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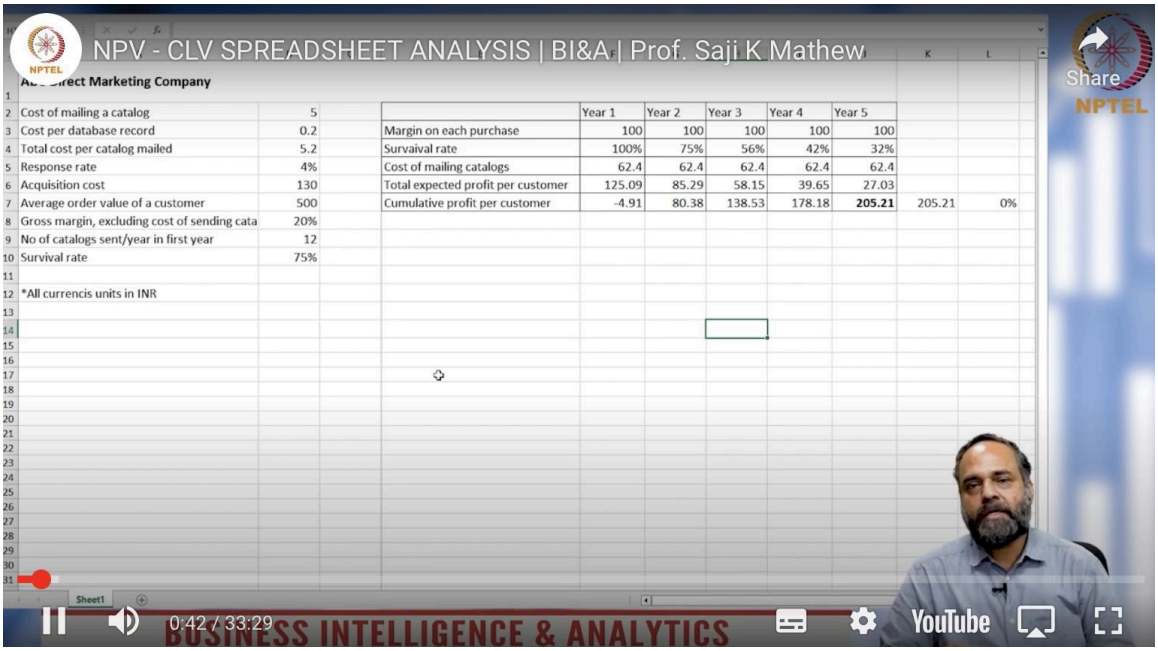
NPV - CLV SPREADSHEET ANALYSIS | Business Intelligence & Analytics

All right. And I want to start this discussion of this small case. The case that I am going to discuss here is that of a direct marketing company. Direct marketing here means the company actually reach outs to the customers directly. It sells it products directly to the customer. It does not go through a distributor, retail channel.



				Year 1	Year 2	Year 3	Year 4	Year 5
Cost of mailing a catalog	5		Margin on each purchase	100	100	100	100	100
Cost per database record	0.2		Survaival rate	100%	75%	56%	42%	32%
Total cost per catalog mailed	5.2		Cost of mailing catalogs	62.4	62.4	62.4	62.4	62.4
Response rate	4%		Total expected profit per customer	125.09	85.29	58.15	39.65	27.03
Acquisition cost	130		Cumulative profit per customer	-4.91	80.38	138.53	178.18	**205.21**
Average order value of a customer	500							
Gross margin, excluding cost of sending cata	20%							
No of catalogs sent/year in first year	12							
Survival rate	75%							
*All currencis units in INR								

But the company produces and sells directly to the customer and that is known as direct marketing. You know e-commerce is direct marketing. And you know when you subscribe to a magazine or a journal, you subscribe to Harvard Business Review, The Economist or the Madhupamis. These are all subscriptions or these are all products delivered directly to a customer and of course, they will be sending you promotions.

Promotional investments or expenses are part of direct marketing. So ABC, let me camouflage the name of the company. ABC is a direct marketing company, which sells its products through catalogs, meaning it has list of customers, existing customers and it reach outs to those customers directly for increasing their sales and of course, promoting

its product. So that is customer retention and customer expansion. And it also tries to acquire new customers, which is cost on customer acquisitions through you know through programs, through programs like reaching out to the customers with materials or catalogs, etc.

and offering, you know, products or services free for some time, etc. These are all part of the tactics that is followed by direct marketing companies. So we have a company of that sort, which we are discussing now and look at some basic data that is available. So let us look at some data about this direct marketing company ABC and look at the left hand side of the spreadsheet, we are given some basic data. So as I said, this company reaches out to its customers, potential customers as well as existing customers by mailing catalogs.

So if it has to mail a catalog, there is a cost involved. That cost involved involves the administration cost as well as the mailing cost. And that together is given here as rupees 5, all values are in rupees. So this is rupees 5. That is their value.

And then there is another cost in mailing catalogs, that is you need to get the address, especially if it is for customer acquisition. There is a one time cost of getting the address of the customer. So you have to buy a database. And the databases are usually bought from database marketing companies who sell information about customers and sometimes they do analytics that is something that we are going to see in classification. So customers who are likely to buy your product would be available with this firms and that has to be bought at a cost.

So the cost of one record is 0.2 or 20 paise. So you have to buy the contact. So total cost of mailing a catalog is the cost of the address plus cost of the catalog and the mailing expense put together 5 rupees 20 paise. That is the value.

Now this, at this point we are discussing reaching out to a potential customer or a prospect. And now when you mail catalogs, a customer or a prospect, not a customer here, a prospect may respond, may not respond. And therefore, there is a response rate. And here the response rate from historical data is shown as 4 percent. What does that mean? That means if you send your catalogs to 100 prospects, 4 people respond, 4 people subscribe or 4 people become your customers.

So that shows the response rate is very poor and for getting 4 customers you need to send 100 catalogs. That is understanding or to get 1 customer you need to send to 25 people. That is also an another interpretation of it. And therefore, acquisition cost is nothing but the cost of mailing divided by the response rate. So that we get by dividing

5.2 divided by 0.04 and that is the acquisition cost for 1 customer. And you already see that to get 1 customer you need to send the catalog at rupees 5.2 to 25 customers and that is the value that you are getting here as 130. And 130 is the acquisition cost of a customer. That is one time cost.

We calculated it and we know that that is required for the formula acquisition cost AC. Now again from historical data, it is known that average order value of a customer. If a customer responds on an average the customer places order for 500 rupees in 1 year. The average order value is INR 500. And that is the price a customer in other words in terms of our formula that is the price a customer pays in 1 year to the company.

That is a positive cash flow. And again there is a profit margin. So what does it show? If 500 rupees is received as a as revenue the profit is 20 percent. And I think I use the term production cost sometimes when I was explaining the explaining the formula for CLV that is not very accurate because production cost of the product is not what I meant there. It is the production cost of the catalog, the marketing material and you know the mailing cost and database cost and all that.

That is about the marketing cost. But the cost of production of whatever product you are selling and you know the employee cost and all that is factored in calculating the gross margin. That is a separate calculation. So if 500 rupees comes as revenues 20 percent of it is profit for the company. So that means 20 percent of 500 which is 100 rupees.

So when a firm gets 500 rupees from a customer it is making a profit of 100 rupees because profit margin is or gross margin is 20 percent. And the other data that is given is number of catalogs sent per year in the first year. So let us see let us keep that as the rate for all years. So then you see that a company or this firm sends a catalog every month. It is a bit traditional and you can send this through electronic channels but there are challenges because of you know the attention problem today and also you know it may get caught in the spam etc.

So regular mails are still active especially in indirect marketing programs. So and the last item so 12 catalogs a year that is a cost that is incurred in the marketing 12 times. Whatever cost is incurred in mailing catalog is incurred 12 times. And there is also survival rate. So survival rate is something that we discussed already but here in this problem survival rate has been estimated as a fixed rate.

That is if there are 100 customers in this first year the 100 customers in the first year the 100 will become 75 in the next year 75 will become 56 in the third year 42 in the

fourth year or 32 in the fifth year or you can see in the formula we are multiplying the 100 by 0.75 and 0.75 every year or the probability of a customer being active in the first year is of course 100 percent or one second year is 0.75 third year is 0.56 and so on. So expected value is based on the probability of survival of the customer and that is given as 75 percent as a fixed rate. So this is the data that is available to us in calculating the CLV customer lifetime value for a customer. Now let us see how this information together can be used to arrive at a figure called CLV of the customer. And in this particular calculation we are going to use a time horizon of 5 years or t equals 5.

And here is the first year. Let us look at how we can arrive at what is the cumulative profit per customer in the first year which is the bottom value. Margin on each purchase we have seen that 500 rupees is average order cost and that multiplied by the this 500 multiplied by 20 percent. That is 100. So 100 rupees is what the price that the not the price but the profit that the customer brings. Survival rate in the first year is 100 percent or 1 and cost of mailing catalogs is ok.

Cost of mailing cost per catalog is 5.2 per customer. And therefore in the first year you incur a cost of 5.2 into 12 which is shown as 62.4. So 12 times the catalog is mailed. And therefore it is 62.4 and it includes the database cost and the and the sort of you know the cost of the catalog and the mailing expenses.

So 62.4. Total expected profit per customer in the first year is of course the using the formula you can see how this formula is applied. This is F F3 is your profit that is 100. Give me a moment I will get back to this. So we have discussed up till cost of mailing the catalog and now we are going to calculate total expected profit per customer and look at the formula. Look at the formula, 2 x F3 - F5. 2 x F3. what is F3? F3 is margin on each purchase. And why is it multiplied by 2? Because in the case it is given that a customer places two orders in an year. That is a given information which I did not explain when I was explaining the basic data. But average order size is 500. But for this category of customers which is discussed in the case there are different customer categories.

This customer places two orders in a year and therefore it is multiplied by 2. So 2 into F3 that is the profit. So that is the inflow that is the revenue minus F3. F3 we have already seen this is the cost incurred on the customer.

This is the marketing cost. And therefore this is this becomes 125.09 in the first year. But we have seen that in the CLV formula there is also an acquisition cost. Acquisition cost is already calculated as in the previous discussion.

This is 130. Acquisition cost is 130. So 125.09 - 130, is - 4.91. We can see that in the first year it is a loss because of the investment that has happened in customer acquisition. The customer acquisition cost actually drives down the profit in the first year.

And we expect profits to become positive from or the loss to become profit from the second year onwards. So when we move another element which I did not show you in the formula. The numerator is explained 2 x F3 - F5. The denominator is the discount rate. 1 + 0.1. And what is the 0.1? Let me add that here. The interest rate. Interest rate of capital is given as 10 percent. So 10 percent is the interest rate.

So therefore denominator becomes 1 + 0.1. And so that so indicating that there is an interest that the company has to pay in the first year for the expense that it has made in the first year. This is understood and we have calculated the cumulative profit for customer now. And now let us go to the second year. Second year is the same as first year in terms of you know we do not have any additional information here. Since we are relying on the historical data when we do calculation at a given point in time.

So margin on each purchase is 100. Survival rate has become 75 percent from 100 percent. We discussed this already. Cost of mailing catalogue is given here. I calculated it as 62.4 which is the same as the previous year. But there is an issue here. I must correct myself. Why? Because the acquisition cost is typically in the first year. And when it comes to the second year you are maintaining the customer whom you acquired in the first year. And therefore you may be continuing to send catalogues to the customers in order to retain the customers in order to continue to get subscriptions from the customer on a monthly basis or on a quarterly basis.

So here we have taken the or we assume that the company sends 12 catalogues in an year. Let us assume that the 12 remains the same. So the multiplication factor is 12.

But I have used B4. B4 is the 5.2. 5.2 is the sum of 5 and 2. 5 and 0.2. 0.2 is the cost per database record and 5 is the cost of mailing the catalogue.

But in the second year we should not add this database cost because this is already procured. So therefore I must make that correction here. Instead of B4 I should rather use B2 which is the cost of mailing, producing and mailing the catalogue. So I change here it to B2.

And that is slightly it has become 60. And in all years it should be B2. So I will change that here. And that makes it pretty straightforward. Error corrected now. So now second year onwards the cost of mailing is only the catalogue cost and then there is no database

cost.

And then total expected profit is of course in the year second from the revenues the total expected profit is 86.78. And why it is not 125.09? It is not just the change in the catalogue mailing costs but it has although it has reduced you can see the profit has reduced that is because of the discount rate.

So you are paying interest for your capital. In the second year you can see the discount rate has got multiplied it is to the power of 2. And that has brought down the profit in the second year as compared to the first year. And now of course the cumulative profit of course your cash flow has become positive in the second year. But you have to of course account for the negative value of loss in the previous year. So accounting for that your total profit in the first year per customer is 81.87. And this calculation is replicated from year 2 to year 3 and year 4 and year 5. And rate survival rate has become 56 percent cost of mailing remains the same. And therefore based on the adjusted survival rate and discount rate it is to the power of 3 here the you know the returns as the present value of the returns has subsequently come down it has become 59.17. And of course when you add that 59.17 to 81.87 your cumulative profit becomes 141.03 in year 3. And of course going by the same calculations when you actually further do it for year 4 it actually becomes 181.37 which is 141.03 added to 40.34 which is 181.37. And when you further go down go forward to year 5 you know the cumulative profit becomes 208.88. I have put that figure in bold.

What is 208.88? This is the CLV of a customer. The CLV of a customer is 208.88. Our effort here is to estimate the future returns of a customer who contributes to the business in this way based on this data and whose survival rate is at this given rate the CLV of that customer will be 208.88 rupees over 5 years. Looks very slightly disappointing. In 5 years time a customer is going to buy 208.88 as I look at the customer's value today. That looks very small. Well, this makes sense only if a firm is doing a company is doing a volume business. As in the case of e-commerce when this is a value per customer but your customer segment may be running to a few hundred thousands or a few millions.

Then you can see the overall profitability, future profitability. So let us not worry about this figure. Let us treat this figure as given. And this is not given this is something that we computed based on data. And this customer of course belong to a particular category because survival rate is given for a category of customers.

And a customer in that category the CLV is 208.88. This is interesting. Now, when we so I am here showing some other figures like earlier we had estimated it as 205.21 and in that case we took the cost per mailing data cost per mailing for the database cost as well.

When we removed that of course, you know the profitability or the CLV increased by 2 percent. Just leave that that is very trivial. But once we have a spreadsheet of course or ROI spreadsheet it also enables a decision maker to do some sensitivity analysis or how the output changes or the response changes when you change a certain input values.

The input output dynamics is of course given in the spreadsheet but where it is more sensitive where it is less sensitive etc. For example, let us do one thing suppose the company invest in customer retention and tries to increase the survival rate. Suppose the survival rate of the segment is instead of 75 percent.

Let me actually correct this figure first. This is 208.88 that is our base value. 208.88. Now let me actually make the survival rate say increase it by 5 percent. So let me make it 80 and see how the CLV is going to change.

Well, the CLV has now become 239.54 and that is a 13 percent increase in the customer lifetime value. What does that mean? A 5 percent increase in the survival rate increases customer future value by 13 percent. So it is not just the double but it is more than double. I think we discussed this in a previous session where we saw that customer retention contributes to profitability of a business. So this is quite obvious for us here that increasing survival rate has a very positive and multiplier impact on the CLV.

Let me actually take this value back to 75 percent because that is our base value which is 208.88. Now keeping survival at 75 itself, let us see gross profit or gross margin is something that you may not be able to change and you do not want to change the number of catalogs percent but average order value of a customer. Now suppose you invest in recommender systems and proposes or recommends more relevant products which a customer is likely to buy to a customer and the customer's order value increases. So if you have some average order value instead of 500 suppose you are able to make it 600 and if this customer of course buys twice instead of 500 if it becomes 600 what is the impact on CLV? That is very interesting.

So a 100 rupees increase in order value has led to 32 percent increase in the CLV. So 100 percent increase means what? This is 100 by 500. So therefore it is a 20 percent increase. So a 20 percent increase in order value results in 32 percent increase in CLV. So therefore this is a sort of a simple insight but it is very insightful as far as investment decisions in analytics is concerned. You are going to invest in recommender systems by employing experts, by employing in investing in databases or analysts.

It is based on the rationale that customer value, customer's future value is going to increase when you actually make strong recommendations, relevant recommendations

leading to increase in customer's buying behavior or customer's contribution. So that is a sort of insight that you get from this simple exercise. And let us also look at this. So that is the response rate has a bearing on the acquisition cost.

You can see the acquisition cost is 130 rupees. Suppose the response rate increases from 4 percent to 5 percent. Does it have a, what is the sort of impact it has on CLV? Let me make it 5. Wow. That is very impressive. You can see a 1 percent increase in the response rate has led to 11 percent increase in the CLV of the customer or a customer that belongs to a segment in my articulation.

So a 1 percent increase in response rate has 11 percent, leads to 11 percent increase in CLV of a customer. And that is very, very impressive. And that is why you will see in the next sessions that companies, especially those who are in internet business, doing large volume business, invest hugely in improving the performance of their algorithms. If response rate can be slightly increased, it has a huge impact on revenues as well as cost.

And therefore, this is very profitable, and it impacts the profitability and CLV of the company. And that is another insight that you can actually derive from this spreadsheet. Let me go back to the 4 percent. And well, I will not change any figure, but we are seeing how sensitive the CLV model is to various inputs. And we can actually look at the impact of changes in the inputs on the output.

And this is insightful for a manager when manager decides on its strategy for marketing. And it also provides a rationale for a marketing manager in front of the finance group to justify the investment in analytics. We touched upon business value of business intelligence in one of the previous sessions. And the hard step for a manager to get professionals in analytics is the conviction of the top management or the conviction of the managers in finance. They need to provide you funds to invest in analytics.

They will ask what is the return on investment. And a CLV analysis you can see also helps in building rationale for investing in analytics, in customer analytics, in recommender systems, etc. Because you can demonstrate based on data, based on data from databases that this is the expected returns. It is not your intuition, it is not your assumption, or it is not your gut feeling, but it is data that speaks in this kind of an exercise. So I will close this discussion here.

And I hope you got a sense of the importance of customer analytics. And also the value of customer analytics from a marketing department level like customer segmentation using CLV or categorizing customers into platinum, diamond, gold, silver, etc. You

know, CLV can be a value that you can use along with other factors that is purely marketing exercise. Now, from that it can go up till customer equity calculation using CLV, where the customer's equity to firm value can be assessed using CLV. So it has more a strategic use in making decisions on marketing investments from a top management perspective.

That is what we see in the case of CLV. Thank you very much and look forward to meeting you all in the next session. Thank you. Thank you.