create a Cancer Centre in Gujarat was conceived in 1960 by His Excellency, the Governor of Gujarat Shri Mehdi Nawab Jung. The Chief Minister of the State Jivraj Mehta blessed this activity by providing land in the Civil Hospital campus. A generous donation of UK £55,000 by the M.P. Shah Charitable Trust, London paved the way towards the foundation of M.P. Shah Cancer Hospital, and the hospital started functioning from the year 1966. To accelerate the development of M.P. Shah Cancer Hospital, the Gujarat Cancer Research Institute (GCRI) was established in 1972 under a tri-partiate agreement between the Gujarat Cancer Society, Government of Gujarat and GCRI. Under this agreement, the state government agreed to provide 100 percent grant-in-aid to institute's all recurring expenses, and to finance future developments as and when required.

GCRI has now grown to a comprehensive cancer center with 550 beds and all modern diagnostic and treatment facilities. GCRI is recognized by the Government of India as a Regional Cancer Centre. Certain important statistics of GCRI are given in Table I.

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Sl No.	Item	2000	2001	2002
1	No. of beds	550	550	550
2	Outpatient visits	166,552	165,000	163,485
3	Inpatient admissions	16,164	13,673	13,923
4	Average length of stay (days)	8	9	9.5
5	Lab investigations	634,152	693,493	688,838
6	Radiology investigations	81,472	70,717	74,221
7	RIA investigations	11,063	11,845	14,142
8	Radiation treatment	10,214	10,834	12,228
9	Surgical operations – major	2,877	2,944	2,738
10	Minor/IVTC neurological	10,339	11,675	11,503
11	Operations	248	380	559
12	Nuclear medicines	2,652	2,145	2,022
13	Bone marrow transplants	5	17	6
14	Chemotherapy procedures	13,763	14,772	15,997
15	Physiotherapy treatment	15,837	16,562	16,238

Table I.
Certain important statistics

A preliminary analysis of financial performance of GCRI for the last three years is given in Table II. It can be seen that the gap between variable expenses (hospital expenses) and income from patient care (hospital fees) has widened over the last three years from Rs 24.4 million in 2000-2001 to Rs 27.2 million in 2002-2003. This widening gap is causing concern to the GCRI management about its ability to continue providing quality patient care services.

In order to reduce the above gap, it is necessary to either increase the service charges, or reduce the variable expenditure, or both. The option of increasing the service charges would raise a number of critical issues regarding the social obligations of GCRI. On the other hand, variable expenditure can be reduced through an efficient and effective management of either the purchases of hospital supplies, or the inventory of hospital supplies or both. In this paper, we take up the study of managing the purchase of hospital supplies.

2. Purchase of hospital supplies: the old system

GCRI purchases about 2,000 items every year from about 260 suppliers worth Rs 60 million per year. All the items are classified into 12 groups, namely, medicines

	2002-2003	2001-2002	2000-2001
Income			
Grants	207,205,700	189,605,577	187,339,938
Hospital fees	39,027,925	39,429,820	43,217,467
Other income	1,264,645	1,509,199	672,271
Expenditure			
Establishment expenses	138,841,501	131,941,420	132,254,518
Hospital expenses	66,187,363	64,229,403	67,678,516
Other operating expenses	32,725,257	29,725,984	29,274,677
Expenditure on projects	51,682	57,789	115,172
Depreciation	20,707,907	22,873,964	26,002,684

Table II.
Income and expenditure statement

and drugs, laboratories, X-ray units, surgical, and so on. The existing processes and procedures are as follows.

GCRI floats tenders in the month of March every year asking quotations for each item for its annual requirements, for the period June 1-May 31. All the quotations received are tabulated manually and the vendors are selected on L1 price (least price quoted) for each item quoted. This entire process takes about three months.

Once the vendor selection is complete, the purchase officer places purchase orders (POs) with the selected vendors, as and when needed. PO quantity is based on a subjective assessment by the purchase officer about the stock on hand and the quantity indented by the user departments. No proper registers are maintained by the user departments to monitor its consumption of items. As a result, each user department raises *ad hoc* indents throughout the month, over and above the monthly indent raised at the beginning of the month. About 1,200 POs are placed every year. Emergency purchases as well as purchases of new medicines and drugs are common. The purchase department is also responsible for all the follow up actions with the vendors, checking/inspecting all the items received from the vendors, and approving the bills for payment. The finance department, upon receiving the payment approvals, makes the payments to the vendors. GCRI enjoys a 3-month credit period for all its purchases.

3. Purchase of hospital supplies: a new reengineered system

In this section, we present our approach to the design, development and implementation of a reengineered purchase system in order to address the concerns in the existing system. This approach consists of designing a new organizational structure, and reengineering the purchase system. Reengineering is not just automating the existing system, but is about changing the existing system and then automating the new system (Hammer, 1990).

3.1 A new organizational structure

The organizational structure at GCRI consisted of a director as its head, assisted by a deputy director and an administrative officer. This structure was highly centralized, and the director took almost all the decisions. The role of the deputy director was unclear, while the administrative officer was responsible for the routine day-to-day administration. This centralized structure was no more able to satisfactorily respond to the emerging needs for decentralized decisions in patient care.

We replaced the existing centralized organizational structure with a new decentralized structure. The new organizational structure has a director, three deputy directors (medicine, surgery, and research) and an administrative officer at the same level as the deputy directors. The deputy directors and the administrative officer are given the necessary powers to manage their departments efficiently and effectively in providing cost- effective quality care to the patients.

3.2 A new system for vendor selection

In the new purchase system, we have a new system of tendering, where we invite quotations for a group of items (basket of items) instead of individual items. We define a "Basket of items" as follows. We first classified all the items under each group (hereafter called major group) of items into different minor groups and defined each minor group as a basket. For example, all items under the major group

"Drugs and Medicines" were classified into the following minor groups (baskets): anti cancer injectibles, anti cancer oral, general tablets and capsules, general injectible drugs, general parenteral fluids, and so on. The composition of each basket of items underwent slight revisions based on unique characteristics of certain items, such as brand preference.

Our approach to buying a basket of items as opposed to individual items from the vendors lead to bulk orders with a few large vendors, who in turn supply items at a discounted price. Our new tendering system also mentioned a credit period of 30 days, instead of the existing period of 90 days, and thereby achieved a further reduction in the price of items.

Our final selection of vendors was then based on the following criteria:

- L1 for each basket of items to meet the yearly requirements, after ensuring that the L1 prices for each item in the new system (quoted prices for a basket of items) does not exceed the L1 prices in the old system (quoted prices for individual items);
- an assessment of vendor ratings from our previous experience; and
- select brand items (suggested by the user departments) instead of generic items upon approval from the concerned deputy director.

3.3 A new prescription for placing purchase orders

In the old system, about 1,200 POs are placed every year, which works out to about 4-5 POs per working day. As a result, there are frequent receipts of ordered items, constant follow ups of orders placed, increased load on inspection/checking for payment approvals and the actual payments as well. All these activities result in a very substantial load on clerical work for the stores, purchase, finance and user departments.

In the new system, we placed 12 POs, one for each month at the beginning of the financial year itself, based on an estimate of the annual requirements and the monthly consumption pattern over the year. At the time of placing POs in advance, we included a provision to allow marginal revisions and changes to the quantity ordered by 15 percent either way, in order to take care of unforeseen circumstances. This new procedure eliminated any delays in the receipt of goods, ensured a given annual business to the vendors, and thereby promoted a good relationship between the hospital and its vendors.

3.4 A computerized database

Designing an appropriate database is critical in computerizing any application. A good data base organization alone can ensure quick data retrieval for analysis and reporting needs in order to facilitate the planning and monitoring activities. Given that GCRI handles more than 2,000 items, it is necessary to design a logical code for each item to facilitate data storage and retrieval. Accordingly, we designed a 10-digit code for each item, as shown in Table III.

Leading digits: 1-4	Digits 5-7	Last digits: 8-10
Major group code	Minor group code	Serial number of the item

Table III.

Note that the last three digits (columns 8-10) for the serial number of the item allows a total of 1,000 items in each major-minor groups combination.

4. Benefits from the new system

In order to estimate the benefits from the new system, we focus our analysis on class A group of items, consisting of:

- drugs and medicines;
- lab supplies;
- X-ray items; and
- surgical items.

Our policy to purchase "Basket of Items" as opposed to individual items has led to a reduction in the number of vendors from 192 in the old system to 58 vendors in the new system. Our policy to place with each vendor a single PO for the whole year with a monthly delivery schedule has reduced the number of POs from 980 (old system) to 58 POs (new system), one PO per each of the 58 vendors. Our approach also led to minimizing the number of items carried in the inventory. All these benefits are shown in Table IV.

4.1 Value of annual purchases

In this section, we estimate the benefits in the value of annual purchases for the year 2004-2005, by comparing the value of purchases for a previous year in the old system. Any comparison will be meaningful only when we compare the purchases of the same items in the same quantity. There are some items purchased in the past, but are not required now (and therefore, not present in the new tendering scheme). Similarly, there are some new items to be purchased this year, which were not purchased in the past. As a result, we focus our analysis only on the "Common Items" between the purchases for 2002-2003 and the present year 2004-2005. Our results are tabulated in Table V.

We can see that the net benefit from purchase of A class items is around Rs 4.5 million. The total benefit from purchase of all items works out to be Rs 6 million. We should realize that actual benefits would be much more, since net benefits in Table V reflect the prices after replacing generic items in the old system with brand items in the new system.

Table IV.
Benefits from the new system

Major groups	No. of vendors		No. of POs		No. of items in inventory	
	Old system	New system	Old system	New system	Old system	New system
Drugs and medicines	72	26	404	26	291	301
Lab supplies	67	28	359	28	708	641
X-ray items	19	1	44	1	39	37
Surgical items	34	3	173	3	284	294
	192	58	980	58	*1,322*	*1,273*

Table V.
Tangible benefits: value of annual purchases

Major group	Minor groups	Value of purchases for the common items L1 rate old system[a]	L1 rate new system[b]	Net benefits new system[c]
Drugs and medicines	Anti cancer injectibles	89,07,115	79,56,423	9,50,692
	Anti cancer orals	20,45,949	16,94,784	3,51,165
	Anesthetics	9,42,696	8,65,545	77,151
	General injectible drugs	36,07,417	33,19,280	2,88,137
	General parenteral fluids	22,57,927	23,50,025	(−) 92,098
	General tablets and capsules	18,51,647	18,28,659	22,988
	Surgical disposable items	10,48,949	9,44,968	1,03,980
	Surgical dressing materials	9,99,031	10,22,123	(−) 23,091
	Sub total	*2,16,60,731*	*1,99,81,807*	*16,78,924*
Lab supplies	Chemicals	1,68,29,173	1,46,67,390	21,61,783
	Kits	46,36,513	45,61,421	75,092
	Antibodies	5,05,747	4,90,017	15,730
	Glass wares	7,83,885	7,74,865	9020
	Plastic wares	28,79,180	26,17,432	2,61,748
	Miscellaneous	1,01,450	1,02,038	(−) 588
	Sub total	*2,57,35,948*	*2,32,13,163*	*25,22,785*
X-ray items	Plates	30,83,585	28,86,210	1,97,375
	Developers	2,53,330	1,79,140	74,190
	Fixer	1,07,975	95,800	12,175
	Contrast	28,92,674	24,62,000	4,30,674
	Miscellaneous	1,43,425	1,16,050	27,375
	Sub total	*64,80,989*	*57,39,200*	*7,41,789*
Surgical items	Consumables	21,41,407	24,36,739	(−) 2,95,332
	Catgut	27,09,678	27,74,527	(−) 64,849
	IV therapy centre	2,74,672	2,95,428	(−) 20,756
	Sub total	*51,25,757*	*55,06,694*	*(−)3,80,937*
Total (class A)		*5,90,03,425*	*5,44,40,864*	*45,62,561*

Notes: [a]L1 prices for 2004-2005 are assumed to be the same as the L1 prices in 2002-2003; [b]new system prices are prices for brand items (old system had many generic items); [c]net benefits = actual benefits − increased price for brand items vs generic items

4.2 Intangible benefits

- Saving of clerical time by the purchase department
  All POs for the year placed at the beginning of the year
  Only emergency purchases ordered during the year
  POs placed only after ensuring stock position with user departments
  Less load on Inspection of goods received
  Less load on approval of receipts and payment authorization
  Purchase department staff have gained an excellent knowledge of each item
- Saving of clerical time by the finance department
  Less load on payment (to vendors) procedures
- Saving of clerical time by the user departments
  Can easily generate monthly indents
  Can monitor the consumption of materials
  Low chances of stock out
- Less number of items in the inventory
  Less value of inventory holding
- Less number of vendors, and POs
  Better relations with vendors

The time saved in the new system by the purchase, finance, and user departments can be utilized for better planning and control of purchase system and managing an inventory system very efficiently and effectively (expected tangible savings 5-10 percent of inventory holding costs).

5. Implementation of the new system

Implementing any reengineered system calls for changes in the processes followed by the organization. Changing to a new system for procurement of hospital supplies at GCRI called for energy, enthusiasm, and dedication from the hospital administrators, especially those in charge of stores and purchase, accounts, and the user departments.

This project got started when the author of this paper was invited by the director of the hospital to give a presentation on "Hospital Management: Challenges Ahead." At the end of the presentation, the author invited suggestions from the hospital managers to identify a few critical areas of concern to their hospital.

Traditionally, hospital management has focused on specific activities in various functional units. These included activities such as queuing models for appointment systems in outpatient department (Brahimi and Worthington, 1991), planning and designing of emergency departments (Gabaeff and Lennon, 1991; Lennon, 1992), scheduling case orderings in operating theatres (Weiss, 1990), scheduling nurses' shifts (Siferd and Benton, 1994), and improving inventory management (Sahney and Rupp, 1988). Some of the recent developments in the application of management science focus on coordination of multiple departments for patient care delivery (HBS, 2000, 699-154), standard operating procedures for service quality improvements (HBS, 1999, 696-015), coordinating patient clinic visits (Newman, 1994), reengineering purchase and supplies (Bence, 1995), and management information system for estimating hospital performance indicators (Ramani, 2004).

Financial management has not received its due attention yet, even though many government hospitals attribute lack of financial resources as their main cause of concern. In fact, the main concern is not lack of financial resources, but lack of management of available financial resources. In most government hospitals, fixed expenses (salary, office expenses and hospital overheads) account for almost 75-80 percent of total recurring expenditure, leaving very little funds for variable expenses. Insufficient funds for variable expenses for purchase of hospital supplies such as medicines, drugs, X-ray films, etc. adversely affect service quality. It is, therefore, very essential that government hospitals manage their variable expenditure efficiently and effectively for service quality considerations.

It was, therefore, very encouraging for the author when he learnt that the GCRI staff identified the management of stores and purchase as their most critical concern in order to ensure a desired level of service quality. Management of stores and purchase at GCRI consists of two major functions, namely, procurement and inventory management. After some discussions, we decided to focus on procurement activities in phase I and inventory management in phase II.

Our first task was to constitute a project team. Integrating the procurement activities under a reengineered process involves integrating the working of the stores, purchase, accounts and user departments. Our project team, therefore, consisted of the administrative officer, two officers from the stores and purchase department, the three deputy directors representing the user departments under their control, and the author of this paper (hereafter called the management consultant). The administrative officer was made the project coordinator, as it is he who has to ultimately take the responsibility to implement changes for improving the hospital performance. The project team met very regularly throughout the life of the project.

Motivation of the hospital staff to change to a new system is a critical element for a successful implementation of our reengineered system. Towards this, we emphasized the role of user involvement from the beginning itself. User expectations from the reengineered system, obtained through a survey of all user departments, were clearly documented and shared in the project group meetings. These meetings also brought out the concerns of the medical professionals on the non-cooperation form the stores and purchase department. Vendor lead-time delays were being attributed to the frequent delays in payment to the vendors by the finance department. After a series of meetings, the project team outlined the GCRI needs to manage the stores and purchase activities in the new system being planned.

After about 8 months of design and development of the new system, a pilot system was implemented to understand the difficulties in accepting the changes by the hospital staff. Constant feedback was taken and discussed regularly. Trade-offs for benefits from the new system against changes required were highlighted by the project consultant in his response to the feedback sessions. The project team gave a presentation to the GCRI governing board members regarding the benefits of the new reengineered purchase system. The new system was implemented for the purchases to be made for the year 2004-2005.

6. Conclusions

Designing, developing and implementing the above system for efficient and effective management of the purchase of hospital supplies has been very challenging.

Continuous encouragement from the top management and active involvement of the middle management were the real reasons for the successful implementation of the new purchase system. The monetary savings will be used to buy more items to treat more patients as well as to provide subsidy to a larger number of poor patients, leading to an overall improvement in the quality of patient care and thus meeting our social obligations satisfactorily.

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Corresponding author
K.V. Ramani can be contacted at: ramani@iimahd.ernet.in