



Treasures in the Attic How much is that IP worth?

FICPI World Congress Toronto - June 5-10, 2018
Wednesday, June 6 – Break out 4.1



Introduction

- Thank you for attending: complex topic.
- Our goal today: be practical, manipulate numbers, present case studies.
- Relevant speakers: with various and complementary experiences.
- Organization of the session



Outline of the presentation

- Introduction - by Anne Levy, Partner Brandon IP
- Presentation of the speakers
 - Elise Deliau, Consultant, Brandon Valorisation (FR)
 - Dr. Moonkyo Chung, Deputy Senior Director, Korea Technology Finance (KR)
- Why carry out a valuation study?
- Business cases:
 - The need for a detailed demonstration – by Brandon
 - Kibo's model and DCF Case Study
 - Brandon's calculation model
- Conclusion by Anne Levy
- Q & A



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Ms Elise Deliau

- Background:
 - Master's degree in management & finance from the European Business School
 - IP development consultant especially in charge of patent financial valuation
 - 8 years experience in SMEs strategic advice
- Brandon Valorisation key drivers:
 - Set up in 1991
 - To provide entrepreneurs with solutions suitable to their development issues “from and through” innovation
 - Making IP an income stream vs. a cost center
 - Leveraging economic development through innovation & IP valuation and management
 - Delivering high quality services thanks to a small team entirely dedicated to its clients





Ms Elise Deliau

- Our expertise:

Financial valuation:
how much is
this patent worth?



Business diversification:
looking for patents open
to license



Technology transfer and
licensing



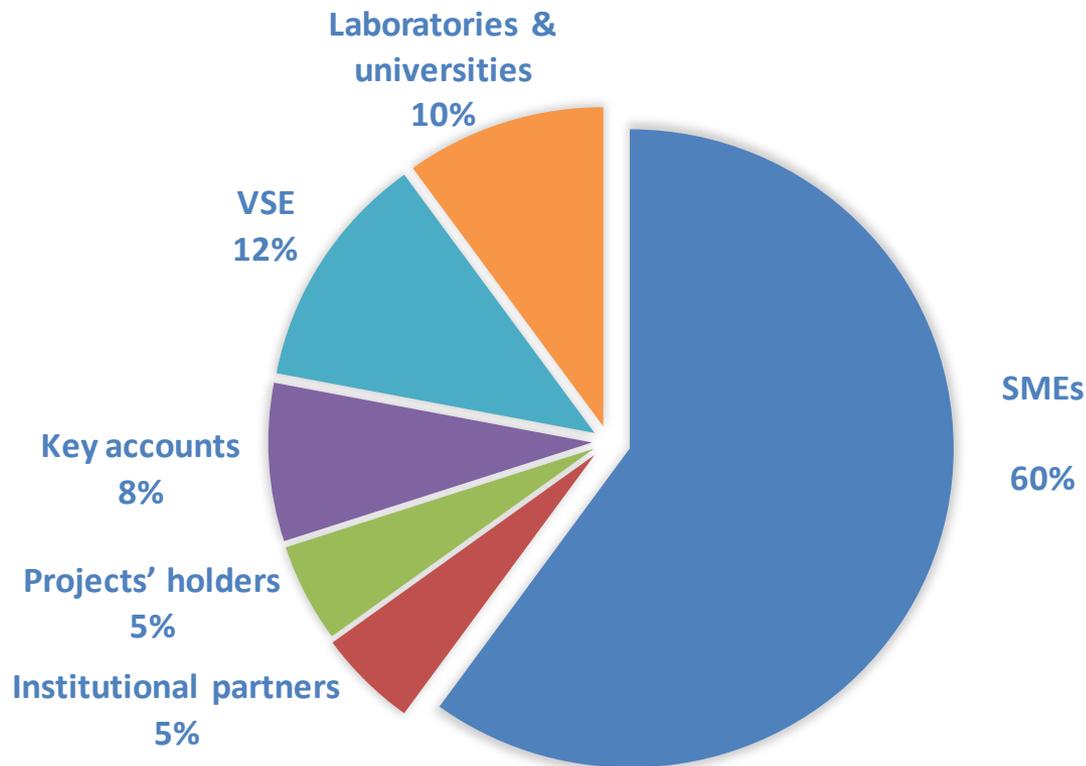
Ms Elise Deliau

- What Brandon Valorisation does in terms of IP financial valuation:
 - A unique method based on 25 years of experience
 - Relying on a strong qualitative and financial demonstration
 - Validated with accountants and financial investors
 - Mainly for start-ups and SMEs, accompanied in their business and IP strategy from the very beginning of their activity
 - Estimated IP value: from 400 K€ to 18 500 K€



Ms Elise Deliau

- Our clients:



BRANDON VALORISATION

INNOVATION ET PROPRIÉTÉ INDUSTRIELLE



Dr. Moonkyo Chung

- Background:
 - PhD in Physics from the University of Kentucky (USA)
 - Postdoc in Physics from Clemson Univ. (USA) and POSTECH (Korea)
 - Senior researcher at Korea Institute of Science and Technology (KIST)
(Research field : CDW, Superconductor, thermal & optical material design)
 - Working as a Deputy senior director in Seocho branch of Kibo, mainly responsible for technology appraisal guarantee.
 - Experience in defining, developing, implementing, and monitoring the technology appraisal models in Kibo
 - Specializes in the valuation of advanced and novel technologies (IP),
 - 8 years experience in R&D and 18 years experience in technology appraisal and guarantee service for innovative SMEs



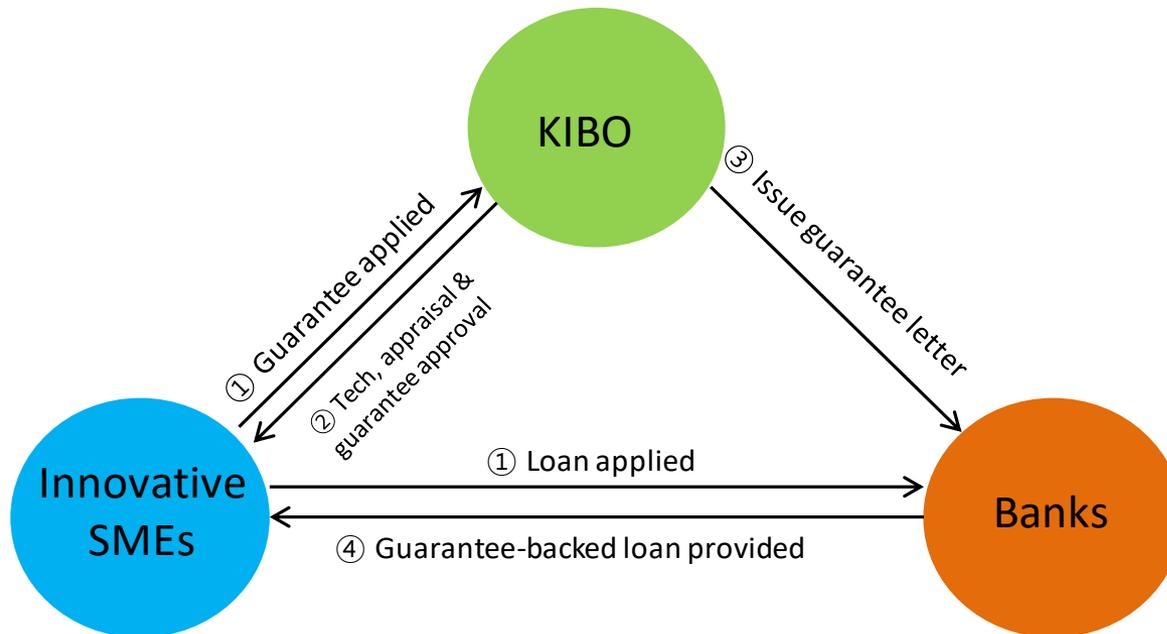
Dr. Moonkyo Chung

- Kibo key drivers
 - Founded in 1989
 - 68 branches, 1,206 employees
 - Foundation purposes
 - ① to facilitate the financing of new technology business and further to contribute to the development of national economy by establishing & developing technology credit guarantee system.
 - ② to provide debt guarantee for companies that are not financially strong enough to afford collateral to facilitate financing.



Dr. Moonkyo Chung

- Technology guarantee service





Dr. Moonkyo Chung

- Technology appraisal system

	Tech. rating/ranking	IP valuation
Purpose	<ul style="list-style-type: none">- guarantee- certificate- tech. business feasibility	<ul style="list-style-type: none">- investment in kind- collateral value of IP- transfer of technology (IP)
Type	<ul style="list-style-type: none">- KTRS(general), KTRS-SM (start-up), KTRS-BM(revenue)- R&D, cultural contents service, green tech, climate tech- 1-man creative, young-generation startup, pre start-up	<ul style="list-style-type: none">- income approach (DCF+TF, S/W, Dynamic)- market approach (Relief-from royalty)- cost approach
Results	scores, rating, ranking	monetary value



Dr. Moonkyo Chung

- Performance of technology appraisal guarantee (y2017)

Amount of guarantee

- Cumulative balance : B\$20.5
- Newly provided : B\$0.6
- # of SMEs guaranteed : 61,288

Technology appraisal cases

- Total # of cases : 55,087 cases
- # of IP valuation : 1,095 cases (cumulative # : 7,581 cases)
- Amount of guarantee by IP valuation : B\$0.734

Default & claim right

- Default amount : B\$0.88
- Default rate : 4.4%
- Indemnity right balance : B\$1.89
- Indemnity right collected : B\$0.22



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Why carry out an IP valuation study?





Why carry out an IP valuation study?



- Assessing the value of the company: fundraising, capital opening operation, transfer of shares to the staff
- Capital contribution
- Preparing a joint venture
- In case of litigation
- In case of patent sell-off or licensing



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The need for a detailed demonstration

Patented
manufacturing process

Customized cosmetic
formulation

Owned by a project
holder

Objective

- To calculate the value of the patent
- In view of contributing to the capital of the company
- Preparing a fundraising at the same time

What we'll look at

- What are the key drivers of a relevant IP valuation?
- Focus on the demonstration: how does the product meet its market
- Calculation

Scope of the study

- Scope of application: a specific segment of the cosmetic industry
- Area of the Study: Europe and USA





Key drivers of a successful IP valuation study

What?

To assess at which price a potential acquirer would buy the IP title.

How?

To demonstrate that the IP right is able to meet its market and has a market value:

A strong (not long) market study, including market trends, consumer habits, competitors, standards and rules

An IP right quality analysis

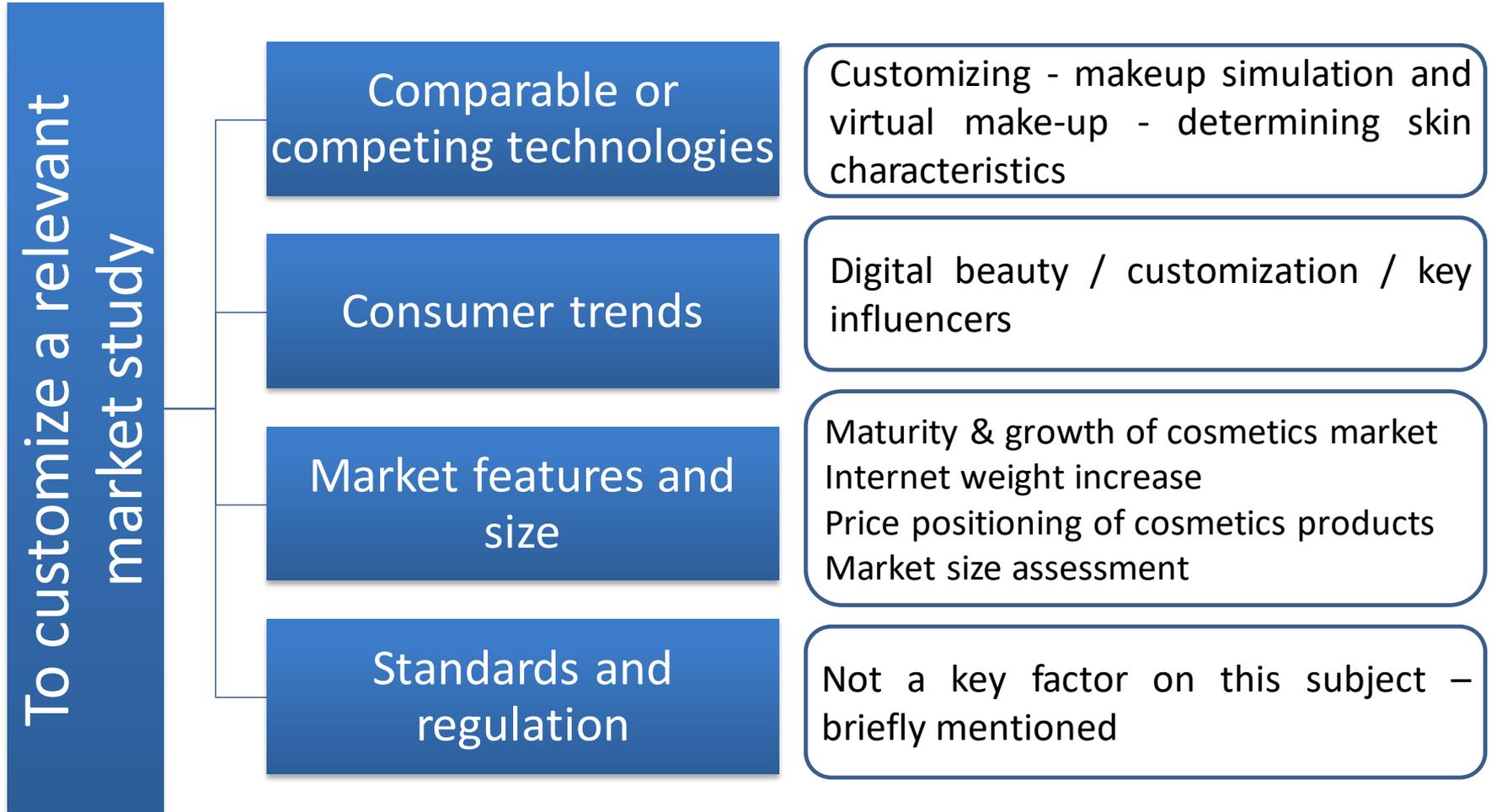
A fine analysis of the patented technology: what makes it different from existing processes or products?

To compare the technology economic forecasts to the market metrics





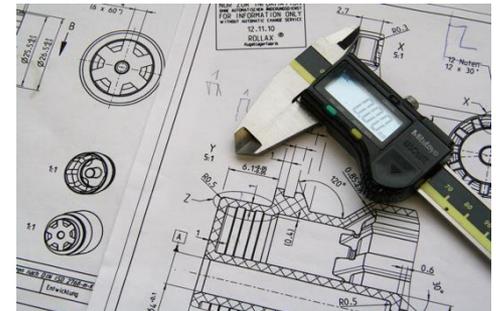
How to: market study





How to: IP quality

- To evaluate the quality of the patent:
 - Written by an IP attorney who didn't work on the patent application
- To explain the value of the patent regarding its legal and technical characteristics:
 - Sufficiency of the description
 - Novelty
 - Inventive step
 - And any factor which may affect its value, especially opposition proceedings and litigation.





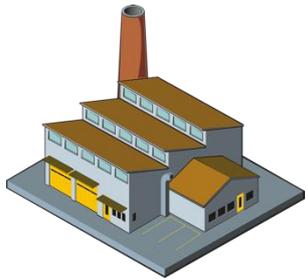
How to: product analysis

To customize the product analysis according to the market and the technology



Products marketed from the patent and related know-how

- Certain sorts of personalized cosmetics, ordered via an online or mobile app,
- Wide range of versions possible,
- Customer's modus operandi for ordering the product.



Production line

- Industrial partnership

Marketing strategy

- Throughout social networks and influencers



Market positioning

- Recap of the differentiation drivers and positioning, depending on the market; here: luxury houses.



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Kibo's IP valuation model

- Income approach based on DCF+TF

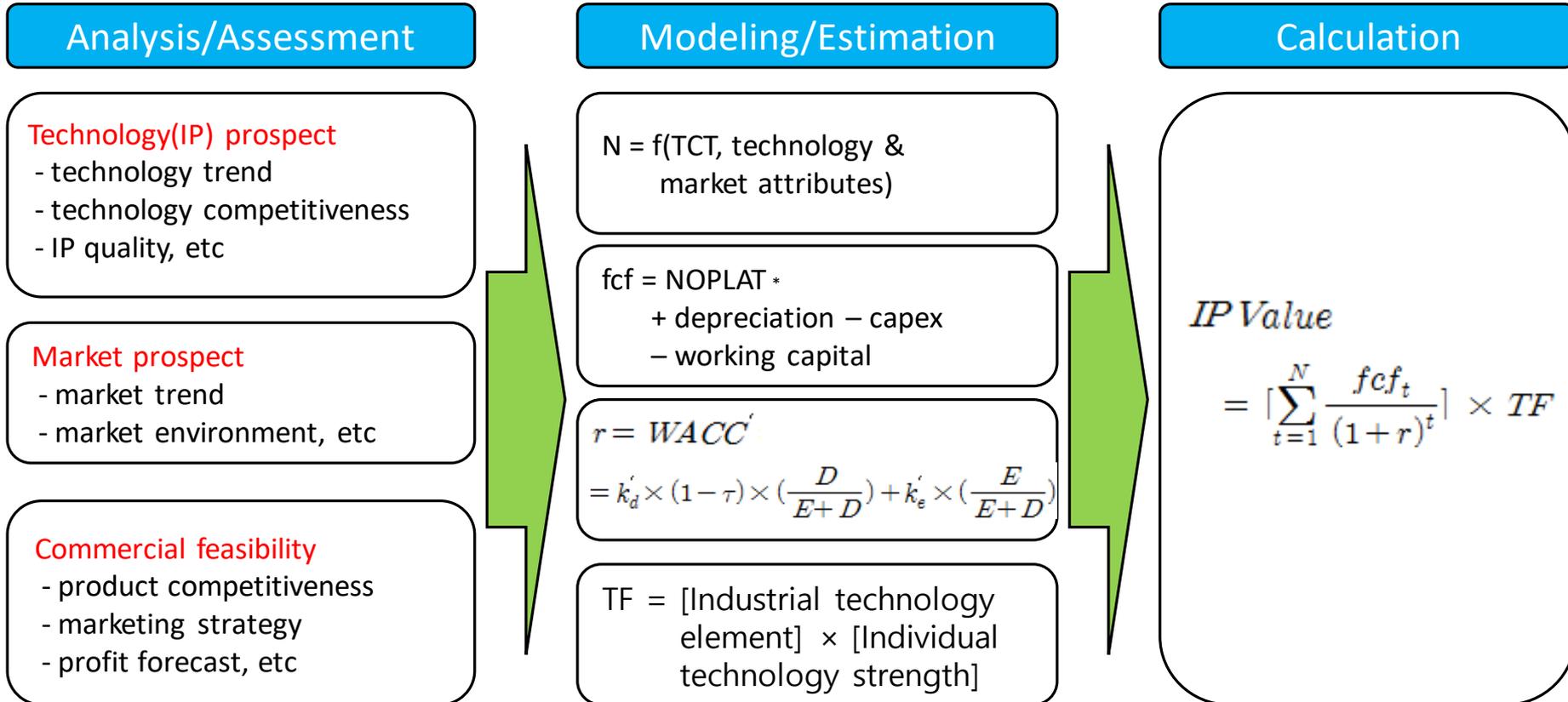
$$\begin{aligned} IP\ Value &= \left[\frac{fcf_1}{(1+r)^1} + \frac{fcf_2}{(1+r)^2} + \frac{fcf_3}{(1+r)^3} + \dots + \frac{fcf_N}{(1+r)^N} \right] \times TF \\ &= \left[\sum_{t=1}^N \frac{fcf_t}{(1+r)^t} \right] \times TF \end{aligned}$$

where

- N is the economic life time of the technology (IP)
- fcf_t free cash flow at a time t
- r is the discount rate
- TF is a technology factor, degree contributed by the tech. asset



IP Valuation procedure



*NOPLAT : Net Operating Profit Less Adjusted Tax

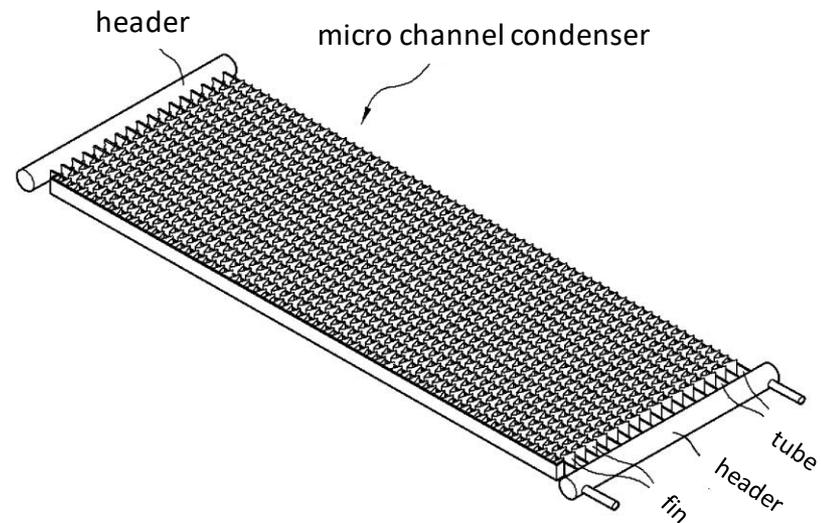
** WACC' : modified Weighted Average Cost of Capital



Case study

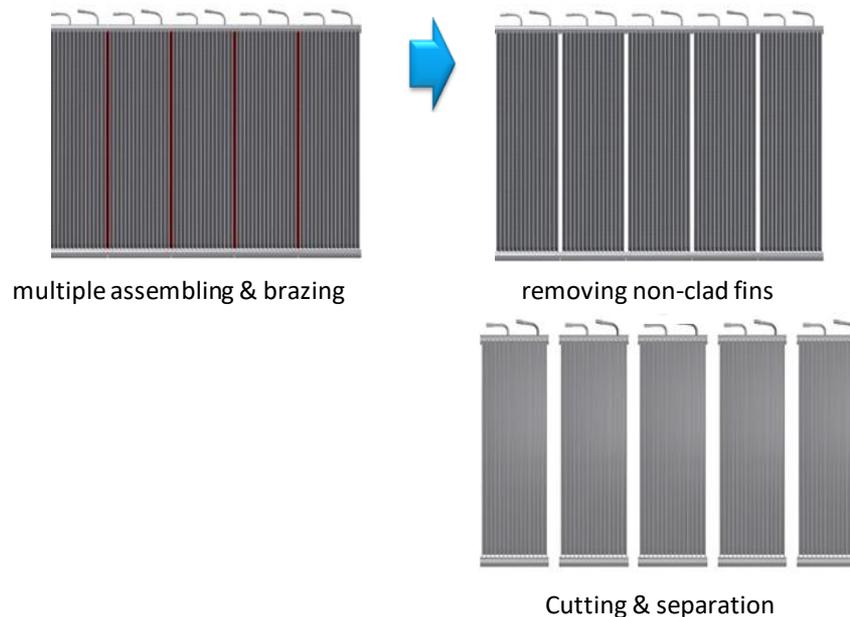
- Overview of valuation

- Company S (founded in 2004, ~120 employees)
- Purpose of valuation : to finance for commercializing the patented product micro-channel condenser
- Invention name : Manufacturing method of a condenser for air conditioning (IPC : F28F, Industry : C29176(heat exchange in machinery industry))
- Patent #: KR 10-1540071
- Date filed: Jan. 27, 2015
- Date being expired : Jan. 27, 2035
- Registration date: July 20, 2015
- Date valued: Sept. 30, 2016

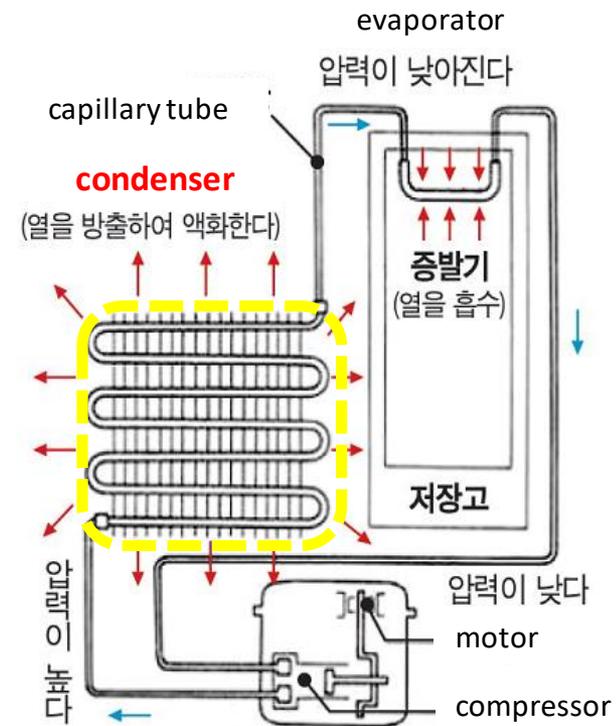


Case study

- Technology competitiveness
 - Able to manufacture multiple micro channel condensers at one time
 - Increase productivity and decrease cost
 - Used for refrigerator, air-conditioner, water purifier, vending machine. etc



<Fig. 1> Production process of micro channel condensers



<Fig. 2> Mechanism of refrigerator



Case study

- Market Trend

- Product: micro-channel condenser for refrigerator, air conditioner, etc.
- Market size

		Y 2012	Y 2013	Y 2014	Y 2015	Y 2016
Global market	# of refrigerators (in 1000)	106,180	109,760	112,670	115,690	119,150
	# of air conditioner (in 1,000)	121,940	128,650	134,870	141,920	149,370
	Total # of production (in 1,000)	228,120	238,410	247,540	257,610	268,520
	Micro-channel condenser (in B\$)**	1.49	1.56	1.62	1.69	1.76
Korea market	# of refrigerators (in 1000)	31,854	32,928	33,801	34,707	35,745
	# of air conditioner (in 1,000)	36,582	38,595	40,461	42,576	44,811
	Total # of production (in 1,000)	68,436	71,523	74,262	77,283	80,556
	Micro-channel condenser (in M\$)**	448	468	486	506	527

* Korea market size (mainly produced by LG, Samsung Electronics) is 30% of world market

** Selling price : 7,000₩/ea

*** Exchange rate: 1,069.1 ₩/\$ used



IP Valuation

(1) Economic Life Time of Technology (IP)

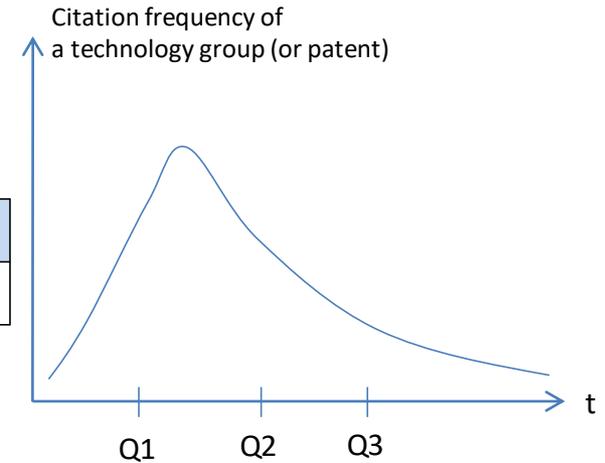
- Defined as
 - A period to keep the competitiveness of business using the underlying technology or a future time that a technology loses its competitive advantages in the market resulting from negative factors taking place
- TCT (Technology Cycle Time)
 - Index to denote speed in change of technology group that the given IP belongs to, using statistically analyzed data (Q1, Q2, Q3, average, median, etc) of yearly citation frequency over the years
- Economic life time (N)
 - $N = f(\text{TCT, technology attribute, market attribute})$



IP Valuation

- Example of TCT (626 IPCs DB)

IPC	Description	Avg.	Q1	Q2	Q3
F28F	general heat exchange or details of heat transfer	11.23	5	9	15



- Economic life time (N)
- $f(\text{TCT, technology attribute, market attribute})$

Type	Attribute	w.f.	very low	low	normal	high	very high
			1	2	3	4	5
Technology	Possibility to appear to replace the technology	7			●		
	Technological superiority	5			●		
	Existence of similar competitive technology	4				●	
	Possibility to imitate	3				●	
	Range of patent right	3			●		
Market	Market concentration & Market competitiveness	8			●		
	Change in market competitiveness	4			●		
	Potential market share	4			●		
	Frequency of new products	3			●		
Sum (in points)			130				
Acquired score(in %)			63.4% = (130/205) x 100				



IP Valuation

- Calculation of the economic life time of the technology

Economic life time of the technology = f(TCT, Technology factors, Market factors)

$$= Q_2 + (Q_3 - Q_2) \times \frac{\text{acquired} - \text{basis}}{\text{maximum} - \text{basis}} \quad (\text{if acquired} \geq \text{basis})$$

Where

Q1, Q2, Q3 : 1st, 2nd, 3rd quarter of TCT distribution

which is given by IPC look-up table

maximum = 100 pts, basis = 60 pts

acquired score is obtained by tech/market assessment

For example,

for IPC = F28F,

Q1=5, Q2=9, Q3=15,

acquired score=63.4%

Economic life time (N) = $9 + (15-9) (63.4-60)/((100-60))$

$\hat{=}$ 10 years



IP Valuation

(2) Free cash flow

- Defined as

$$\text{fcf} = \text{NOPLAT (revenues} - \text{sales cost} - \text{selling \& management cost} - \text{tax)}$$
$$+ \text{Depreciation} - \text{Capital expenditure} - \text{Working capital}$$

* NOPLAT : Net Operating Profit Less Adjusted Tax



IP Valuation

Forecast of future revenues

(unit : 1,000, M₩)

year	1 st yr		2 nd yr		3 rd yr		4 th yr		5 th yr		6 th yr	
Buyer	quantity	sales	quantity	sales	quantity	sales	quantity	sales	quantity	sales	quantity	sales
S	500	3,500	700	4,900	700	4,900	800	5,600	1,000	7,000	1,000	7,000
G	-	-	300	2,100	800	5,600	1,200	8,400	1,600	11,200	2,000	14,000
M	-	-	33	233	200	1,400	300	2,100	400	2,800	500	3,500
H	-	-	67	467	400	2,800	600	4,200	800	5,600	1,000	7,000
Total	500	3,500	1,100	7,700	2,100	14,700	2,900	20,300	3,800	26,600	5,500	31,500

year	7 th yr	8 th yr	9 th yr	10 th yr
Total	33,957	36,606	39,461	42,539

(Assumed 7.8%(CAGR of global heat exchange market) growth rate after 6th year)



IP Valuation

Fee cash flow

(unit : M₩)

	1 st yr	2 nd yr	3 rd yr	4 th yr	5 th yr	6 th yr	7 th yr	8 th yr	9 th yr	10 th yr
Revenue	3,500	7,700	14,700	20,300	26,600	31,500	33,957	36,606	39,461	42,539
Sales cost*	2,821	6,205	11,847	16,360	21,437	25,386	27,366	29,500	31,802	34,282
S&M cost*	500	1,100	2,101	2,901	3,801	4,501	4,852	5,231	5,639	6,079
EBIT	179	394	753	1,039	1,362	1,613	1,739	1,874	2,020	2,178
Tax**	19	64	143	206	277	332	360	390	422	457
NOPLAT	159	329	609	832	1,084	1,279	1,378	1,483	1,597	1,720
Depreciation	62	222	374	447	466	466	466	466	466	466
Capex	1,249	1,950	1,090	380	0	0	0	0	0	0
Working capital	737	885	1,475	1,180	1,327	1,032	517	558	601	648
Investment recovered										9,724
FCF	-1,764	-2,283	-1,581	-279	223	714	1,327	1,392	1,463	11,263

(* sales cost : 80.59%, selling & management cost 14. 29% of sales assumed (average cost rate in the same industrial field (C291))

** Korea corporate tax rate : 11% for less than 200M₩, 22% for more than 200M₩



IP Valuation

(3) Discount rate (r)

- Defined as

$$r = WACC' = k'_d \times (1 - \tau) \times \left(\frac{D}{E + D}\right) + k'_e \times \left(\frac{E}{E + D}\right)$$

where

$k'_d = \bar{k}_d + \text{risk spread}$, \bar{k}_d : average cost of debt capital of the same industry

$k'_e = [R_f + \beta \times (E(R_m) - R_f)] + \text{size premium} + \text{commercialization premium}$

(average cost of equity capital of the same industry)

Estimated by appraiser

E : Equity capital, D : Debt capital



IP Valuation

- Look-up table of k'_e and k'_d (96 industries DB)

Industry code	Cost of equity ($k'_e = [R_f + \beta \times (E(R_m) - R_f)] + \text{size premium}$)					%equity E/(E+D)	Cost of debt ($k'_d = \bar{k}_d + \text{risk spread}$)					%debt D/(E+D)
	listed	big	medium	small	start-up		listed	big	medium	small	start-up	
29(machinery)	5.35%	5.76%	6.20%	6.71%	7.42%	53.96%	3.87%	7.41%	8.78%	10.31%	14.37%	46.04%

- Commercialization premium

	Appraisal element	Score		Appraisal element	score
Technology risk	Differentiation	4	Commercialization risk	Time required to commercialize	5
	Technology competitiveness	4		Market growth	3
	Possibility to imitate	4		Market competitiveness	3
	Stability of patent right	4		Market penetration	4
					Productivity
				Profitability	3
Acquired score : Commercialization risk premium				38 pts : 2.71 %	

- Calculation of r

$$r = 8.78 \times (1 - 0.20345) \times 46.04\% + (6.20 + 2.71) \times 53.96\% = 8.03\%$$

$$k'_d \times (1 - \tau) \times \left(\frac{D}{E + D} \right) + k'_e \times \left(\frac{E}{E + D} \right)$$



IP Valuation

(4) Technology Factor (TF)

- Originally developed by
 - Dow Chemical Company, supported by Arthur D. Little consulting firm
 - later extended and refined by Dr. Sam Khoury, CEO of Inavisis

- Defined as

- $TF = \text{Industrial technology element} \times \text{Individual technology strength}$

(upper limit for the contribution
of a certain technology)

(asset's strength and weakness determined
by the competitive and utility categories)

- Industrial technology element
= intangible asset ratio \times technology asset ratio



IP Valuation

- Industrial technology element (DB of 72 different industries)

Industrial code	Intangible asset ratio	Technology asset ratio	Industrial technology element
29 (machinery)	59.03%	98.96%	58.42%

- Individual technology strength (input by appraiser)

Competitive attribute	Score	Utility attribute	Score
Innovation	4	Time required to commercialize	5
Differentiation(Uniqueness)	4	Capital required to commercialize	3
Replacement	3	Productivity	4
Imitation	4	Economic life time	4
Range of right	3	Market demand	4
Stability of right	4	Market penetration	4
Usability	4	Potential market share	3
Prospect	4	Sale growth	3
Impact	4	Profitability	3
Obsolescence	3	By product sales	3
subtotal of competitive	37	subtotal of utility	36

- Calculation of TF : $TF = 58.42\% * 73 \text{ pts} = 42.65$ (in %)



IP Valuation

- Summary of estimated parameters for DCF+TF method
 - $N = 10$ years (<18 years which is remaining period of time legally protected by the patent)
 - $r = 8.03\%$
 - $TF = 42.65\%$



Calculation of IP value

(unit : million KR₩)

	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	year 9	year 10	
Revenues	3,500	7,700	14,700	20,300	26,600	31,500	33,957	36,606	39,461	42,539	
Sales cost	2,820	6,205	11,846	16,359	21,436	25,385	27,365	29,500	31,801	34,282	
Selling & administrative cost	500	1,100	2,100	2,900	3,801	4,501	4,852	5,231	5,638	6,078	
Corporate tax	19	64	143	206	277	332	360	390	422	457	
NOPLAT (A)	159	329	609	832	1,084	1,279	1,378	1,483	1,597	1,720	
Depreciation expenses (B)	62	222	374	447	466	466	466	466	466	466	
Capital expenditure (C)	1,249	1,950	1,090	380	0	0	0	0	0	0	
net working capital (D)	737	885	1,475	1,180	1,327	1,032	517	558	601	648	
Investment recovered (E)										9,724	
fcf (F) (F=A+B-C-D+E)	-1,764	-2,283	-1,581	-279	223	714	1,327	1,392	1,463	11,263	
Coeff. of PV (G)	0.9256	0.8568	0.7931	0.7342	0.6796	0.6291	0.5823	0.539	0.499	0.4619	r=8.03%
Present Value (H) (H=FxG)	-1,633	-1,956	-1,254	-205	152	449	772	750	730	5,202	3,008
Tech Factor (J)											42.65%
Tech. Value (K) (K=∑HxJ)											1,283

~ 1 million US\$



Patent ledger after providing guarantee

특허 등록번호		10-1540071-0000 (patent #)	
권리란 (Area for patent right)			
표시번호	사항		
(date filed)	출원 연월일 : 2015년 01월 27일	출원 번호 : 10-2015-0012808	
(registration date)	공고 연월일 : 2015년 07월 29일	공고 번호 :	
1번	특허결정(심결)연월일 : 2015년 07월 20일	청구범위의 항수 : 5	
(Invention name)	(IPC) 유 별 : F28F 9/013		
	발명의 명칭 : 공조용 응축기 제조 방법		
	존속기간(예정)만료일 : 2035년 01월 27일		
		2015년 07월 22일 등록	
		(patent registration date)	

특허권자란 (Area for patent owner)	
순위번호	사항
1번	<p>(등록권리자) (owner of patent)</p> <p>(주)삼원산업사 광주광역시 광산구... 김영진 광주광역시 광산구...</p> <p>2015년 07월 22일 등록</p>
2번	<p>(근질권설정등록) (Registration of the pledge right)</p> <p>등록 의무자 : (주)삼원산업사 (debtor : company S) 광주광역시 광산구...</p> <p>등록 권리자 : 기술보증기금 (취급점: 광주기술평가센터) (creditor : Kibo) 부산광역시 남구...</p> <p>채 권 액 : 금1,080,000,000원 (claim amount : ~\$1M) 변 제 기 :</p> <p>등 록 원 인 : 설정계약</p> <p>존 속 기 간 :</p> <p>2016년 12월 05일 등록</p>



Kibo's concluding remarks

- Kibo developed its own IP valuation model
 - Established many useful database for IP valuation, such as bibliographic patent data (IPC vs. Q1,Q2,Q3), corporate's financial data with industries, technology & market data, etc.
 - Make IP valuation relatively easy & fast and reliable
- Provide financial benefits to innovative SMEs
 - 1,095 cases, \$271M provided to SMEs using IP valuation in year 2017
- Create new business related to IP
 - University technology holdings company (set up by patent investment-in kind by University)
 - Research based company (set up by matching patent investment-in kind by research institute and cash investment by private enterprise)



Outline of the presentation

- Introduction
- Presentation of the speakers
 - Elise Deliau, Consultant, Brandon Valorisation (FR)
 - Dr. Moonkyo Chung, Deputy Senior Director, Korea Technology Finance (KR)
- Why carry out a valuation study?
- **Business cases:**
 - The need for a detailed demonstration – by Brandon
 - Kibo’s model and DCF Case Study
 - **Brandon’s calculation model**
- Conclusion by Anne Levy
- Q & A
-



Key drivers of a successful IP valuation study

What?

To assess at which price a potential acquirer would buy the IP title.

How?

To demonstrate that the IP right is able to meet its market and has a market value:

A strong (not long) market study, including market trends, consumer habits, competitors, standards and rules

An IP right quality analysis

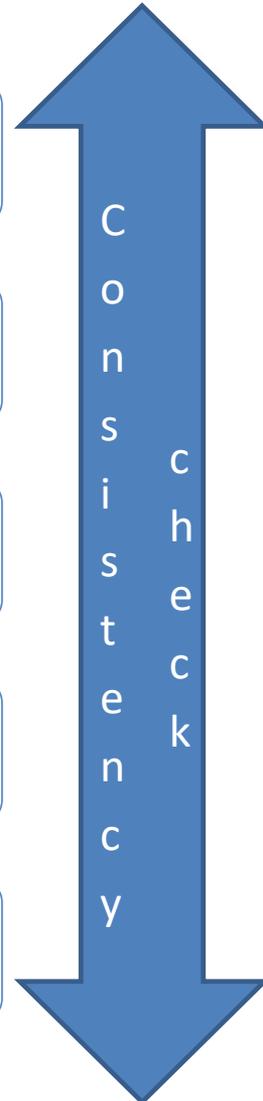
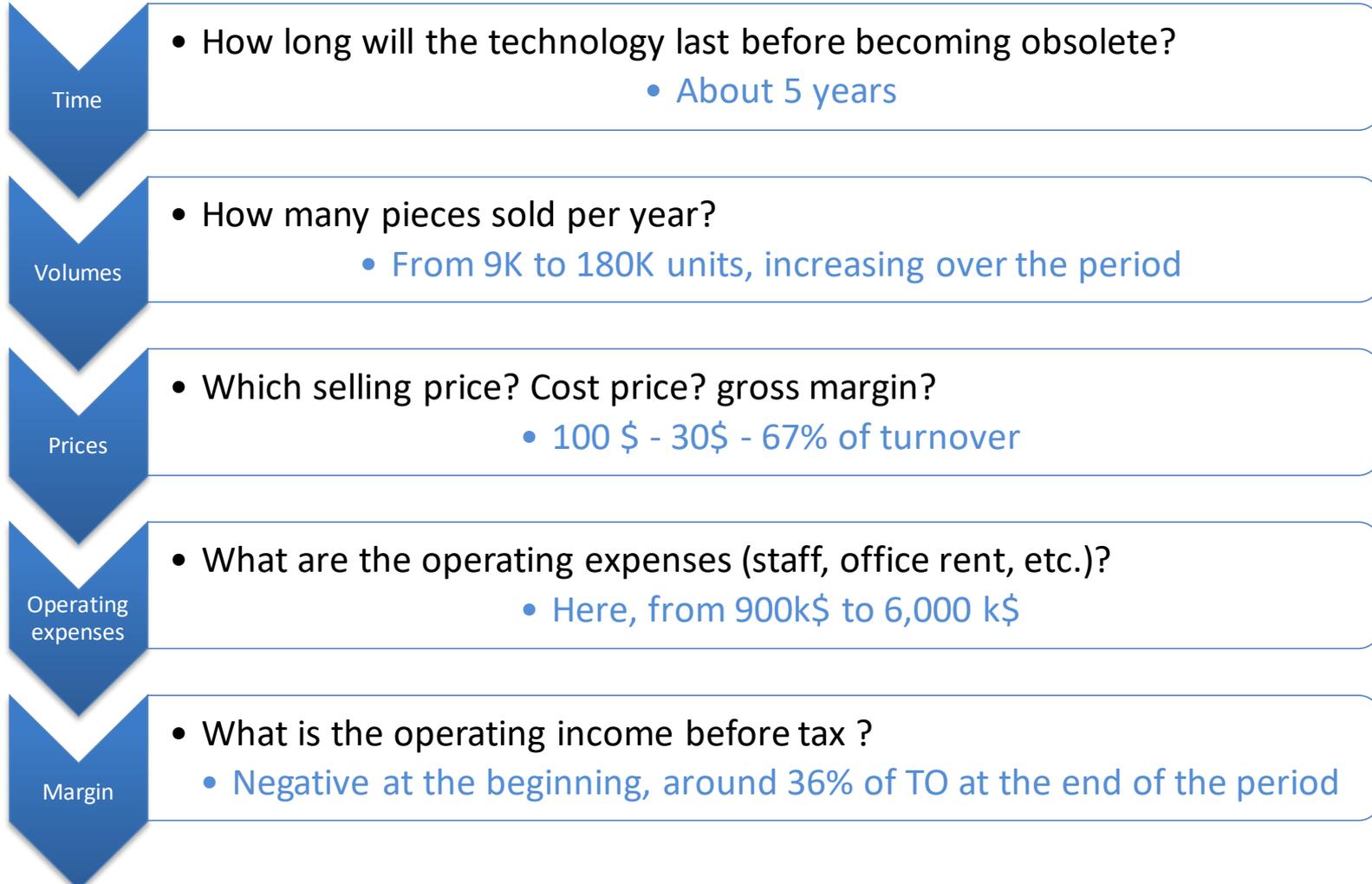
A fine analysis of the patented technology: what makes it different from existing processes or products?

To compare the technology economic forecasts to the market metrics





How to: market forecasts





How to: market forecasts

In k\$ (except unit prices in \$)	Year 1	Year 2	Year 3	Year 4	Year 5
Traded volumes	9,000	18,000	45,000	90,000	180,000
Unit selling price (pre-tax)	100	100	100	100	100
Unit cost price (pre-tax)	33	33	33	33	30
Turnover	900	1,800	4,500	9,000	18,000
<i>Growth rate</i>		100%	150%	100%	100%
Cost of goods sold	297	594	1,485	2,970	5,400
Gross margin	603	1,206	3,015	6,030	12,600
<i>Gross margin rate</i>	67%	67%	67%	67%	70%
Other operating expenses	900	1,200	3,000	3,700	6,000
EBITDA	-297	6	15	2,330	6,600
<i>EBITDA rate</i>	-33%	0%	0%	26%	37%
Amortization	90,000	90,000	90	120	120
EBIT	-387	-84	-75	2,210	6,480
<i>EBIT rate</i>	-43%	-5%	-2%	25%	36%



How to: value calculation

At this stage, it's time to:

Sum up the major factors driving the patent value

Life expectancy of the invention:

5 years

Cosmetics market specificities

Differentiating features of the invention:
personalization, unique products, trends,
luxury

Setting up the gross value of the patent

Percentage of the cumulated EBIT, usually between 3% and 10%.

8 %

Sum up the reduction factors

High competition, recency/youth of the patent, industrial risks

25% of the gross value

Setting up the net value

Gross value minus reduction rate

489 k\$



How to: value calculation

Focus on the calculation

In K\$	Year 1	Year 2	Year 3	Year 4	Year 5
EBIT	-387	-84	-75	2,210	6,480

Cumulated EBIT		8,144
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Gross value	8%	652
Rate of reduction	25%	163
Net Value		489

EBIT : earnings before interest and tax = result



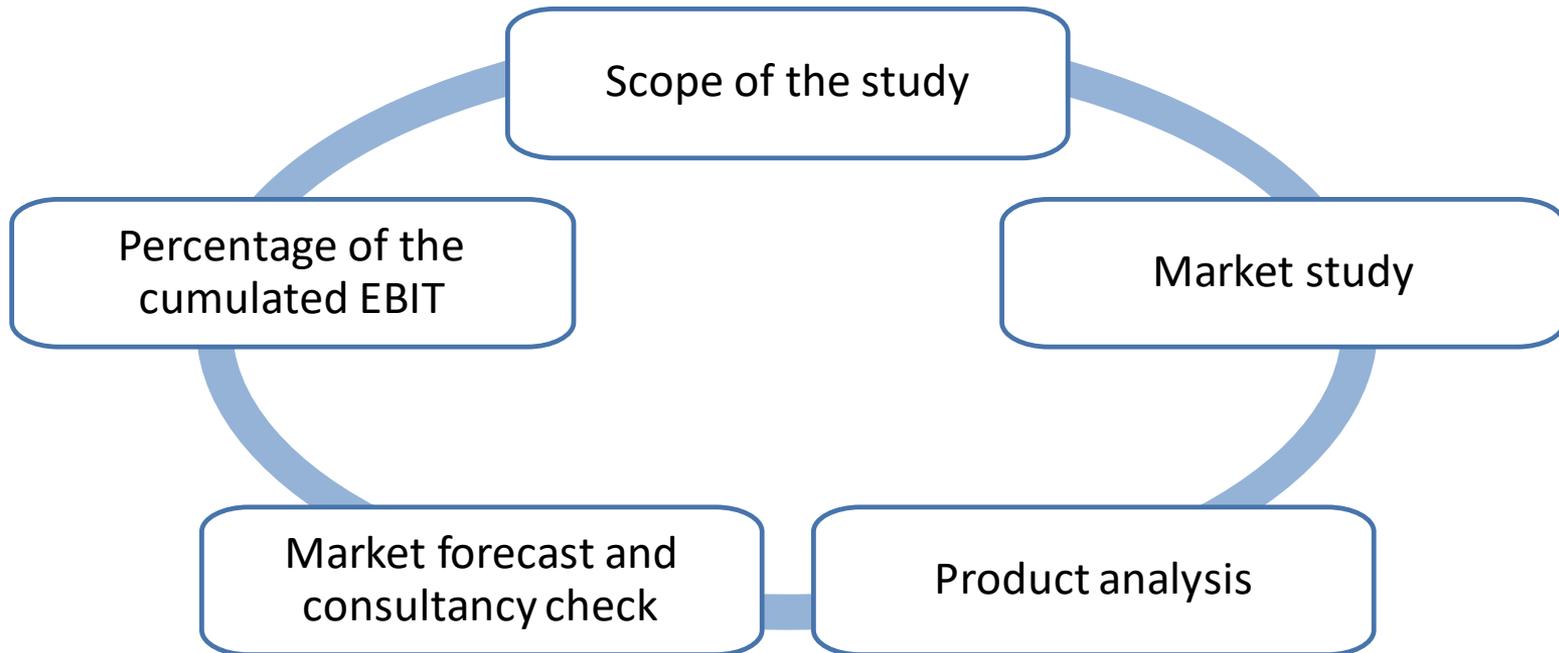
How to: value calculation

- Details regarding the method of calculation:
 - Brandon uses a method based on the forecast of future revenues
 - Other methods are:
 - Discounted cashflows – not used because of:
 - The lack of comparable data regarding innovations at the beginning of their life cycles
 - Little in common with listed companies whose metrics will be used in DCF methods
 - Expected royalties – not used because of:
 - Strong variability of royalty rate, generating high gaps in the value appreciation
 - Difficulty getting reliable data regarding royalty rates for comparable patents



Brandon's concluding remarks

- Brandon's method for IP valuation study :
 - Based on a **strong demonstration that the technology is able to meet its clients.**



- Always accepted and validated by the accountants and/or financial investors of our clients.



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To sum up

A few things to keep in mind:

- 2 different approaches to value IP rights that have both been proven as relevant
- Quantitative analysis alone is insufficient.
- Good IP valuation is finding the right balance.
- Mix of skills and components: legal analysis, economic analysis, market research.
- Rigor, demonstration and consistency are keywords!

CET8 is currently drafting a best practice guide on IP Valuation for FICPI members. Should be ready for circulation next year.



Outline of the presentation

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Thank you for your attention

Q & A