IP value extraction and commercialisation

Determining the value of IP

in cooperation with TUM-Tech GmbH

Dr. Christian Hackl
Managing Director of TUM-Tech GmbH
25.10.2018
Your speaker – Christian Hackl

Background
- Ph.D. in Chemistry

More than 20 years experience in industry (management consulting), CEO of TUM-Tech for more than 15 years

TUM-Tech GmbH:
- “Tech”: Technology Transfer (demand oriented)
- Consulting on innovation management for companies and researcher

Assistant Professor at TUM (Technology and Innovation Management)

Cofounder of start-up (renewable energy)
Overview of Webinars

1. IP strategy
   Five virtual classroom sessions

2. IP evaluation and protection
   Five virtual classroom sessions

3. IP value extraction and commercialisation
   Four virtual classroom sessions
Series Three - IP value extraction and commercialisation

Module 1: “IP value extraction”
Module 2: “Licensing I”
Module 3: “Licensing II and enforcement”
Module 4: “Determining the value of IP”
Agenda

- Different types of assets, value
- Main valuation methods
- Summary
What does the value of a company consist of?
Tangible and intangible assets

Allocation of the enterprise value (%)

Tangible assets

- Buildings: 30%
- Vehicles: 47%
- Equipment: 23%

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Tangible and intangible assets

Allocation of the enterprise value (%)

**Tangible assets**
- Buildings
- Vehicles
- Equipment...

**Intangible assets I**
- Patents / Trademarks
- Know-how / Trade secrets
- Copyright / Design
- Human capital

**Intangible assets II**
- Goodwill

- Goodwill: excess amount paid for a company over the fair market value of the company’s identifiable assets” (tangible and IPR).
Importance of intangible assets?

Components of S&P 500 market value

Ocean Tomo intangible asset market value study 2017
Tangible and intangible assets

<table>
<thead>
<tr>
<th>Industries</th>
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<tr>
<td>Technology</td>
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<td>Media and entertainment</td>
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<td>Asset Management</td>
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European Patent Office

Ernst & Young
Importance of patents

What IP-asset is most important in M&A transactions?

European Patent Office
The value of European patents

EPO, Ceccagnoli et al., 2005.
The value of European patents

Average value (Mean)

European Patent Office
The value of European patents

EPO, Ceccagnoli et al., 2005.
The value of European patents

EPO, Ceccagnoli et al., 2005.
The value of European patents

- Share of patents, %
- Median
- Average value (Mean)

- Patent value categories:
  - <30k
  - 30-100k
  - 100-300k
  - 300-1m
  - 1-3m
  - 3-10m
  - 10-30m
  - 30-100m
  - 100-300m
  - >300m

- Patents valued at 3% have an average value of 10% of the total.

European Patent Office

EPO, Ceccagnoli et al., 2005.
Just 3% of all patents!

Just 10% of all patents!

European Patent Office

Share of patent value classes in total portfolio value
The notion of value

Value • Price
The notion of value

**Value • Price**

- Price: result from the transaction seller / buyer

- Value: how much people are ready to pay
The notion of value

**Value • Price**

- Price: result from the transaction seller / buyer

  - **Willing Buyer** (Licensee)
  - **Willing Seller** (Licensor)

- Value: how much people are ready to pay

**Owner value:** estimate of the value by the owner if he was deprived of the property of the item

**Purchaser value:** how much the buyer could pay for it

**Market value:** value • price of similar items already sold
What is the value?

Value
Value to you / somebody else

Price
Amount of money exchanged
What is the value?

Value
Value to you / somebody else

Price
Amount of money exchanged
What is the value?

6 year old Golf
What is the value?
What is the value?
IP Value

a) Why valuing Intellectual Property?
IP Value

a) Why valuing Intellectual Property?

Different stakeholders involved

European Patent Office
Agenda

- Different types of assets, value
- Main valuation methods
- Summary
Overview of the different methods
Overview of the different methods
Overview of the different methods

Cost-based

Market-based

Income-based
Overview of the different methods

Cost-based

Income-based

Market-based
Cost-based methods

Definition

The pricing of an asset is based on the cost of developing the technology asset.
Cost-based methods

Definition

- The pricing of an asset is based on the cost of developing the technology asset

- **Cost considerations usually include:**

  ????
Cost-based methods

Definition

- The pricing of an asset is based on the cost of developing the technology asset

- **Cost considerations usually include:**
  - R&D: salaries, materials & equipment
  - IP protection
  - Trials, testing and prototyping
  - Marketing & advertising
  - Cost of capital
Cost-based methods

*Capitalization of historical costs*

- How much was spent to develop the technology

- Problems:
Cost-based methods

Capitalization of historical costs

How much was spent to develop technology

Problems:
- R&D costs are difficult to count (Which personal costs? Over which period of time? Including failures?)
- How to take into account inflation
- Cost • potential value
Cost-based methods

*Replication / replacement costs*

- Value of **total costs to replace or re-create similar technology** that may already exist
- Value paid • cost of re-developing it
- Advantages for the buyer:

Replication cost: recreate similar IP, including cost of failure
Replacement cost: create s.th. to replace IP, excluding cost of failure
Cost-based methods

*Replication / replacement costs*

- Value of **total costs to replace or re-create similar technology** that may already exist
- Value paid • cost of re-developing it

- Advantages for the buyer:
  - Avoids development effort
  - Minimises risk
  - Avoids costs related to a delayed market entry (lost sales)

Replication cost: recreate similar IP, including cost of failure
Replacement cost: create s.th. to replace IP, excluding cost of failure
Cost-based methods

Replication / replacement costs

Practical considerations for the buyer

- Can you re-develop a unique, protected asset?
- Have development costs changed?
- Does a license secure freedom to operate?
- What is the cost of delayed time-to-market?

Replication cost: recreate similar IP, including cost of failure
Replacement cost: create s.th. to replace IP, excluding cost of failure
Cost-based methods

*When to use the cost approach*

β When the asset is at very early stage of development
β When IP is easy to “design-around”
β Bookkeeping
Overview of the different methods

Cost-based

Income-based

Market-based
Market-based methods

**Definition**

- Value is based on the transactions of other purchasers & sellers in the marketplace
- Licensee/buyer is not willing to pay more than others have paid for similar IPRs
- Fair value of a patent = Price paid in comparable, “arm’s length” transactions
Market-based methods

When to use market approach

When you can find sufficient transaction information
Similar transactions: IPR type, industry, market size

Comparison considerations:
Technology: technical features, stage of development
Specific clauses, financial terms, legal parameter
Background: economic conditions, position of the parties
Market-based methods

Where to find transaction data

- Company web sites, Industry presentations
- Company annual reports
- Online databases (e.g. www.Royaltysource.com, www.Windhover.com)
- Securities filings: SEC (US), FSA (UK)
- Licensing specialists
- Licensing Executives Society (LES) www.lesi.org
- Royalty-rate journal: Licensing Economics Review
- Court records
Overview of the different methods

- Cost-based
- Income-based
- Market-based
Income-based methods

Definition

\[
\text{IPR Value} = \text{Ability of Technology to Generate Future Income}
\]

Fair Value of Patent = Present Value of the expected future income (cash flow) stream
Income-based methods

Discounted Cash Flow (DCF)
Income-based methods

*Discounted Cash Flow (DCF)*

\[
PV = I_1(1+r)^{-1} + I_2(1+r)^{-2} + I_3(1+r)^{-3} + \ldots + I_n(1+r)^{-n}
\]

PV = Present value of IP asset  
I = Economic income projection  
n = Year  
r = Risk-adjusted discount rate
Income-based methods

What do you prefer?

Now?  $\textbf{\textit{OR}}$  in 1 Year??
Income-based methods

What do you prefer?

Now? OR in 1 Year??

TIME
Income-based methods

What do you prefer?

Cash? (1 EURO) OR Lottery ticket (chance to win 1 EURO)?
Income-based methods

What do you prefer?

Cash? (1 EURO) **OR** Lottery ticket (chance to win 1 EURO)??
Income-based methods

**DCF**

Two main principles:
1. Time
2. Risk

Three key parameters (for calculation):
1. ???
2. ???
3. ???
Income-based methods

**DCF**

Two main principles:
1. Time
2. Risk

Three key parameters:
1. Amount of the income stream
2. Duration of the income stream
3. Risk associated with the realization of the income
Income-based methods

*Discount Cash Flow (DCF)*

Discounting with an adjust Risk Rate

Revenue

\[ t_0 \]

Time
Income-based methods

*Discount Cash Flow*
Income-based methods

*Discount Cash Flow*
Income-based methods

Discount Cash Flow

- Licensing fee
- Incremental profit:
  * price premium (apportioned cash flow)
  * extra sales
  * lower cost
- Relief from royalty

100 EUR
Income-based methods

**Discount Cash Flow – year 1**

\[ PV = I_1 (1 + r)^{-1} \]

---

\( t_0 \)  \( t_1 \)  \( t_2 \)  \( t_n \)

- **PV**: Present value of IP asset
- **I**: Economic income projection
- **n**: Year
- **r**: Risk-adjusted discount rate

100 EUR

European Patent Office
Income-based methods

*Discount Cash Flow – year 1*

\[
PV = \frac{I_1}{(1+r)^1}
\]

\[
PV = \frac{I}{(1+r)^n}
\]

PV = Present value of IP asset

I = Economic income projection

n = Year

r = Risk-adjusted discount rate

100 EUR

t_0 \quad t_1 \quad t_2 \quad t_n
Income-based methods

*Discount Cash Flow – year 1*

\[
PV = \frac{I_1}{(1+r)^1}
\]

\[
PV = \frac{I}{(1+r)} = \frac{100}{1 + 10\%}
\]

PV = Present value of IP asset  
I = Economic income projection  
n = Year  
r = Risk-adjusted discount rate
In this diagram, the formula for the Present Value (PV) of an IP asset is shown:

\[ PV = I \cdot (1 + r)^{-1} \]

Where:
- \( PV \) = Present value of IP asset
- \( I \) = Economic income projection
- \( r \) = Risk-adjusted discount rate
- \( n \) = Year

The diagram includes a timeline with labels for \( t_0 \), \( t_1 \), \( t_2 \), and \( t_n \) indicating the time periods. The present value calculation is given as:

\[ PV = \frac{100}{(1 + 10\%)} = \frac{100}{1.1} = 90.91 \text{ EUR} \]

Assumption: \( r = 10\% \)

European Patent Office
Income-based methods

Discount Cash Flow – year 1

\[ PV = I \frac{1}{1 + r} \]

100 EUR

Assumption: \( r = 10\% \)

\[ PV = \frac{I}{1 + 10\%} = \frac{100}{1,1} = 90,9 \text{ EUR} \]

PV = Present value of IP asset

I = Economic income projection

n = Year

r = Risk-adjusted discount rate
**Income-based methods**

*Discount Cash Flow – year 1*

\[
PV = \frac{I}{(1+r)} = \frac{100}{1.1} = 90.9 \text{ EUR}
\]

- **PV**: Present value of IP asset
- **I**: Economic income projection
- **n**: Year
- **r**: Risk-adjusted discount rate

Assumption: \( r = 10\% \)
Income-based methods

Discount Cash Flow – year 2

2. Year: \[ PV = \frac{I}{(1+r)^2} = \frac{100}{(1 + 10\%)^2} = \frac{100}{1.1^2} = 82.6 \text{ EUR} \]

PV = Present value of IP asset

l = Economic income projection

r = Risk-adjusted discount rate

n = Year
Income-based methods

Discount Cash Flow – year 1 + 2

\[ \text{PV} = \frac{I_1}{(1+r)^1} \]

Assumption: \( r = 10\% \)

1. Year:

\[ \text{PV} = \frac{100}{1.1} = \frac{100}{1 + 10\%} = \frac{100}{1.1} = 90.9 \text{ EUR} \]

Total: 173.5 EUR

2. Year:

\[ \text{PV} = \frac{I_2}{(1+r)^2} \]

\[ \text{PV} = \frac{100}{1.1^2} = \frac{100}{1 + 10\%^2} = \frac{100}{1.1^2} = 82.6 \text{ EUR} \]

\( PV = \text{Present value of IP asset} \)
\( I = \text{Economic income projection} \)
\( n = \text{Year} \)
\( r = \text{Risk-adjusted discount rate} \)
Income-based methods

*Discount Cash Flow*

\[
PV = I_1(1+r)^{-1} + I_2(1+r)^{-2} + I_3(1+r)^{-3} + \ldots + I_n(1+r)^{-n}
\]

- **PV** = Present value of IP asset
- **I** = Economic income projection
- **n** = Year
- **r** = Risk-adjusted discount rate
Income-based methods

Discount Cash Flow

\[ PV = I_n(1+r)^{-1} \]

\[ PV = I_1(1+r)^{-1} + I_2(1+r)^{-2} \]

\[ PV = I_1(1+r)^{-1} + I_2(1+r)^{-2} + I_3(1+r)^{-3} \ldots + I_n(1+r)^{-n} \]

PV = Present value of IP asset

I = Economic income projection

n = Year

r = Risk-adjusted discount rate
Valuation tools: patent rating

Automated tools, up to 50 econometric indices aggregated:

- IPscore (EPO – www.epo.org)
- Global Patent Scorecard (Patent Board)
- Patent Factor index (Patent Café)
- Patent strength (Innography)
- IPQ (Ocean Tomo)
Valuation tools: patent rating

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**Limitations:**
- Often works as a black box
- Limited value for a single patent
- Strongly depends on the field of activity
## Patent x1

### Input

<table>
<thead>
<tr>
<th>Instructions</th>
<th>Financial results</th>
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<tbody>
<tr>
<td>A - Legal status</td>
<td>B - Technology</td>
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<tr>
<td>C - Market conditions</td>
<td>D - Finance</td>
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<td>E - Strategy</td>
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### Output

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<th>Radar profile</th>
<th>Strategic profile</th>
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<tr>
<td>Net present value</td>
<td>Charts</td>
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<tr>
<td>Diagnoses</td>
<td>Portfolios</td>
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<td>Supplementary reports</td>
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### Reports

<table>
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<th>Combined report</th>
<th>Evaluation table</th>
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</table>
Structured approach / stimulating communication

Source: IPscore
Output – risk and opportunity

The size of the bubble shows the profit generated by each patent

Source: IPscore
Output – financial forecast

- Business area profits without the patent technology
- Business area profits with the patent technology
- Foreseeable profits for the patent technology

Source: IPscore
Various factors

β Legal position
  • Granted? Valid? Countries (number, importance)
  • Remaining patent time
  • Backward / forward citations
  • Detectability of infringement, enforceability
  • Passed opposition (period, proceedings)

β Technical position
  • Strength of claims
  • Maturity, options of design around

β Market attractiveness
  • Industry, size, competitors

See VC on “Evaluation dimensions” (series: “IP evaluation and protection”)
How to choose valuation methods

- The choice should be influenced by:
  - The kind of industry
  - The degree of maturity of the technology
  - The degree of risk
  - The IPR
  - Available information / price of comparable assets

- Combination of several methods to get an envelope of values

- Valuation should be done on a regular basis