

## Business R&D and the Role of Public Policies for Innovation Support: A qualitative approach

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### Structure of the Presentation

- The Sample Companies in Detail
  - Activities and competitive environment, Size and growth, Internationalization
  - R&D activities, prod. dev. time, prod. life time, time horizon f. commercial exploitation of R&D
- Public Policies to Support Private R&D
  - Evaluation of policies reducing R&D costs/risks
- Observations from the Sample Companies
  - Changing patterns of business R&D
  - The role of innovation policies

### The Sample Companies: Activities & Competitive Environment

Company	AT&S	FACC	FRONIUS	TRIDONIC
Industry	Electronic components	Plastics	Machinery and equipment	Electronic components
Main products	Printed circuit boards with focus on telecom. & automotive applications	Fibre reinforced lightweight systems for the aviation industry	Welding technology and solar electronics	Magnetic and electronic lighting components such as ballasts, chokes, ignitors and transformers
Market share, specialisation	Global market share of about 10%; leading in Europe and No.3 worldwide	Highly specialised in several related fields	No. 5 globally (market share of about 3.5 %) and leading in Europe (about 12%)	Amongst the three leading European companies and No. 5 globally
Source of main competitors	Three main competitors which are based in Finland, Taiwan and Japan	Global competition within the supplier networks of major aircraft manufacturers	Two European (Finland, Sweden), two Japanese and two American competitors	Two European Competitors (Germany, The Netherlands) and several in Asia and USA
Company	ADCON	FEMTOLASERS	TROTEC	WESTCAM
Industry	Communication hard- and software	Electronics	Machinery and equipment	IT services and software
Main products	Wireless telemetry and tele-monitoring applications (e.g. in agriculture)	Ultra-fast laser sources, amplifiers and measurement systems	Laser-based marking systems and laser engraving systems	IT-solutions for 3D-construction and process automation (applied e.g. in automotive and medical)
Market share, specialisation	Highly specialised	Highly specialised	Global market share of about 10-15%; highly specialised	Highly specialised
Source of main competitors	Main competitors in USA	Only a few competitors, all of them located in the USA	Two competitors in USA and one in Taiwan	Fragmented market with competitors in Europe and US

## The Sample Companies: Size & Growth

Company	AT&S	FACC	FRONIUS	TRIDONIC
Employment	-2.700	-650	-1.200	-1.940
Sales (in m. €)	-320	-100	-117	-290
Number and location of production sites	Austria (3), India (1), China (1)	Austria (2)	Austria (3), Czechia (1), Ukraine (1)	Austria (3), AUS (2), South Africa (1), CH (1), UK (1)
Growth in the recent past	Since 1996 sales almost tripled	Since 1999 sales doubled	Since 1997 sales doubled	Since 1995 (partly due to takeovers) sales more than tripled
Current growth situation	Consolidation	Consolidation	Continuous growth	Continuous Growth
Medium-term prospects	Annual growth of 10-20%	Growth from 2004 onwards	Annual growth of about 10%	Annual growth of about 5%
Company	ADCON	FEMTOLASERS	TROTEC	WESTCAM
Employment	-120	-20	-25	-40
Sales (in m. €)	-16	-3	-8,5	-4,7
Number and location of production sites	Austria (1), France (1), RUM (1), NL (1), USA (1)	Austria (1)	Austria (1)	Austria (3)
Growth in the recent past	Since 1999 sales approximately doubled	Very strong: sales in 1997 only ~ 0,6m €	Very strong: sales in 1998 < 2m €	Since 1998 sales doubled
Current growth situation	Strong growth	Continuous growth	Continuous growth	Continuous growth
Medium-term prospects	Strong growth	Within 3 years doubling	Annual growth of 20-25%	Within 3-4 years doubling

## The Sample Companies: Internationalisation

Company	AT&S	FACC	FRONIUS	TRIDONIC
Production	Austria; increasingly Asia	Austria	Austria; some Eastern Europe	Austria, Australia, South Africa, Switzerland, UK
Markets	Austria negligible Europe (-80%) North America (-10%) Asia (-10%)	EU (-50%) North America (-50%)	Austria (-20%) EU (>65%)	Austria negligible Europe (>70%)
Company	ADCON	FEMTOLASERS	TROTEC	WESTCAM
Production	Focus on Europe	Austria	Austria	Austria
Markets	Austria negligible Western Europe (-40%) North America (< 40%) Lat. Am., AUS (- 8% each)	Austria (< 10%) EU (- 60%) North America (-15%) Asia (-15%)	Austria (<5%)	Austria (- 50%) Germany (- 35%) Italy and Switzerland

## The Sample Companies: R&D Activities

Company	AT&S	FACC	FRONIUS	TRIDONIC
Current R&D to sales ratio	- 2-3%	- 8%	- 7%	- 10%
Internal R&D personnel	20	55	- 100	- 120
Stability of R&D expenses	Further increase of R&D efforts despite of currently declining sales expected	Increase expected with R&D to sales ratio target of 8-12%	R&D to sales ratio only 3,5% by end of 80s; stable at about 7%	Increase in the past and stability at current level expected
Company	ADCON	FEMTOLASERS	TROTEC	WESTCAM
Current R&D to sales ratio	- 22%	-15%	- 12%	- 14%
Internal R&D personnel	42	4	5	5
Stability of R&D expenses	Remaining at high level	R&D expenses should still grow in line with sales	Continuous growth of R&D in the past and some further increase expected	Stable R&D expenses but R&D-personnel increasing

## The Sample Companies: Product Development Time, Product Life Time

Company	AT&S	FACC	FRONIUS	TRIDONIC
Average product development time	1-2 years	2-3 years	~ 2 years	1.5-2.5 years
Average product life time	~ 3 years	Up to about 10 years	4 to 8 years	3-4 years
Company	ADCON	FEMTOLASERS	TROTEC	WESTCAM
Average product development time	1-3 years	1-2 years	~ 2 years	1-1.5 years
Average product life time	~ 8 years	~ 3 years	3-4 years	~ 5 years

## The Sample Companies: Time Horizon for Commercial Exploitation

Company	AT&S	FACC	FRONIUS	TRIDONIC
Within 1 year	~60 %	< 30 %	~20 %	~25 %
2-3 years	~30 %	~ 66 %	~70 %	60-70%
Long-term	~10 %	< 5 %	~10 %	5-10%
Structural changes of time horizon	Stable	In the past short term used to dominate but is increasingly replaced by medium-term	Stable	Stable
Company	ADCON	FEMTOLASERS	TROTEC	WESTCAM
Within 1 year	< 10%	~10 %	> 10 %	~50 %
2-3 years	~ 60 %	~70 %	~80 %	~50 %
Long-term	~ 30 %	~20 %	< 10 %	
Structural changes of time horizon	Stable	Stable	Stable	Stable

## Public Policies to Support Private R&D: R&D costs, R&D risks, research infrastructure

- Policies reducing R&D costs
  - Tax incentive, personnel subsidy, project grants, project loans
- Policies reducing R&D risks
  - Conditional loan, loan guarantee, royalty grant, stock option grant
- Improvement of research infrastructure
  - public researching organisations, training of scientists and engineers

## Public Policies to Support Private R&D: Policies Reducing R&D Costs

Table 3a: Schemes addressing R&D costs				
Ranking by grades [no. of companies]				
	(1) ++	(2) +	(3) -	(4) --
Tax incentive	3	4	1	1
Personnel subsidy	4	5	0	0
Project grant	6	3	0	0
Project loan	1	5	3	0
Ranking directly [no. of companies]				
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>
Tax incentive	3	3	2	1
Personnel subsidy	2	5	1	1
Project grant	4	1	4	0
Project loan	0	0	2	7

## Public Policies to Support Private R&D: Policies Reducing R&D Risks

Table 3b: Schemes addressing R&D risks				
Ranking by grades [no. of companies]				
	(1) ++	(2) +	(3) -	(4) --
Conditional loan	4	4	1	0
Loan guarantee	0	1	4	4
Royalty grant	1	4	2	2
Stock option grant	1	0	2	6
Schemes addressing R&D risks [no. of companies]				
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>
Conditional loan	7	2	0	0
Loan guarantee	0	3	5	1
Royalty grant	2	3	4	0
Stock option grant	0	1	0	8

## Observations from the sample companies: The role of innovation policies

- Clear preferences for measures reducing R&D costs
  - But: individual circumstances matter
- Ownership structure might inhibit the use of some risk reducing schemes
- Research infrastructure in the home country highly valued

Observations from the sample companies:  
Changing patterns of business R&D

- Growing R&D intensity observable, variety of explanations
  - (internal) strategy vs. (external) environment
  - product development time / life time
- Diminishing time horizon for commercial exploitation of R&D plausible
- Importance of external knowledge bases seems to grow