POLITECNICO MILANO 1863

Exercise session – Customer lifetime value

AY 2024/2025 - Gloria Peggiani

AGENDA

- CLV formula: A quick recap
- Exercise 1 – Bar Milano
- Exercise 2 – Segmentation assessment
- Exercise 3 – Pricing assessment
- Exercise 4 – Telco

CLV formula: A quick recap

01

CLV operational definition

«At an individual level, customer lifetime value is calculated as the sum of cumulated cash flows-discounted using the Weighted Average Cost of Capital (WACC)-of a customer over his or her entire lifetime with the company. It is a function of the predicted contribution margin, the propensity for a customer to continue in the relationship, and the marketing resources allocated to the customer»

(Kumar, 2006, p.14).

CLV formula

General Formulation:

$$CLV = \sum_{t=1}^{\infty} \frac{M_t * RR^t}{(1+DR_t)^t}$$

- RR(t) is the probability that a customer who was active in (t-1) will in (t)
- DR = discount rate (may coincide with WACC)
- M = margin (discounted at the end of the first period)
- **RR constant over time**

CLV formula

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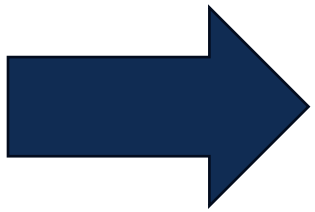


$$NPV = \sum_{t=0}^{n} \frac{CF_t}{(1+r)^t}$$

- NPV: net present value
- CFt: cash flow at the period t
- r: discount rate
- t: period of the cash flow
- n: number of periods

- RR(t) is the probability that a customer who was active in (t-1) will in (t)
- DR = discount rate (may coincide with WACC)
- M = margin (discounted at the end of the first period)
- **RR constant over time**

CLV formula

Why do we **discount** cash flows?

October 2024

$100

?

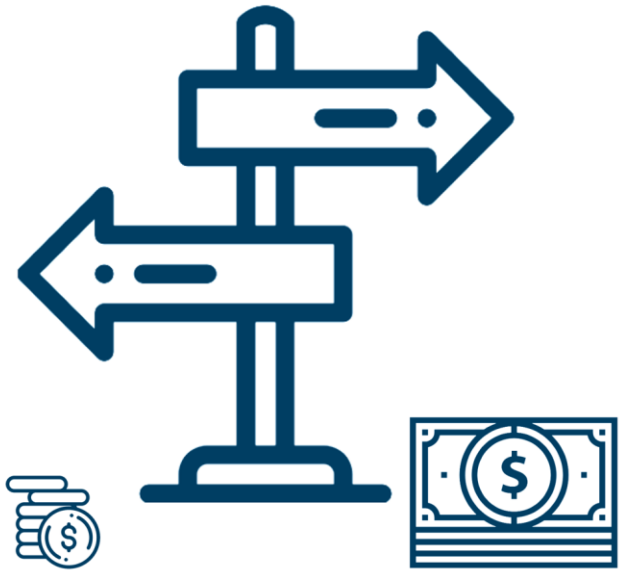
=

October 2025

$100

CLV formula

Why do we **discount** cash flows?



CLV formula

General Formulation:

$$CLV = \sum_{t=1}^{\infty} \frac{M_t * RR^t}{(1+DR_t)^t}$$

$$NPV = \sum_{t=0}^{n} \frac{CF_t}{(1+r)^t}$$

- NPV: net present value
- CFt: cash flow at the period t
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- RR(t) is the probability that a customer who was active in (t-1) will in (t)
- DR = discount rate (may coincide with WACC)
- M = margin (discounted at the end of the first period)
- **RR constant over time**

Example:
A company loses 0.5% of customers monthly, on average.

RR(t) is the probability that a customer who was active in (t-1) will be active also in (t)

→ **$RR_{monthly}$ = 99.5 %**

Steps to be followed

1. Definition of time horizon
2. Definition of the unit of time
3. Constraints Definition (M, RR and DR constant?)
4. Definition of Assumptions

AGENDA

- CLV formula: A quick recap
- **Exercise 1 – Bar Milano**
- **Exercise 2 – Segmentation assessment**
- **Exercise 3 – Pricing assessment**
- Exercise 4 – Telco

Exercise 1 – Bar Milano

02

Exercise 1 – Bar Milano

Andrea has just moved to Milan for a project with a two-year work contract. Immediately he became a regular customer at the bar next to his office. Usually, he goes there once a week and has 2 drinks. The average drink price is 7€, and the bar's gross margin is 70%.

Assume 4 weeks per month and a monthly discount rate of 1%.

Your tasks:

a) *Calculate Andrea's CLV to the bar over a two-year horizon.*

Two years have passed, and Andrea would like to explore new places, and probably he would not go to the same bar as regularly as before.

b) *If he has a 95% chance of going to the same bar in the following month, how long can the bar expect Andrea to be its customer?*

c) *Considering an infinite time horizon, what would be his CLV?*

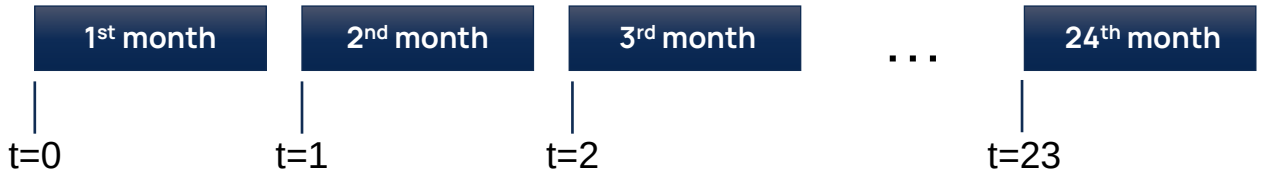
Exercise 1 – Bar Milano

- Time horizon: 2 years
- Unit of time: month
- Quantity of purchase: 2/week = 8/month
- Average price x unit: 7€
- Margin on full price: 70% → Margin: € 4,9
- Discount Rate (DR): 0,01

Exercise 1 – Bar Milano

$$CLV = \sum_{t=0}^{\infty} \frac{M_t * RR^t}{(1 + DR)^t}$$

Time horizon: 24 months → **t = [0, 1, …, 23]**



Assumption: we model the problem as if the customer paid at the beginning of the month (e.g., subscription-based modeling) → Andrea decides to renew its loyalty to Bar Milano at the beginning of each month. → t=0

Exercise 1 – Bar Milano

$$CLV = \sum_{t=0}^{\infty} \frac{M_t * RR^t}{(1 + DR)^t}$$

Time horizon: 24 months → t = [0, 1, …, 23]

$$\boldsymbol{M = 8 * 4,9 = € 39,2}$$

2/week *x* 4 weeks

Margin

Exercise 1 – Bar Milano

$$CLV = \sum_{t=0}^{\infty} \frac{M_t * RR^t}{(1 + DR)^t}$$

Time horizon: 24 months → t = [0, 1, …, 23]

$M = 8 * 4{,}9 = € 39{,}2$

DR = 0,01

RR = 1

Regular customer

Exercise 1 – Bar Milano

$$CLV = \sum_{t=0}^{\infty} \frac{M_t * RR^t}{(1 + DR)^t}$$

$$\frac{39{,}2 * 1}{(1 + 0{,}01)^t}$$

t	M	Discounted M

Exercise 1 – Bar Milano

$$CLV = \sum_{t=0}^{\infty} \frac{M_t * RR^t}{(1+DR)^t}$$

$$\frac{39{,}2 * 1}{(1+0{,}01)^t}$$

t	M	Discounted M
0	39,2	39,20

Exercise 1 – Bar Milano

$$CLV = \sum_{t=0}^{\infty} \frac{M_t * RR^t}{(1 + DR)^t}$$

t	M	Discounted M
0	39,2	39,20
1	39,2	38,81
2	39,2	38,43
…	…	…
23	39,2	31,18

Exercise 1 – Bar Milano

t	M	Discounted M
0	39,2	39,20
1	39,2	38,81
2	39,2	38,43
3	39,2	38,05
4	39,2	37,67
5	39,2	37,30
6	39,2	36,93
7	39,2	36,56
8	39,2	36,20
9	39,2	35,84
10	39,2	35,49
11	39,2	35,14
12	39,2	34,79
13	39,2	34,44
14	39,2	34,10
15	39,2	33,76
16	39,2	33,43
17	39,2	33,10
18	39,2	32,77
19	39,2	32,45
20	39,2	32,13
21	39,2	31,81
22	39,2	31,49
23	39,2	31,18

$$\mathbf{CLV = € 841,07}$$

Exercise 1 – Bar Milano

Two years have passed, and Andrea would like to explore new places, and probably he would not go to the same bar as regularly as before.

b) *If he has a 95% chance of going to the same bar in the following month, how long can the bar expect Andrea to be its customer?*

c) *Considering an infinite time horizon, what would be his CLV?*

After two years being here, Andrea would like to explore new places and probably he would not go to the same bar as regularly as before.

RR = 0,95
DR = 0,01

$$CLV = \sum_{t=0}^{\infty} \frac{M_t * RR^t}{(1 + DR)^t}$$

Exercise 1 – Bar Milano

t	RR	Cumulated RR
0	1	1
1	0,95	0,95
2	0,95	0,9025

$$\mathbf{RR(t) * CumulatedRR\ (t-1)}$$

Assumption: we model the problem as if the customer paid at the beginning of the month (e.g., subscription-based modeling) → Andrea decides to renew its loyalty to Bar Milano at the beginning of each month.

Exercise 1 – Bar Milano

Two years have passed, and Andrea would like to explore new places, and probably he would not go to the same bar as regularly as before.

b) *If he has a 95% chance of going to the same bar in the following month, how long can the bar expect Andrea to be its customer?*

c) *Considering an infinite time horizon, what would be his CLV?*

Assumption: Set 50% as cumulated RR threshold

Pure chance

$$CLV = \sum_{t=0}^{\infty} \frac{M_t * RR^t}{(1+DR)^t}$$

Exercise 1 – Bar Milano

Under the assumption made, the bar can expect to lose Andrea as a customer between t=13 and t=14, namely during the 14th month

t	RR	Cumulated RR
0	1	1
1	0,95	0,95
2	0,95	0,9025
3	0,95	0,857375
4	0,95	0,81450625
5	0,95	0,773780938
6	0,95	0,735091891
7	0,95	0,698337296
8	0,95	0,663420431
9	0,95	0,63024941
10	0,95	0,598736939
11	0,95	0,568800092
12	0,95	0,540360088
13	0,95	0,513342083
14	0,95	0,487674979
15	0,95	0,46329123
16	0,95	0,440126669
17	0,95	0,418120335
18	0,95	0,397214318
19	0,95	0,377353603
20	0,95	0,358485922
21	0,95	0,340561626
22	0,95	0,323533545
23	0,95	0,307356868

Exercise 1 – Bar Milano

Two years have passed, and Andrea would like to explore new places, and probably he would not go to the same bar as regularly as before.

b) *If he has a 95% chance of going to the same bar in the following month, how long can the bar expect Andrea to be its customer?*

c) *Considering an infinite time horizon, what would be his CLV?*

Exercise 1 – Bar Milano

Assumptions check: (i) infinite time horizon, (ii) M, RR and DR constant

$$CLV = M + \frac{M * RR}{(1+DR-RR)}$$

Existence of a margin in t=0

$M = 8 * 4{,}9 = € 39{,}2$

DR = 0,01

RR = 0,95

$$CLV = 39{,}2 + \frac{39{,}2 * 0{,}95}{(1+0{,}01-0{,}95)} = € 659{,}87$$

Exercise 1 – Bar Milano

Assumptions check: (i) infinite time horizon, (ii) M, RR and DR constant

$$CLV = \frac{M * RR}{(1 + DR - RR)}$$

Steps to be followed

1. Definition of time horizon **2 years**
2. Definition of the unit of time **months**
3. Constraints Definition

TASK A,B

i. **M, RR and DR constant**

ii. **Limited time**

$$CLV = \sum_{t=0}^{\infty} \frac{M_t * RR^t}{(1 + DR)^t}$$

TASK C

i. **M, RR and DR constant**

ii. **Infinite time**

$$CLV = \frac{M * RR}{(1+DR-RR)}$$

Steps to be followed

4. Assumptions

i. **t=0 since we model the problem as if the customer pays in advance**

ii. **we measure loyalty as the 50% of RR**

Exercise 2 – Segmentation Assessment

03

Exercise 2 – Segmentation assessment

A telecommunication company analyzed its customer base and identified three segments:

- Basic segment, with a subscription to basic services. The customers in the basic segment are very likely to be attracted by lower price offerings of competitors, therefore has the highest churn rate. The monthly retention rate of this segment is 97%, and monthly revenue is €12 per customer with a 20% margin.

- Plus segment, with a subscription to more comprehensive services. The customers often have accepted cross-sale and up-sale offers during their lifetime and have multiple service packages. The monthly retention rate of plus-segment is 99%, monthly revenue is €25 per customer with a 22% margin.

- Premium segment, with high-level services and various add-ons. These customers usually are the most loyal and have made multiple upgrades. The monthly retention rate of this segment is 99,5%, monthly revenue is €50 per customer with a 25% margin.

Exercise 2 – Segmentation assessment

The **monthly** discount rate is 0,8%. The approximation coefficients based on **yearly** retention and **yearly** discount rate is as follows:

AC		RR				
		0,7	**0,8**	**0,9**	**0,95**	**0,99**
DR	**5%**	90%	80%	60%	45%	25%
	7%	90%	80%	60%	50%	35%
	9%	90%	80%	65%	55%	40%
	10%	95%	85%	70%	55%	45%
	15%	95%	85%	75%	65%	55%

Your task:

Calculate the CLV in the first five years of a customer in basic-, plus-, and premium-segment, respectively

Exercise 2 – Segmentation assessment

Three segments: Basic, Plus, Premium

Monthly RR, Monthly DR, revenues, and margins are given

Time horizon: 5 years

Your task: Calculate the CLV in the first five years of a customer in basic-, plus-, and premium-segment, respectively

Steps to be followed

1. Definition of time horizon **5 years**
2. Definition of the unit of time **months**
3. Constraints Definition

Two alternatives

i. **M, RR and DR constant**

ii. **Limited time**

$$CLV = \sum_{t=0}^{\infty} \frac{M_t * RR^t}{(1+DR)^t}$$

Total theoretical CLV (infinite time)

i. **M, RR and DR constant**

ii. **Limited time (5 years)**

$$CLV_{approx} = AC * \left(M * \frac{RR}{(1+DR-RR)} \right)$$

Exercise 2 – Segmentation assessment

$$CLV_{approx} = AC * \left(M * \frac{RR}{(1 + DR - RR)} \right)$$

Time horizon: **5 years**

Assumptions check: (i) M, RR and DR constant

AC		RR				
		0,7	0,8	0,9	0,95	0,99
DR	5%	90%	80%	60%	45%	25%
	7%	90%	80%	60%	50%	35%
	9%	90%	80%	65%	55%	40%
	10%	95%	85%	70%	55%	45%
	15%	95%	85%	75%	65%	55%

Calculate the CLV in the first five years of a customer in basic-, plus-, and premium-segment, respectively.

Exercise 2 – Segmentation assessment

$$CLV_{approx} = AC * \left(M * \frac{RR}{(1 + DR - RR)} \right)$$

Time horizon: 5 years

Assumptions check: (i) M, RR and DR constant

$$\boldsymbol{M = Revenue * Margin}$$

M_{Basic} = € 2,4; M_{Plus} = € 5,5; $M_{Premium}$ = € 12,5

€ 12 x 20%

Exercise 2 – Segmentation assessment

$$CLV_{approx} = AC * \left(M * \frac{RR}{(1 + DR - RR)} \right)$$

Time horizon: 5 years

Assumptions check: (i) M, RR and DR constant

$M = Revenue * Margin$

M_{Basic} = € 2,4; M_{Plus} = € 5,5; $M_{Premium}$ = € 12,5

RR_{month}: RR_{Basic} = 97%; RR_{Plus} = 99%; $RR_{Premium}$ = 99,5%

DR_{month}: 0,8%

Exercise 2 – Segmentation assessment

THE APPROXIMATION COEFFICIENT IS CALCULATED ON A YEARLY BASE.

$$CLV_{approx} = AC * \left(M * \frac{RR}{(1 + DR - RR)} \right)$$

AC		RR				
		0,7	0,8	0,9	0,95	0,99
DR	5%	90%	80%	60%	45%	25%
	7%	90%	80%	60%	50%	35%
	9%	90%	80%	65%	55%	40%
	10%	95%	85%	70%	55%	45%
	15%	95%	85%	75%	65%	55%

Exercise 2 – Segmentation assessment

$RR_{month} \rightarrow RR_{year}$

RR = 0,97

$RR_{year} = RR_{month}^{12}$

AC		RR				
		0,7	0,8	0,9	0,95	0,99
DR	5%	90%	80%	60%	45%	25%
	7%	90%	80%	60%	50%	35%
	9%	90%	80%	65%	55%	40%
	10%	95%	85%	70%	55%	45%
	15%	95%	85%	75%	65%	55%

Exercise 2 – Segmentation assessment

RR_{month} → RR_{year}
RR_{month}: RR_{Basic} = 97%; RR_{Plus} = 99%; $RR_{Premium}$ = 99,5%
RR_{year}: RR_{basic} = 69% ; RR_{plus} = 89% ; $RR_{premium}$ = 94%

AC		RR				
		0,7	0,8	0,9	0,95	0,99
DR	5%	90%	80%	60%	45%	25%
	7%	90%	80%	60%	50%	35%
	9%	90%	80%	65%	55%	40%
	10%	95%	85%	70%	55%	45%
	15%	95%	85%	75%	65%	55%

Exercise 2 – Segmentation assessment

$DR_{month} \rightarrow DR_{year}$

$$\frac{CF}{(1+DR_{month})^{12}} = \frac{CF}{(1+DR_{year})^{1}}$$

$$\frac{(1+DR_{year})^{1} * CF}{1} = \frac{(1+DR_{month})^{12} * CF}{1}$$

$$(1+DR_{year})^{1} = (1+DR_{month})^{12}$$

$$1+DR_{year} = (1+DR_{month})^{12}$$

$$DR_{year} = (1+DR_{month})^{12} - 1$$

Exercise 2 – Segmentation assessment

$DR_{month} \rightarrow Dr_{year}$

$DR_{month} = 0,8\%$

$DR_{year} = (1,008)^{12} - 1 = 1,1003 - 1 = 10\%$

AC		RR				
		0,7	0,8	0,9	0,95	0,99
DR	5%	90%	80%	60%	45%	25%
	7%	90%	80%	60%	50%	35%
	9%	90%	80%	65%	55%	40%
	10%	95%	85%	70%	55%	45%
	15%	95%	85%	75%	65%	55%

Exercise 2 – Segmentation assessment

RR_{year}: RR_{basic} = 69% ; RR_{plus} = 89% ; $RR_{premium}$ = 94%
DR_{year} = 10%

AC		RR				
		0,7	0,8	0,9	0,95	0,99
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	7%	90%	80%	60%	50%	35%
	9%	90%	80%	65%	55%	40%
	10%	95%	85%	70%	55%	45%
	15%	95	%	75		

AC basic

AC plus

AC premium

Exercise 2 – Segmentation assessment

$$CLV_{approx} = AC * \left(M * \frac{RR}{(1 + DR - RR)} \right)$$

$$CLV_{basic} = 0{,}95 * \left(2{,}4 * \frac{0{,}97}{(1 + 0{,}008 - 0{,}97)} \right) = € 58{,}2$$

$$CLV_{plus} = € 211{,}8$$

$$CLV_{premium} = € 526{,}2$$

Exercise 3 - Pricing assessment

04

Exercise 3 – Pricing assessment

A SaaS (software-as-a-service) startup offers its service with the following pricing scheme:

- Free account: cost of service provided free of charge is €0,5 per month
- Basic account: €10 per month to be paid at the beginning of the month, 30% profit margin
- Premium account: €15 per month to be paid at the beginning of the month, 40% profit margin

A campaign aiming at acquiring customers has been performed. In one month, about 5.000 users have signed up for the service directly from the campaign, among which 3.500 registered a free account, 1,100 registered for a basic account, and 400 for a premium account.

Assume that the retention rate of paying customers (basic and premium) is 98% per **month**. Free account users rarely delete their accounts officially, regardless they are actively using the service or not. Therefore, for what concerns the cost estimation, free account users could be considered of 100% retention. However, it is known when the free account users upgrade to basic or premium accounts, ending their status as free account users.

Exercise 3 – Pricing assessment

The **monthly** discount rate is 0,8%. The approximation coefficients based on **yearly** retention and **yearly** discount rate is as follows:

AC		RR				
		0,8	**0,85**	**0,9**	**0,95**	**0,99**
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	10%	85%	75%	70%	55%	45%
	15%	85%	80%	75%	65%	55%

a) What is the CLV in the first five years of a basic account customer and a premium account customer, who are acquired during this campaign, respectively?
b) Consider it the first month when a user signs up for the service. In the following five months, among the free account users acquired during the campaign, 10, 20, 70, 200, and 250 users upgraded from free to basic account; 0, 0, 10, 10, and 20 users upgraded from free to a premium account. What is the ROI of the campaign by the end of six months, considering a budget for the campaign of €10.000 on social media advertising?

Exercise 3 – Pricing assessment

- **Three pricing schemes:** Free, Basic, Premium
- **Monthly RR, Monthly DR, costs, revenues, and margins** are given
- **Time horizon:** 5 years

- **Social media spending, new customer acquisitions** are given

Exercise 3 – Pricing assessment

Your tasks:

a) **What is the CLV in the first five years of a basic account customer and a premium account customer, who are acquired during this campaign, respectively?**

Exercise 3 – Pricing assessment

$$CLV_{approx} = IM + AC * \left(M * \frac{RR}{(1 + DR - RR)} \right)$$

Time horizon: 5 years

Assumptions check: (i) M, RR and DR constant

Exercise 3 – Pricing assessment

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Exercise 3 – Pricing assessment

$$CLV_{approx} = IM + AC * \left(M * \frac{RR}{(1 + DR - RR)} \right)$$

Time horizon: 5 years

Assumptions check: (i) M, RR and DR constant

$\boldsymbol{M = (Revenues - costs) * Margin}$

M_{Free} = - 0,5 €;

M_{Basic} = 3 €;

$M_{Premium}$ = 6 €

Exercise 3 – Pricing assessment

A SaaS (software-as-a-service) startup offers its service with the following pricing scheme:

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- Basic account: €10 per month to be paid at the beginning of the month, 30% profit margin
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A campaign aiming at acquiring customers has been performed. In one month, about 5.000 users have signed up for the service directly from the campaign, among which 3.500 registered a free account, 1,100 registered for a basic account, and 400 for a premium account.

Assume that the retention rate of paying customers (basic and premium) is 98% per **month**. Free account users rarely delete their accounts officially, regardless they are actively using the service or not. Therefore, for what concerns the cost estimation, free account users could be considered of 100% retention. However, it is known when the free account users upgrade to basic or premium accounts, ending their status as free account users.

Exercise 3 – Pricing assessment

$$CLV_{approx} = IM + AC * \left(M * \frac{RR}{(1 + DR - RR)} \right)$$

Time horizon: 5 years

Assumptions check: (i) M, RR and DR constant

RR_{month}: RR_{basic} = 98%; $RR_{premium}$ = 98%; RR_{free} → 1

Exercise 3 – Pricing assessment

The **monthly** discount rate is 0,8%. The approximation coefficients based on **yearly** retention and **yearly** discount rate is as follows:

AC		RR				
		0,8	**0,85**	**0,9**	**0,95**	**0,99**
DR	**5%**	80%	70%	60%	45%	25%
	7%	80%	75%	60%	50%	35%
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Exercise 3 – Pricing assessment

$$CLV_{approx} = IM + AC * \left(M * \frac{RR}{(1 + DR - RR)} \right)$$

Time horizon: 5 years

Assumptions check: (i) M, RR and DR constant

M_{Free} = - 0,5 €; M_{Basic} = 3 €; $M_{Premium}$ = 6 €

RR_{month}: RR_{basic}= 98%; $RR_{premium}$= 98%; RR_{free}→ 1

DR_{month}: 0,8%

Exercise 3 – Pricing assessment

$DR_{month} \rightarrow DR_{year}$

$DR_{year} = (1 + 0{,}008)^{12} - 1 = 10\%$

AC_{basic} & $AC_{premium}$:

$RR_{month} \rightarrow RR_{year}$

$RR_{year} = 0{,}98^{12} = 78\%$

AC		RR				
		0,8	0,85	0,9	0,95	0,99
DR	5%	80%	70%	60%	45%	25%
	7%	80%	75%	60%	50%	35%
	9%	80%	75%	65%	55%	40%
	10%	85%	75%	70%	55%	45%
	15%			75%		55%

AC_{basic} ; $AC_{premium}$

AC_{free}

Exercise 3 – Pricing assessment

$$CLV_{approx} = IM + AC * \left(M * \frac{RR}{(1 + DR - RR)} \right)$$

$$CLV_{free} = -0{,}5 + 0{,}45 * \left(-0{,}5 * \frac{1}{(1 + 0{,}008 - 1)} \right) = -28{,}63\ €$$

$$CLV_{basic} = 92{,}25\ €$$

$$CLV_{premium} = 184{,}5€$$

Exercise 3 – Pricing assessment

b) Consider it the first month when a user signs up for the service. In the following five months, among the free account users acquired during the campaign, 10, 20, 70, 200, and 250 users upgraded from free to basic account; 0, 0, 10, 10, and 20 users upgraded from free to a premium account. What is the ROI of the campaign by the end of six months, considering a budget for the campaign of €10.000 on social media advertising?

Exercise 3 – Pricing assessment

Development logic

i. Assess the number of users along six months
ii. Assess the margin associated
iii. Assess the discounted margin associated

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Exercise 3 – Pricing assessment

i. Assess the number of users along six months

	Upgrades		Total users		
Period	*Upgrade_Basic*	*Upgrade_Premium*	*Free*	*Basic*	*Premium*
0			3500	1100	400
1					
2					
3					
4					
5					

From text

Exercise 3 – Pricing assessment

i. Assess the number of users along six months

	Upgrades		Total users		
Period	***Upgrade_Basic***	***Upgrade_Premium***	***Free***	***Basic***	***Premium***
0			3500	1100	400
1	10	0			
2	20	0			
3	70	10			
4	200	10			
5	250	20			

From text

Exercise 3 – Pricing assessment

i. Assess the number of users along six months

	Upgrades		Total users		
Period	***Upgrade_Basic***	***Upgrade_Premium***	***Free***	***Basic***	***Premium***
0			3500	1100	400
1	10	0	3490		
2	20	0			
3	70	10			
4	200	10			
5	250	20			

3500 - 10

Exercise 3 – Pricing assessment

i. Assess the number of users along six months

	Upgrades		Total users		
Period	***Upgrade_Basic***	***Upgrade_Premium***	***Free***	***Basic***	***Premium***
0			3500	1100	400
1	10	0	3490	1088	392
2	20	0			
3	70	10			
4	200	10			
5	250	20			

1100 * 0,98 + 10

Exercise 3 – Pricing assessment

i. Assess the number of users along six months

	Upgrades		Total users		
Period	***Upgrade_Basic***	***Upgrade_Premium***	***Free***	***Basic***	***Premium***
0			3500	1100	400
1	10	0	3490	1088	392
2	20	0	3470		
3	70	10			
4	200	10			
5	250	20			

3470 - 20

Exercise 3 – Pricing assessment

i. Assess the number of users along six months

	Upgrades		Total users		
Period	***Upgrade_Basic***	***Upgrade_Premium***	***Free***	***Basic***	***Premium***
0			3500	1100	400
1	10	0	3490	1088	392
2	20	0	3470	1086	384
3	70	10			
4	200	10			
5	250	20			

1088 * 0,98 + 20

Exercise 3 – Pricing assessment

i. Assess the number of users along six months

	Upgrades		Total users		
Period	***Upgrade_Basic***	***Upgrade_Premium***	***Free***	***Basic***	***Premium***
0			3500	1100	400
1	10	0	3490	1088	392
2	20	0	3470	1086	384
3	70	10	3390	1135	386
4	200	10	3180	1312	389
5	250	20	2910	1536	401

Exercise 3 – Pricing assessment

ii. Assess the margin associated

	Total users			Margin [€]		
Period	***Free***	***Basic***	***Premium***	***Free***	***Basic***	***Premium***
0	3500	1100	400	-1750,0		
1	3490	1088	392			
2	3470	1086	384			
3	3390	1135	386			
4	3180	1312	389			
5	2910	1536	401			

3500 * (- 0,5)

Exercise 3 – Pricing assessment

ii. Assess the margin associated

	Total users			Margin [€]		
Period	***Free***	***Basic***	***Premium***	***Free***	***Basic***	***Premium***
0	3500	1100	400	-1750,0	3300,0	2400,0
1	3490	1088	392			
2	3470	1086	384			
3	3390	1135	386			
4	3180	1312	389			
5	2910	1536	401			

1100 * 3

Exercise 3 – Pricing assessment

ii. Assess the margin associated

	Total users			Margin [€]		
Period	***Free***	***Basic***	***Premium***	***Free***	***Basic***	***Premium***
0	3500	1100	400	-1750,0	3300,0	2400,0
1	3490	1088	392	-1745,0	3264,0	2352,0
2	3470	1086	384	-1735,0	3258,7	2305,0
3	3390	1135	386	-1695,0	3403,5	2318,9
4	3180	1312	389	-1590,0	3935,5	2332,5
5	2910	1536	401	-1455,0	4606,8	2405,8

Exercise 3 – Pricing assessment

iii. Assess the discounted margin associated

	Margin [€]			Discounted margin [€]		
Period	***Free***	***Basic***	***Premium***	***Free***	***Basic***	***Premium***
0	-1750,0	3300,0	2400,0	-1750,0	3300,0	2400,0
1	-1745,0	3264,0	2352,0			
2	-1735,0	3258,7	2305,0			
3	-1695,0	3403,5	2318,9			
4	-1590,0	3935,5	2332,5			
5	-1455,0	4606,8	2405,8			

$$\frac{-1750}{(1+0,008)^0}$$

Exercise 3 – Pricing assessment

iii. Assess the discounted margin associated

	Margin [€]			Discounted margin [€]		
Period	***Free***	***Basic***	***Premium***	***Free***	***Basic***	***Premium***
0	-1750,0	3300,0	2400,0	-1750,0	3300,0	2400,0
1	-1745,0	3264,0	2352,0	-1731,2	3238,1	2333,3
2	-1735,0	3258,7	2305,0			
3	-1695,0	3403,5	2318,9			
4	-1590,0	3935,5	2332,5			
5	-1455,0	4606,8	2405,8			

$$\frac{-1745}{(1+0,008)^1}$$

Exercise 3 – Pricing assessment

iii. Assess the discounted margin associated

	Margin [€]			Discounted margin [€]		
Period	***Free***	***Basic***	***Premium***	***Free***	***Basic***	***Premium***
0	-1750,0	3300,0	2400,0	-1750,0	3300,0	2400,0
1	-1745,0	3264,0	2352,0	-1731,2	3238,1	2333,3
2	-1735,0	3258,7	2305,0	-1707,6	3207,2	2268,5
3	-1695,0	3403,5	2318,9	-1655,0	3323,2	2264,1
4	-1590,0	3935,5	2332,5	-1540,1	3812,0	2259,3
5	-1455,0	4606,8	2405,8	-1398,2	4426,8	2311,9

Total: € 25362,4

Exercise 3 – Pricing assessment

iii. Assess the discounted margin associated

Total discounted margin = € 25.362,4
Initial investment = € 10.000

The campaign **is** profitable (net effect = 25.362,4 - 10.000 = € 15.362,4)

Exercise 3 – Pricing assessment

iii. Assess the discounted margin associated

Total discounted margin = € 25.362,4
Initial investment = € 10.000

The campaign **is** profitable (net effect = 25.362,4 - 10.000 = € 15.362,4)

ROI = 15.362,4 / 10.000 = 1,54

POLITECNICO MILANO 1863

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AY 2024/2025