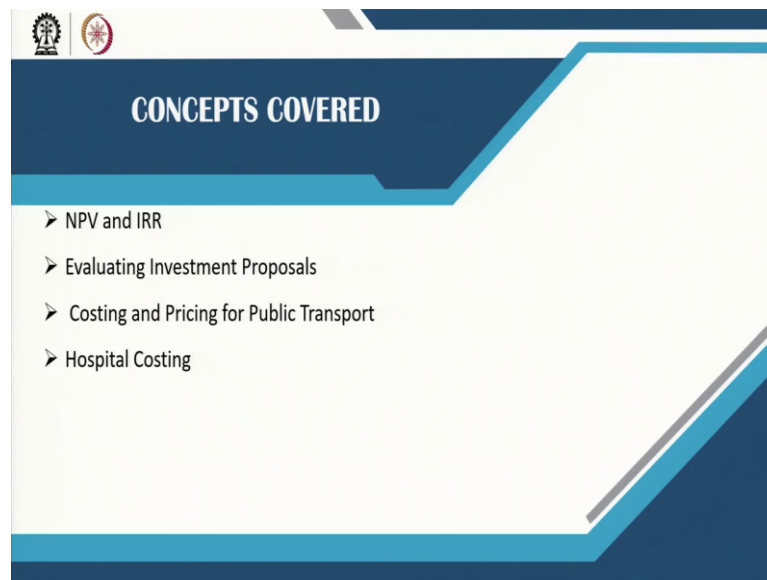


Decision Support System for Managers
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Module - 07
Decision Support System for Finance
Lecture - 36
Costing and Pricing for Hospitals

Hello and welcome to “Decision Support Systems for Managers”! We are into module 07, ‘decision support system for finance’ and we are into lecture 03. This is the last lecture for this module, ‘costing and pricing for hospitals’.

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Now, we have covered these in finance NPV and IRR, evaluating investment proposals, then we took a bit of bit and we went into costing and pricing for public transport and today we will do hospital costing, because these are areas which are coming up very-very importantly, this areas of public systems management and these will play a major role in the years to come; ok.

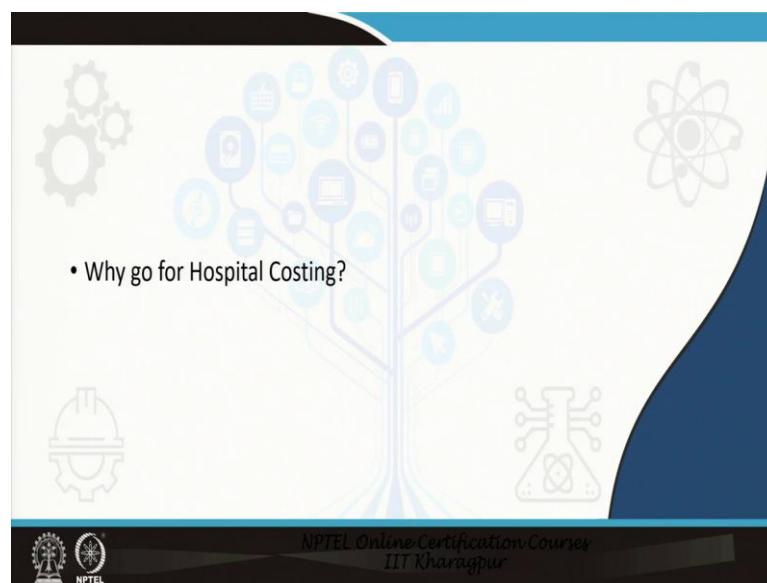
So, we are doing this part of costing also. In public transport, costing for public transport what we learnt and what we showed you is how to fix fares for public transport ok. And first what did we do? First, we understood what the cost structure is and then we went to fix the fare.

So, what is the cost structure we understood, then we went to fix the fare right. This is the way we did it. Here, and for understanding the cost structure cost structure varies from place to place so we took a average cost structure ok, more or less average, but that average is not proper not good also. If you look at it very carefully, you will have to take an average for city, average for, sorry, city cost structure, district cost structure, hills cost structure, if you have hills in your area; ok.

So, the model that we showed applies to the weightage. Formula you remains same, but the weightage of fuel maintenance, etcetera will be different for city, district, and hills. So, that part you will have to be very careful.

We showed you the one that is applicable to the cities; ok, but in the hills the operations and maintenance cost will increase, that proportion will increase. Staff cost might come down, but the proportion of operations and maintenance will increase.

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Now, today we will take care of another aspect that is hospital costing; ok. Now, so; these are the once that we covered. Now, why do we go for hospital costing? Now, this is very important now, because more and more people are ageing and more and more people are living alone.

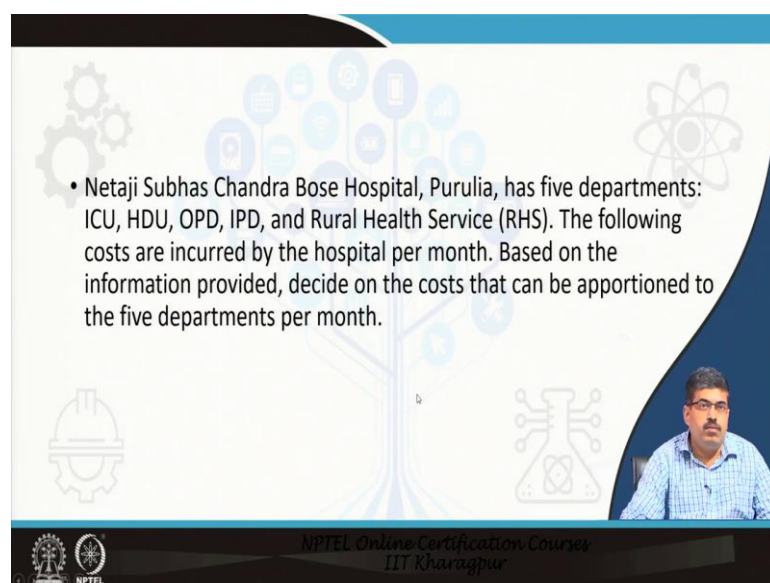
Ageing and living alone has a renewed focus on healthcare sector ok. Lot of additional medical problems are arising, because of changing work style, changing lifestyle. So, demand for medical care is increasing, demand for quality medical care is increasing.

So, but then when we go to a medical care facility which is not a government run medical care facility, it is a privately run medical care facility, we are sometimes very much worried about how much they will charge? What will be the charge for a private medical care facility? Government medical fare, medical care is free, totally free for most of the places, but private medical care is costly.

So, we sometimes are very worried about, if we are going to a private medical care what will be the price? Are, will we able to will we be able to sustain it? Will we be able to afford it? Ok. So, two issues are coming here very-very clearly that there should be a costing mechanism for hospitals and second is there should be a way by which hospitals also know how much they can reduce the charges for a needy patient. Nobody, no one should be left out of medical care.

So, hospital should also think of ways by which they can reduce the charges for a really needy patient, who wants medical care ok. So, you have to know the costing parameters right and then come up with some decisions. So, the purpose today for ours is to arrive at such a decision right ok. So, we will take a problem.

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• Netaji Subhas Chandra Bose Hospital, Purulia, has five departments: ICU, HDU, OPD, IPD, and Rural Health Service (RHS). The following costs are incurred by the hospital per month. Based on the information provided, decide on the costs that can be apportioned to the five departments per month.

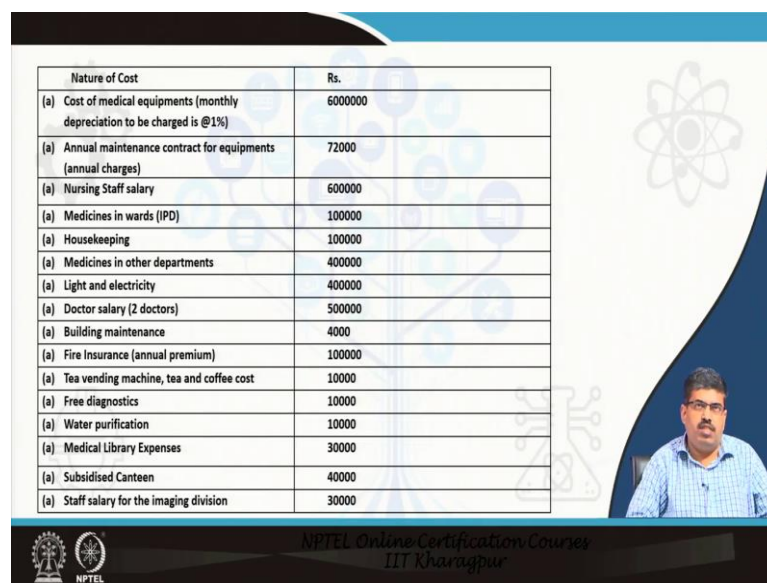
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Let us start with this problem; Netaji Subhas Chandra Bose Hospital, Purulia has five departments; ICU; we all know what ICU is; HDU, high dependency unit; OPD, out-patient department that is the outdoor normally; we call IPD in patient department that is people who are admitted and rural health services because it is a district rural health services.

The following costs are incurred by the hospital per month decide on the now following costs are incurred, you will show what costs are incurred, but what do you want to know is these costs are now have to be apportioned across five departments; ICU, HDU, IPD, OPD, rural health. These costs have to be apportioned across five departments; right.

So, we need to know how to apportion. What will we do after it spread out the cost across five departments? We know which department is incurring maximum cost, we also know on what head it is incurring the maximum cost. Accordingly, we can do something about it.

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Nature of Cost	Rs.
(a) Cost of medical equipments (monthly depreciation to be charged is @1%)	600000
(a) Annual maintenance contract for equipments (annual charges)	72000
(a) Nursing Staff salary	600000
(a) Medicines in wards (IPD)	100000
(a) Housekeeping	100000
(a) Medicines in other departments	400000
(a) Light and electricity	400000
(a) Doctor salary (2 doctors)	500000
(a) Building maintenance	4000
(a) Fire Insurance (annual premium)	100000
(a) Tea vending machine, tea and coffee cost	10000
(a) Free diagnostics	10000
(a) Water purification	10000
(a) Medical Library Expenses	30000
(a) Subsidised Canteen	40000
(a) Staff salary for the imaging division	30000

So, these this is the problem actually, cost of medical equipment monthly depreciation to be charged is 1 percent, cost of medical equipment is 6000000 monthly depreciation is 1 percent; that means, 60000 rupees is the monthly depreciation.

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Machinery 60,00,000 — Depn. per mth = 60,000
@ 1%

	ICU	HDU	OPD	IPD	RH
Machine (25:25:10:20:20)	15	15	6	12	12
Nurse [6,00,000] (30:30:0:20:20)	180	180	0	120	120
Housekeeping (1,00,000)	25	25	25	25	—
Medicine (4,00,000)	133	133	—	—	133

So, let us go ahead ok. So, machine every hospital needs very-very sophisticated machines ok. Machines is 6000000, depreciation per month is how much? 60000 at the rate of 1 percent 60000.

So, this is my machinery cost ok. So, next let us move maintenance contract, annual charges, nursing staff salary, medicines in wards IPD, housekeeping, medicines in other departments, light and electricity, doctor's salary, 2 doctors, building maintenance, fire insurance, tea vending machines. So, all sorts of this hospital costs are listed here.

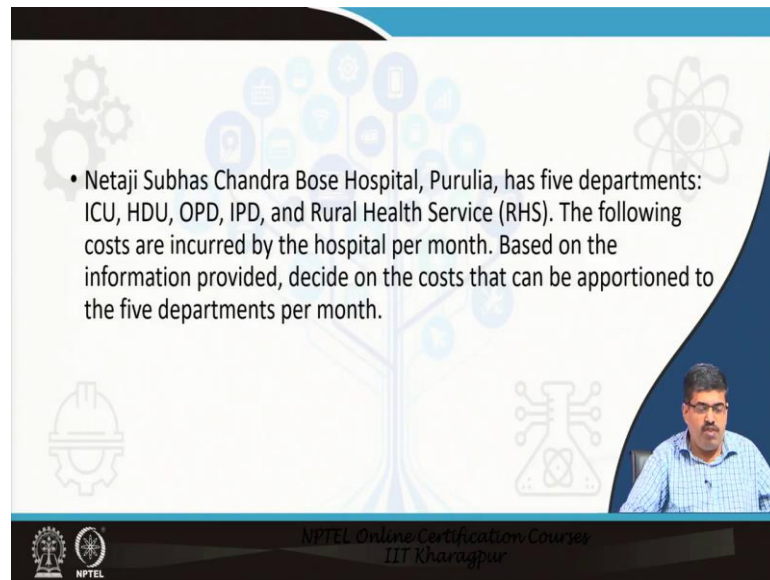
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- The medical equipments are used by the five departments in the proportion: 25:25:10:20:20
- Nurses devote their time in the ratio: 30:30:0:20:20
- 'Housekeeping', 'Light and electricity', 'Building maintenance', 'Fire insurance', 'Tea vending costs', 'Water purification', and 'Subsidised canteen charges' is required by all the departments except RHS.
- 'Medicine in Other Departments' is shared by: ICU 25%, HDU 25%, RHS 50%.
- The doctors devote their time in the ratio of 25:25:10:20:20
- Free diagnostics is give solely by RHS. There is a small number of ICU, HDU and IPD patients who are recommended 'free' and their combined proportion is only 3%.
- 'Staff salary for the imaging division' is not to be borne by OPD.

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Now, they are telling on what basis I should apportion the cost ok. Medical equipments are used by the five departments in proportion 25 25 10 20 20. So, how much did we say was the medical charges? 60000 rupees; ok, that has to be divided among the five departments has 25 25 10 20 20; ok.

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So, let us see what are the five departments; ICU, HDU, OPD, IPD, rural health. So, ICU right, so machine depreciation right 25 25 then 10 20 20.

In this ratio this in this ratio this 60000 rupees has to be distributed ok. So, what is it 50 60 70 80 90 100 ok. So, 25 by 100 is one fourth ok. So, 60000 one fourth of 60000 is 15000. So, 15 15 6 12 12 the 1000, the last three 0s are deducted. So, the machine cost has to be distributed in this manner across all the departments; clear!

Now, let us go to the next one. Nurse devotes their time in the ratio 30 30 0 20 20, what is the nurses cost? Nursing staff salary 600000, 30 30 0 20 20 600000, 30 30 0 20 20 nurse ok. So, if you again see the ratio 100. So, 3 by 10, 30 by 100 is 3 by 10. So, 3 by 10 in to 600000 3 by 10 into 600000, is basically 180000 ok. So, that is 180000. So, this will be 180, 180 0 ok. So, this is the nurses salary.

So, in this way whatever is given you have to re proportionate ok. Let us do another one that will help you to understand. Housekeeping, light, electricity, building maintenance, etcetera is required by all the departments except RHS rural health services. Let us take

housekeeping. Housekeeping 100000 required by all the departments except rural health; ok.

So, let us go to housekeeping let us go to housekeeping is 100000 required by all departments except rural health. We will use a different colour except rural health. So, 100000 rupees is now to be distributed in what ratio? Nothing is mentioned, required by all department. Housekeeping means cleaning and all that will any way we required by all departments and if we consider that all the departments of equal size or work required is equal. So, then we can distribute it equally. So, 25 25 25 25; ok.

So, see we are basic we are basically apportioning every cost ok. Now, having then there are so many others ok. Now, let us do one more. Medicine in other departments is shared by ICU 25, HDU 25, RHS 50. So, ICU, HDU, and RHS, medicine in other departments medicine in other departments, let us see medicine in other departments 400000 ICU, HDU, RHS, medicine in other departments ICU, HDU, RHS; ok.

So, OPD and IPD do not need and we do not know how much the sharing ratio is; no not given. So, we assume that they are equally required by all the departments. So, that 400000 has to be divided into three departments. So, 133 133 133. So, in this way you will calculate. You will calculate and you will get the total cost for ICU, HDU, OPD, IPD, RHS that is rural health services. Now, what is the implication for this? Ok.

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	D1 ICU	D2 HDU	D3 OPD	D4 IPD	D5 RH
Total Cost	100	110	90	100	150
Revenue	150	140	50	80	—

Annotations: 'Cost Control' with arrows between ICU and HDU; '1 day/ 2 days/ 7x24' with arrows pointing to the RH column.

So, let us write down ICU, HDU, OPD, IPD, rural health department. Now, when we are doing the costing let us say we get total cost. Let us assume the total cost of ICU is 100; HDU is 110; OPD is 90; IPD is 100; rural health is 150.

Let us assume that after calculating it in that ratio manner, we get this result. What is the implication that you will have to be very careful? Ok. Let us let us take think it very carefully. Let us take very carefully. ICU is the extreme level in any hospital. Not every hospitals have ICU. Just below it is HDU, high dependency; ICU is intensive care; HDU, high dependency; OPD, out-patient means, people who are coming in they will have a check-up, take a prescription, go away.

IPD is people were admitted in the hospital, maybe one day, maybe two days, may be three days, RH rural health means you might be you have a division for catering to rural people, most probably that is free ok. Now, if this information is in front of you what do what do you understand? Your HDU cost is more than your ICU cost, be very careful, be very careful, because you need to do cost control.

Cost control ok, similarly you see your OPD is 90 outpatient means people who are coming in daily, getting a check up and going away, no need to stay, IPD is people are staying right, people are admitted in the hospital.

In normal English people are admitted in the hospital IPD. So, IPD cost should be more, because you are deploying your people day night, having a doctor there, having nurses there, staff there, electricity goes on day night. So, IPD cost should be much more than OPD.

So; that means, someone is inefficient. Who is inefficient here? That is OPD is inefficient. They are having all the lights on, may be some where some cost control is required. So, maybe you can learn from IPD, but the finance is indicate also some desired things.

Why is IPD less? Does it mean that very few people are admitted in the hospital over for a night stay for a long treatment? Why are lesser number of peoples there in a hospital for night treatment for longer treatment? Why lesser number? Are they not convinced about your treating capability? Are they going to another hospital? Are they see this 90 is

a big number? Is it indicating the people only trust you for OPD? They do not trust you for someone admitting somebody in the hospital.

So, this OPD IPD these will lead to lot of questions. Why are these numbers? So, close together rural health you are spending lot of money on rural health, highest what is the extent are you opening the rural health counter for only 1 day or 2 days or all the 7 24 by 7 days.

If this is it then this might be acceptable, but if it is for 1 day, 2 days, you have to be very careful. You will have to be really dig deep and try to understand what is wrong? Why is this number coming up; ok. So, you have to be very-very careful right. So, just by looking at these numbers, you can make out which department is doing what; ok. So, this apportionment of costs helps a lot; ok. Now, this can be; let us try to increase this model a bit; ok.

A new department has come up. Now, bring in the revenue part of it ok, adding one more component with that is revenue. Let us say revenue 150, HDU 140, OPD 50, IPD let us say 80, rural health is anyway 0 ok, rural health is 0.

Now, see this now gives a very different picture ok. IPD the ratio revenue and cost, all are running at; so, only the ICU and HDU running at a profit. Profit in the sense surplus, we cannot use the profit for the non for a philanthropic activity and so, OPD income is less than the cost, IPD income is less than the cost but this gap here is very disturbing; ok; this gap here is very disturbing.

So, there is some serious problem with your OPD ok. Now, you can increase this, you can improve this model also, you can improve this model. How do you improve this model? Say new departments have come up. So, this instead of ICU HDU this is department 1, department 2, department 3, department 4, department 5.

New departments have come up, this is the cost structure, we just cannot say that department is bad, for that department spend too much of money. How long is the department there; that department, there is no income, no revenue; how long is the department in place? What is the problem? Try to understand; ok.

So, what do you want to say is these numbers will tell you lot of stories. Be very careful and do good to the general people. Try to understand this numbers; try to understand what stories it is conveying and then take necessary steps. Do good to millions of poor people who come to a hospital in search of medical care. Now, we will shift to the another aspect of this hospital costing; ok.

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That is; this is something again a very-very social issue, patient has come in emergency. They have brought him to a private hospital that was the nearest one to their house emergency they have brought ok, patient family cannot pay such a high amount.

So, how to determine concessions for a patient ok, how to determine the patient family cannot pay that much of amount. So, they have applied for concessions, how to determine concessions for a patient. So, let us try to understand that.

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Concession for a Patient

$$\frac{\text{No. of Patients}}{\text{No. of Beds}} \times \text{No. of Days}$$

1 Patient x 1 Bed x 1 day = 1 Bed-Day

1 " x 1 " x 2 days = 2 Bed-days

We introduce these three terms: number of patients; number of beds; number of days. Now one patient the patient is occupying one bed, patient is there for one day this is called as one bed day one patient. One bed patient is staying for two days; this is called as two bed days; ok; in this way, it is done; ok. Now, how much concession you will give? Ok.

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Total Surplus of the Hospital in a Year

$$\frac{\text{Total Surplus of the Hospital in a Year}}{\text{Total No. of Bed Days in a year (occupied)}}$$

= Surplus per Bed per Day

↓
Dis count to the patient

Concession you give is total income or rather surplus. Let us not use the let us not use the word income, let us use the word surplus. Sorry total surplus of the hospital divided by. I

am sorry we will take a new sheet ok. So, total surplus of the hospital divided by total number of bed, days in a year, total of number occupied bed days in a year; ok.

Total surplus in a of the hospital total surplus of the hospital in a year divided by total number of bed days in a year, total number of occupied bed days in a year. So, what you will get surplus per bed per day. This is what you will get surplus per bed per day.

If this is the surplus per bed per day, this amount you can give as discount to the patient this amount you can give as discount to the patient ok, surplus per bed per day. This amount you can give as discount to the patient total surplus of the hospital in a year divided by total number of bed days in a year occupied bed days this will give you surplus per bed per day and this is the discount to the patient ok. So, this is the way by which you should give discount; ok.

Sometimes, if you really want to be if you really want to go step forward to help a really needy patient what you can do is, you can do something else also only the fixed, only the variable cost. Let us do this only the variable cost, cost of hospital services in a year.

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$$\frac{\text{Variable Cost of Hospital Services in a Year}}{\text{Total no. of Bed Days in a year (occupied)}} = \text{Variable Cost per bed per day for the Hospital}$$

Variable cost of hospital services in a year divided by total number of bed days occupied in a year ok, whatever the variable cost divided by total number of bed days. So, what will you get? You will get the variable cost per bed per day for the hospital ok.

This will only give you how much the fixed cost of the hospital is; anyways fixed cost of the building, cost of the machinery; these are anyways fixed. So, what you need is, you just need to recover the variable cost nothing else. So, variable cost per bed per day for the hospital, if you can recover enough, this will give you much more cheaper bed rent for the people, for the needy patients. So, this also you can do.

So, please keep this in mind when you are doing such calculations, particularly for hospital costing; ok. So, what we did in this module is, we tried to come up with financing techniques for businesses covered NPV IRR investment proposal decisions and we also took up financing decisions for public utility services including transport and hospital services. These are new dimensions which you must think of and work on to improve peoples' life; ok.

So, thank you very much! And with this, we end this particular module.

Thank you!