

FACILITY MANAGEMENT FOR HOSPITALS

A Thesis

Submitted in partial fulfillment of the requirements for the award of
Master of Architecture degree in Building Management

by

AAFREEN BANU A (39840001)



**DEPARTMENT OF ARCHITECTURE
SCHOOL OF BUILDING AND ENVIRONMENT**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited with Grade "A" by NAAC

JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119

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BONAFIDE CERTIFICATE

This is to certify that this Report is the bonafide work of **AAFREEN BANU A (39840001)** who carried out the Thesis entitled "**FACILITY MANAGEMENT FOR HOSPITALS**" under our supervision from January 2021 to May 2021.

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ABSTRACT

Healthcare facilities is considered as one of the most complicated and difficult types of facilities to manage, maintain, and operate. The facilities have to be managed with utmost care because a small failure can cost a life of a patient. The facilities are usually one of the greatest component of hospital's administrative expense. The requirement to reduce expenditure on "non-core" activities, along with fulfilling the hospital's expectations for improved performance, are the main challenges of facility management. Outsourcing is becoming popular in healthcare industry to reduce the operating cost of facilities but is still at its nascent stage. This thesis explores the potentials and benefits of outsourcing healthcare facilities. This thesis helps to choose between in-house and outsourcing models for every non-core healthcare facility. Personal interviews were conducted with healthcare facility managers to understand the various business management approaches for every healthcare facility. The advantages and disadvantages of every approach is discussed. The facilities in a 250 bed hospital are studied in detail and possibilities of outsourcing them are explored. A cost comparison is made between in-house and outsource facilities and recommendations are made for having the facilities in-house or outsource with a focus on quality and cost aspects. Factors affecting the choice of facility management approaches are discussed. The payback period and percentage of yearly cost savings are calculated for the hospital if the recommended approach is followed.

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LIST OF SYMBOLS AND ABBREVIATIONS

NHS	-	National Health Services
SLAs	-	Service Level Agreements

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Facility Management plays a key role in managing the resources and services that support the core business of any hospital. The practice of outsourcing facilities is increasing both in public and private hospitals due to increased efficiency and reduced costs. But, careful analysis for every project is required to find out what facilities can benefit from outsourcing with a focus on quality and cost aspects.

1.2 AIM

To identify the potentials of outsourcing

1.3 SCOPE & OBJECTIVE

- To understand the various facilities in a hospital.
- To identify scope for improvement in maintaining the facilities.
- To explore the advantages and disadvantages of outsourcing
- To identify facilities that can be outsourced in a particular hospital
- To calculate costs for in-house and outsourcing for a facility.
- To compare and understand the profits of outsourcing.
- To find the risks in outsourcing.
- To come up with the best decision whether to outsource various facilities based on cost and quality.

1.4 METHODOLOGY

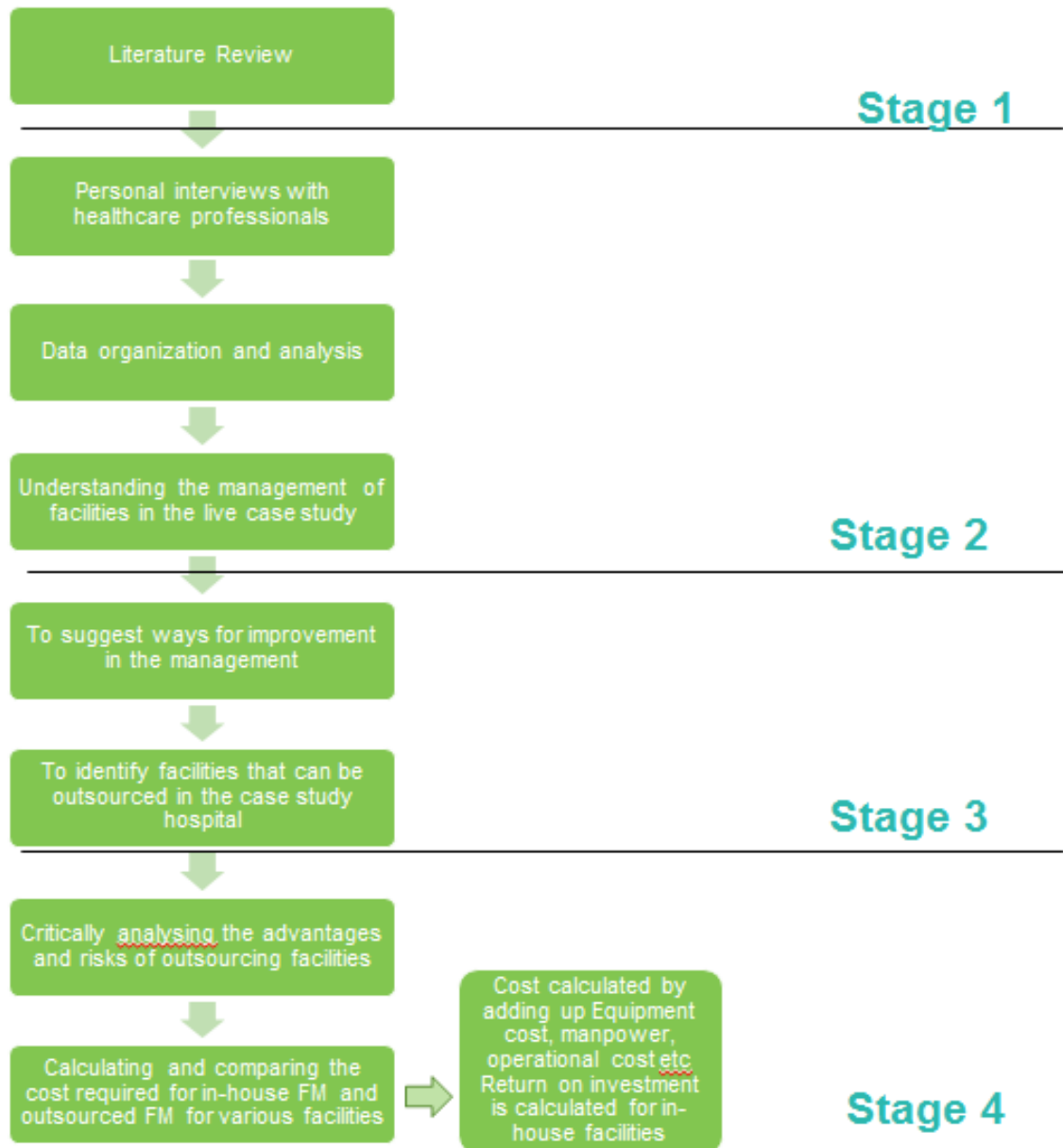


Fig 1.1 Methodology

CHAPTER 2

LITERATURE REVIEW

2.1. RESEARCH PAPERS

2.1.1 Research Paper 01

Assessment of facility management practices in public and private buildings in Akure and Ibadan cities, south-western Nigeria

Adedayo Johnson Ogungbile and Ayodeji Emmanuel Oke

Methodology:

A case study of

- a) 19 public buildings

The public buildings selected were ministry buildings, government- or government parastatal-owned office complexes, corporate public buildings and public commercial centres.

- b) 20 private buildings

The private buildings in the population were also corporate private buildings, residential buildings, warehouses and commercial buildings

Primary source of data:

The methodology for the study included using questionnaires to seek views of some professional facility managers in the public and private buildings and service providers as well as end-users

Questionnaires:

The questionnaires were well structured to address information about the individual respondent, background information about the particular building under-studied, the state of awareness of FM, level of availability of FM in the building and extent of usage of FM in the particular building and were sought to address the facility practices in the particular building.

Methods of analysis:

The methods of analysis used for the study included frequency distribution analysis and mean and rank analysis; mean gap analysis was used to show the difference, and Max Wilcoxon signed-ranks test was used to test the difference in FM practices in both the building types.

Table 2.1 Respondent's Information

Factors	Variables	Frequency	(%)
Type of building	Public/government building	19	49
	Private/corporate building	20	51
	Total	39	100
Form of building	Residential	9	24
	Office complex	10	26
	Shopping complex	11	29
	Hospital	3	8
	Hotel	4	11
	Warehouse	1	3
	Total	38	100
Years of existence of the building	0-5	8	21
	6-10	15	39
	11-15	10	26
	16-20	2	5
	21-25	2	5
	26-30	1	3
	Total	38	100

Table 2.2 Building Information

Equipment/tools/department	Level of availability		Level of awareness		Extent of usage	
	Mean	Rank	Mean	Rank	Mean	Rank
Fire alarms	3.06	5	3.33	3	2.56	5
Fire extinguishers	4.00	2	3.72	2	3.00	2
Water sprinklers	3.11	4	3.17	5	2.50	6
Maintenance manual	2.89	7	2.39	7	2.61	4
Users' building evaluation forms	3.12	3	3.18	4	2.71	3
Maintenance department	4.23	1	4.11	1	3.83	1
Facility management department	2.94	6	2.72	6	2.44	7

Table 2.3 FM equipment, tools and departments in public buildings

Equipment/tools/department	Level of availability		Level of awareness		Extent of usage	
	Mean	Rank	Mean	Rank	Mean	Rank
Fire alarms	3.45	4	3.55	4	3.15	4
Fire extinguishers	3.95	2	3.90	2	3.55	2
Water sprinklers	3.15	7	3.10	7	2.80	6
Maintenance manual	3.20	6	3.15	6	2.80	6
Users' building evaluation forms	3.30	5	3.35	5	2.95	5
Maintenance department	4.55	1	4.63	1	4.63	1
Facility management department	3.74	3	3.58	3	3.32	3

Table 2.4 FM equipment, tools and departments in private buildings

Facility management services in buildings	Public building		Private building		Mean Gap
	Mean	Rank	Mean	Rank	
Maintenance planning (equipment, etc.)	3.67	5	4.00	6	0.33
Record keeping (legal requirements, monitoring, etc.)	3.50	9	4.05	4	0.55
Reducing operational impacts and life cycle costs	3.65	7	3.55	13	-0.10
Responding to complaints and suggestions about the building	4.47	1	4.10	3	-0.37
Building code and regulatory compliance management	3.29	13	3.45	15	0.16
Building repairs and maintenance	4.33	2	4.05	4	-0.28
Cleaning and general maintenance	4.06	3	3.35	16	-0.71
Resident caretaker	3.78	4	4.45	1	0.67
Conserving asset value	3.06	16	3.75	11	0.69
Asset management (mechanical services, etc.)	2.89	17	3.80	8	0.91
Contract and contractor management	1.72	20	2.80	20	1.08
Gardening and grounds maintenance	2.28	19	2.95	19	0.67
Enhancing comfort and amenity for facility users	3.50	9	3.50	14	0.00
Improving building performance	3.61	8	3.80	8	0.19
Maintaining security for property occupants and assets	3.44	12	3.25	17	-0.19
Essential services provision (fire systems, etc.)	3.50	9	3.65	12	0.15
Risk management	3.17	15	3.00	18	-0.17
Space management (i.e. effective utilisation of space)	3.28	14	3.80	8	0.52
Tracking and recording energy and water consumption	2.78	18	3.85	7	1.07
Waste management	3.67	5	4.45	1	0.78

FM services in public buildings

- building repairs and maintenance;
- Cleaning and general maintenance;
- Resident caretaker;
- Maintenance planning;
- Waste management;
- reducing operational impacts; and
- Life cycle costs.

FM services in private buildings

- Waste management;
- Resident caretaker;
- responding to complaints and suggestions about the building;
- Record keeping;

- building repairs and maintenance;
- Maintenance planning;
- tracking and recording energy and water consumption;
- Asset management; and
- improving building performance.

Table 2.5 Compares of approaches to FM in public and private buildings

Approaches to FM in public and private buildings	Level of awareness		Mean gap Level of awareness	Extent of usage		Mean gap Extent of usage	Level of effectiveness		Mean gap Level of effectiveness	Average of mean gap (Positive)
	Public	Private		Public	Private		Public	Private		
Preventive maintenance	3.78	3.75	0.03	3.12	2.95	0.17	3.24	3.05	0.19	0.13
Corrective maintenance	4.33	4.60	-0.27	4.18	4.65	-0.47	3.94	4.70	-0.76	0.50
Predictive maintenance	3.89	3.90	-0.01	3.47	2.60	0.87	3.35	3.90	-0.55	0.48
Planned maintenance	4.11	4.40	-0.29	3.35	4.10	-0.75	3.65	4.15	-0.50	0.51
Benchmarking/building comparison	3.78	3.60	0.18	2.47	3.05	-0.58	3.00	3.21	-0.21	0.32
Building simulation/forecasting	3.39	3.45	-0.06	2.82	2.95	-0.13	2.88	3.05	-0.17	0.12
Users' or customers' evaluation/feedback	4.17	4.15	0.02	3.24	3.75	-0.51	3.88	3.75	0.13	0.22

FM approaches mostly used in public buildings are:

- Corrective maintenance;
- planned maintenance; and
- The Users' feedback.

FM approaches mostly used in private buildings are:

- FM outsourcing,
- responsive, planned
- Regular inspection.

Table 2.6 Compares of methods to FM in public and private buildings

Methods to FM in public buildings and private buildings	Level of awareness		Mean gap Level of awareness	Extent of usage		Mean gap Extent of usage	Level of effectiveness		Mean gap Level of effectiveness	Average of mean gap (Positive)
	Public	Private		Public	Private		Public	Private		
Outsourcing of FM	4.22	3.95	0.27	3.06	3.74	-0.68	3.47	3.74	-0.27	0.46
In-house FM administration	4.11	3.55	0.56	3.59	3.32	0.27	3.29	3.42	-0.13	0.29
Strategic planning	3.22	3.45	-0.23	3.18	3.11	0.07	3.00	3.05	-0.05	0.12
Building performance evaluation	4.28	4.40	-0.12	3.18	3.63	-0.46	3.47	3.79	-0.32	0.30
Benchmarking/building comparison	3.44	3.55	-0.11	3.00	3.21	-0.21	2.88	3.21	-0.33	0.22
Feedback mechanism	3.72	4.25	-0.53	2.82	3.58	-0.76	3.41	3.89	-0.48	0.59
Preventive maintenance	3.72	4.25	-0.53	2.94	3.11	-0.17	3.00	3.68	-0.68	0.46
Responsive inspection	4.22	4.75	-0.53	4.24	4.74	-0.50	4.47	4.84	-0.37	0.47
Planned/regular inspection	4.06	4.60	-0.54	3.29	4.21	-0.92	3.53	4.37	-0.84	0.77

Table 2.7 Factors affecting FM in buildings

Factors affecting FM in buildings	Mean	Rank
Corruption	4.68	1
Insufficient funding	4.58	2
Poor maintenance culture	4.50	3
Poor handling and misuse	4.24	4
Lack of maintenance information manual to users	3.97	5
Problem of policy implementation	3.84	6
Inadequate facilities usage information	3.76	7
Lack of legislative rule on FM	3.74	8
Inadequate FM personnel skill level	3.71	9
Low technical knowhow	3.71	9
Insufficient FM personnel	3.58	11
Overcrowding in the building	3.53	12
Age of the building	2.79	13

Conclusion and Recommendations:

1. More effort should be made by facility managers to sensitize the public more on the need and importance of FM in buildings
2. The users of the buildings should be encouraged to use FM tools and departments more habitually.
3. Preventive maintenance should be used more often than corrective maintenance as an approach to FM as it is more effective and prevent unnecessary cost of repairing.
4. Better effectiveness is obtained with the use of FM outsourcing than in-house FM administration.

5. Benchmarking, strategic planning and customers' evaluation are better methods to FM as it allows for planning for the future of the building, realizing the future threat(s) to the building and enabling facility managers to have first-hand information about the building from the users of the building that are directly affected by any practice on the building's FM.
6. Owners of buildings should endeavour to plan and make more funds available to facility managers
7. Government of Nigeria should give more attention to FM by ensuring that legislation be passed to make FM mandatory in buildings (especially public buildings) and stricter measures should be made available to correct the poor handling and misuse by building users.

2.1.2 Research Paper 02

SWOT Analysis of the Facility Management of Hospitals: The Case of Bulgaria

Silvia Trifonova , Anton Pramatarov

Europe-wide polls show that the lowest levels of satisfaction with health care are reported in Bulgaria

Significant problems

The healthcare sector continues to face significant problems – understaffing, supply shortages, braindrain, bribes to doctors and nurses to ensure better treatment, huge debts and chronic lack of money.

Objective: To make a SWOT analysis of the Facility Management of general hospitals for active treatment in Bulgaria

- The applied SWOT analysis is based on the example of the Military Medical Academy – Sofia which is a medical, educational and scientific-research institution with an internationally acknowledged reputation.
- Service Level Agreements (SLAs) relating to technical standards and quality standards are of concern when services are outsourced.

Part 1:

Role and Functions of Facility Management

The requirement for better productivity and efficiency, coupled with pressure to reduce costs, resulted in large elements of non-core activities being outsourced. The primary function of facility management is the provision of strategic management advice on the efficient operation of buildings and the minimization of operational life cycle costs.

Scope of FM is

the scope of FM is 'space and infrastructure' (planning, design, workplace, construction, lease, occupancy, maintenance, furniture, cleaning, etc.) and 'people and organization' (catering, ICT, HRM, HS&S, accounting, marketing, etc.).

Benefits of FM

- Clear and transparent communication between the demand side and the supply side by dedicating persons as single points of contact for all services, which are defined in a Facility Management Agreements;
- Most effective use of synergies amongst different services, which will help to improve performance and reduce costs of an organization;
- Single and manageable concept of internal and external responsibilities for services, based on strategic decisions, which leads to systematic in- or outsourcing procedures;
- Reduction of conflicts between internal and external providers;
- Integration and coordination of all required support services;
- Transparent knowledge and information on service levels and costs, which can be clearly communicated to the end users;
- Improvement of the sustainability of an organization by the implementation of life-cycle analysis for the facilities in the organization.

Part 2:

Specific Features of Facility Management of Hospitals

- The hospitals should have **modern material-technical base**, built and maintained in accordance with all **hygienic-sanitary, fire protection, security and technical requirements** in the country.
- Facility management, both of hospitals and other healthcare institutions, covers all activities on **maintenance and management of non-productive assets of the hospital, as well as its buildings and infrastructure, organisation and supervision** of the various activities.
- The ageing of the population, the changing nature of the diseases, the **introduction of new technologies** and pharmaceuticals, the increased public and political expectations, and the creation of new financial mechanisms, are some of the factors faced by medical institutions

Specific features of the hospitals:

- 24-hour performance of the healing activity, 7 days a week;
- They provide comprehensive services;

- They must continually update their technical base and equipment in order to meet the highest technical standards and security standards and quality;
- An error or omission in the operation of the hospital could cost someone's life.

What opportunities offer FM in this respect?

- 'end client'- patient
- intermediate customers - Clinical units
- clinical pathways had been implemented in more than 80% of hospitals in Bulgaria

Table 2.8 Facility management product list in hospitals

FM Product List	
Outside facilities	Guard and security
Building and offices maintenance	Bed conditioning
Basic rent for buildings and offices	Maintenance of medical equipment
Technical maintenance	Management of automobile park and parking services
Electricity (power) supply	Information technology services
Water supply	Patients transport
Heating supply	Logistics
Cleaning / hygiene maintenance	Catering
Air conditions / equipment cooling services	Laundry / linen services
Office supplies	Printing and reprographics services
Sterilization services	Mail and telephone services
Waste disposal	Pest control

Source: Lennerts, K., "Facility management of hospitals", Chapter 9, In: "Investing in hospitals of the future", eds. by Rechel, B., S. Wright, N. Edwards, B. Dowdeswell, M. McKee, *Observatory Studies Series*, No. 16, World Health Organization European Health Property Network, European Observatory on Health Systems and Policies, 2009, p. 174.

Structure of the overall costs of FM products :

- Basic rent for buildings and offices or capital cost of available space – almost 41%;
- Catering – 8.62%;
- Cleaning / hygiene maintenance – 7.49%;
- Building maintenance – 6.63%;
- Maintenance of medical equipment – 5.07%;
- Technical maintenance – 4.48%;
- Heating supply – 3.45%;
- Laundry / linen services – 3.14%

About 60% of the facility management costs are related with space-related products, 35% to quantity-related products and 5% to other-related products.

Part 3:

Brief Overview of the Military Medical Academy – Sofia

The structure and activities of MMA – Sofia are described in this section

Part 4:

SWOT Analysis of Facility Management of Hospitals:

Strengths:

- The structure of the hospital supposes closed cycle of healthcare – a diagnostic study, reception, room for hospital treatment, separate compartments for extra healthy facilities – laboratories and pharmacies.
- **Highly qualified staff.**
- Staff and patients at the MMA-Sofia have at their disposal retail (sales) offices, bank office and several ATMs located in the building of the hospital.
- Provision of **quality living conditions** of patients and staff of the MMA-Sofia, in accordance with the best European standards for safety and security, physical and psycho-emotional comfort.

Weaknesses:

- **Outdated facilities and equipment**, which reduces the possibilities of renting teaching rooms and other areas. This leads to lower profitability of the MMA-Sofia.
- **Closing of the Hospice** at the MMA-Sofia, which has been operated until 10 years ago. This leads to the following negatives. Example: a rehabilitation stay of a patient in the hospital up to 10 days the rent would be between EUR 30 and 60 per day
- **The lack of a Single Information Center** and a well-designed website of the MMA-Sofia which cannot give a profound, complete and update information on the patients and the staff of the hospital.
- The **lack of parking** area for patients and visitors to the hospital.

Threats:

- Reflux of patients to other medical establishments in the country. Loss of reputation of the hospital within the society.
- **Decrease in number of beds** in the hospital which leads to a significant reduction in length of hospital stay and treatment of more patients on an ambulatory basis.
- **Financial losses** from the mismanagement of the MMA-Sofia's property – building and offices, technical infrastructure, equipment, automobile park and parking services, etc.

- **Increase in liabilities to external suppliers of goods and services**, due to the generation of huge maintenance costs of built environment (buildings, offices, technical base and equipment) of the MMA-Sofia.
- Leaving the **highly qualified medical staff** and administrative personnel with **managerial experience**

Opportunities:

- Development of activities, related to further treatment, rehabilitation and care for the sick and the elderly people.
- **Performing the replacement of existing lighting fixtures with fixtures of new generation**, which are energy saving and with long life. Investing in equipment and repair of modern teaching and meeting rooms, which can be attributed to partner organizations and to other entities with similar activity for organizing different events.
- **Creation and maintenance of a Single Information Center (SIC)**, with a front office at the entrance of the hospital, which helps to direct patients and help doctors from diagnostic surgeries. SIC may be beneficial for medical and administrative staff of the hospital in providing different kind of information sought by them. As a result of an inquiry held among the hospital patients it is found that patients in the MMA-Sofia cannot navigate quickly to the location of the office that they need. Moreover, the correct and timely information would greatly facilitate the work of the medical staff and the administration of the hospital.
- **Differentiation of a paid parking for patients of the hospital.**

2.1.3 Research Paper 03

Healthcare facilities management operations and organisational decisions

M.I. Okoroh, B.D. Ilozor, P.P. Gombera , And M.A. Alani

Introduction

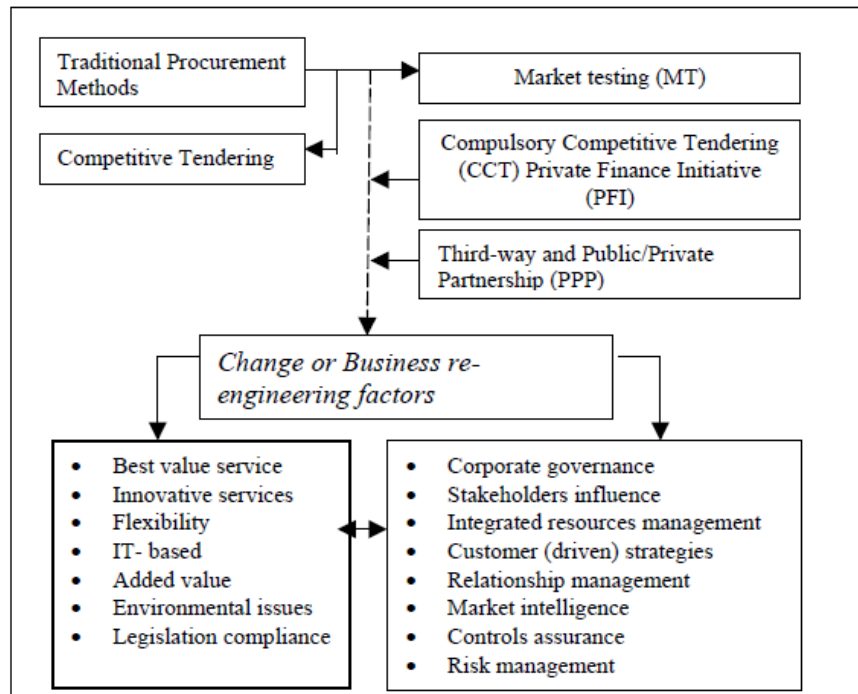


Fig 2.1 Evolutionary change factors in NHS Trusts Hospitals non-clinical services

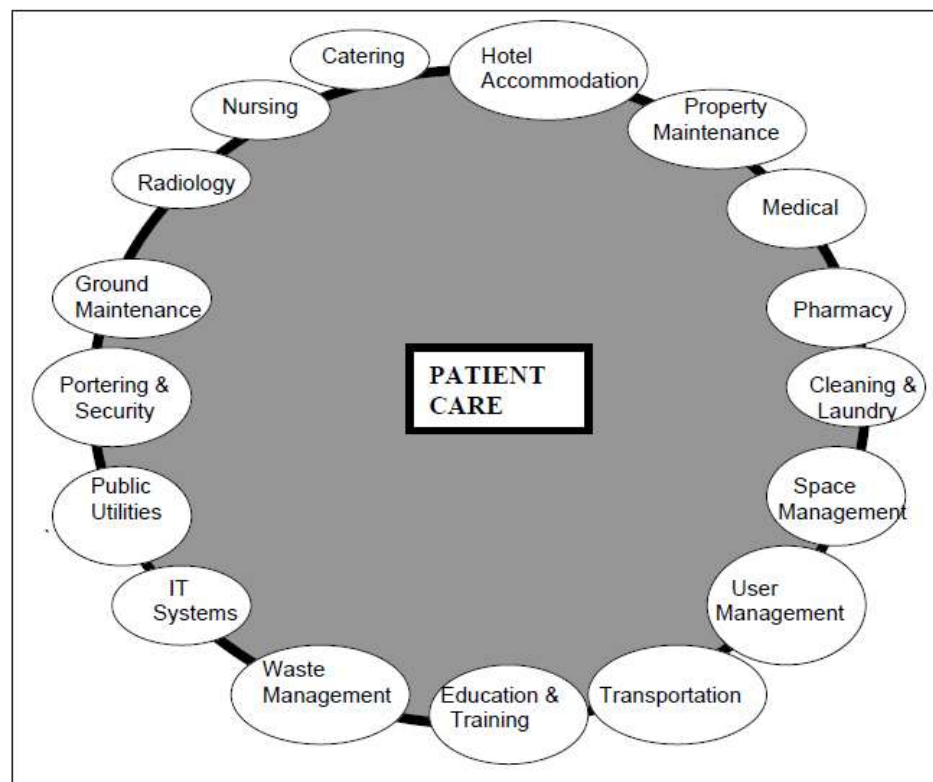


Fig 2.2 Modern healthcare services and their dependencies

Research methodology

Data collection involved structured questionnaire and interviews with leading healthcare managers detailed study of a healthcare partnering arrangement between Derby Royal Infirmary (now part of the Southern Derbyshire Acute NHS Trust) and Carillion and Bateman Services, a well-known healthcare service provider.

Table 2.9 Composition of the survey sample

Job titles of NHS Trust Executives	Number of respondents	Percentage of respondents
Chief Executives	64	31.2
Trust Secretaries	2	1.0
Operations	16	8.0
Finance and Allied Services	19	9.0
Risk Management	4	2.0
Corporate Affairs	6	3.0
Business Development	5	3.0
Clinical Support	1	1.0
Strategy and Planning	3	2.0
Hospital Services	1	1.0
Resources	8	4.0
FM and Support Services	60	30.0

Table 2.10 NHS Trusts core service competencies

Type of NHS Trust	Number of NHS Trusts	Percentage of respondents
Acute	71	35.5
Community/Mental	57	28.5
Teaching	18	9.0
Acute and Community	55	27.5
Others	35	17.5

As Acute services are needed on daily basis, support related services in these hospitals would also be needed on daily basis

Table 2.11 NHS Trusts total bed capacity

Number of sleeping beds	Number of Trusts	Percentage of respondents
0-99	9	4.5
100-199	17	8.5
200-399	43	21.5
400-599	49	24.5
600-799	29	14.5
800-999	19	9.5
1000-2000	17	8.5
Others	9	4.5

The more the number of hospital beds the more the clinical business and facilities. The higher occupancy levels of the Trusts demands more cost cutting measures and benchmark the best practice in FM practice.

Table 2.12 NHS Trusts purchasing behavior analysis

FM Function	No. of Trusts	% Outsourced	% Outtasked	% In-sourced
Gardens and Grounds	105	53	7	40
Estate Management	15	8	33	51
Hotel & Catering	70	35	13	52
Mechanical & Elect.	15	8	3	89
Domestic	87	43	21	36
Risk Management	5	3	2	95
Building Services	40	20	20	60
Waste Management	120	60	8	32
Total FM	5	3	7	90
Energy Management	60	30	7	63
Car Parking	80	40	45	15
Health and Safety	45	23	73	4
Reprographic	5	3	45	52
IT & Telecom.	20	10	73	17
Cleaning	90	45	10	45
Portering & Security	25	13	10	77
Pathology & X-ray Services	19	9	20	71
EBME & Medical Equipment	115	56	20	14
Courier and Lock Smith	61	30	10	60
Low Dependency Patient Care	13	6	15	79
Patient Transport	30	15	10	75
Specialist Support	11	4	5	91
Police Force	41	20	5	85

Table 2.13 NHS Trusts average purchasing behavior analysis

Outsource	48%
Out-task	23%
In-house.	52%
In-sourced from in-house contractors	60%

Outsourcing is not widely practiced because of the mindset of the management. It has questioned the job security of hospital staff. The management and monitoring of outsourcing are often very complex. Outsourcing is not an immediate cost cutting exercise but is a long term objective.

Table 2.14 NHS Trusts strategic procurement options

Type of procurement route	Number of Trusts	Percentage of respondents
Traditional contracting	133	66.5
Partnering	16	8.0
Compulsory Competitive Tendering	103	51.5
Joint ventures	15	7.5
Partnerships	20	10.0
Private Finance Initiative	9	4.5
Service Level Agreements	6	3.0
Nil	3	1.5

SLA is a modern specialist contract practice in FM and is followed by 3 % of the Trusts who are knowledgeable.

Table 2.15 FM Annual Operational budgets

Amount in Million Pounds	Number of Trusts	Percentage of Respondents
0-10	181	90.5
11-20	11	5.5
21-40	2	1.0
41-80	1	0.5
81-100	1	0.5
100-150	0	0.0
151-200	1	0.5
200-250	1	0.5
250+	0	0.5
Others	3	1.5

The above table shows that the amount spent on non-core support facilities is quite high. Effective management strategies are required to control over-expenditure.

Conclusion

All the non-clinical support services have to be under FM directorate that acts as a value added element. Outsourcing can help meet the ever-growing demands of non-core services in health sector. An integrated approach that merges the management and control of clinical and non-clinical services will provide direct accountability for senior trust executives.

2.2 DEFINITION OF FACILITY MANAGEMENT

Facility Management is the integrated process to support and improve the effectiveness of the primary activities of an organization by the management and delivery of agreed support services for the appropriate environment needed to achieve its changing objectives’.

-Atkins and Brooks (2009)

Organizational function which integrates people, place and process within the built environment with the purpose of improving the quality of life of people and the productivity of the core business.

-ISO



Fig 2.3 Facility Management System

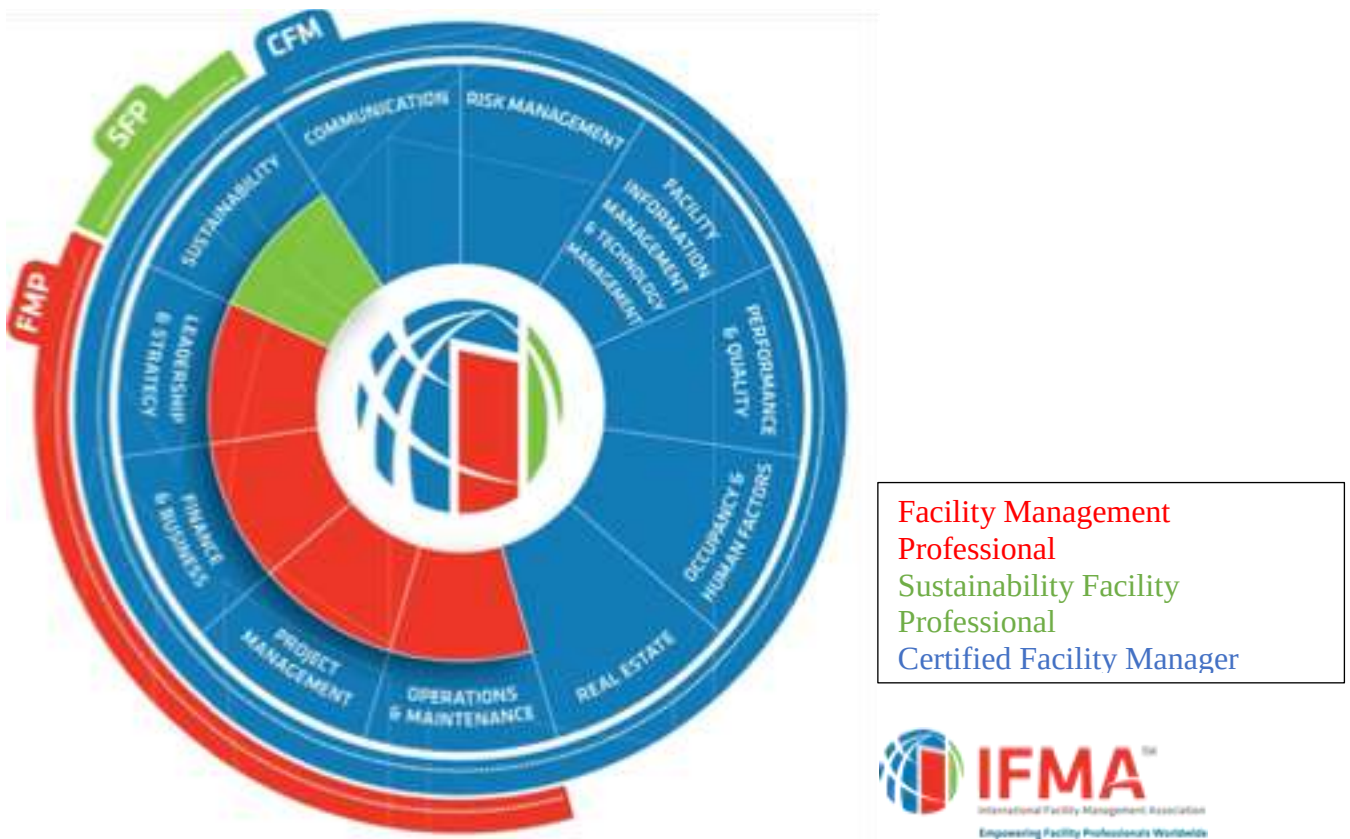


Fig 2.4 The core competencies of Facility Management

2.3 TYPES OF SERVICES IN FACILITY MANAGEMENT

Hard Facilities Management Services

- HVAC
- Electrical
- Plumbing
- Leasing
- Planning, Construction and Design
- Preventive Maintenance
- Maintenance Requests
- Capital Improvements

Soft Facilities Management Services

- Space Planning
- Security
- Catering
- Environmental, Health and Safety
- Waste Management
- Cleaning, Sanitation and Janitorial
- Groundskeeping
- Mail Management
- Regulatory Compliance

2.4 FACILITY MANAGEMENT APPROACHES

- i. Outsourced
- ii. In-house
- iii. Hybrid

2.4.1 Outsourcing

- commissioned from an external supply organization

- formal contractual arrangement based upon the formal terms and conditions derived from a service level agreement

2.4.2 In-House

- dedicated resource directly employed by the client organization
- monitoring and control of performance is normally conducted under the terms of conventional employer/ employee relationship;

(Barret and Baldry, 2003)

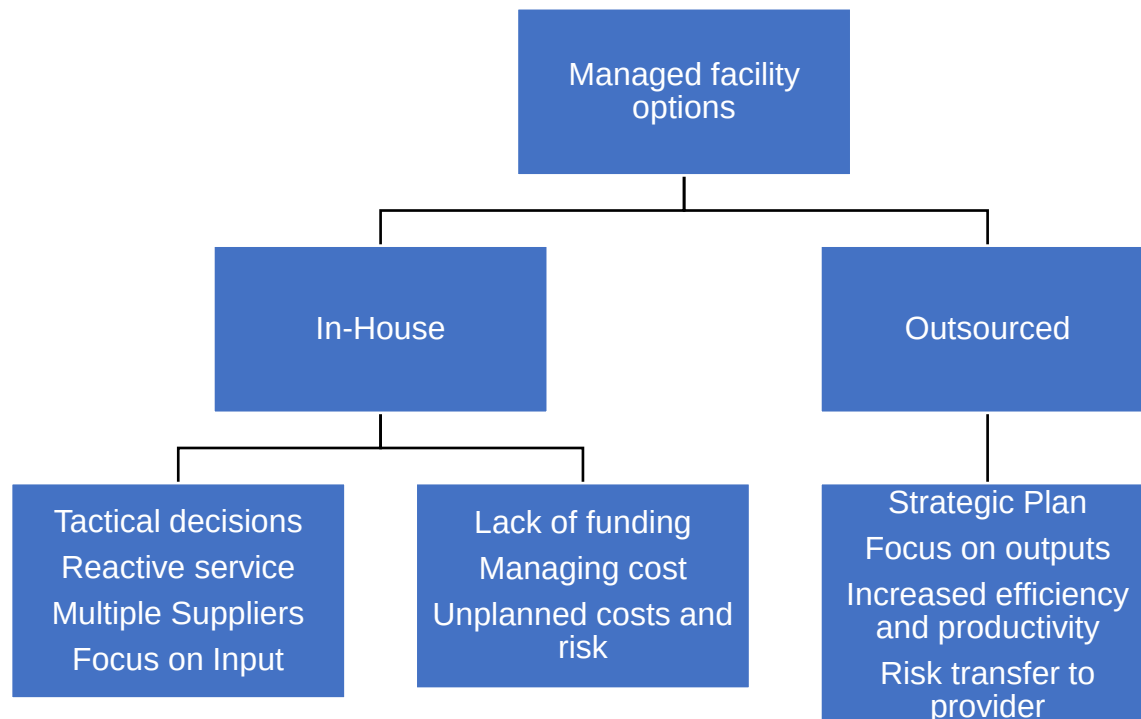


Fig 2.5 Managed Facility Options

2.5 FACILITIES IN A HOSPITAL

2.5.1 Clinical facilities

- Outpatient services
- In-patient services
- Accident and Emergency Services
- Operation theatre
- Intensive Care Unit

2.5.2 Support and Utility facilities

- CSSD
- Pharmacy
- Laundry
- Laboratory
- Radiology
- Blood Bank

2.5.3 Auxiliary Services

- Waste management
- Canteen facility
- Transport
- Housekeeping
- Mortuary
- Stores
- Engineering and Maintenance Services
 - Electric supply
 - HVAC
 - Water Supply
 - Fire, Safety and Emergency Power
 - Sanitary Equipment
 - Communication system
 - Medical gases, Piped Air and Vacuum
 - Elevators

Non-core facilities not directly related to patient care but supports it comes under Facility Management which includes Support and Utility facilities and Auxiliary Services.

2.6 TRADITIONAL PROCESS OF OUTSOURCING

- Security

- Laundry
- Housekeeping
- Food services
- Maintenance – Civil, Electrical and Mechanical
- Pharmacy
- Transportation – Ambulance, other.

2.7 EMERGING AREAS OF OUTSOURCING

- Laboratory services
- Radiology
- Nursing
- Bio-medical engineering
- Blood bank
- Physiotherapy
- Homecare services
- Outreach services (eg.camps)
- IT services
- Billing
- Insurance Claims Processing
- Revenue Cycle Management
- Payroll processing
- Marketing
- HR Processes

2.8 PROCESS ORIENTED COST ALLOCATION

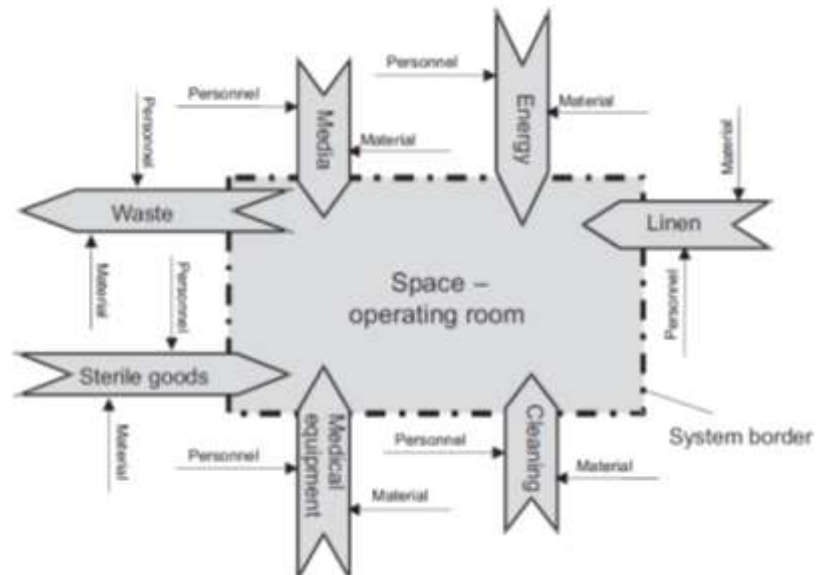


Fig.2.6: Performance of facility management services for an operation

In terms of facility management, the main requirement for performing an operation is space, which therefore is the basic product of facility management. Because of the need for high security and hygiene standards, the construction of operating rooms involves a high degree of specification and tends to be expensive. Furthermore, the accompanying technical equipment must be maintained in an absolutely reliable condition, as do the characteristics of the space itself, such as ventilation and communication systems. During the operation, medical gases, electrical power and heating are required; the surgeon requires an appropriate set of sterile instruments; and, following the operation, surgical waste must be disposed of.

Table 2.16 Classification of the 29 facility management products in Germany

Product list – cost proportions

Allocation basis: floor space in m ²	Allocated on quantity basis
outside facilities	waste disposal ton of waste
operation	bed conditioning bed
building maintenance	information technology services personal computer
technical maintenance	fleet management vehicle
basic rent	hygiene advice analysis
cleaning	maintenance of medical equipment value
pest control	cooling service kilowatt-hour
security	broadcasting services television
	catering meal
	sterilization service sterile unit
	power supply kWh
	telephone services extension
	patient transport transport
	heating supply kWh
	laundry services ton linen
	water supply m ³
Order-related allocation	
office supplies	
caretaker services	
reprographics services	
mail services	
removal services	

Source: Investing in hospitals of the future

2.9 IN-HOUSE ADVANTAGES AND DISADVANTAGES

Advantages

- Staff are direct employees
- Employment package is often better than external contractor
- No GST payable on the wage cost

Disadvantages

- Staff absence
- Lack of expertise
- Difficulty in restructuring services as required

2.10 OUTSOURCED ADVANTAGES AND DISADVANTAGES

Advantages

- Experienced management and expertise - fewer staffing issues
- Lower costs- efficient budget controls
- Restructuring of service easily achieved
- Guaranteed service levels

Disadvantages

- Employment terms not as generous
- Contract management can be subject to change- time and effort managing contract
- GST payable on contract

2.11 WHY OUTSOURCING IN HEALTHCARE?

- Cost-effective
- High investment/obsolescence
- Difficulty in recruiting/retaining
- Space constraints
- Disproportionate management time
- Specialist skills

Healthcare industry lacks in outsourcing than other businesses

2.12 OUTSOURCING HEALTHCARE

- Healthcare industry lacks in outsourcing than other businesses
- As more and more facilities are outsourced there are more risks involved.
- Biggest risk: patient privacy issues and data breaching
- Providing excellent care requires substantial manpower and resources which requires larger capital investment. This might lead to outsourcing.
- Availability and selection of right vendors is crucial
- The contractor should be a specialist in the outsourced service to provide service efficiently and should be able to achieve economies of scale
- Expenses on outsourcing can be from **7% to 25%** of expenses



Fig 2.7 Healthcare Facilities Management Market

2.13 OUTSOURCING MODELS

1. Services provided with full-time staff at the hospital
 - Security
 - House keeping
2. Outsourcing with external facility
 - Laundry

- Canteen
 - Radiology
3. Services provided using hospital facility or other facility
- Canteen
 - Laundry
 - IT services
 - Radiology
4. Part-time services

*(Source: Outsourcing in Hospitals by Tilak Shankar,
Management Solutions, Chennai)*

2.14 PAYMENT FOR SERVICES

- Pre-agreed payment per month per staff (e.g. security)
- Per meal or per kilogram of clothes (canteen, laundry)
- Revenue/profit-sharing (e.g. laboratory, pharmacy, radiology)
- One-time payment
- Usage of services – transaction based (e.g. PACS)
- Number of lines (e.g. medical transcription)

*(Source: Outsourcing in Hospitals by Tilak Shankar,
Management Solutions, Chennai)*

2.16 SLA

Service specifications and service level agreements [SLAs] are essential documents in the management of facilities. They set down the output-driven guidelines for customers and service providers in terms of the quality, methodology and timeliness of supply and are used whether the services are supplied in-house or by external service providers.

These formal documents establish:

- the essential customer service requirements and minimum acceptable standards
- the service quality and performance (the outputs) expected by the customer
- performance measures for the services; and
- the agreement for the supply and acceptance of the services.

2.16.1 INTRODUCTION

Kauvery hospital acquired Seahorse Hospital - a public limited company in the year 2008 & since then it has been functioning as Speciality hospital - a 200 bed multispecialty facility. The KMC Speciality hospital has renamed as Kauvery Hospital in the year 2002.

அவசர கால வெளியேறும் வரைபடம்
EMERGENCY ESCAPE ROUTE PLAN - GROUND

YOU ARE HERE

Electrical Room

Pharmacy

Waiting

Reception

Operation

DM

Console Room

CT Scan Room

Dialysis Room

Casualty

Staff Room

Kitchen

North Arrow

26



Fig 2.9 Kauvery Hospital Basement Floor Plan



Fig 2.10 Kauvery Hospital First Floor Plan





Fig 2.12 Kauvery Hospital Fourth Floor Plan



Fig 2.13 Kauvery Hospital Sixth Floor Plan

4.3 ORGANIZATION CHART OF KAUVERY HOSPITAL

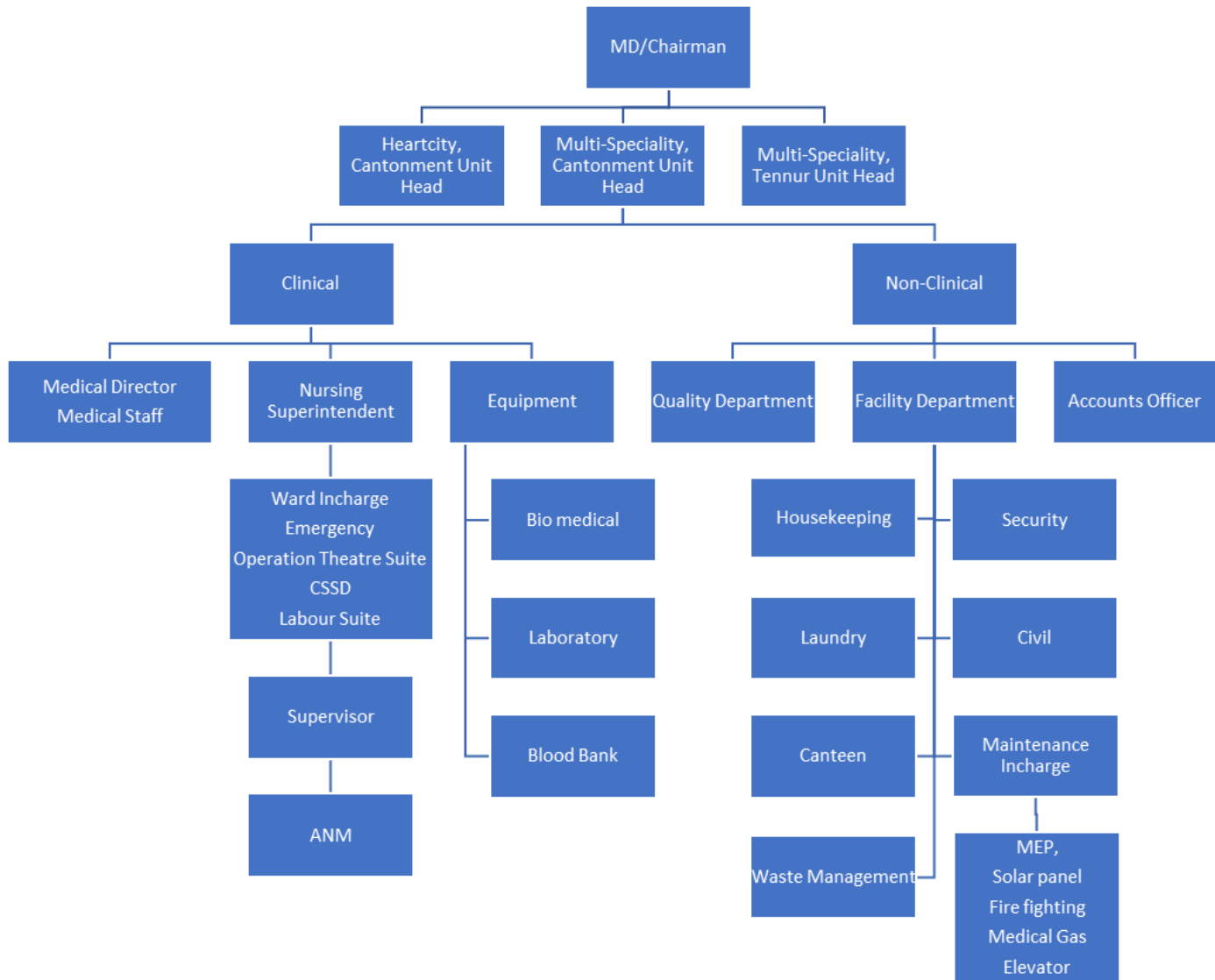


Fig 2.14 Kauvery Hospital Organization Chart

2.16.4 ENGINEERING SERVICES

- The engineering services of a healthcare facility support the delivery of patient care and help to maintain a healing and safe environment.
- Engineering services are integral part of hospital infrastructure
- Engineering services account for approximately 35-40% of the capital costs in the construction of health care facilities
- The requirement for the healthcare design is that it facilitates high quality patient care for the most cost effective capital and recurrent cost.

The following areas require 24 hour per day, 7 days per week on call maintenance service:

- Medical gases and suction system
- Lifts
- Fire systems

- Bio-electronic equipment
- Any life-support systems
- Boiler plant
- Telecommunication system including:
 - Paging
 - Emergency warning and Intercommunication system
 - Nurse call

SL.NO	VENDOR NAME	EQUIPMENT NAME	QTY	SCOPE OF WORK	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	REMARKS
1	DAIXIN Airconditioning	Central Airconditioning	1	yearly 4 times													
2	BSR Airconditioning Engineers	Central Airconditioning - Vultas	1	yearly 2 times													
3	JAYAM AIR SOLVERS	Compressor	2	yearly 4 times													
4		Vacuum Pump	2														
5		Air Dryer - Trident	1														
6	VINAYAKA Engineering Services	MV PANEL	1	yearly 2 times													
7	KRISHNAV Projects	Swisting Pneumatic System	1	yearly 4 times													
8	Crossfields Water Purifiers	Water Purifier - V7NH	1	yearly 2 times													
9		Water Purifier - V7NH	1														
10		Water Purifier - H5NH	1														
11		Water Purifier - V7NH	1														
12	JN Machineries P. Ltd	Diesel Genset - 320 kv	1	yearly 6 times													
13	JN Machineries P. Ltd	Diesel Genset - 320 kv	1														
14	JOHNSON Lifts Private Ltd	Bed Lift	2	Monthly													
15	Novature Electrical & Digital Systems Pvt Ltd	UPS 10Kva - 2N04	2	yearly 4 times													
16	Aqua New Generation	RO Plant - 255 ltr	1	yearly 4 times													
17	Funkia Forbes limited	Aquaguard Water Purifier	2	yearly 2 times													
18	CORUS, Newswell Power Sol	Active Harmonic Filter	1	yearly 4 times													
19	primo safety	Fire Equipment	A F	yearly 6 times													

Fig 2.15 Kauvery Hospital AMC Schedule 1

Sl No	Equipment name	Fly	DEPT	From date	End date	Payment Mode	Comp. Labour	Remarks
1	Dalikin VRV	1	Electrical	01.08.2020	31.03.2021	8 Months	Compreh	4 Preventive Maintenance service per Year. Any number of breakdown calls will be attended.
2	BSK Air Conditioning - Voltas	1	Electrical	01.11.2019	31.10.2020	Half-Yearly	Compreh	4 Preventive Maintenance service per Year. Any number of breakdown calls will be attended.
3	Compressor	2	Gas Plant	01.04.2020	31.03.2021	Half-Yearly	Labour	4 Preventive Maintenance service per Year. Any number of breakdown calls will be attended.
4	Vacuum Pump	2						
5	Ice Dryer - Trident	3						
6	Transformers	3	Electrical	16.05.2020	15.05.2021	Half-Yearly	Labour	4 Preventive Maintenance service per Year/Unlimited Breakdown calls
7	Swirling Pneumatic System	1	Maintenance	01.04.2020	31.03.2021	Annual		
8	Water Purifier - V7NH	1	3 F	01.12.2019	31.11.2020	Annual	Compreh	Periodical service 2 per year Purifier will be thoroughly checked/cleaned/adjusted/ Monthly service: 12 & Any Number of breakdown call will be attend.
9	Water Purifier - V7NH	2	Canteen					
10	Water Purifier - H6NHC	1	2 F					
11	Water Purifier - V7NH	1	opd					
12	Diesel Genset - 320 kv	1	Electrical	16.12.2019	15.12.2020	Annual	Labour	6 Preventive Maintenance service per Year/Unlimited Breakdown calls.
13	Diesel Genset - 320 kv	1		01.09.2019	31.08.2020	Annual		
14	Med Lift	2		01.12.2019	30.11.2020	Half-Yearly	Compreh	Monthly service -12 & Any Number of Breakdown calls will be attended Full Coverage including all spares.
15	UPS 30kv - 2Nos	2		05.01.2020	04.01.2021	Half-Yearly		3 Preventive Maintenance service per Year. Any number of breakdown calls will be attended.
16	AC Plant - 250 Ltr	1	Maintenance	01.04.2020	31.03.2021	Annual		4 Preventive Maintenance service per Year. Any number of breakdown calls will be attended.
17	Aquaguard Water Purifier	2	Cathlab/OT	05.06.2019	04.06.2021	2 years	Labour	Any Number of Breakdown calls will be attended.
18	Active Harmonic Filter	1	Electrical	01.06.2020	31.05.2021	Annual	Compreh	4 Preventive Maintenance service per Year. Any number of breakdown calls will be attended.
19	Fire and Safety equipment	All floor	Safety	Oct-20	Oct-21	Annual	Labour	Yearly six visit for testing and reporting of equipment

Fig 2.16 Kauvery Hospital AMC Schedule 2

PREVENTIVE MAINTENANCE SCHEDULE										
SLNO	EQUIPMENT NAME	PLAN	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	REMARKS
1	Genset 320 kva - 1	DAILY	✓	✓						
2	Genset 320 kva - 2	DAILY	✓	✓						
3	Ro plant	DAILY	✓							
4	Heat pump	DAILY	✓							
5	ALL AHU UNIT	DAILY	✓							
6	Ups - 1-30KVA	DAILY	✓	✓						
7	Ups - 2 - 30KVA	DAILY	✓	✓						
8	ALL VRV UNIT	DAILY	✓							
9	Floor a2 cylinder	DAILY	✓							
10	ALL cot	Monthly	✓							
11	ALL Nurse call system	Monthly	✓							
12	ALL wheel chair	Monthly	✓							
13	ALL room Scrub bar	Monthly	✓							
14	ALL Daikin Ac	Monthly	✓	✓	✓					
15	ALL AHU unit	Monthly	✓	✓	✓					
16	ALL Split	Monthly	✓							
17	ALL Floor Power Room	Monthly	✓							
18	Medical gas line checking	Monthly	✓							

Fig 2.17 Kauvery Hospital Preventive Maintenance Schedule

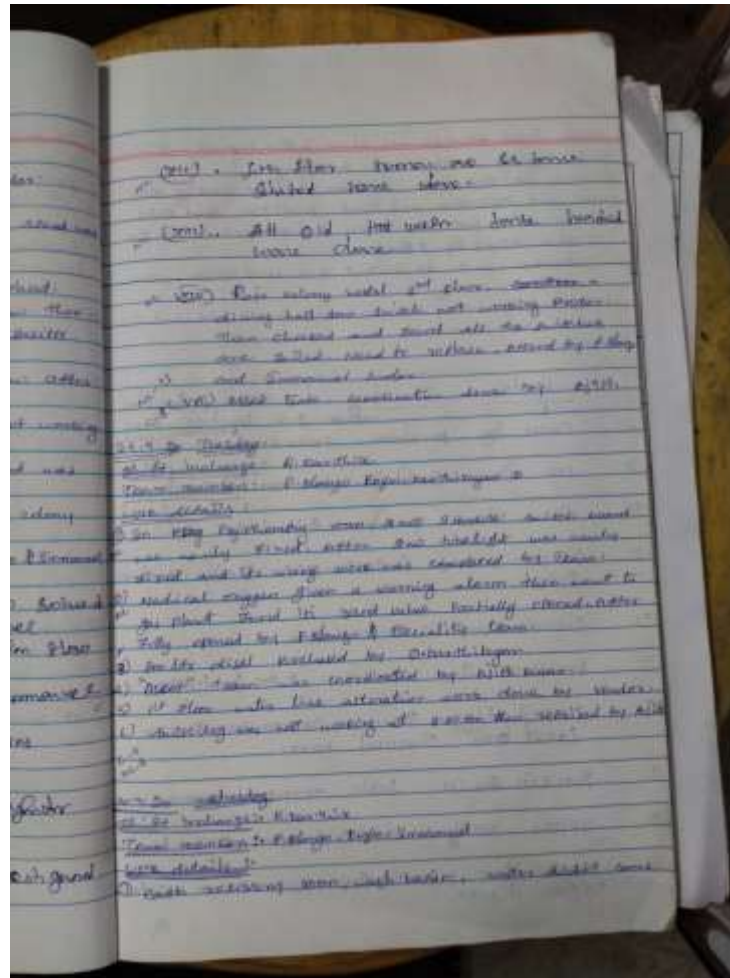


Fig 2.18 Kauvery Hospital Repair Log

Description	Created By	Resolved by	Status	Sub Category	Date	Resol Date
ccu1 cot no6 side rails stopper broken	Priyanka Sopra K	Immanuel Sundar A	Resolved	Carpentry	12-03-21	12-03-21
kindly fix the display stand in duplex	ESTHER MARY	Immanuel Sundar A	Resolved	Carpentry	11-03-21	11-03-21
in duplex ward 301 and 305 side rail stopper was broken so kindly	ESTHER MARY	Immanuel Sundar A	Resolved	Carpentry	11-03-21	11-03-21
phone not worked	Jane Abishak	Immanuel Sundar A	Resolved	Telephone Complants	10-03-21	11-03-21
staff room [rest room] flush not work to be corrected	Jane Abishak	Saravanan S	Resolved	Plumbing Complants	10-03-21	12-03-21
Patient rest room -1 flush not working kindly do the needful	T.Jaymine	Elango P	Resolved	Plumbing Complants	09-03-21	10-03-21
Room - 105 - Main road creates noise, can't able to lock properly.	Nancy J	Immanuel Sundar A	Resolved	Carpentry	09-03-21	10-03-21
Dr.TSK sir op Intercom and pedestal fan is not working	Gayathiri	Subramanian D	Resolved	Telephone Complants	08-03-21	08-03-21
STAFF ROOM MIRROR NOTICE BOARD TO BE FIX	T.Jaymine	Immanuel Sundar A	Resolved	Carpentry	08-03-21	08-03-21
Kindly arrange wires in admin office first floor so that we can place	Revathy S	Elango P	Resolved	Electrical complants	06-03-21	08-03-21
Cot wheel broken in room no-102	Dhatshayini P	Immanuel Sundar A	Resolved	Carpentry	06-03-21	06-03-21
room, no 105 side rails was broken	Kanimozhi M	Immanuel Sundar A	Resolved	Carpentry	06-03-21	08-03-21
single room B room no 111 Bed side rails was broken.	Kanimozhi M	Immanuel Sundar A	Resolved	Carpentry	06-03-21	08-03-21
key board broken	Pivithira	Immanuel Sundar A	Resolved	Carpentry	02-03-21	02-03-21

Fig 2.19 Kauvery Hospital Complaint Register

i. Cylinders:

Cylinders that contain liquefied gases are never completely filled with liquid because an increase in temperature would lead to an increase in pressure and the risk of cylinder rupture

Storage:

- Guidelines for storing medical gas cylinders recommend that they should **not be stored with non-medical cylinders**.
- The store area should:
 - not be subjected to extremes of heat and be kept under cover or inside a locked area
 - have good vehicular access for deliveries and a level floor surface
 - be well **away from combustible materials** or sources of ignition
 - have warning notices to **prohibit smoking** or naked flames
 - allow **large cylinders** to be **stored vertically** and **small cylinders horizontally**
 - be clean, dry and well ventilated
 - allow for rotation of cylinders, so that the **oldest are used first**
 - allow **segregation** of full and empty cylinders and those of different gases.

ii. Piped Medical Gas:

Medical gases are distributed throughout the hospital via a pipeline network.

Hospitals should hold a minimum of 14 days' supply of oxygen but this should be increased if there is delivery or logistical problems

- Oxygen, nitrous oxide, entonox and medical air are distributed throughout hospitals at a pressure of 4 bar through a colourcoded pipeline network.
- Pipelines distribute medical gases from supplies outside the hospital to outlets on the walls of wards and departments.
- Pipelines are labelled at regular intervals and separated from other pipelines in the hospital according to strict government regulations.
- They are heat treated so that they have a high pressure rating.
- Valves in the pipes are situated within the network at each ward or department and at the exit and entry to buildings. These valves are housed in lockable boxes made of breakable glass to allow gas isolation, servicing or to stop gas flow in the event of a fire.

iii. Cylinder manifolds

- used to supply nitrous oxide, entonox and oxygen.
- hospitals having bulk oxygen supply use smaller oxygen manifold and is used for back-up purposes
- Nitrous oxide and entonox are available only in cylinders so the cylinder manifolds are larger.
- Two banks of cylinders where one bank acts as stand by.
- The total storage capacity of a manifold should be 1 week's supply, with a 3-day supply of spare cylinders kept in the manifold room.
- The room should be well ventilated, fireproof and away from the main hospital buildings.
- The supply automatically switches to secondary bank when the main bank is almost empty.
- This activates an electrical signalling system to change cylinders

Case Study:

Liquid oxygen 1500 litres 2 nos

- One- full
- one – running
- Reading on the cylinder shows the volume left
- When running cylinder is almost empty, it is filled.
- Connected to ER and at every floor through underground.
- During Liquid Oxygen shortage, oxygen manifold is used.



Fig 2.21 Kauvery Hospital Liquid Oxygen Cylinder



Fig 2.22 Kauvery Hospital Air and Vacuum Cylinders

- Oxygen manifolds supplies NICU,OT, IMCU, PICU, Liver ICU, ICU and Neuro ICU
- 20 mins backup
- No automatic switching in manifolds.

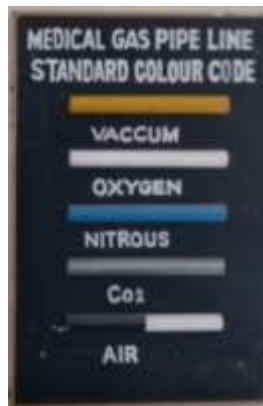


Fig 2.23 Kauvery Hospital Medical Gas Pipeline Standard Colour Code



Fig 2.24 Kauvery Hospital Air and Vacuum Compressors



Fig 2.25 Kauvery Hospital Portable Cylinders

- Portable Oxygen cylinders- Emergency Rooms
- Portable Carbon dioxide cylinders- Emergency Rooms

2.16.6 LAUNDRY

- Linen required 2.5 kg/bed/day
- New linen is bought from store the next year whose number is equal to the old linen condemned maintaining the fixed number of linen. This data is entered in inventory along with date of purchase and cost.
- According to a survey of Delhi hospitals the space requirements is, 10 sq. ft. per bed or 10 sq. ft. for **2.5** kg of linen per day.
- A laundry operator can handle at least 55-60 kgs of linen

Power requirement:

- i) For motorised equipment : 25 kw/h/25 kg, of linen loaded in a drying tumblers
- 1ii) For lighting: **3** Watts per sq. ft. of floor space.

Water requirement :

- Every kg of linen, 30 lit.res of hot water at a temperature of 70°C to 80°C and 10 litres of cold water are required.
- 100 litres of water per bed

Ancillaries

- Laundry Manager's Office;
- Stores;
- Tailoring Bay;

Equipments required for a full-fledged hospital laundry:

- 1) Trolleys
(Dry linen trolleys-diff capacity 50 and 100 kg., Wash room trolleys different capacity 50 and 100 kg)
- 2) Sluice Machine- (15 kg capacity)
- 3) Boiler(s) (Boilers which generate steam or hot water are required for laundry)

- 4) Washing Machine (25-50-1 00 kg.)
- 5) Hydro Extractors-50 kg.
- 6) Drier (Drying Tumblers)-25-50 kg.
- 7) Calendering Machine- (single roller) 80" x 60"
- 8) Steam Bed Press- (47" x 14" x 9")
- 9) Electric Irons (Hand Press)
- 10) Sewing Machine
- 11) Ironing Table (For using hand presses)
- 12) Weighing Scales

Recommended Space requirement:

Table 2.18 Laundry space requirement

No. of beds	Space
200-350 bed	3750 sq. ft.
350-500 bed	4000 sq. ft.
500-650 bed	4500 sq. ft.
>650 bed	5000 sq. ft.

Case Study:

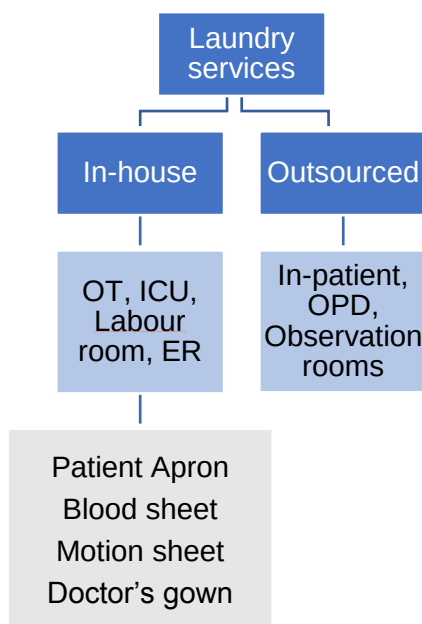


Fig 2.26 Kauvery Hospital Laundry Facility

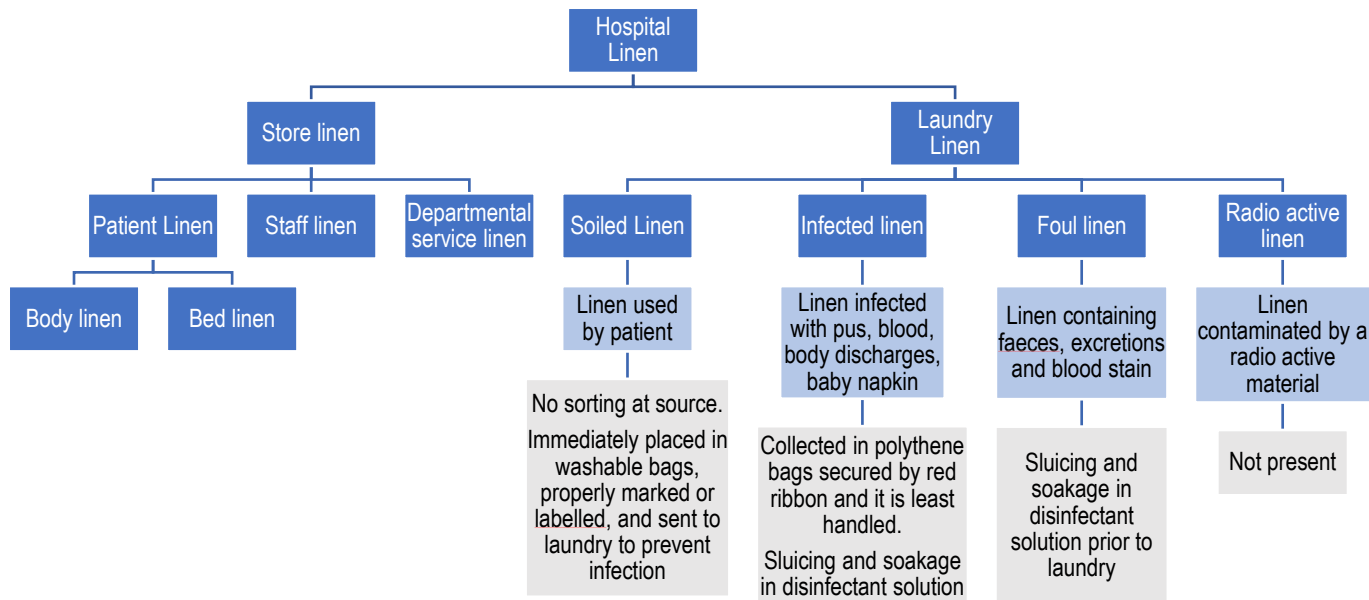


Fig 2.27 Kauvery Hospital Linen category

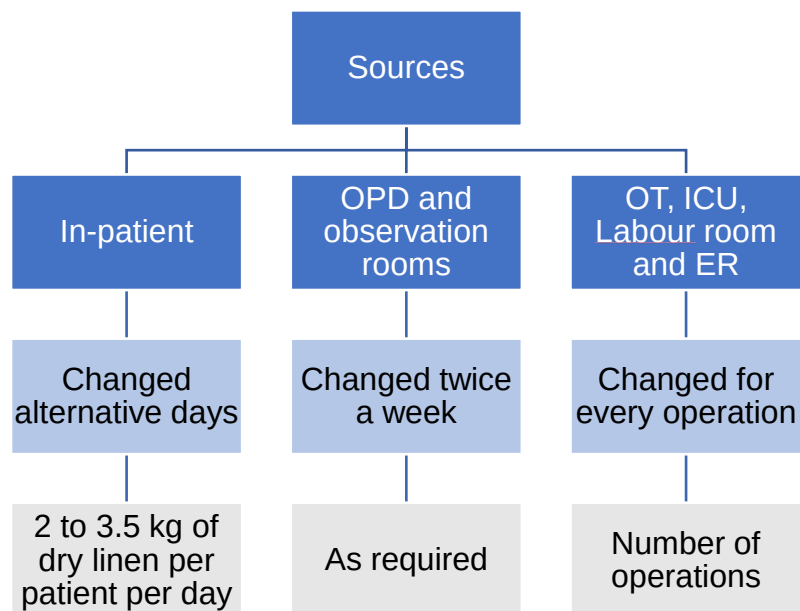


Fig 2.28 Kauvery Hospital Linen Sources

Table 2.19 Kauvery Hospital Laundry Details

Laundry equipments	1 washing machine and 1 drier
Loading capacity of washing machine	25 sheets
Loading capacity of dryer	15 sheets
Outsourced laundry per day	450 to 500 sheets

Table 2.20 Kauvery Hospital Laundry Cost

Cost of outsourced laundry	Rs./unit
Pillow cover	Rs.5
Blanket	Rs.10
Bed sheet	Rs.6
Screen	Rs.7
Approximate cost of outsourced laundry per day	Rs.3500
Approximate cost of outsourced laundry per month	Rs.105000

Process of infected laundry

Infected linen is soaked in 1% Sodium Hypochloride mixed with water in a tank. The clothes are then moved to a washing machine and then a dryer. The clothes from the drier are dried in the terrace and stored in the storage area.



Fig 2.29 Kauvery Hospital Laundry images

2.16.7 BLOOD BANK

Design considerations:

- Ideal to be located on the ground floor
- Direct access from main entry
- Easy visibility
- located away from open sewage, drain, public lavatory or similar unhygienic surroundings.
- The walls and floors of the rooms shall be smooth, washable and capable of being kept clean.
- Drains shall be of adequate size and where connected directly to a sewer, shall be equipped with traps to prevent back siphonage

Table 2.21 Blood Bank Space Requirements

Space	Min Area required
Blood bank operations	100 sq.m
Preparation of blood components	50 sq.m

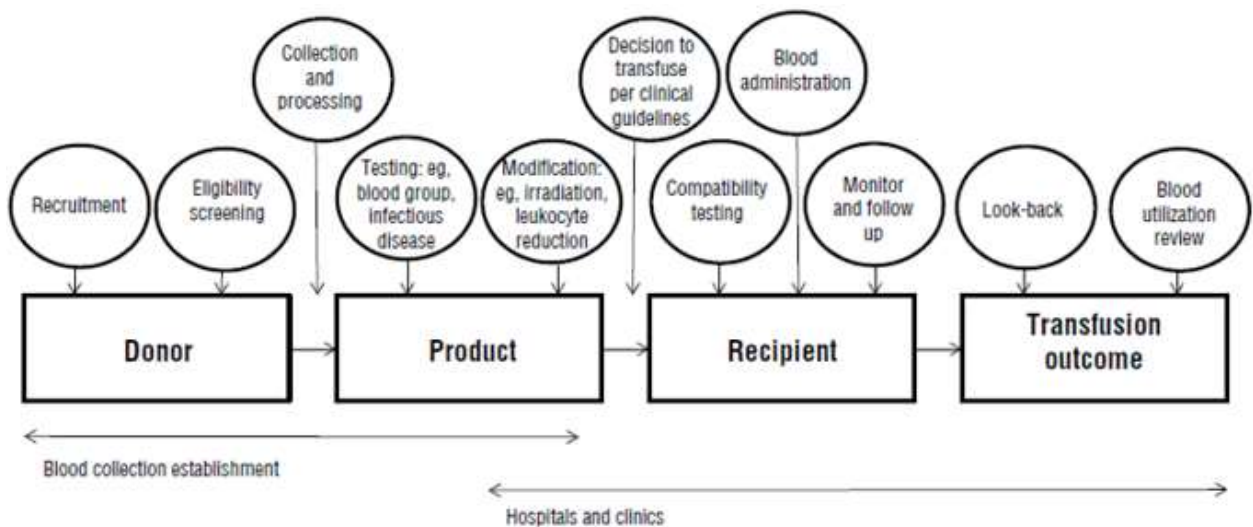


Fig 2.30 Transfusion Chain

Rooms in a blood bank:

- (1) registration and medical examination with adequate furniture and facilities for registration and selection of donors;
- (2) blood collection (air-conditioned);
- (3) blood component preparation. (This shall be air-conditioned to maintain temperature between 20 degree centigrade to 25 degree centigrade);
- (4) laboratory for blood group serology (air-conditioned);
- (5) laboratory for blood transmissible diseases like Hepatitis, Syphilis, Malaria, HIV-antibodies(air-conditioned);
- (6) sterilization-cum-washing;
- (7) refreshment-cum-rest room (air-conditioned);
- (8) store-cum-records

Requirements relaxed if setting up in a hospital having pathological laboratory and a sterilization-cum-washing room

Personnel:

- Staff: - Every blood bank shall have following categories of whole time competent technical
- (a) Medical Officer
 - (b) Blood Bank Technician(s)
 - (c) Registered Nurse(s);
 - (d) Technical supervisor

Table 2.22 Blood Bank Personnel Requirements

Units of blood	Qualification	Experience
>10,000 units	Diploma or M.D (TM) or MD (Pathology)	One year experience in blood bank to head the services

>10,000 units	Quality Manager medical officer or a senior MLT trained in quality management	One year experience in blood bank to manage the services
<10,000 units	MBBS doctor	-

Source- Standards for Blood Banks and Blood Transfusion Services National AIDS control organization

Table 2.23 In-house VS Outsource Blood Bank

Parameters	In-house	Outsource
Cost	Cheaper than outsourcing (doesn't involve transportation cost)	Expensive (Includes storage and transportation cost)
Blood supply	Limited supply	Have multiple options, more storage and more supply
Staff	Requires less staff for maintaining records	Requires extra staff for maintaining records
Donations	Some part of the donations may or may not be provided to blood banks	Completely used in the development of blood bank
Emergency	Time – saving	More time required for transportation
Space	Tests like NAT, ELISA etc requires more equipment	Caters to the need of extra space easily

Equipment:

- Maintained according to Standard Operating Procedures Manual
- Types of equipment used
 1. Temperature Recorder
 2. Refrigerated centrifuge
 3. Hematocrit
 4. General lab. Centrifuge.
 5. Automated Blood typing
 6. Haemoglobinometer
 7. Refractometer or Urinometer
 8. Blood container weighing device

9. Water
10. Rh view box (wherever necessary)
11. Autoclave
12. Serologic rotators
13. Laboratory thermometers
14. Electronic thermometers
15. Blood agitator

Supporting facilities:

- Water supply
- Electricity supply
- Sewage disposal system
- Storage system
- Steam
- Supply of distilled water
- High pressure air vacuum
- Intercom system
- Mobile van

Maintenance:

The premises shall be maintained in a clean and proper manner to ensure adequate cleaning and maintenance of proper operations.

2.16.8 CANTEEN

Factors affecting planning of canteen facility

- Location and site
- Number of hospital beds and specialities existing.
- Number of meals served per day and type of foods to be served considering the local food habits of the people.
- Catering to staff members of the hospital and number of employees.
- Extension of facilities to attendants of the patient
- Centralized vs. decentralized service.
- Type of equipment available

Location:

- Preferably ground floor,
- Close proximity to the service lifts,
- Easy access with the roads of the hospital
- Close to the inpatient area

Personnel:

One number of service personnel (bearers etc.) for every 25-50 mid-day meals served and same number for food preparation.

Table 2.24 Canteen Personnel Requirement

Category of Employees	Beds						
	50	100	200	300	400	500	750
Chief Dietician	-	-	-	-	-	1	1
Dietician	-	1	1	1	1	1	2
Jr. Dietician	1	1	1	2	2	3	4
Head Cook			1	2	2	3	4
Cook	1	2	3	3	4	4	5
Asstt. Cook	2	4	6	7	8	8	10
Read Bearer			1	2	2	3	4
Bearer	2	4	6	7	8	10	15
Masalchis (Cleaners)	2	4	6	8	8	10	15
Total	8	16	25	32	35	43	60

2.16.9 WASTE MANAGEMENT

Bio Medical Waste Management System Flow Chart

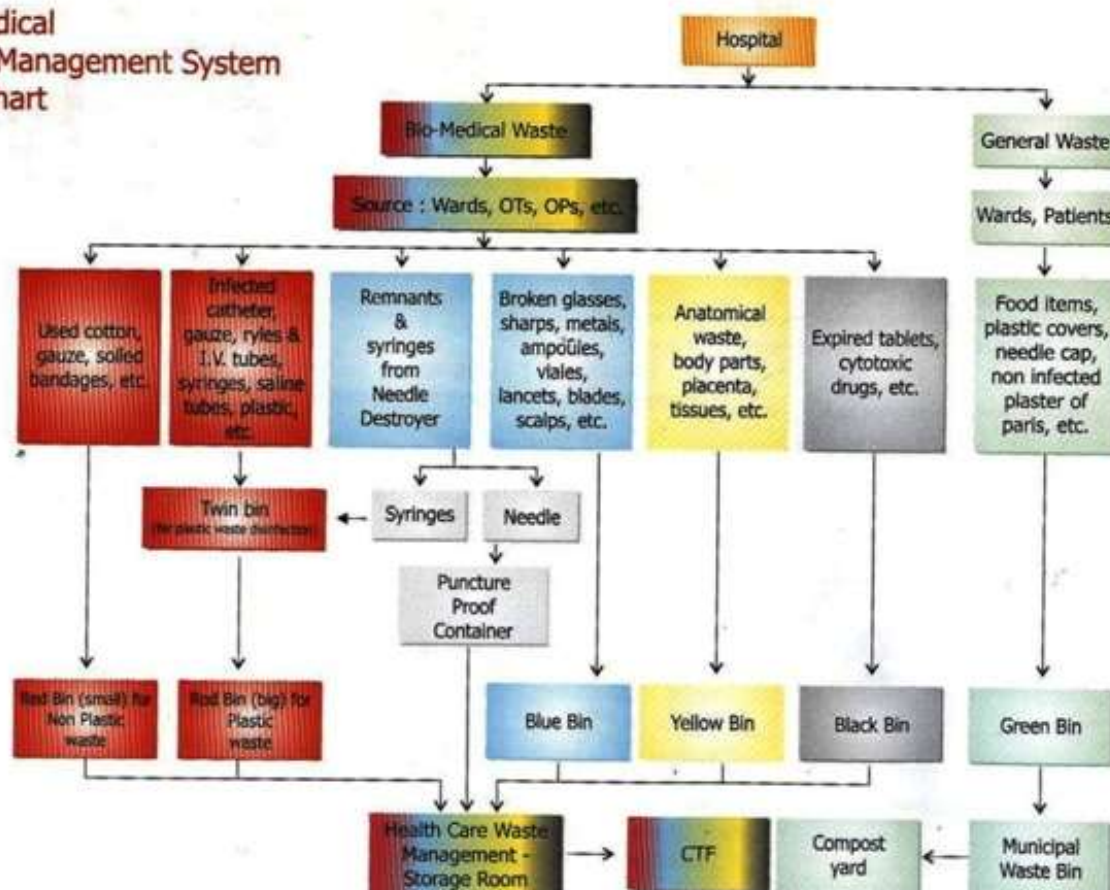


Fig 2.31 Hospital Waste Management

The general waste (85%) does not require any treatment. This can be taken away by the local authority; rest 15% of hospital waste (biomedical) requires treatment.

Transportation:

- The waste transportation route must be designated and avoid the passage of waste through patient care area.
- Biomedical waste and general waste should be collected and transported separately.
- Dedicated wheeled container trolley or cart should be used and these should be cleaned and disinfected after use.
- Transportation of waste for longer distance should be done in dedicated vehicle.
- All efforts to be done to prevent pilferage, spillage and transmission of infection.

Case Study:

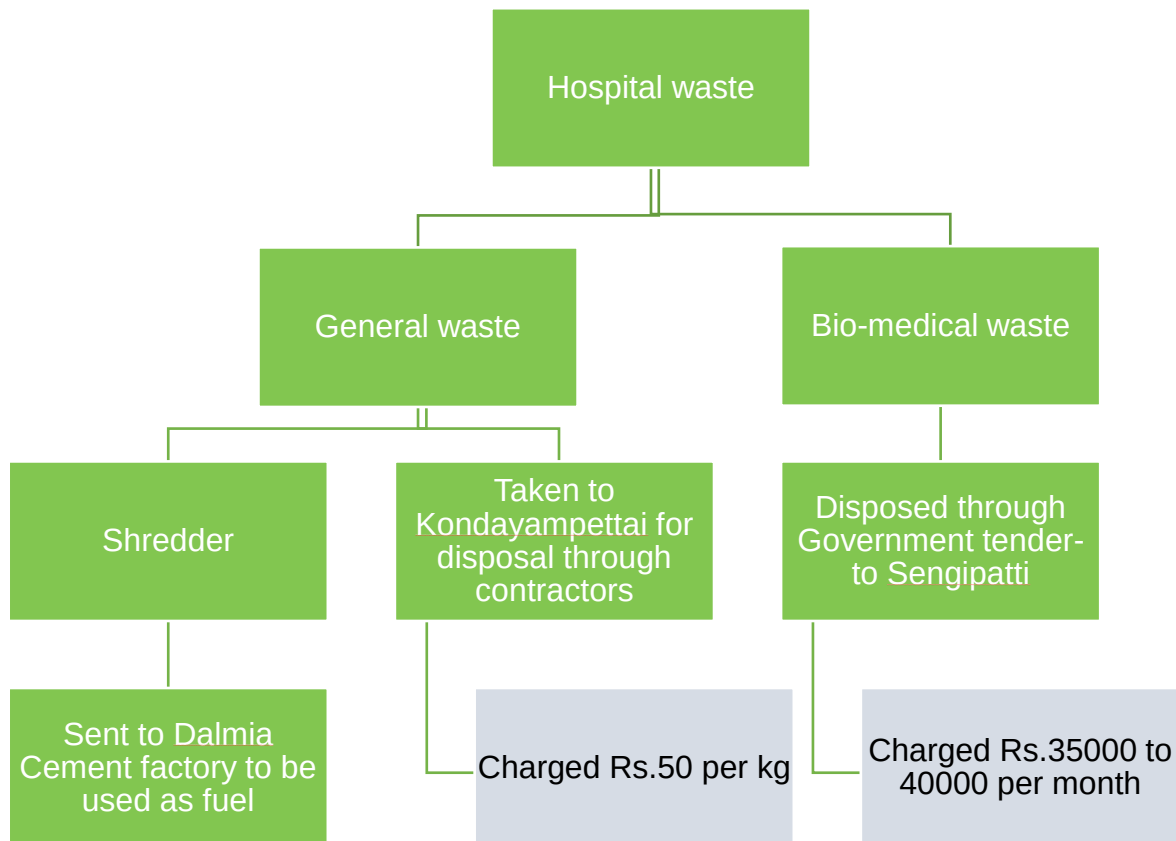


Fig 2.32 Kauvery hospital Hospital Waste Flow Chart



Fig 2.33 Kauvery hospital Bio-medical Waste Chart

Table 2.25 Kauvery Hospital Bio-medical Waste Weight

Types of bio-medical waste	Weight
Yellow	150kg
Red	100kg
White	50kg
Blue	15kg



Table 2.34 Kauvery hospital Bio-medical Waste Bins

2.16.10 HOUSEKEEPING

Aim: hygienic and clean hospital environment

Key Responsibilities of the Housekeeping Services

- a) Clean room floors, restroom, furniture, fixtures, wall, ceilings, curtains, windows and bathrooms
- b) Disposal of hospital waste
- c) Replace supplies in utility rooms
- d) Clean and maintain housekeeping equipment
- e) Patient preparation
- f) Urine Output disposal
- g) Patient shifting
- h) Laundry

Thumb rules:

- 1 supervisor per floor
- One sanitary attendant for 10 hospital beds or for a work area of 1,200 to 1,500 square feet.
- More sanitary attendants may be required for intensive care units/emergency wards.
- Maid can clean anywhere from 3000 to 6500 sq ft per day
- Minimum and maximum amount of floor area which a mopper can be expected to cover ranges from 1800 to 4000 sq ft per man hour.
- Housekeeping services in hospitals amounts to 3% of the total cost.

Outsourcing housekeeping advantages:

Out sourcing/contracting out or handing over services on contract has the following advantages:

- 1) It reduces the work load of the hospital management ie, that they are absolved of procurement activities or the services e.g. procurement of cleaning agent for housekeeping activities.
- 2) Manpower management and its allied activities are the responsibility of the contractor

- 3) Since the service is being provided by the specialists in the respective fields, there is enhancement in the quality of services being provided.
- 4) There may be a resultant reduction in cost if services are contracted out

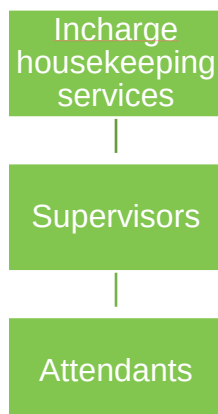


Table 2.35 Kauvery hospital Waste Management Hierarchy

Table 2.26 Housekeeping Costs in Developed Countries

Housekeeping Cost in developed countries	
90 to 95%	Labour cost
5%	Cleaning material cost, equipment cost

Table 2.27 Housekeeping Costs in India

Housekeeping Cost in India based on AIIMS, 1560 bedded hospital	
86.01 %	Labour cost
0.16%	Equipment cost
13.83%	Cleaning material cost

2.16.11 CSSD

Activities of CSSD:

- Cleaning
- Disinfection of semi-/non critical items
- Sterilization of critical items
- Supply of sterile materials

Location:

close proximity to OT, boiler, labour room, casualty and the wards

Table 2.28 Location of CSSD

No. of beds	Location
100 beds	CSSD in OT
> 100 beds	CSSD in Service Area
> 500 beds	CSSD in Service Area and OT

Space Requirement:

- 1.64 sq. m per bed for 400 bed hospital
- 1sq. m per bed for above 400 bed hospital

Maintenance:

Appropriate preventive maintenance schedule and records keeping of maintenance.

Budget Considerations:

a) Assessing demand

b) Capital cost is considered under:

- Physical space and layout including scope for expansion
- Processing and sterilisation equipment
- Initial investment on instruments, online expenditure of consumables e.g. packaging materials, indicators etc.

c) Maintenance cost including labour cost, replacement cost and cost of consumables.

d) Additional costs-cost of development, inventory carrying costs, cost of quality control.

2.16.12 PHARMACY**Aim**

Supply of good standard of drugs for the treatment of patients at economical price

Role and Function: The services rendered by the hospital pharmacy can be categorised as:

a) Demand estimation according to formulary; and in the absence of formulary, establishment of specification for drug procurement.

b) Purchasing of stores.

c) Storage and distribution of drugs to in-patients (wards), and dispensing for outpatients.

d) Compounding and manufacturing of sterile and non-sterile products, in some specialized institutions.

e) Quality control of drugs purchased, compounded and manufactured in the pharmacy.

f) Maintenance of formulary system, and implementation of the decisions of the Pharmacy and Therapeutic Committee.

g) Furnishing drugs information to physicians and other professional staff.

- h) Control of medical gases services, including piped gases.
- i) Maintenance of the facilities of the department.
- j) Imparting training to students of school of nursing, and in the medical intern training programme.
- k) Preparation and submission of periodic reports on progress of department to the hospital administrator.

Personnel:

In a 8-hour shift of OPD Pharmacy, a pharmacist can serve 150 prescriptions with a half-hour break. If the items are 3 to 5, then limit to serve will be reduced to 120 prescriptions in one shift. Hospital having more than 200 beds needs a Head Pharmacist, and for more than 300 beds requires one additional Asst. Pharmacist.

Table 2.29 Pharmacist Requirement

No. of beds	No. of pharmacist
Upto 50	3
Upto 100	5
Upto 200	8
Upto 300	10
Upto 500	15

Location:

- Preferably first floor
- easy access to lifts

Floor Area:

- Min 27 square meters.
- Additional 1.0 square meter per bed in 100-bed hospital;
- Additional 0.6 square meter per bed in 200-bed institution;
- Additional 0.5 square meter per bed in larger hospitals.

CHAPTER 3 METHODOLOGY

3.1 PERSONAL INTERVIEWS

Personal interviews were conducted with Facility Managers of JLL, Kauvery Hospital- Trichy and Ramachandra hospital- Chennai and the following conclusions were arrived.

3.1.1 IN-HOUSE VS OUTSOURCED SERVICES

Table 3.1 In-house VS Outsourced Services

1	PHARMACY	
	Best to have in-house	More profitable if run in-house. More concession on medicines given to hospitals. Eg. Medicine of MRP Rs.15 can be bought by the hospital for Rs.7
		Only manpower can be outsourced but leads to sharing of Hospital Management Software creating privacy issues
2	LAUNDRY	
	Good to outsource provided you get a good contractor.	Saves capital cost, operating and maintenance costs of expensive laundry machines
		SLAs have to established clearly mentioning the procedures for handling different types of linen like radio active linen, soiled linen etc,
		No major quality issues arises for ward linen. Therefore it can be outsourced.
		Good for hospitals located in areas having water scarcity
	Linen from critical areas can have in-house laundry	Disadvantages •Loss of linen or mixing up of linen •Linen from critical areas may not be sanitized properly.
3	WASTE MANAGEMENT	
	Bio-medical Waste: Best to have contracts	The collected bio-medical waste has to be transported to the Common Bio-Medical Waste Treatment Facility. It can be done by agencies without hassle.

	with approved agency	
	General waste: In-house	On-site compost plants if hospital area >5000 sq.m
4	LABORATORY / RADIOLOGY	
	Best to have in-house	Quality is compromised. Speciality hospitals don't outsource
		Manpower can be outsourced but creates privacy issues.
5	HOUSEKEEPING	
	Best to outsource	Cost effective. Monthly Salary is fixed. No need to pay PF, incentives etc
		No absenteeism
		Supervision by in-house staff is recommended
		Contract can be terminated if underperformed. So outsourcing give best quality housekeeping
6	ENGINEERING DEPARTMENT	
	Best to have in-house	Contractors may not have trained personnel which is essential in an engineering department
		The outsourced staff may lack experience
		The outsourced staff keep changing. So the hospitals have to give training to the newly appointed staff which is time consuming and not effective.
		If outsourced should have an in-house head
7	SECURITY	

	Ideal to outsource	Cost effective and good performance
8	CANTEEN	
	Can be in-house if profit oriented.	Dietary services for wards fetch profits as in-patients have to get food from the canteen facility
		If quality food is available people do not think about spending extra inside the hospital campus
9	BLOOD BANK	
	Usually outsourced (franchised)	Has several rules and regulations for setting up blood bank. Outsourced agencies have expertise in the field
		Found to be successful when outsourced
10	AMBULANCE	
	Outsourcing is best	During unexpected trauma, an outsourcing agency might be able to provide enough vehicles and drivers
11	MEDICAL GAS	
	Outsourcing is preferred	Requires huge investment for setting up of O2 and N2O production plants on site.
		Requires large space and additional personnel and electricity charges involved.

3.1.2 PAYMENT OF SERVICES FOR FACILITIES

Housekeeping

- Costs range from Rs 100 to Rs 300 per bed per day
- Depends on the range of work, frequency and extent of modernization and space (and land area), cleaning material
- Minimum Wages Act

Security

- Rs 100 to Rs 200 per bed per day
- Specific training for hospitals required

Laundry

- Cost Per washing Linen
- Overall cost per Bed

Food services

- Compulsory diet for all IP patients
- Rs 100 to Rs 250 per day per patient
- Cooking at site or delivered
- Plates (disposable), washing, cleaning
- Nutritionist/Dietitian services
- Food warmers, trolleys
- Health check for service staff
- Diet kitchen

Table 3.2 Payment of Services for Facilities

S.No	FACILITIES	PAYMENT OF SERVICES
1	Pharmacy	Profit sharing
2	Laundry	Cost per kg / Cost per linen
3	Waste management	Cost per kg
4	Laboratory/ Radiology	Profit sharing (around 30%)
5	Housekeeping	Manpower
6	Engineering Department	Manpower / size of the facility
7	Security	No. of checkpoints and manpower
8	Canteen	Fixed rates for sale of food items
9	Blood bank	Per unit of blood
10	Ambulance	Cost per km
11	Medical Gas	Rental and refill of medical gas charges

3.2 LIVE CASE STUDY

Dr.Kamakshi Memorial Hospital at Pallikaranai, Chennai.

3.2.1 INTRODUCTION

Dr.Kamakshi Memorial Hospital is a 300 bedded tertiary health care provider located at Pallikaranai in South Chennai, committed to a higher objective of delivering ultimate quality of health care with utmost excellence and personal care. Dr.Kamakshi Memorial Hospital is a multispeciality, nationally recognized forerunner and one of the premier institution in providing Cancer and Cardiac care.

3.2.2 PLANS



Fig 3.1 Kamakshi Memorial Hospital Location Plan



Fig 3.2 Kamakshi Memorial Hospital Site Plan

BLOCK 2 PLANS



Fig 3.3 Kamakshi Memorial Hospital Ground Floor Plan



Fig 3.4 Kamakshi Memorial Hospital First Floor Plan



Fig 3.5 Kamakshi Memorial Hospital Second Floor Plan



Fig 3.6 Kamakshi Memorial Hospital Third Floor Plan

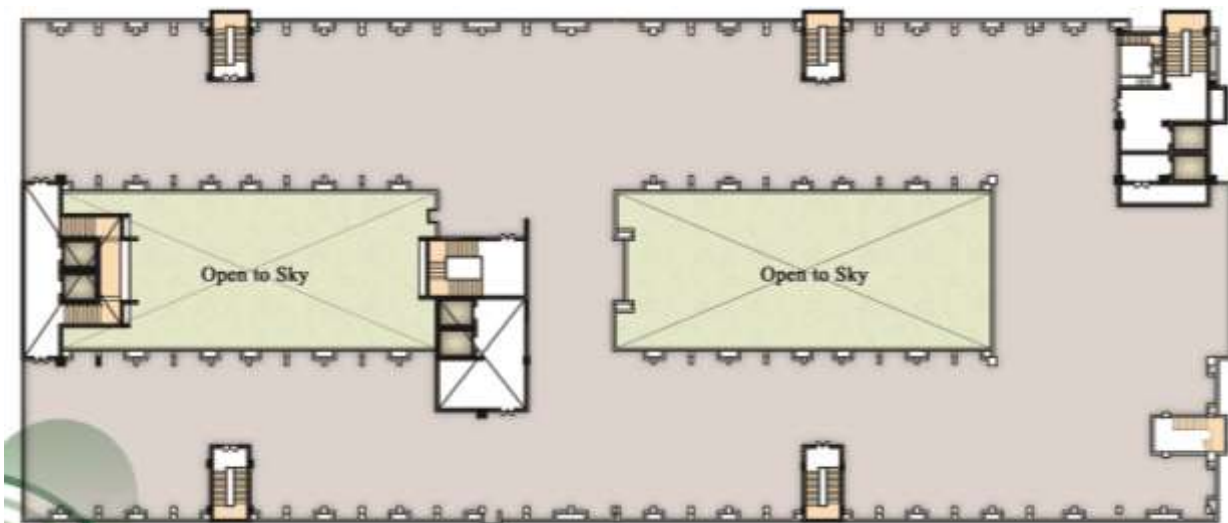


Fig 3.7 Kamakshi Memorial Hospital Terrace Floor Plan

3.2.3 ENGINEERING SERVICES

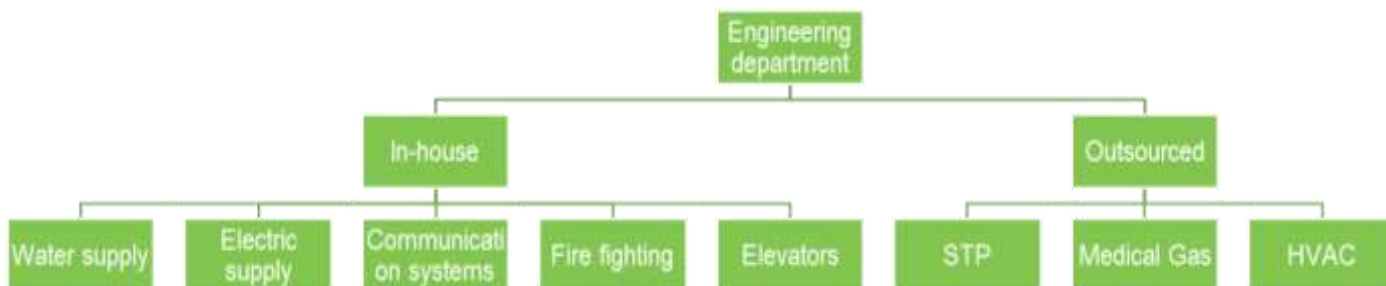


Fig 3.8 Kamakshi Memorial Hospital Hierarchy of Engineering Department

Table 3.3 Kamakshi Memorial Hospital Engineering Department

IN-HOUSE	OUTSOURCED
• Electrical & Lighting, • Plumbing, Elevators and • Fire safety	• HVAC maintenance and • STP maintenance

In-house facilities:

Whatsapp group is used as a communication medium

Maintenance by In-house team:

- DG: Checking the condition of the coolant oil level every day.
- Checking DB box every month.
- Checking plumbing of common restrooms everyday.
- Routine check- AMC visit

Table 3.4 In-house Maintenance Personnel

Maintenance Personnel	Nos	Educational qualification	Fresher Salary per month
Manager	1	Electrical Engineer	Rs.30,000
Supervisor	1	Diploma in Electrical	Rs.15,000
Dayshift • Electrical(5) substation-2, internal-3 • Plumber(1) • HVAC(2)	8	ITI, 10 th , +2	Rs.10,000
Nightshift •Electrician(2) •HVAC(1) •Plumber(1)	4	ITI, 10 th , +2	Rs.10,000

Maintenance Budget:

- Maintenance budget allocated per month: Rs.1,00,000
- Cost above this budget should be notified to Administrative Officer/ MD/ Vice President, get approval and proceed.
- During emergency, manager approves.

Issues in the maintenance department:

- Manpower shortage. Additional requirement: 1 plumber and 1 electrician
- No work orders and repair logs maintained
- No energy monitoring system used.
Most of the maintenance work is corrective. Planned preventive maintenance has to be implemented.
- No provision of Equipment maintenance schedules and instructions
- No Trouble shooting and fault analysis charts maintained.
- No provision of adequate and quality spare parts.
- The in-house team should be subjected to performance measurement and operational improvement targets.
- Planned maintenance programmes are best controlled using software which links to the asset register for each facility and highlights the operational importance and servicing requirement for each piece of plant. This will ensure an efficient use of time by visiting operatives and the completion of records enabling the performance of the facility to be tracked.
- Operating and Maintenance Manual of all equipments are not maintained

3.2.4 MEDICAL GASES

Table 3.5 Kamakshi Hospital Medical Gas

IN-HOUSE	OUTSOURCED
• Monitoring liquid oxygen level every hour ; • Checking pressure in air and vaccuum compressors every morning • Space provided by hospital to set up equipment	• Equipment owned by outsource company • Transport and Supply of medical gas • Maintenance and repair

Liquid Oxygen:

- Capacity- 980L (2 nos) 1 backup
- Supplied through centralised pipelines
- Levels monitored every hour
- Intimated to medical gas agency for refilling once the level drops to 700L
- Refilled when level reaches 200L
- Rental charges- Rs.10,000/month
- Refill charges:1 cubic meter= Rs.16 appx
- Filled alternative days.



Fig 3.9 Kamakshi Memorial Hospital Liquid oxygen

Oxygen manifold:

- Backup to liquid oxygen when liquid oxygen can't be refilled or if there is a problem in the pipeline.
- Capacity- 7 cubic meter (40 nos)
- Supplied through the same centralised pipelines as liquid oxygen.
- 10 cylinders opened at a time for use.
- Line pressure to be maintained at
- 4.5 kg per sq meter at the receiving end
- When a bank of cylinder gets used, the other bank automatically gets connected by oxygen control panel for uninterrupted supply.



Fig 3.10 Kamakshi Memorial Hospital Oxygen manifold



Fig 3.11 Kamakshi Memorial Hospital Oxygen Control Panel



Fig 3.12 Kamakshi Memorial Hospital Nitrous Oxide manifold

Portable cylinders:

- Oxygen, CO₂, N₂O and N₂ are placed in the required departments.
- 1 back up for each cylinder



Fig 3.13 Kamakshi Memorial Hospital Air and Vacuum Compressor

Table 3.6 Kamakshi Hospital Medical Gas Types

Type of medical gas	Nos	Capacity	Usage
Liquid O ₂	2	980 L	Anesthesia, life support, OT, trauma etc;
O ₂ manifold	40	7 cub.m	
Portable O ₂ cylinder	12 per month	1.5 cub.m	
N ₂ O manifold	7 per month	17 cub.m	Anesthesia, OT
Portable CO ₂ cylinder	1 per month	7 cub.m	Operation theatre

Portable N2O cylinder	3 per month	7 cub.m	Anesthesia, OT
Portable N2 cylinder	1 per month	7 cub.m	IVF theatre, Blood bank
Compressed Air			ICU, NICU

Table 3.7 Kamakshi Hospital Medical Gas Maintenance Cost

Maintenance	Checking	Maintenance cost
AMC	Weekly thrice	Rs. 20,000/month

3.2.5 LAUNDRY

Laundry is outsourced in Kamakshi hospital

Reasons for outsourcing:

- Water shortage
- No need for huge investment
- Less manpower required

Table 3.8 Kamakshi Hospital Laundry

IN-HOUSE	OUTSOURCE
• Storage of soiled linen in a separate room. • Storage of clean linen and fresh linen. • Maintain registry for linen sent for laundry everyday, total number of linen present etc;	• Collect, Wash, Iron and deliver according to medical laundry procedure

Process:

- Soiled linen is collected in trolleys from wards. They are then stored in soiled linen room in first floor prior to collection from laundry vendor

- Infected linen and foul linen are sluiced by hand, dried, put in a yellow cover and sent for laundry separately.
- Ordinary linen are sent to laundry without sluicing.
- Curtains, door mats etc are cleaned weekly once in rotation for every department.
- Vendor counts and collects linen from the hospital in the presence of a laundry supervisor.
- A separate register is maintained for infected linen
- Laundry procedure for soiled linen, infected linen and foul linen are not followed effectively which might lead to spread of infection.

Charges:

Per piece rate



Fig 3.14 Kamakshi Memorial Hospital Soiled Linen Room



Fig 3.15 Kamakshi Memorial Hospital Fresh Linen Storage in First Floor

Table 3.9 Kamakshi Hospital Laundry Bill Sample

Types of linen	Nos
Blue sheet	338
Blue pillow cover	175
Brown sheet	43
Brown pillow cover	20
Maroon sheet	39
Maroon pillow cover	09
Purple sheet	29
Purple pillow cover	02
Patient gown	65
Pink gown	03
OT gown	19
OT sheet	17
OT shirt	42
OT Pant	40
Blanket	11

3.2.6 BLOOD BANK

- Blood Bank is outsourced in-house in Kamakshi Hospital
- Located in the basement floor of Block-1
- Consists of Reception, Blood collection area, Blood collection preparation area, Lab-1(Blood Group Serology), Lab-2(Blood Transmissible Diseases), staff and donor restrooms
- Min number of blood donors per day: 5

Personnel:

- Nurses- 2 nos
- Technicians- 8 nos

Instruments present:

Blood component preparation:

- Laminar Airflow
- Refrigerator Centrifuge (2)
- Double pan balance
- Plasma expessor
- Table top tube sealer
- Combo scale
- pH meter
- Blood bank refrigerator
- Platelet agitator with incubator
- -30 deg C freezer
- -80 deg C freezer
- Thawing bath
- Cryo bath

Blood collection:

- Cell separator
- Haemo control
- Heart tube sealer
- Donut couch
- BCM blood collection monitor

Lab-1 (blood group serology):

- Centrifuge
- Incubator
- Diamond incubator
- Centrifuge
- Refrigerator

Lab- 2 (blood transmissible diseases):

- VDRL shaker
- Claya Abbot screening machine

3.2.7 CANTEEN

- Works on royalty
- Initially was in-house but was decided to outsourced due to shortage of labour.

- Operating hours: 7.00 a.m. to 10.00 p.m
- Electricity bill: Rs.70,000 per month
-

Table 3.10 Kamakshi Hospital Canteen

IN-HOUSE	OUTSOURCED
Space	Seating furniture
Charged Electricity	Staff
Water	Kitchen equipment
Pest Control	LPG

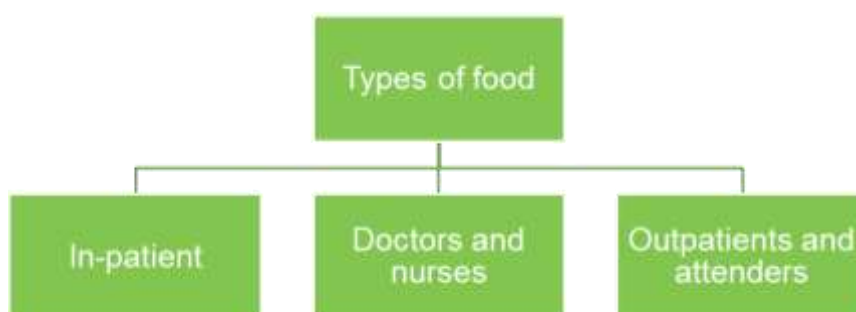


Fig 3.16 Kamakshi Memorial Hospital Canteen Food Types

Types of food for in-patients

- Diet food
- Diabetic food
- Normal food
- Salt free food
- Less spicy
- No onion / no garlic food
- Semi-solid food

Table 3.11 Kamakshi Hospital Canteen Sales

Types of food	Sales
Outpatient food	250 meals
Doctors/Nurses food	75 meals
Patient food	450 meals

Table 3.12 Kamakshi Hospital Canteen Personnel

Personnel	Nos
Manager (B.Sc. Hotel Management)	1
Asst. Manager (B.Sc. Hotel Management)	1
Chef (B.Sc. Hotel Management)	1
Cooks	5
Asst. Cooks	3
Chinese Cook	2
Juice master	2
Supervisor	1
Stewardess (table cleaning-3, vessel washing-6)	9

3.2.8 WASTE MANAGEMENT

General waste:

- Separated into food waste and non-food waste at every floor.

- Transported using trolleys out to the yard.
- Food waste is feeded into composter
- 100 kg food waste+50kg saw dust = manure for gardens on site.



Fig 3.17 Kamakshi Memorial Hospital General Waste

Table 3.13 Kamakshi Hospital Bio-medical Waste Weight in Block-2

Types of bio-medical waste in new building	Weight in kgs
Red	36 kgs
Yellow	32 kgs
White	2 kgs



Fig 3.18 Kamakshi Memorial Hospital Bio-medical Waste

Covid waste:

- stored in separate yellow bags
- Separate lorry for disposal
- Payment: monthly charges



Fig 3.19 Kamakshi Memorial Hospital Covid Waste

Table 3.14 Kamakshi Hospital Bio-medical Waste Weight

Bio-medical waste in both buildings	Weight in kgs
Bio-medical waste	150 kgs
Covid waste	368 kgs (present)

Table 3.15 Kamakshi Hospital Waste Disposal Cost

Type of waste	Cost per kg
General waste	Rs. 50
Bio-medical waste	Rs. 40
Covid waste	Rs. 21

3.2.9 AMBULANCE

- Small ambulance has only Oxygen cylinder provision whereas large ambulance has all life supporting provisions
- Dry lease of large ambulances with 6 in-house drivers.
- Outsourced ambulances are charged based on kms travelled per month

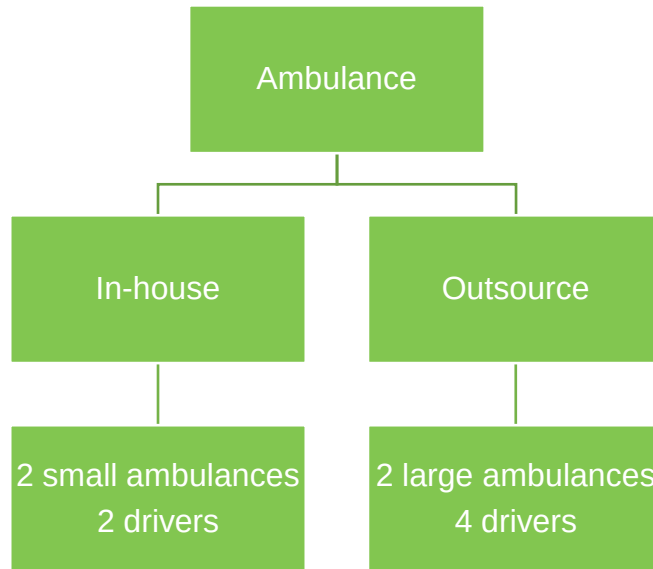


Fig 3.20 Kamakshi Memorial Ambulance



Fig 3.21 Kamakshi Hospital Ambulance Parking

3.2.10 SECURITY

Personnel:

- 50 nos
- Chief security officer assigns duties to securities

Shifts:

- 3 shifts
- 8 hrs shift
- Shuffling of security points to make the securities aware of all locations

Responsibilities of security officers:

- Monitor entry and exit of users
- Guide emergency cases to Emergency room
- Allow visitors inside the ward only during visitor timings and check for visitor pass.

- Check material in and out
- Hospital staff checking- gender based
- Should have knowledge about the entire hospital location and should be able to guide the people to fire exits during emergency
- Works with IT department to get CCTV footage in times of threat.

3.2.11 HOUSEKEEPING

Housekeeping is held in-house in Kamakshi Hospital

Personnel:

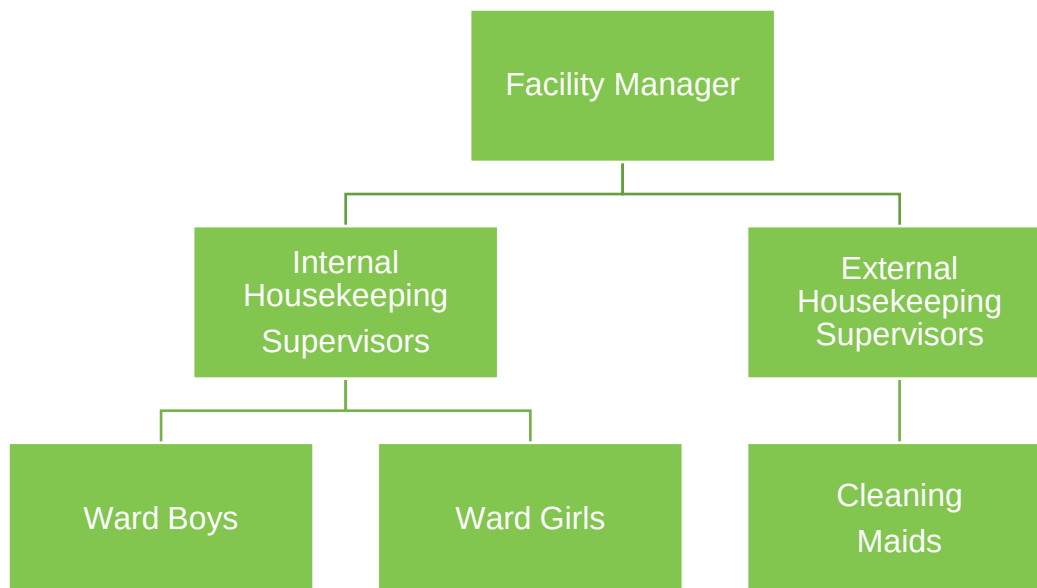


Fig 3.22 Kamakshi Hospital Housekeeping

Table 3.16 Kamakshi Hospital Housekeeping Personnel Numbers

Personnel	Numbers
Executive	1
Internal Housekeeping Supervisors	3
External Housekeeping Supervisors	2
Ward aids morning shift	33
Ward aids evening shift	22

Cleaning maids shift-1	40
Cleaning maids shift-1	25
Cleaning maids shift-1	50

Equipments used in housekeeping:



Fig 3.23 Kamakshi Hospital Automatic Scrubber Dryer Machine



Fig 3.24 Kamakshi Hospital Semi-Automatic Scrubber Machine

The housekeeping services are managed effectively by the in-house team by using checklists for all activities.

3.25 Kamakshi Hospital Room Cleaning Checklist

3.25 Kamakshi Hospital Rest Room Cleaning Checklist

CHAPTER 4 ANALYSIS AND RESULTS

4.1 COST COMPARISON OF IN-HOUSE VS OUTSOURCED FACILITIES IN KAMAKSHI HOSPITAL

4.1.1 ENGINEERING SERVICES

Table 4.1 Engineering Services Cost Comparison

ENGINEERING SERVICES							
IN-HOUSE				OUTSOURCE			
PERSONNEL				PERSONNEL			
Manpower present	Nos	Salary per month/person(Rs)	Salary per month(Rs)	Manpower supplied	Nos	Salary per month/person(Rs)	Salary per month(Rs)
Manager	1	60,000	60,000	Manager	1	45,000	45,000
Supervisor	1	35,000	35,000	Supervisor	1	28,000	28,000
Dayshift				Dayshift			
Electrician	5	22,000	110,000	Electrician	5	16,000	80,000
Plumber	1	20,000	20,000	Plumber	2	14,000	28,000
HVAC	2	20,000	40,000	HVAC	2	14,000	28,000
Nightshift				Nightshift		14,000	
Electrician	2	22,000	44,000	Electrician	3	14,000	42,000
HVAC	1	20,000	20,000	HVAC	1	14,000	14,000
Plumber	1	20,000	20,000	Plumber	1	14,000	14,000
Present salary expense per month			349,000	Total salary expense per month			279,000
				30% overhead charges			83,700
Manpower required	Nos	Salary per month/person	Salary per month	Total salary quoted by outsource company			362,700
Electrician	1	15,000	15,000				
Plumber	1	15,000	15,000	HVAC maintenance outsource			75,000
HVAC maintenance				STP maintenance outsource			70,000
Supervisor	1	35,000	35,000				
Technician	4	20,000	80,000	MAINTENANCE COST			
STP				Cost per month			

maintenance							100,000
Supervisor	1	35,000	35,000				
Technician	3	20,000	60,000	OUTSOURCING ENGINEERING SERVICES COST			₹ 607,700
			240,000				
MAINTENANCE COST							
Cost per month			100,000	RECOMMENDATION- To have in-house manager			
Monthly expense			100,000				
IN-HOUSE ENGINEERING SERVICES COST			₹ 689,000	OUTSOURCING ENGINEERING SERVICES COST with in-house manager			₹ 622,700

In-House

- Additional supervisors and technicians have to be recruited if HVAC and STP maintenance have to be made in-house.
- The maintenance cost allocated per month has more chances of increasing if in-house personnel do not have a proper preventive maintenance plan.
- The in-house cost should also include consumables cost like tools for the technicians, lubricants etc;

Outsourced

- The main reason for outsourcing STP maintenance is finding manpower for STP operation is very difficult despite offering a good salary package. The contractor company manages to find manpower for such jobs.
- The performance of contractors who are expert in HVAC maintenance is much higher than having an in-house team because they follow the protocols and procedures drawn by their company.
- The contractor company strives to work within the allocated maintenance cost and is achievable due to their regular monitoring and maintenance. This is restricted in the SLA
- The cost of consumables such as tools and lubricants are taken care of by the contracting company.

Recommendation:

- The engineering services department can be totally outsourced to different contracting companies who are experts in their particular service.
- Outsourcing is definitely cost saving although not much. The salary benefits for employers are also taken care of by the contracting company.
- Performance is higher when outsourced.
- Saves the efforts and time for recruiting and managing personnel.
- The contracting company provides manpower even during absence of one person and the job is taken care of.
- The in-charge of the engineering department has to be an in-house engineer who has complete knowledge of all the engineering equipment in the hospital to guide the outsourced technicians.

4.1.2 MEDICAL GAS

Table 4.2 Medical Gas Cost Comparison

MEDICAL GAS							
IN-HOUSE				OUTSOURCE			
EQUIPMENT COST				RENTAL CHARGES			(Rs)
Equipment types	Nos	Cost per unit(Rs)	Total cost(Rs)	Rental for O2 storage cylinder			10,000
Oxygen production plant 1KL	1	3,000,000	3,000,000	GAS REFILL CHARGES			
Vacuum compressor	3	150,000	450,000	Types of medical gas cylinders	Nos per month	Charges per cylinder(Rs)	Total refilling charges(Rs)
Air compressor	3	150,000	450,000	Liquid oxygen(L)	15000	80	1,200,000
Investment on equipment			3,900,000	Oxygen manifold	40	154	6,160
MAINTENANCE COST			10,000	Nitrous oxide manifold	3	3,300	9,900
PERSONNEL COST				Oxygen cylinder	12	120	1,440
Manpower required	Nos	Salary per month/person(Rs)	Salary per month(Rs)	Carbon dioxide cylinder	1	1,500	1,500
Supervisor	1	20,000	20000	Nitrogen cylinder	1	1,700	1,700
Technician	2	15000	30000	Transport charges			1,800
Salary expense per month			50000	Handling charges if stored more than 120 days			3,000
RENTED LIQUID OXYGEN TANKS (OUTSOURCED)				Refill charges per month			1,225,500
Rental for O2 storage cylinder			10,000				
Types of medical gas cylinders	Nos per month	Charges per cylinder	Total refilling charges				
Liquid oxygen(L)	15000	80	1,200,000				
Carbon dioxide cylinder	1	1,500	1,500				

Nitrous oxide manifold	3	3,300	9,900	Monthly expense increases even after setting up medical gas production plant. Therefore In-house plant is not economical. Any fault or repair in the in-house plant might require technicians from outside cities to attend to it which might take up 2-3 days delay.		
Transport charges			1,800			
Handling charges if stored more than 120 days			3,000			
Outsourced medical gas charges per month			1,226,200			
Monthly expense			1,286,200			
IN-HOUSE MEDICAL GAS COST			₹ 5,186,200	OUTSOURCED MEDICAL GAS COST	₹ 1,235,500	

In-House

- Setting up a Medical gas production plant on site takes care of Oxygen and Nitrogen requirements of the hospital.
- The O₂ and N₂ produced can be stored in cylinders.
- The pressure at the receiving end can be adjusted depending on the number of patients treated with medical gas but speedy production catering to additional demand cannot be met.
- An additional cryogenic liquid oxygen cylinder is required as a backup.
- The space requirements and investment is high for on-site production plant.
- It requires additional labour who are trained in operating the plant.
- The usage of CO₂, N₂O are considerably low. So setting up a production plant for such gases isn't required.
- Even when Medical gas production plan is installed on site the hospital has to depend on external vendors for spare parts etc;

Outsource

- Liquid oxygen cylinder is rented from vendor and the other cylinders are supplied by refill basis like LPG cylinders.
- INOX is the vendor for Kamakshi hospital and they supply medical gases at reasonable rates.
- They offer free repair and maintenance of cryogenic cylinders throughout their service.
- Additional filling of gases can be done as the demand rises(Covid)

Recommendation:

- Outsourcing is the ideal solution when it comes to medical gas service.
- The regular checking of Oxygen quantity can be done by in-house engineering technicians and doesn't require expertise.
- Any repair on the production plant might cause loss of supply as there is no storage facility in the plant.
- Investment is high for setting up a production plant and requires support of trained technicians. Even then the hospital has to rely on external vendors for support and services.

4.1.3 LAUNDRY

Table 4.3 Laundry Cost Comparison

LAUNDRY							
OUTSOURCE				IN-HOUSE			
Types of linen	Nos	Cost per piece	Cost per day	EQUIPMENT	Nos	Cost per piece	Total Cost
Sheets	449	9.25	4,153	Washing machine 30kgs	1	250,000	250,000
Pillow covers	206	9.25	1,906	Washing machine 15kgs	1	120,000	120,000
Patient gown	68	9.25	629	Sluicing Machine 15kg	1	160,000	160,000
OT gown	19	9.25	176	Dryer machine	1	130,000	130,000
OT sheet	17	9.25	157	Pressing(ironing) machine	1	300,000	300,000
OT shirt	42	9.25	389	Trolley	3	30,000	90,000
OT pant	40	9.25	370	Investment on equipment			1,050,000
Blanket	11	9.25	102				
Cost per day			7,881	UTILITY			
Cost per month			236,430	Water	Req per kg of linen (litres)	Total linen weight (kg)	Water requirement(litres)
				Hot water	30	150	4500
				Cold water	10		1500
				No. of litres of water required per day			6000
				No. of litres of water required per month			180000
				Capacity of 1 can			20 litres
				Total no.of cans required per month			9000
				Cost of 1 can			30

				Total Cost of water per month			270000
				Power			
				3 kwh per 45kg of laundry			
				Power requirement per shift=(150X3)/45			10kwh
				Power requirement for 4 shifts			40kwh
				Power requirement for a month			1200kwh
OUTSOURCED LAUNDRY COST			236,430	1200kwh			1200units of power
				Cost of 1 unit			Rs.8.5
IN-HOUSE				Cost of 1200 units			10200
WEIGHT OF LAUNDRY CALCULATION				Utility costs per month			280200
Converting all types of linen to sheets,							
No of sheets			750	MANPOWER			
Approximate weight of one sheet (kg)			0.2	Laundry Engineer	1	15000	15000
Total weight of laundry per day (kg)			150	Linen attender night shift	4	10000	40000
				Linen attender Day shift	4	10000	40000
WASHING MACHINE CAPACITY CALCULATION				Office incharge	1	12000	12000
Washing machine required=2 nos min				Tailor			
	Mach ine 1	Mach ine 2		Total manpower cost per month			107000
Capacity	30kg	15kg	45kg				
No. of shifts required= 150kg/45kg =4 shifts				Montly expense			387,200
				IN-HOUSE LAUNDRY COSTS			1,437,200

Recommendation:

- Laundry when made in-house in Kamakshi hospital requires a lot of water but ground water isn't available in that area. Therefore it adds to cost if water is bought.
- It requires huge investment and manpower requirement when held in-house.
- Provision of tailoring bay with a tailor has to be made available.

4.1.4 BLOOD BANK

Table 4.4 Blood Bank Cost Comparison

BLOOD BANK							
IN-HOUSE				FRANCHISE			
INVESTMENT ON EQUIPMENT	Nos	Cost per unit(Rs)	Total cost(Rs)	Data	Minor	Major	Total number of operations per day
Laminar Airflow	1	67,000	67,000	Operations per day	2	1.5	3.5
Refrigerated Centrifuge	3	700,000	2,100,000	Units of blood required	3	7	
Double pan balance	1	20,000	20,000	Total units of blood required per day	6	11	17
Plasma expressor	1	18,000	18,000	Total units of blood required per month			495
Table top tube sealer	1	90,000	90,000				
Combo scale	1	20,000	20,000	BLOOD BAG REQUIREMENT	Nos	Cost per unit of blood bag	Total cost of blood bags
pH meter	1	15,000	15,000	No of blood bags required per month	495	1,400	693,000
Blood bank refrigerator	1	75,000	75,000	OUTSOURCED BLOOD BANK COSTS			693,000
Platelet agitator with incubator	1	120,000	120,000	PROFIT IF OUTSOURCED			
minus 30 deg C freezer	1	100,000	100,000	Cost of blood bag purchased by the hospital			1400
minus 80 deg C freezer	1	150,000	150,000	Cost of blood bag sold to the patient			1800
Thawing bath	1	80,000	80,000	Profit per blood bag			400
Cryo bath	1	90,000	90,000	No of blood bags required per month			495
Cell separator	1	100,000	100,000	OUTSOURCE PROFIT			891,000
Hemo control	1	40,000	40,000				

Heart tube sealer	1	70,000	70,000	OUTSOURCED BLOOD BANK PROFIT			198,000
Donut couch	1	60,000	60,000				
BCM blood collection monitor	1	55,000	55,000	PROFIT IF IN-HOUSE			
Incubator	1	70,000	70,000	No of blood bags required per month			495
Diamond incubator	1	150,000	150,000	Cost of blood bag sold to the patient			1800
Refrigerator	1	180,000	180,000	Profit for blood bag per month			891,000
VDRL shaker	1	15,000	15,000	Monthly expense			301667
Total equipment cost			3,685,000	IN-HOUSE PROFIT			589,333
PERSONNEL	Nos	Salary per month/p erson(Rs)	Salary per month(Rs)	ROI			
Nurses	2	20,000	40,000	Investment			3,685,000
Technicians	8	15,000	120,000	In-house profit per month			589,333
Total manpower cost per month			160,000	ROI	Investment/pro fit per month		6.3
							months
MAINTENANCE COST							
AMC			500,000				
Monthly			41,667				
UTILITY							
Electricity charges per month			100,000				
Monthly expense			301,667				
IN-HOUSE BLOOD BANK COSTS			₹ 3,986,667				

In-House

- There are 2 minor operations and 2 to 3 major operations happening in Kamaksi hospital. This data is used to calculate the quantity of blood bags required per month.

Outsource

- Profit gained by the hospital when bought from franchise blood bank is Rs.400 per unit of blood.
- If bought from outsource blood bank off campus, transportation charge will be added.
- So having a franchise blood bank within the hospital is better than outsource system

Recommendation:

- From the cost analysis it is found that in-house generates additional profit of Rs.391333 when blood bank is held in-house.
- Running a in-house blood bank also requires adherence to Standards for Blood Banks and Blood Transfusion Services National AIDS control organization.
- The blood banks are subject to frequent inspections for license renewal.
- The hospital has to have tie ups with other blood banks for emergency purposes.

4.1.5 CANTEEN

Table 4.5 Canteen Cost Comparison

CANTEEN							
IN-HOUSE				OUTSOURCE			
EQUIPMENT	Nos	Cost per unit(Rs)	Total cost(Rs)	REVENUE OF HOSPITAL IF OUTSOURCED			
				Types of food	No. of meals per day	Cost of meals for a day(Rs)	Total cost(Rs)
25 kg boiler	2	70,000	140,000				
4' Tawa	1	30,000	30,000	Outpatient	250	150	37,500
500L Refrigerator	3	58,000	174,000	In patient	450	250	112,500
Microwave oven	2	25,000	50,000	Tea/Coffee	1200	25	30,000
Bain marie	3	25,000	75,000	Juice	400	50	20,000
2 Burner Range	2	15,000	30,000	Snacks	200	40	8,000
Coffee maker	1	24,000	24,000	Sales per day			208,000
Juicer with 2 jars	1	5,500	5,500	Sales per month			6,240,000
Investment on Equipment			528,500				
				30% of sales given to management Revenue of hospital from outsource canteen			1,872,000

FURNITURE	Nos	Cost per unit(Rs)	Total cost(Rs)				
Tables	18	7,500	135,000	EXPENDITURE FROM HOSPITAL END IF OUTSOURCED			
Chairs	72	1,500	108,000				
Investment on furniture			243000	Types of food	No. of meals per day	Cost of meals for a day(Rs)	Total cost(Rs)
Total Investment			771,500	Doctor's/nurse	75	250	18,750
				Food cost per month			562,500
MANPOWER	Nos	Salary per month/person(Rs)	Salary per month(Rs)	UTILITY			
Manager	1	45,000	45,000	Water			
Asst. Manager	1	35,000	35,000		No of cans/ day	Cost per can(Rs)	Total cost of Water cans(Rs)
Chef	1	25,000	25,000	Water requirement	15	30	450
Cooks	5	16,000	80,000	Utility cost per month			13,500
Asst. cooks	3	12,000	36,000				
Chinese cook	2	16,000	32,000	Expenditure per month			576,000
Juice master	2	12,000	24,000	PROFIT IF OUTSOURCED			
Supervisor	1	28,000	28,000	Revenue 30% sales from outsource agency			1,872,000
Stewardess	9	10,000	90,000	Expenditure per month although outsourced			576,000
Total salary expense per month			395,000	OUTSOURCE PROFIT			1,296,000
UTILITY				PROFIT IF IN-HOUSE			
Electricity charges per month			70,000	Sales per month			6,240,000
	No of cylinder s/day	Cost per cylinder	Total cost of LPG	Staff salary		-	395,000
LPG requirement	4.5			Utility		-	

		1,772	7,974				322,720
	No of cans/day	Cost per can	Total cost of Water cans	Provision cost	45%	-	2,808,000
Water requirement	15	30	450	Food waste cost	5%	-	312,000
Water and LPG cost per day			8,424	Doctor food	50% of actual cost	-	281,250
Water and LPG cost per month			252,720	IN-HOUSE PROFIT			2,121,030
Utility costs per month			322,720				
				ROI			
Provision cost	45%		2,808,000	Investment			771,500
Food waste and miscellaneous	5%		312,000	Profit per month			2,121,030
				ROI	Investment/pr ofit per month		0.4
Monthly expense			3,837,720				months
IN-HOUSE CANTEEN COST			₹ 4,609,220				

In-House

- Investment on furniture + equipment = Rs.771500
- Return on investment can be got back within a month

Outsource

- Revenue of appx.43L can be generated every month. The only expenditure is cost of water.
- Hospital is free from recruiting and managing the personnel, kitchen equipment etc;

Recommendation:

- In-house canteen can generate high profits but adds responsibilities on hospital management.

4.1.6 WASTE MANAGEMENT

Table 4.6 Waste Management Cost Comparison

WASTE MANAGEMENT							
IN-HOUSE				OUTSOURCE			
Equipment	Nos	Cost	Total cost	Disposal cost	kgs	Cost per kg(Rs)	Total cost per day(Rs)
General waste shredder (500kg/hr)	1	2000000	2,000,000	Biomedical waste	150	21	3,150
Food waste shredder	1	100000	100,000	Covid waste	368	40	14,720
Investment on equipment			2,100,000	General waste	800	50	40,000
Disposal cost	kgs	Cost per kg(Rs)	Total cost per day(Rs)	Disposal charges per day			57,870
Biomedical waste	150	21	3,150	Disposal charges per month			1,736,100
Covid waste	368	40	14,720				
Disposal charges per day			17,870	Equipment Cost			
Disposal charges per month			536,100	Food waste shredder			100,000
Monthly expense			536,100				
IN-HOUSE WASTE MANAGEMENT COST			₹ 2,636,100	OUTSOURCE WASTE MANAGEMENT COST			₹ 1,836,100

Recommendation:

- Outsourcing of bio-medical waste is preferred because it requires a lot of space and legal requirements. The Government approved agencies are capable of disposing bio-medical waste even during times of covid.
- Management of food waste is done with food shredder and is ideal.
- General waste can be shredded and sent for cement factories to be used as fuel. Investing on general waste shredder is a good solution to general waste if there is a possibility of sending the waste to cement factories.

4.1.7 AMBULANCE

Table 4.7 Ambulance Cost Comparison

AMBULANCE							
IN-HOUSE				OUTSOURCE			
INVESTMENT ON AMBULANCE	Nos	Cost	Total cost of vehicles	Hire charge per km			Rs.16
Basic Life Support Ambulance	2	500,000	1,000,000	Facility charge eg.O2		Appx	Rs24
Advanced Life Support Ambulance	2	2,500,000	5,000,000	Dry lease for ambulance		Appx	Rs.40
Ambulance cost			6,000,000	Within 10kms		Appx	Rs.400
				VEHICLE RENT	No of cases per day	Cost within 20kms(to and fro)	Total Cost
MANPOWER	Nos	Salary per month/person(Rs)	Salary per month(Rs)	Cost per day	4	800	3,200
Drivers	6	16,000	96,000	Cost per month			96,000
UTILITY				MANPOWER	Nos	Salary per month/person(Rs)	Salary per month(Rs)
Diesel calculation				Drivers	6	16,000	96,000
No of trips	Appx Distance travelled in 1 trip(kms)	Total distance travelled in day(kms)	Total distance travelled per month	OUTSOURCE AMBULANCE COSTS			₹ 192,000
4	20	80	2,400	PROFIT IF OUTSOURCED			
Total distance travelled per month	Mileage	Diesel required per month(l)			No of patients per	Avg charge/person	Revenue from ambulance

					month		
2400	10	240		Revenue	120	6000	720,000
Cost per litre of diesel			86	Monthly expense			192,000
Total cost for diesel		86x240	20,640	OUTSOURCE PROFIT			₹ 528,000
MAINTENANCE							
Maintenance costs + oxygen per month			5,000				
Monthly expense			121,640				
IN-HOUSE AMBULANCE COSTS			₹ 6,121,640				
PROFIT IF IN-HOUSE				ROI			
	No of patients per month	Avg charge/person	Revenue from ambulance	Investment			6000000
Revenue	120	6,000	720,000	In-house profit			598360
Monthly expense			121,640	ROI	Investment/profit per month	10.03	
IN-HOUSE PROFIT			₹ 598,360			months	

- Distance travelled per trip is taken as 20kms (to and fro) to calculate as most of the cases fall within this distance range for pick up.
- The hospital has opted for dry lease of vehicles as in-house drivers are trustworthy and are available 24x7 for service.

Recommendation:

- It is recommended that the hospital invests on ALS ambulances of 2 numbers as the return on investment is only 10.3 months.
- By investing the hospital can increase their profit to Rs.70,360 per month.

4.1.8 SECURITY

Table 4.8 Security Cost Comparison

SECURITY							
IN-HOUSE				OUTSOURCE			
PERSONNEL				PERSONNEL			
	N o s	Salary per month/per son(Rs)	Salary per month(Rs)		N o s	Salary per month/per son(Rs)	Salary per month(Rs)
In-charge Officer	1	30,000	30,000	In-charge Officer	1	25,000	25,000
Securities in 3 shifts	50	15,000	750,000	Securities in 3 shifts	50	10,000	500,000
Total manpower cost per month			780,000	Total manpower cost per month			525,000
				20% overhead			105,000
				Total salary quoted by outsource company			630,000
IN-HOUSE SECURITY COSTS			₹ 780,000	OUTSOURCED SECURITY COSTS			₹ 630,000

- The performance of outsourced security personnel is known to be professional and satisfactory.
- Outsourcing Security services results in cost saving without compromising on the service
- The hospital doesn't have to take care of another responsibility when outsourced.

Recommendation:

- Security is a non-technical job and can be carried out effectively by contracting agencies.
- Security shows considerable cost savings of Rs.1,50,000 per month when outsourced.
- There is no manpower shortage when outsourced and absenteeism is taken care of by substitutes.
- Saves the efforts and time for recruiting and managing personnel
- There is no need for the hospital to pay employer salary benefits.

4.1.9 HOUSEKEEPING

Table 4.9 Housekeeping Cost Comparison

HOUSEKEEPING							
IN-HOUSE				OUTSOURCE			
MANPOWER	Nos	Salary per month/ person(Rs)	Salary per month(Rs)	MANPOWER	Nos	Salary per month/ person (Rs)	Salary per month(Rs)
Executive	1	35,000	35,000.	Executive	1	25,000	25,000
Supervisors	5	25,000	125,000	Supervisors	5	18,000	90,000
Ward boys and Aids				Ward boys and Aids			
Morning shift	33	10,000	330,000	Morning shift	33	8,000	264,000
Night shift	22	10,000	220,000	Night shift	22	8,000	176,000
Cleaning		10,000		Cleaning		8,000	
Shift 1	40	10,000	400,000	Shift 1	40	8,000	320,000
Shift 2	25	10,000	250,000	Shift 2	25	8,000	200,000
Shift 3	50	10,000	500,000	Shift 3	50	8,000	400,000
Total manpower cost per month			1,860,000	Total manpower cost per month			1,475,000
				20% overhead			295,000
				Total salary quoted by outsource company			1,770,000
EQUIPMENT							
Semi Automatic Scrubbing machine			97,000				
Automatic Karcher Scrubber drier machine			110,000	RECOMMENDATION- To have in-house manager			
Total equipment cost			207,000				
IN-HOUSE HOUSEKEEPING COST			₹ 2,067,000	OUTSOURCED HOUSEKEEPING COST with in-house manager			₹ 1,780,000

- The chemicals used for housekeeping activities are generally provided by the hospital even if the activities are outsourced. This ensures that the hospital premises are hygienic and free of germs.

- The cost of chemicals and disinfectants has to be included in house keeping services cost.
- The hospital doesn't have to invest in cleaning equipment, brooms etc.; as it can be handled by the outsourced agency.

Recommendation:

- Housekeeping is a non-technical job and can be carried out effectively by contracting agencies.
- Housekeeping shows considerable cost savings of Rs. 2,97,000 per month when outsourced.
- There is no manpower shortage when outsourced and absenteeism is taken care of by substitutes.
- Saves the efforts and time for recruiting and managing personnel
- There is no need for the hospital to pay employer salary benefits.

4.1.10 PHARMACY

Pharmacy is held in-house at Kamakshi Hospital

Recommendation:

- Profits associated with medicines are almost more than double. Therefore it is better for the hospital to have in-house pharmacy.
- There is a possibility of breach of data if men are outsourced.

4.1.11 LABORATORY AND RADIOLOGY

Laboratory is held in-house at Kamakshi Hospital

Recommendation:

- Laboratory when outsourced may lead to questioning the quality of reports. So having it in-house is better.
- The hospital has NABL certified laboratory equipments. Therefore there is no compromise in quality of testing in such laboratories.
- If laboratories are outsourced, they have to be outsourced to a NABL certified laboratory which reflects in the cost.

4.1.12 CSSD

CSSD is held in-house at Kamakshi Hospital

Recommendation:

- CSSD is an upcoming outsourcing service in India
- There are no outsourcing agencies for CSSD in Chennai. So, there is no option for outsourcing.

- CSSD when outsourced has risk of contamination on travel to the hospital.
- So the outsourcing agency should have a vehicle that is sterilized and trained men to take care of proper sterilization of equipments.
- CSSD is better if held in-house.

4.2 DETERMINANTS FOR THE CHOICE OF FACILITY MANAGEMENT APPROACH

4.2.1 Non-case specific

Cost:

If the outsource contractor can provide the service at a lesser cost.

Strategy:

Whether the hospital wants to take up additional responsibility of managing facilities or only focus on patient care.

Innovation:

If the hospital has up to date equipment or does it require sophisticated high cost equipment from an outsourced person

Quality:

If the outsourced person will give better quality of services than in-house team.

Time:

If the outsourced person will provide the services faster than in-house team

Social:

If the hospital wants to let go of its own employees who rely on the organization for their living.

Availability:

There might not be reliable specialist external service providers for certain facilities like CSSD in India and organisations have no alternative to in-house provision in such a case.

4.2.1 Case specific

Table 4.10 Determinants for the Choice of Facility Management Approach

Sl. No	DETERMINANTS	SCALE OF FACILITY	LOCATION OF HOSPITAL	SPACE	LEGAL REQUIREMENTS	MANPOWER	EQUIPMENT
1	Engineering Services					✓	✓
2	Medical Gas	✓	✓	✓	✓	✓	✓
3	Laundry	✓	✓	✓	✓	✓	✓
4	Canteen	✓	✓			✓	✓
5	Housekeeping					✓	✓
6	Waste Management	✓		✓	✓		✓
7	Security					✓	
8	Blood Bank	✓	✓	✓	✓	✓	✓
9	Ambulance	✓	✓	✓		✓	✓
10	Laboratory and Radiology	✓	✓	✓	✓	✓	✓
11	CSSD	✓	✓	✓	✓	✓	✓
12	Pharmacy	✓	✓	✓	✓	✓	
Sl. No	DETERMINANTS	MAINTENANCE	FURNITURE	DISTANCE/TRANSPORT	WATER	POWER	LPG
1	Engineering Services	✓					
2	Medical Gas	✓		✓		✓	
3	Laundry	✓		✓	✓	✓	
4	Canteen	✓	✓		✓	✓	✓
5	Housekeeping	✓					
6	Waste Management	✓		✓			
7	Security						
8	Blood Bank	✓	✓	✓		✓	
9	Ambulance	✓		✓			
10	Laboratory and Radiology	✓	✓	✓	✓	✓	
11	CSSD	✓		✓	✓	✓	
12	Pharmacy		✓	✓			

4.2 CONSOLIDATED COST ANALYSIS

Table 4.11 Consolidated Cost Analysis

S.I.N o	FACILITIES PROFIT ORIENTED	IN-HOUSE PROFIT	OUTSOURCI NG PROFIT	INVESTMENT	RETURN ON INVESTMENT (in months)	MONTHLY INCREASE IN PROFIT	YEARLY INCREASE IN PROFIT	% OF PROFI T
1	Canteen	2,121,030	1,296,000	771,500	0.4	825,030	9,900,360	63.7
2	Blood Bank	589,333	198,000	3,685,000	6.3	391,333	4,695,996	197.6
3	Ambulance	598,360	528,000	6,000,000	10.0	70,360	844,320	13.3
4	Laboratory and Radiology	Retain in-house	-	-	-	-	-	
5	CSSD	Retain in-house	-	-	-	-	-	
6	Pharmacy	Retain in-house	-	-	-	-	-	
S.I.N o	FACILITIES EXPENSE ORIENTED	IN-HOUSE EXPENSE	OUTSOURCI NG EXPENSE	INVESTMENT	RETURN ON INVESTMENT (in months)	MONTHLY SAVING	YEARLY SAVING	% OF SAVIN G
7	Engineering Services	689,000	622,700	-	-	66,300	795,600	9.6
8	Medical Gas	1,286,200	1,235,500	-	-	50,700	608,400	3.9
9	Laundry	387,200	236,430	-	-	150,770	1,809,240	38.9
10	Housekeeping	2,067,000	1,780,000	-	-	287,000	3,444,000	13.9
11	Security	780,000	630,000	-	-	150,000	1,800,000	19.2
12	Waste Management	536,100	1,836,100	2,000,000	1.54	1,300,000	15,600,000	70.8

CHAPTER 5 RECOMMENDATION AND CONCLUSION

5.1 FINAL RECOMMENDATION LIST FOR KAMAKSHI HOSPITAL

Table 5.1 Final Recommendation List for Kamakshi Hospital

SI.N o	FACILITIES PROFIT ORIENTED	PRESENT	SUGGESTED	MONTHLY INCREASE IN PROFIT	YEARLY INCREASE IN PROFIT	% OF PROFIT	RETURN ON INVESTMEN T (in months)
1	Canteen	Outsource	IN-HOUSE	825,030	9,900,360	63.7	0.4
2	Blood Bank	In-house	In-house	391,333	4,695,996		
3	Ambulance	partly in- house partly outsource	IN-HOUSE outsource during emergency	70,360	844,320	13.3	10.0
4	Laboratory and Radiology	In-house	In-house	-	-		-
5	CSSD	In-house	In-house	-	-		-
6	Pharmacy	In-house	In-house	-	-		-
SI.N o	FACILITIES EXPENSE ORIENTED	PRESENT	SUGGESTED	MONTHLY SAVING	YEARLY SAVING	% OF SAVIN G	RETURN ON INVESTMEN T (in months)
7	Engineering Services	partly in- house partly outsource	OUTSOURCE	66,300	795,600	9.6	
8	Medical Gas	Outsource	Outsource	-	-		
9	Laundry	Outsource	Outsource	-	-		
10	Housekeeping	In-house	OUTSOURCE	287,000	3,444,000	13.9	
11	Security	In-house	OUTSOURCE	150,000	1,800,000	19.2	
12	Waste Management	Outsource	OUTSOURCE Invest on solid waste shredder	1,300,000	15,600,000	70.8	1.54
Cost saving for the hospital if recommendations are followed				₹ 3,090,023	₹ 37,080,276		

5.2 CONCLUSION

- Based on the discussion of the results in this thesis it was found that some of the facilities can be outsourced while some in-house to have potential operating cost savings for the hospital.
- The above table shows that all those facilities that generate revenue can be held in-house due to the fact that they considerably increase the profit for the hospital.
- Since the canteen facility in Kamakshi Hospital has more sales, there is more profit involved. So, canteen can increase the revenue of the hospital if it is made in-house.
- The shorted Return on Investment of less than a year for facilities like canteen, blood bank and ambulance can be an added advantage to invest on these facilities and run them in-house.
- Non-technical facilities requiring only staffing such as housekeeping, security and engineering services can be effectively outsourced.
- For waste management facility, investing on a solid waste shredder completely eliminates the general waste disposal charges as the shredded waste can be sent to a cement factory to be used as a fuel.
- The decision to choose between the two facility management approaches depends upon the parameters listed on table along with the costs associated with it.
- This approach can be extended to other hospitals of small and large hospitals to get an overall picture which FM approach best suits a facility depending upon the scale of the hospital.

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