



COMPARATIVE ANALYSIS OF OUTSOURCED VERSUS IN-HOUSE LABORATORY SERVICES: A STUDY ON THE PARADIGM OF HOSPITAL LABORATORY MANAGEMENT

Vijay Kumar Tadia

Senior Resident Administrator, Department of Hospital Administration
AIIMS, New Delhi

Isha Saini*

Engagement Manager, Camomile Healthcare, Bengaluru, Karnataka
*Corresponding Author

ABSTRACT

Introduction: Hospitals have been outsourcing support functions like housekeeping, food services and even supply chain management as these services don't come under core competencies of the hospital.

There has also been growth in outsourcing some of the clinical services in the hospital such as anaesthesia, emergency department, diagnostic imaging etc. **Aim & Objective:** To do a comparison between outsourced versus in-house laboratory services on the basis of certain parameters. **Methodology:** A longitudinal prospective quantitative study was conducted at two 200 bedded NABH accredited multi-specialty hospitals of comparable occupancy rates and clinical services, located at National Capital Region (NCR) in India for a period of 1 year from April 2012 to March 2013. One hospital had outsourced the laboratory services to a NABL accredited laboratory for last seven years and the other hospital had an in-house NABL accredited laboratory. The two hospitals were selected by purposive sampling method. A sample size of 11 laboratory tests was considered from both the hospitals by convenient sampling method. Secondary data related to Costing & Pricing details of 11 tests (from Biochemistry and Haematology department) was collected from both the hospitals, tests were shortlisted by the hospital and information was collected from both outsourced as well as in-house laboratory services. Quantitative analysis was done using Microsoft Excel. Unstructured Interviews were also conducted with Key Informants like Consultants in Departments of Pathology & Microbiology, Head of the Laboratory Services and Facility Directors of the hospitals. **Results:** The results for the selected number of tests suggested that the revenue generated for OPD Patients by In-house laboratory was Rs. 2684513.82 and by the Outsourced laboratory was Rs. 8583510. This meant that the revenue generated by outsourced laboratory was more by Rs. 5898996.18. Similarly, the results for IPD Patients suggest that the In-house laboratory generated the revenue of Rs. 5290840 and Outsourced laboratory generated about Rs. 15485400. This meant that the revenue generated by outsourced laboratory was more by Rs. 10194560. The total amount to be invested for conducting 11 tests under study was around 67.25 Lakh. There were no direct expenses for the hospital that had outsourced laboratory services, as it had outsourced its entire laboratory services, so these direct expenses were incurred by the outsourced laboratory. **Conclusion:** There was a significant amount of difference in revenue generated between outsourced and in-house laboratory. It was beneficial for a hospital to outsource its laboratory as there was a huge amount of cost savings depending upon the type of agreement signed with the outsourced laboratory. The hospital under study had entered into joint venture agreement with the outsourced laboratory and hence the profits were shared between both the parties. There were no direct expenses for the hospital that had outsourced laboratory services, as it had outsourced its entire laboratory services, so these direct expenses were incurred by the outsourced laboratory. When the laboratory services are outsourced in a hospital certain expenses are cut down like there are no expenses on training of staff, arrangement of logistics, calibration cost apart from all the direct expenses like labour cost, material cost and repair and maintenance cost. The total amount to be invested for conducting tests 11 tests under study was around 67.25 Lakh. In order to perform other tests in the laboratory total amount invested is much more than this so outsourcing laboratory services to a reliable NABL accredited laboratory is a wise idea to save money. The hospitals have to decide for the In-house or Outsourced laboratory services based on its context and needs without compromising critical patient care needs wherein life saved may be more important than the revenue generated.

KEYWORDS : Outsourcing Laboratory, Outsourcing Diagnostic Testing

Background:

"Outsourcing has been bantered around as next revolution"- Mark J Power(1)

Hospitals have been outsourcing support functions like housekeeping, food services and even supply chain management as these services don't come under core competencies of the hospital. There has also been growth in outsourcing some of the clinical services in the hospital such as anaesthesia, emergency department, diagnostic imaging etc.(2)

Outsourcing efforts are fruitful and beneficial for the organisation only if strategic assessment is conducted properly. (3) There are various reasons for outsourcing like in an effort to achieve cost savings, improving quality, improving cost predictability, increase market penetration and gaining new industry expertise.(4)

Outsourcing is an automatic expectation to respond to competition and the choice of where to obtain the goods and services is not a static decision, rather a subject to continual

re-evaluation(5).

The boundary of outsourcing versus in-house separates the outside from the inside. This boundary is crucial because it defines the area of responsibility and the scope of interest, which is important for an outsourcing project. This is done so that there is no ambiguity about the responsibilities of the vendor and the client. Over the last two decades, organizations have tried different types of outsourcing depending on what they fit best for their situation(6). Franceschini et al (2003)(7) have identified the following three broad categories:

1. Traditional outsourcing: The primary aim for this type of outsourcing was cost savings. There was not an established relationship between the vendor and the client.
2. Strategic outsourcing: The main objective of strategic outsourcing is to have joined value creation type of a partnership.
3. Futuristic outsourcing: It is a form of partnership with main

objective to have a better future market position. It is normally a long term co-operation in which there could be a joint company vision.

AIM & OBJECTIVE:

To do a comparison between outsourced versus in-house laboratory services on the basis of certain parameters.

METHODOLOGY:

A longitudinal prospective quantitative study was conducted at two 200 bedded NABH accredited multi-specialty hospitals of comparable occupancy rates and clinical services, located at National Capital Region (NCR) in India for a period of 1 year from April 2012 to March 2013. One hospital had outsourced the laboratory services to a NABL accredited laboratory for last seven years and the other hospital had an in-house NABL accredited laboratory. The two hospitals were selected by purposive sampling method. A sample size of 11 laboratory tests was considered from both the hospitals by convenient sampling method. Secondary data related to Costing & Pricing details of 11 tests (from Biochemistry and Haematology department) was collected from both the hospitals, tests were shortlisted by the hospital and information was collected from both outsourced as well as in-house lab services. Quantitative analysis was done using Microsoft Excel. Unstructured Interviews were also conducted with Key Informants like Consultants in Departments of Pathology & Microbiology, Head of the Laboratory Services and Facility Directors of the hospitals.

RESULTS

For the sake ease of analysis, the hospitals have been given code names as Hospital A & Hospital B. The Hospital A had outsourced its laboratory services and the Hospital B had inhouse laboratory services.

To do a comparative analysis between outsourced versus in-house laboratory services following parameters were used:

1. Cost/Price per patient
2. Additional charges included - housekeeping cost, electricity cost, stationary cost etc
3. Profit generated

Table 1. Tests Outsourced in OPD of Hospital A.

Name of the test	Frequency of test	Revenue (Rs.)	Price/patient
GLUCOSE	2294	206460	90
CREATININE	6850	1575500	230
BILIRUBIN (Direct/Indirect/Total)-SERUM	570	108300	190
BUN (BLOOD UREA NITROGEN)	4057	1257670	310
SGPT [ALT] - SERUM	2936	469760	160
SGOT (AST) - SERUM	18562	2969920	160
CHOLESTEROL TOTAL	1907	381400	200
TRIGLYCERIDES - SERUM	1987	437140	220
LDL CHOLESTEROL	802	401000	500
HDL CHOLESTEROL	982	491000	500
HAEMOGLOBIN, TLC, DLC	1189	285360	240

Observations (Table 1):

1. SGOT generated maximum revenue followed by Creatinine and BUN among other tests.
2. SGOT had maximum count followed by Creatinine, BUN and SGPT.

Table 2. Tests Outsourced in IPD of Hospital A

Name of the test	Frequency of test	Revenue Generated	Price/patient
GLUCOSE	3215	321500	100
CREATININE	7145	2000600	280
BILIRUBIN (Direct/Indirect/Total)-SERUM	612	140760	230
BUN (BLOOD UREA NITROGEN)	8412	3617160	430
SGPT [ALT] - SERUM	4125	866250	210
SGOT (AST) - SERUM	25480	5350800	210
CHOLESTEROL TOTAL	2351	705300	300
TRIGLYCERIDES - SERUM	1842	534180	290
LDL CHOLESTEROL	1167	641850	550
HDL CHOLESTEROL	1436	789800	550
HAEMOGLOBIN, TLC, DLC	1724	517200	300

Observations (Table 2):

1. SGOT generated maximum revenue followed by BUN and Creatinine.
2. SGOT had maximum frequency of test followed by Creatinine and Glucose.

Table 3. Tests In-House in OPD of Hospital B:

Hospital B			
Name of the test	Count of test	Revenue generated	Price/patient
GLUCOSE	3510	278570.99	110
CREATININE	6716	1189662.74	200
BILIRUBIN -SERUM	477	117893.08	290
BUN	30	3469.99	200
SGPT [ALT] - SERUM	3390	584393.82	200
SGOT (AST) - SERUM	335	55951.09	200
CHOLESTEROL TOTAL	95	23972.34	350
TRIGLYCERIDES - SERUM	19	3339.77	240
LDL CHOLESTEROL	230	14490	520
HDL CHOLESTEROL	510	51000	310
HAEMOGLOBIN, TLC, DLC	1167	361770	200

Observations (Table 3):

1. Creatinine generated maximum revenue followed by SGPT and Hb, TLC,DLC.
2. Creatinine had the maximum count followed by glucose and SGPT.

Table 4. Tests In-House in IPD of Hospital B:

Hospital B			
Name of the test	Count of test	Revenue generated	Price/patient
GLUCOSE	412500	2750	150
CREATININE	1781500	7126	250
BILIRUBIN -SERUM	192640	602	320
BUN	30600	102	300
SGPT [ALT] - SERUM	1793050	5123	350
SGOT (AST) - SERUM	191450	547	350

CHOLESTEROL TOTAL	85200	213	400
RIGLYCERIDES SERUM	9500	38	250
LDL CHOLESTEROL	143150	409	350
HDL CHOLESTEROL	267750	765	350
HAEMOGLOBIN, TLC, DLC	383500	1534	250

Observations (Table 4):

1. SGPT generated maximum revenue followed by Creatinine and Glucose.
2. Creatinine had maximum count followed by SGPT and Glucose.

Table 5. Comparison between two hospitals for OPD Patients

Name of the test	Hospital A(Outsourced)		Hospital B(In-house)	
	Revenue generated	Price/patient	Revenue generated	Price/patient
GLUCOSE	206460	90	278570.99	110
CREATININE	1575500	230	1189662.74	200
BILIRUBIN -SERUM	108300	190	117893.08	290
BUN	1257670	310	3469.99	200
SGPT [ALT] - SERUM	469760	160	584393.82	200
SGOT (AST) - SERUM	2969920	160	55951.09	200
CHOLESTEROL TOTAL	381400	200	23972.34	350
TRIGLYCERIDES - SERUM	437140	220	3339.77	240
LDL CHOLESTEROL	401000	500	14490	520
HDL CHOLESTEROL	491000	500	51000	310
HAEMOGLOBIN, TLC,DLC	285360	240	361770	200
Total	8583510		2684513.82	

Observations (Table 5):

1. The revenue generated by hospital that had outsourced its laboratory was more by Rs. 58,98,996.18.
2. There was also a variation in price per test between outsourced and in-house laboratory
3. There was not a huge difference in price per test performed in both the laboratories.
4. Frequency of tests were more for outsourced hospital which added on to revenue generated by the laboratory.

Table 6. Comparison between two hospitals for IPD Patients

Name of the test	Hospital A(Outsourced)		Hospital B (In-house)	
	Revenue generated	Price/patient	Revenue generated	Price/patient
GLUCOSE	321500	100	412500	150
CREATININE	2000600	280	1781500	250
BILIRUBIN -SERUM	140760	230	192640	320
BUN	3617160	430	30600	300
SGPT [ALT] - SERUM	866250	210	1793050	350
SGOT (AST) - SERUM	5350800	210	191450	350
CHOLESTEROL TOTAL	705300	300	85200	400
TRIGLYCERIDES SERUM	534180	290	9500	250
LDL CHOLESTEROL	641850	550	143150	350
HDL CHOLESTEROL	789800	550	267750	350
HAEMOGLOBIN, TLC, DLC	517200	300	383500	250
Total	15485400		5290840	

Observations (Table 6):

1. As per the comparison shown in the table, revenue generated by outsourced hospital was more by Rs. 10194560.

2. Price per test was more for some of the tests in Hospital A-like Creatinine, BUN, Hb, TLC,DLC, LDL and HDL Cholesterol.
3. There was a variation in the frequency of the tests performed leading to increase number of tests performed in outsourced hospital.

Table 7. Direct expenses of Hospital B

Direct expenses	Hospital A (Outsourced)	Hospital B (In-house)
Doctor's salary	Nil	2500000
Staff salary	Nil	4000000
Material cost	Nil	5000000
Maintenance cost	Nil	80000
Depreciation (15%)	Nil	200000

Observations (Table 7):

There were no direct expenses for Hospital A, as it had outsourced its entire laboratory services so these direct expenses were incurred by the outsourced laboratory.

Table 8. Comparison of other expenses between two hospitals

OTHER EXPENSES	Hospital A (Outsourced)	Hospital B (In-house)
External quality testing	5000	8000
Training of staff	NA	50000
Water	300000	311000
NABL Fee	37500	40000
Corporate cost	6000	5000
Supervisory cost	3000	2000
Logistics department	NA	20000
Calibration cost	NA	15000
Electricity	213000	400000
Housekeeping	50000	40000
Stationary	20000	30000
IT cost	156000	200000
Linen and Laundry	40000	50000
Total	830500	1171000

Observations (Table 8):

1. When laboratory services are outsourced in a hospital certain expenses are cut down like there are no expenses on training of staff, arrangement of logistics, calibration cost apart from all the direct expenses like labour cost, material cost and repair and maintenance cost.
2. The reasons for above observation are: When laboratory services are outsourced then it is the duty of the outsourced laboratory to bear expenses like training of staff, logistics arrangement and calibration cost and other direct expenses.

Table 9. List of equipment used in performing the selected tests

Name of test	Equipment used
GLUCOSE	Siemens RapidLab 1240 Blood Gas Analyser
CREATININE	BN II System
BILIRUBIN(Direct/Indirect/Total) SERUM	RAPIDPoint 400/405 Systems
BUN (BLOOD UREA NITROGEN)	Dimension RxL Max Integrated Chemistry System
SGPT [ALT] - SERUM	Dimension RxL Max Integrated Chemistry System
SGOT (AST) - SERUM	Dimension RxL Max Integrated Chemistry System
CHOLESTEROL TOTAL	Dimension RxL Max Integrated Chemistry System
TRIGLYCERIDES - SERUM	Dimension RxL Max Integrated Chemistry System

LDL CHOLESTEROL	Dimension RxL Max Integrated Chemistry System
HDL CHOLESTEROL	Dimension RxL Max Integrated Chemistry System

Table 10. Quantity and price of equipment used in the laboratory to perform selected number of tests

Equipments required for biochemistry laboratory:	Quantity (Number)	Cost (lakhs)
Fully automated Biochemistry Analyzer	1	26
Immuno Assay System	1	22.00
Semi automated Analyzer	1	3.00
Blood Gas analyzer	2	8.00
Electrolyte Analyzer	1	3.00
Centrifuge	2	0.60
Water bath	1	0.25
refrigerator(2-4C)	2	0.40
refrigerator(-20C)	1	4.00
		67.25

Observations (Table 10):

1. The total amount to be invested for conducting tests 11 tests under study was around 67.25.
2. In order to perform other tests in the laboratory total amount invested is much more than this so outsourcing laboratory services to a reliable NABL accredited laboratory is a wise idea to save money.

The interviews conducted with Key Informants in the hospitals revealed that there were both pros and cons of outsourcing the laboratory services. There were certain issues faced by the hospital with outsourced laboratory services like problems in integration of software with different modules in hospital so that exchange of information about the report of a critical patient could be done easily and also it could make the data entry and retrieval easier. There was another issue wherein some of the patients had certain complaints with outsourced laboratory like-delay in issuing of report to patient, unavailability of a consultant. As the hospital had no direct authority over outsourced laboratory services so it was quite difficult to resolve such issues in the hospital.

CONCLUSION:

Outsourcing of clinical laboratory services is increasingly seen as a potential source of cost savings by hospital administrators, and a careful analysis of the actual financial performance of such joint ventures is critical.(8)

To do the comparative analysis between outsourced versus in-house laboratory services the parameters used were Cost per patient, additional charges include- housekeeping cost, electricity cost, stationary cost etc and the profit generated.

The results for the selected number of tests suggested that the revenue generated for OPD Patients by In-house laboratory was Rs. 2684513.82 and by the Outsourced laboratory was Rs. 8583510. The meant the revenue generated by outsourced laboratory was more by Rs. 5898996.18 (Table 5).

Similarly, the results for IPD Patients suggest that the In-house laboratory generated the revenue of Rs. 5290840 and Outsourced laboratory generated about Rs. 15485400. This meant the revenue generated by outsourced laboratory was more by Rs. 10194560 (Table 6).

There was a significant amount of difference in revenue generated between outsourced and in- house lab. It was beneficial for a laboratory to outsource their laboratory as there was a huge amount of cost savings depending upon the

type of agreement signed with the outsourced laboratory. The hospital under study had entered into joint venture agreement with the outsourced laboratory and hence the profits were shared between both the parties.

There were no direct expenses for the hospital that had outsourced laboratory services, as it had outsourced its entire laboratory services, so these direct expenses were incurred by the outsourced laboratory (Table 7). 1. When the laboratory services are outsourced in a hospital certain expenses are cut down like there are no expenses on training of staff, arrangement of logistics, calibration cost apart from all the direct expenses like labour cost, material cost and repair and maintenance cost (Table 8). 1. The total amount to be invested for conducting tests 11 tests under study was around 67.25 Lakh. In order to perform other tests in the laboratory total amount invested is much more than this so outsourcing laboratory services to a reliable NABL accredited laboratory is a wise idea to save money (Table 10).

It was beneficial for a laboratory to outsource their laboratory as there was a huge amount of cost savings.

An analysis of financial data (expenditure to be incurred in hospital services) for 3-4 years in case the hospital owned the labour/material/medicine, etc. involved in in-patient care was compared with similar type of financial analysis drawn from outsourcing services already existing in the hospital. The results have shown that the cost was contained to the tune of 28 per cent (direct) and 52.4 per cent (indirect) in case of man outsourcing, 58.38 per cent (direct) and 72.25 per cent (indirect) in case of man & materials outsourcing, and approx. 33 per cent (direct) in case of machine was outsourced. Machines such as MRI, Ultrasound etc on lease have also given reasonably good results in terms of revenue generation and uninterrupted services.(9)

A thorough analysis of the downstream consequences of the proposed arrangement both on finances and on other missions of the hospital are essential elements in successfully assessing a joint venture proposal.(8)

The availability of various outsourcing models can offer new ways to maintain laboratory services with oversight and profitability, regardless of practice size. (10)

Precanalytical variables that alter cellular parameters and levels of analytes in transit and on storage can significantly and adversely affect interpretation of test results in hematology. Awareness of these changes is necessary to avoid misinterpretation of results that in turn could influence medical management decisions.(11)

Windrum et al. (2009) argue that not every company defines core competences successfully. Some argue that outsourcing does create winners and losers while some researchers see outsourcing as a win-win situation.(12)

The outsourcing of tests is beneficial for a hospital if profits are shared by both hospital as well as laboratory, as direct cost involved like labour cost, material cost, maintenance cost and the investment that is required for any equipment is reduced to a great extent. There is also reduction in expenditure for training of staff, logistics arrangement and calibration cost.

A laboratory within the hospital is run within a hospital as one of the departments out of many departments so the necessary attention is not received from hospital personnel. Moreover, there are problems like high inventory costs, issues of pilferage, inadequate service turnaround time which in turn leads to dissatisfaction amongst patients and physicians. So to resolve such problems specially in a small setting like 200-

250 bedded hospitals, hospitals are increasingly outsourcing lab management to external referral laboratories and this new phenomena is called as Hospital Laboratory Management (HLM) which offers best diagnostic services to patients also saving time and cost. Referral laboratories carry out wide range of tests also reducing the delivery time exponentially e.g., HLM is being offered by diagnostic labs like Metropolis and it is a boon for small settings specially who find it difficult to manage laboratory within the hospital setting.

The hospitals have to decide for the In-house or Outsourced laboratory services based on its context and needs without compromising critical patient care needs wherein life saved may be more important than the revenue generated.

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