

Study „Adult learning in the workplace:
skill development to promote innovation in enterprises“
commissioned by CEDEFOP Contract N° 2010/S 164-251530 of 25/08/2010

Adult learning in the workplace: Skill development to promote innovation in enterprises - Research design & findings -

Validation Workshop

Thessaloniki, November 10-11, 2011

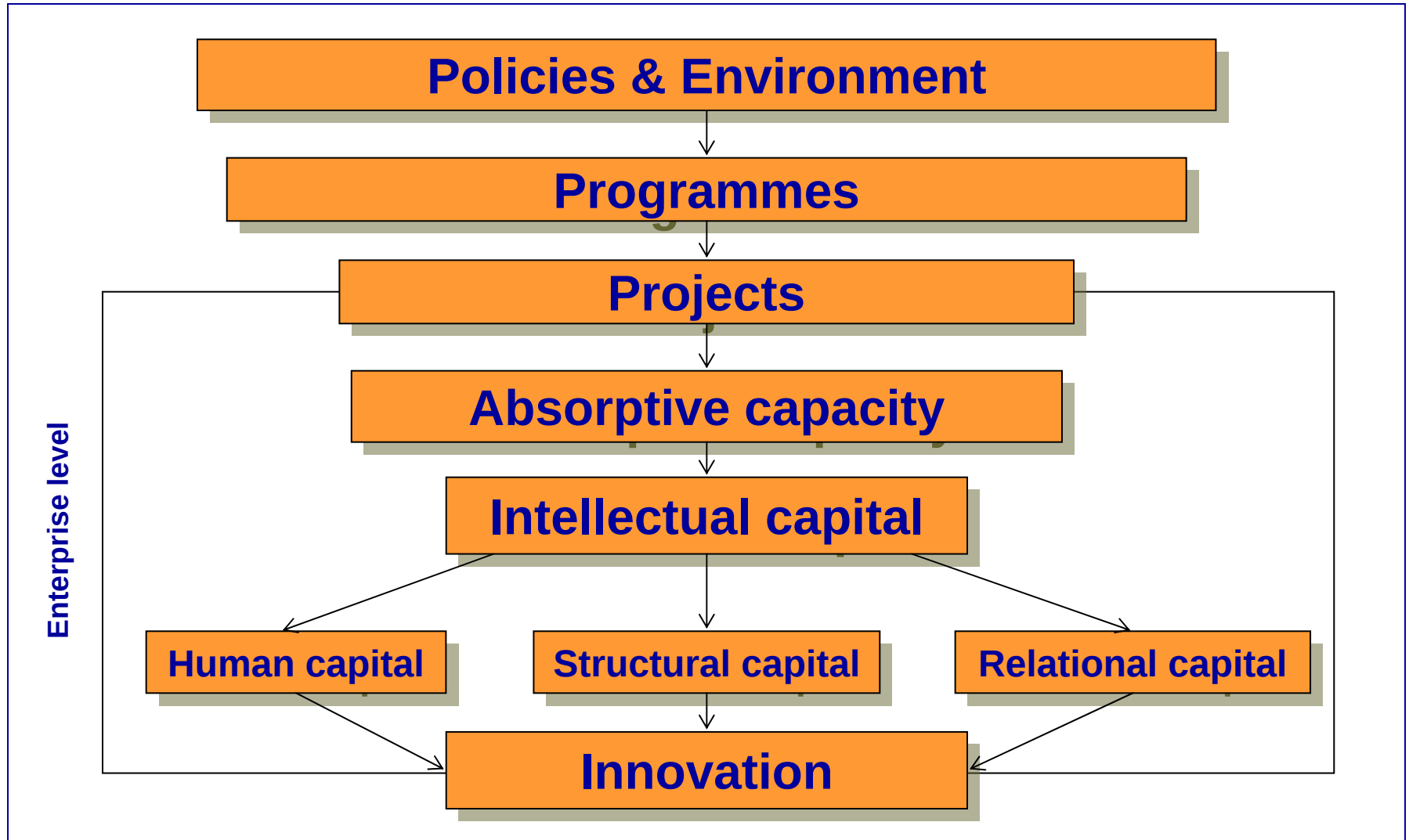
Institute for Innovation and Technology within
VDI/VDE Innovation + Technik GmbH and
FiBS-Institute for Education and Socio- Economic Research

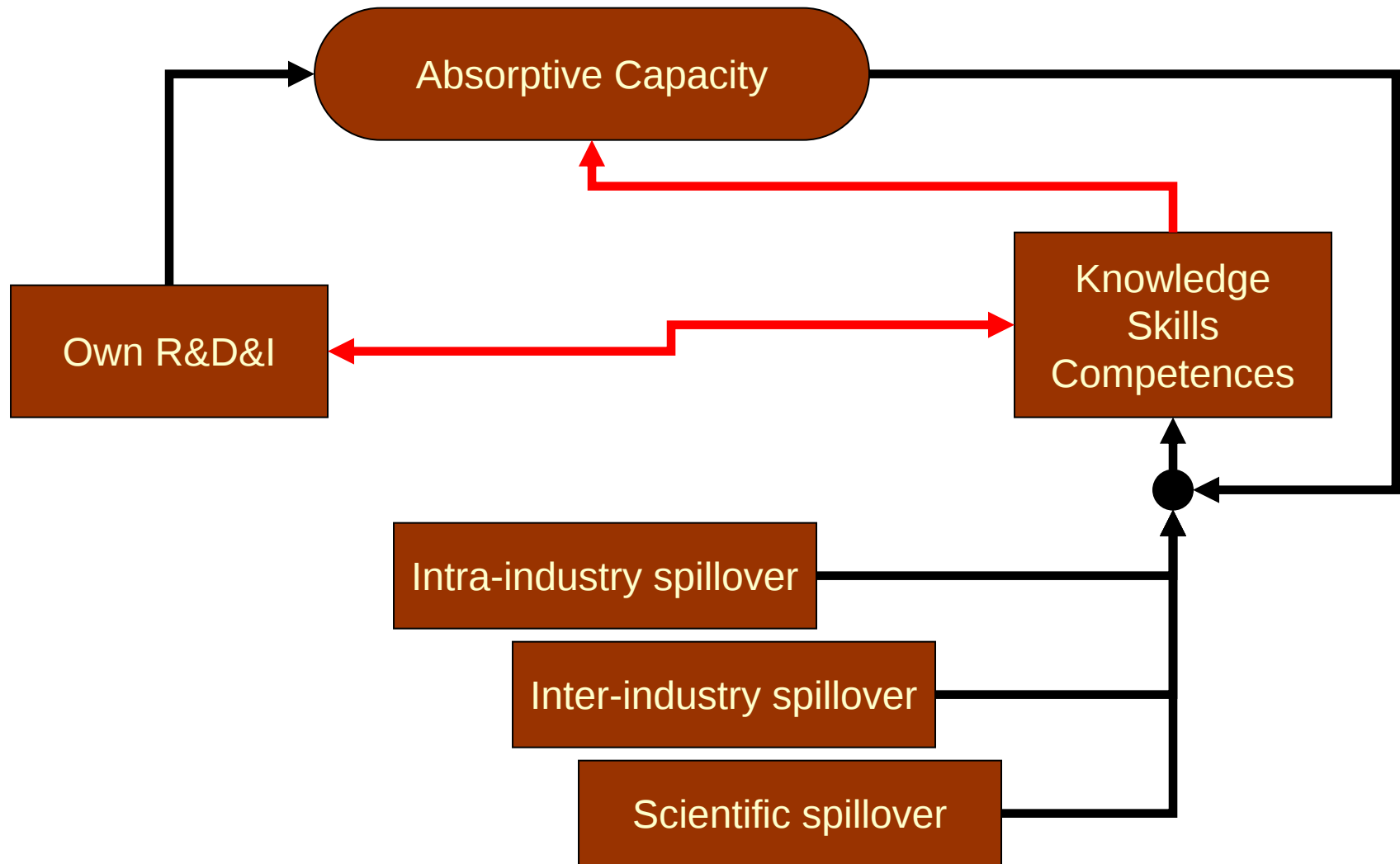
1. Subject and purpose of the study
2. Theoretical framework
3. Desk research
4. Secondary data analyses
 - Indicators: Work organisation, workplace learning, innovation (EWCS, CWTS, EIS)
 - Programme portfolios (ERAWATCH)
5. Primary data analyses
 - Methodology
 - Selected results on programme level
6. Preliminary conclusions and issues for discussion

1. Subject and purpose of the study

- Linkage of work organisation, workplace learning and innovation
- Quantitative and qualitative analysis of innovation programmes
- Comparison of the 27 EU-member states + Norway
- Effects of innovation programmes
- 10 case studies

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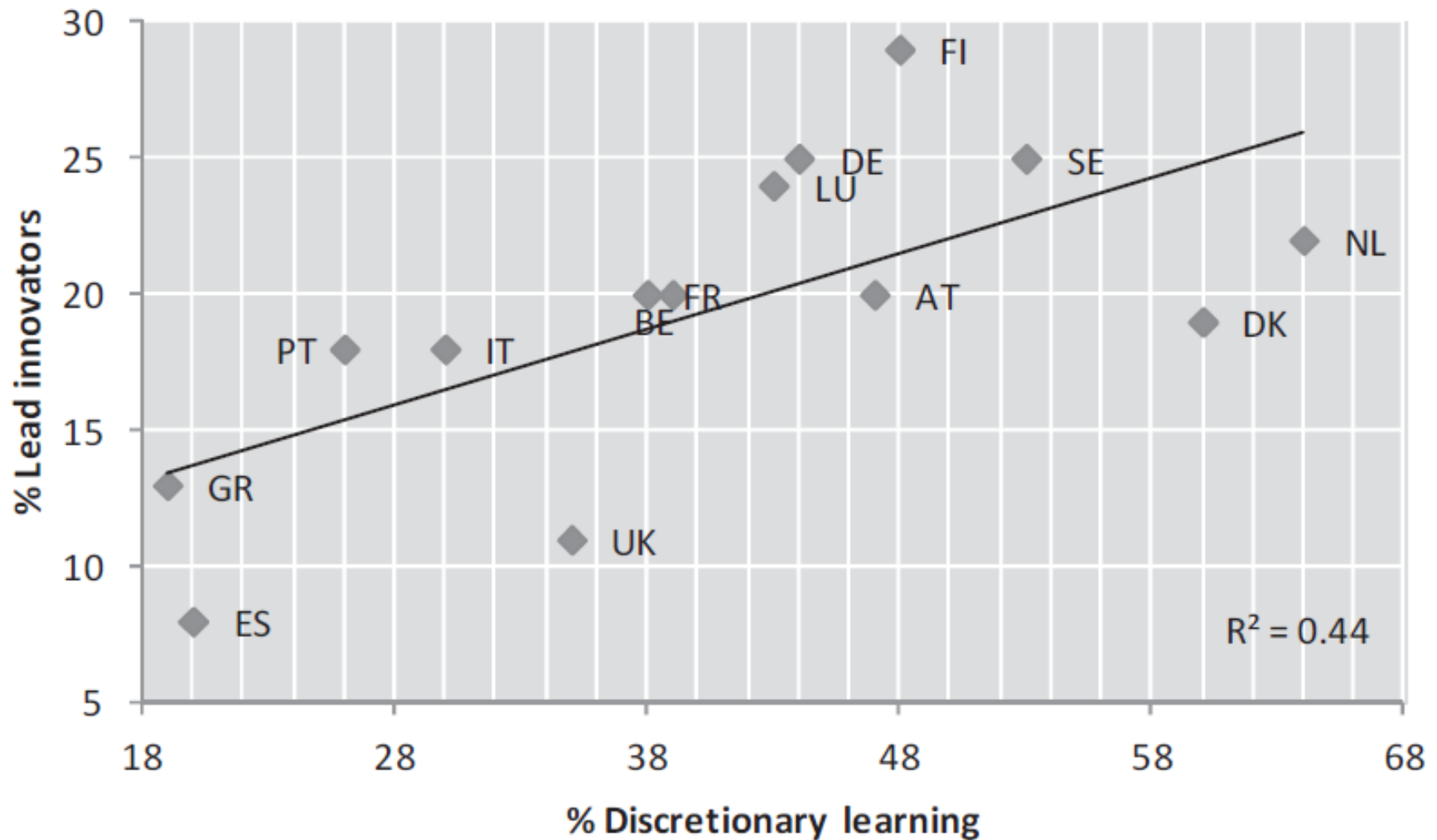
Human capital	Structural capital	Relational capital
Domain-related knowledge and skills	Corporate culture	Relations to customers
Practical experience	Cooperation and communication within the organisation	Relations to suppliers
Social competences	Equipment regarding information technology, software, and other technological systems	Relations to investors/shareholders
Motivation	Knowledge transfer and storage	External cooperation with educational institutions
Leadership skills	R&D infrastructure for product innovation	External knowledge acquisition
Corporate education and personnel development	R&D infrastructure for process innovation	Engagement in associations, Engagement in Corporate Social Responsibility (CSR)
	Structural organisation	Image/Brand
	Process organisation	

Table 1: Human, structural and relational capital as determinants of innovative ability (modified from Alwert, 2005, p. 23)

Type of investment in innovative ability	Focus of programme/service
1: Human capital (not main focus of this study)	Mostly formal basic or continuing education and training; programmes may fund the development and provision of E&T services, or support individual learners by providing funds to pay education fees etc.
2a: Structural capital, focus on the workplace	Work organisation and workplace design, including learning potentials of work
2b: Structural capital, focus on the organisation	Organisational Innovation and Business Development
3: Relational capital	Cluster / regional innovation systems programmes and initiatives
4: Stimulation of R&D&I investment in shared-budget programmes	Technological Research, Development and Innovation (R&D&I)

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Correlation between discretionary learning and lead innovators



(OECD 2010:67)

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The **learning-orientation of types of work organisation** can be measured with items of the European Working Conditions Survey. The following items were chosen:

- The eight original items within the category ‘work organisation’ (excluding the composed index ‘Level of group autonomy’)
 - Are you able to choose or change your order of tasks? (q50a)
 - Are you able to choose or change your methods of work? (q50b)
 - Are you able to choose or change your speed or rate of work? (q50c)
 - Are you involved in improving the work organisation or work processes of the department or organisation? (q51d)
 - Do you have a say in the choice of your working partners? (q51e)
 - Can you take a break when you wish? (q51f)
 - Can you influence decisions that are important for your work? (q51o)
 - Do you work in a group or team that has common tasks and can plan its work? (q56)
- Six of the nine items from the category ‘cognitive factors’, which also address organisational issues, in terms of task allocation:
 - Do you assess the quality of your own work? (q49b)
 - Does your work involve solving unforeseen problems on your own? (q49c)
 - Does your work involve monotonous tasks? (q49d)
 - Does your work involve complex tasks? (q49e)
 - Does your work involve learning new things? (q49f)

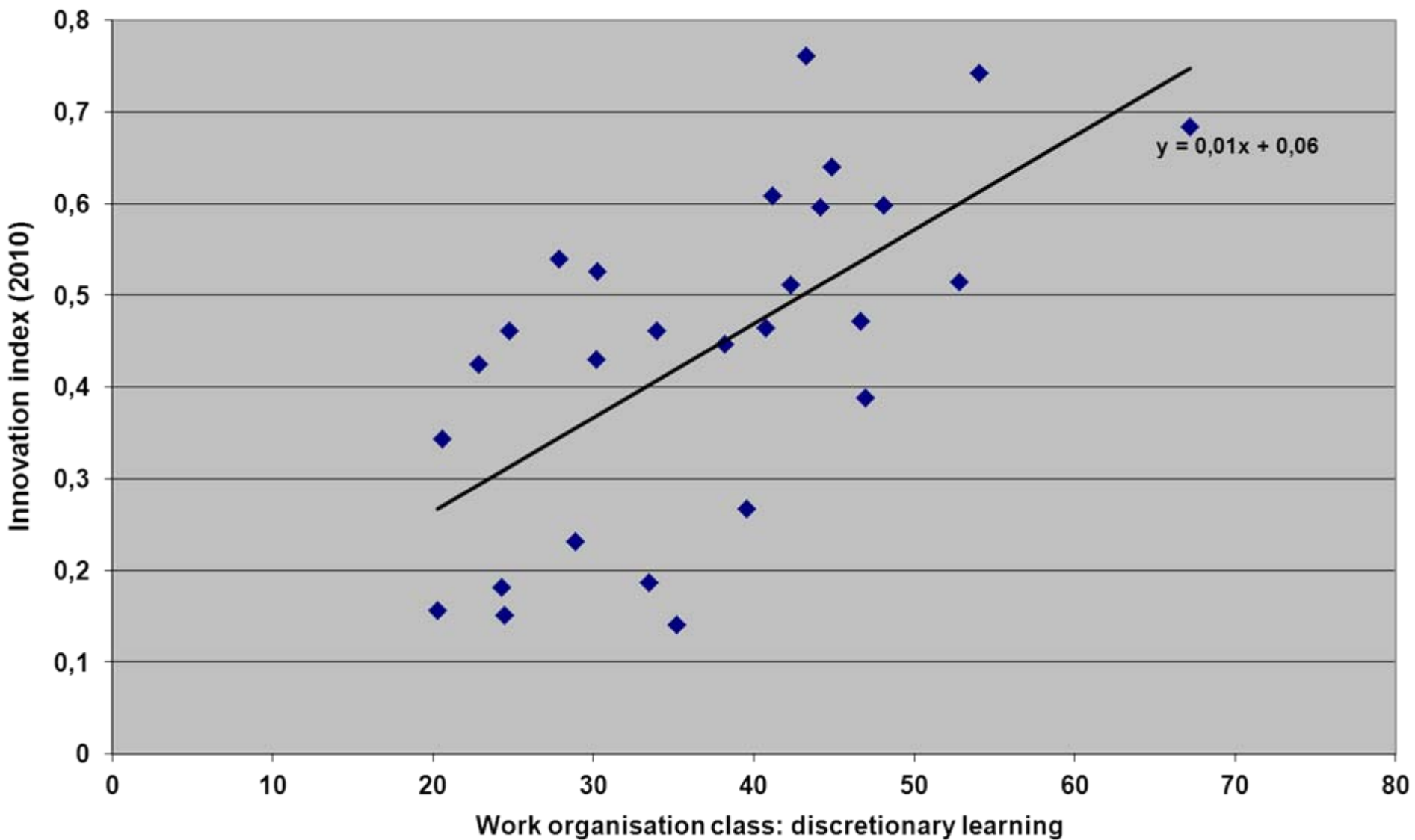
Workplace-related forms of learning can be measured with an item within the 3rd continuing vocational training survey (CVTS3, Eurostat 2006):

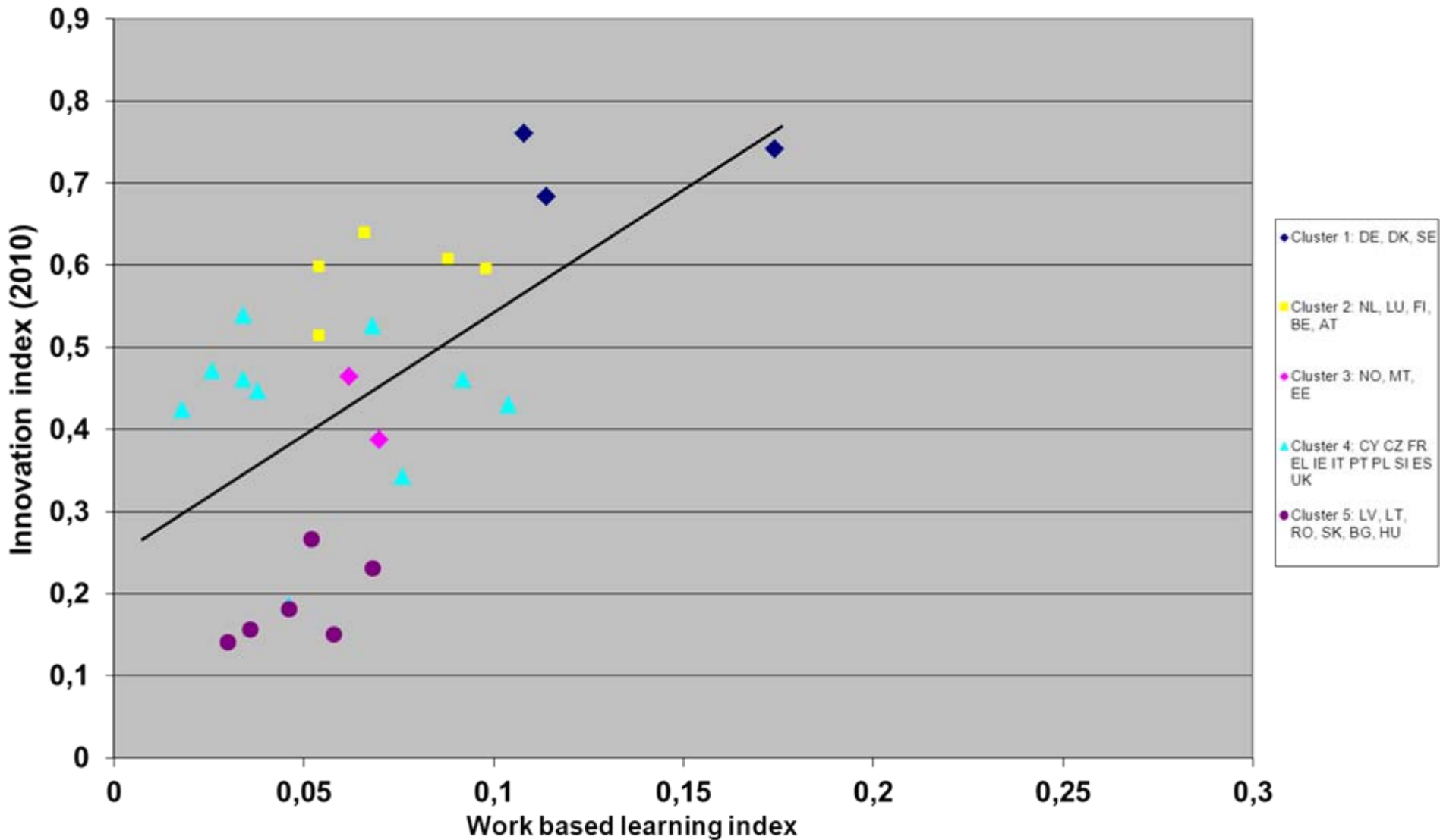
- Participants in other form of CVT as a percentage of employees in all enterprises by SIZE and type of training [trng_cvts3_50].
- Within this item, several sub-categories are coded:
 - WS: Continuing vocational training in work situation
 - JROT: Job rotation, exchanges or secondments
 - LQUC: Learning/quality circles
 - SLEAR: Self-learning
 - CONF: Continued training at conferences, workshops, lectures and seminars
- For the analysis within this study, the last sub-category (CONF) was excluded, because it refers to learning activities not related to the workplace

Innovation is measured by the European innovation Scoreboard (EIS, InnoMetrics, 2010). Only throughput and output parameters were included in the analysis:

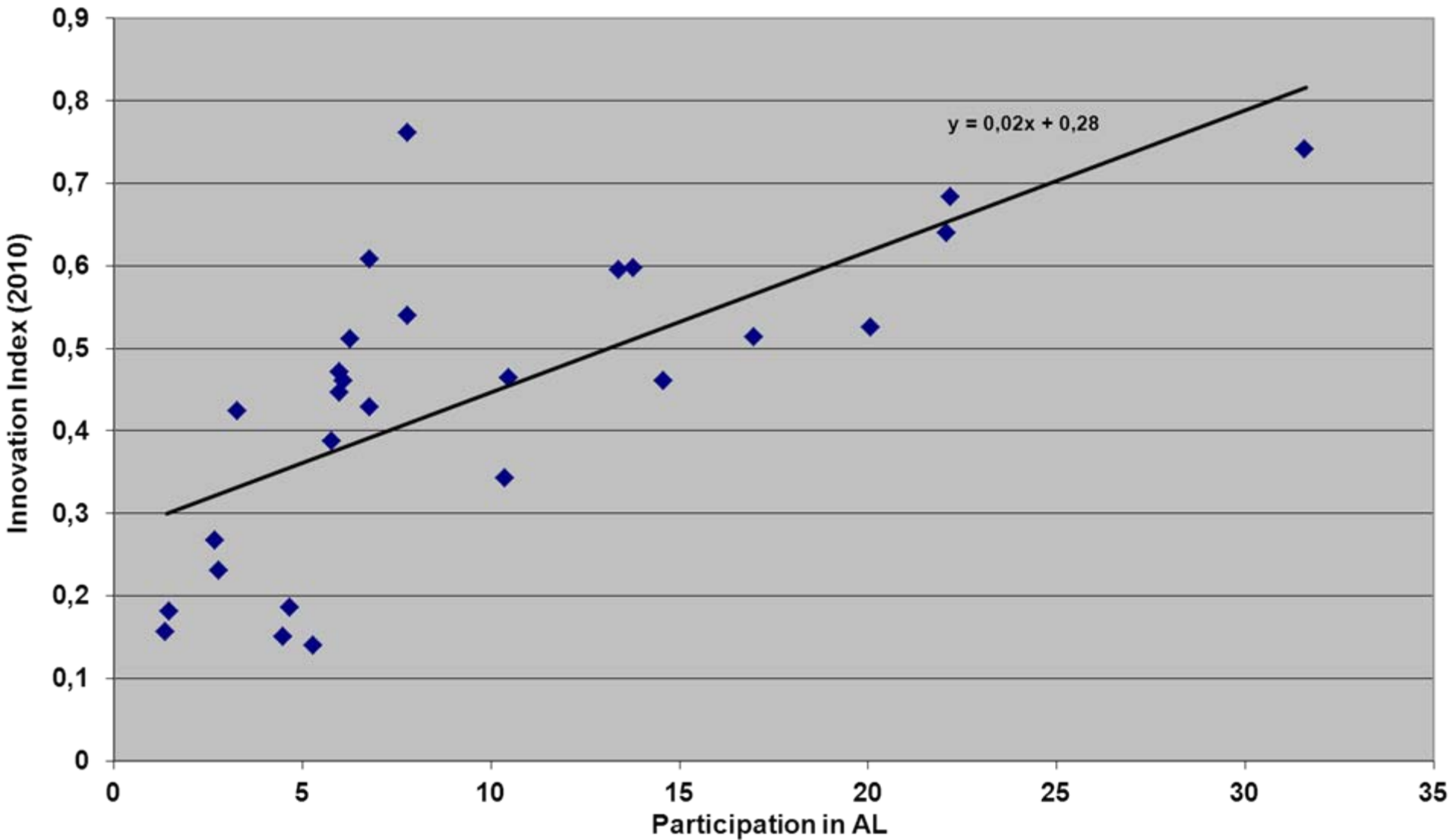
- Linkages & entrepreneurship
 - 2.2.1 SMEs innovating in-house
 - 2.2.2 Innovative SMEs collaborating with others
 - 2.2.3 Public-private co-publications
- Intellectual Assets
 - 2.3.1 PCT patent applications
 - 2.3.2 PCT patent applications in societal challenges
 - 2.3.3 Community trademarks
 - 2.3.4 Community designs
- Innovators
 - 3.1.1 SMEs introducing product or process innovations
 - 3.1.2 SMEs introducing marketing/organisational innovations
- Economic effects
 - 3.2.1 Employment in knowledge-intensive activities
 - 3.2.2 Medium and high-tech product exports
 - 3.2.3 Knowledge-intensive services exports
 - 3.2.4 Sales of new to market and new to firm innovations
 - 3.2.5 Licence and patent revenues from abroad

Advanced	Follower	Moderate 1: High learning, moderate innovation	Moderate 2: Low learning, moderate innovation	Catching up
Work organisation high (0.680)	Work organisation high (0.659)			Work organisation low (0.580)
Workplace learning high (0.132)	Workplace learning moderate (0.072)	Work organisation high (0.700)	Work organisation low (0.585)	Workplace learning low (0.048)
Innovation high (0.729)	Innovation moderate to high (0.591)	Workplace learning moderate (0.074)	Workplace learning low (0.042)	Innovation low (0.187)
		Innovation moderate (0.413)	Innovation moderate (0.461)	
Denmark	Austria	Estonia	Cyprus	Bulgaria
Germany	Belgium	Malta	Czech Republic	Hungary
Sweden	Finland	Norway	France	Latvia
	Luxemburg		Greece	Lithuania
	Netherlands		Ireland	Poland
			Italy	Romania
			Portugal	Slovakia
			Slovenia	
			Spain	
			United Kingdom	





Participation in adult learning in relation to innovation



Dependent	Independent	C	Sig. C	B	Beta	Sig.	R ²
Innovation index (2010)	R&D/GDP (2009)	0,19	0,00	0,15	0,82	0,00	0,67
Innovation index (2010)	GDP per capita	0,20	0,01	0,00	0,61	0,00	0,37
Innovation index (2010)	Cognitive factors	-0,60	0,06	1,53	0,57	0,00	0,57
Innovation index (2010)	Labour productivity per hour	0,09	0,19	0,00	0,74	0,00	0,55

Innovation Index (2010)	Participation in AL (LFS)	0,28	0,00	0,02	0,69	0,00	0,46
Innovation index (2010)	Work Based Learning index (2005)	0,23	0,00	3,08	0,57	0,00	0,33
Innovation index (2010)	Work organisation index new (2010)	-0,16	0,62	1,10	0,35	0,07	0,12
Innovation index (2010)	Share of training enterprises as % of total (2005)	0,05	0,57	0,01	0,70	0,00	0,49
Innovation index (2010)	Employee participation in CVT courses (2005)	0,17	0,05	0,01	0,57	0,00	0,32

Innovation index (2010)	Work orga: discretionary learning	0,06	0,54	0,01	0,65	0,00	0,42
Innovation index (2010)	Work orga: taylorist	0,73	0,00	-0,02	-0,61	0,00	0,37
Innovation index (2010)	Work orga: lean production	0,70	0,00	-0,01	-0,28	0,16	0,08
Innovation index (2010)	Work orga: traditional or simple	0,63	0,00	-0,01	-0,31	0,12	0,09

Innovation index (2010)	Work Based Learning index (2005)	0,14	0,01	1,23	0,22	0,13	0,80
	R&D/GDP (2009)			0,13	0,70	0,00	
Innovation index (2010)	Work Based Learning index (2005)	0,12	0,12	1,99	0,38	0,03	0,45
	GDP per capita			0,00	0,47	0,01	
Innovation index (2010)	Work Based Learning index (2005)	-0,34	0,31	1,94	0,36	0,09	0,41
	Cognitive factors			0,95	0,36	0,09	
Innovation index (2010)	Work Based Learning index (2005)	-0,02	0,94	2,78	0,51	0,01	0,35
	Work organisation index new (2010)			0,50	0,16	0,39	
Innovation index (2010)	Work Based Learning index (2005)	0,07	0,57	2,64	0,49	0,01	0,36
	Share of tertiary education			0,01	0,30	0,09	
Innovation index (2010)	Work organisation index new (2010)	0,55	0,08	-0,56	-0,18	0,36	0,50
	Participation AL (LFS)			0,02	0,81	0,00	

Role of WBL remains positive and visible, even when controlling for other relevant factor (though sometimes not significant at 0.1% level)

Innovation index (2010)	Work Based Learning index (2005)	0,02	0,82	1,75	0,33	0,07	0,52
	Work organisation form: discretionary learning			0,01	0,50	0,01	
Innovation index (2010)	Work Based Learning index (2005)	0,13	0,15	2,01	0,38	0,06	0,43
	Employee participation in CVT			0,01	0,37	0,07	
Innovation index (2010)	Work Based Learning index (2005)	0,45	0,03	2,86	0,53	0,01	0,37
	Work organisation form: lean production			-0,01	-0,21	0,23	

Innovation index (2010)	Work Based Learning index (2005)	0,03	0,74	1,01	0,19	0,35	0,52
	Share of training enterprises			0,01	0,59	0,01	
Innovation index (2010)	Work Based Learning index (2005)	0,24	0,00	0,84	0,16	0,45	0,52
	Participation in AL (LFS)			0,02	0,60	0,01	

Role of WBL remains positive and largely significant at 0.1%-level when other learning factor are controlled for

Innovation index (2010)	Work Based Learning index (2005)	-0,27	0,40	1,31	0,25	0,20	0,54
	Cognitive factors			0,66	0,25	0,21	
	GDP per capita			0,00	0,44	0,02	
Innovation index (2010)	Work Based Learning index (2005)	0,24	0,00	0,84	0,16	0,45	0,52
	Participation AL (LFS)			0,02	0,60	0,01	
	Cognitive factors						
Innovation index (2010)	Work based learning index	-0,34	0,31	1,94	0,36	0,09	0,41
	Cognitive factors			0,95	0,36	0,09	
	Share of tertiary education						

Role of WBL turns insignificant when controlling for GDP per capita and/or participation in AL (LFS)

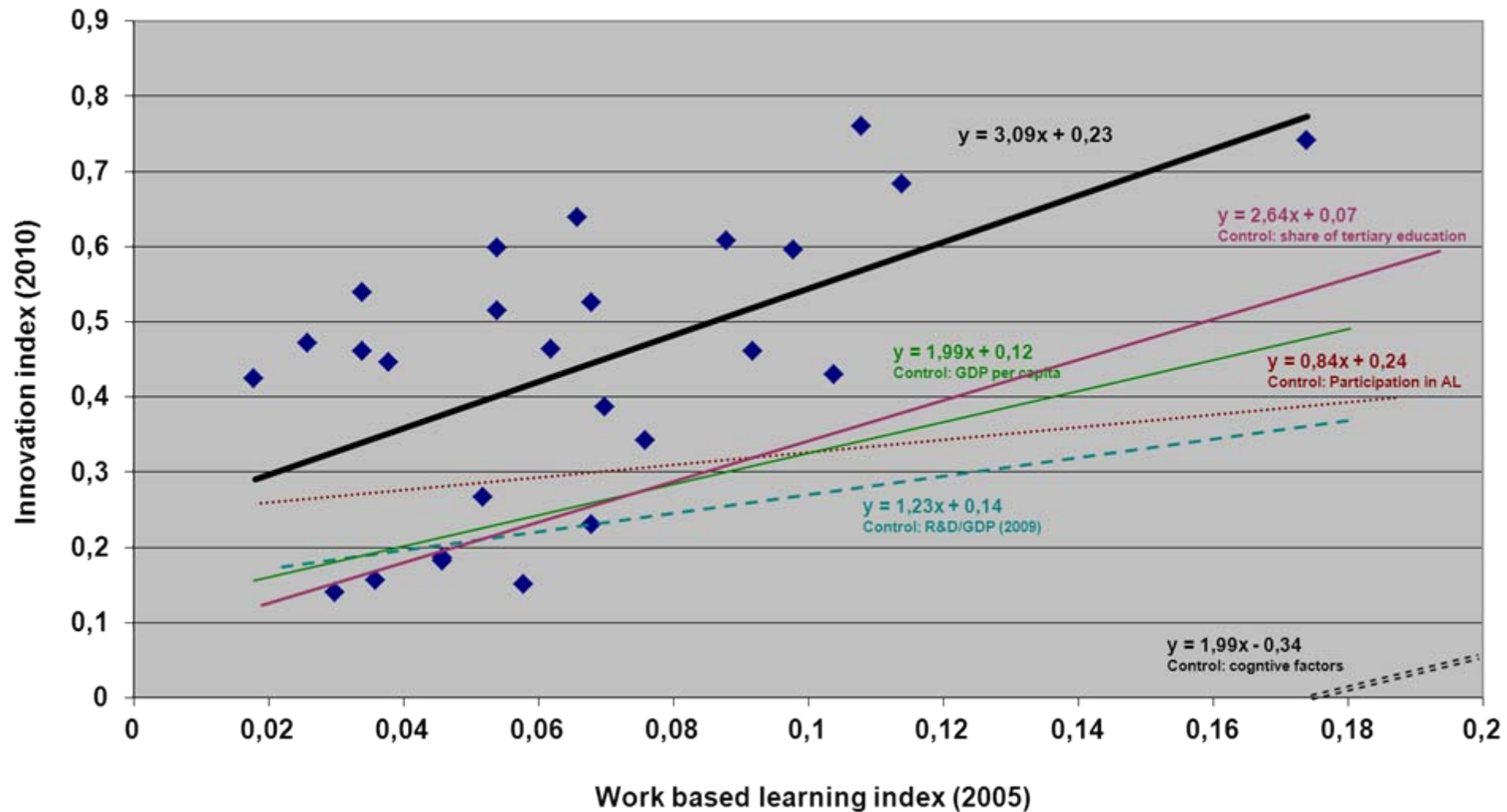
Innovation index (2010)	Work organisation index new (2010)	-0,56	0,10	-0,33	-0,11	0,66	0,33
	Cognitive factors			1,73	0,65	0,01	
Innovation index (2010)	Work organisation index new (2010)	0,25	0,51	-0,97	-0,31	0,16	0,54
	Participation AL (LFS)			0,02	0,68	0,00	
	Cognitive factors			0,83	0,31	0,19	
Innovation index (2010)	Work organisation new (2010)	-0,43	0,17	-0,10	-0,03	0,88	0,50
	Cognitive factors			1,06	0,39	0,08	
	GDP per capita			0,00	0,49	0,01	
Innovation index (2010)	Work organisation index new (2010)	-0,54	0,09	-0,84	-0,27	0,26	0,45
	Cognitive factors			1,76	0,65	0,01	
	Share of tertiary education			0,01	0,37	0,04	

Role of work organisation is insignificant and usually negative, when controlling for other relevant factor

This raises the question, what the role of work organisation is in this regard or whether it has to be specified differently (e.g. discretionary learning)

Innovation index (2010)	Work organisation index new (2010)	-0,56	0,10	-0,33	-0,11	0,66	0,33
	Cognitive factors			1,73	0,65	0,01	
Innovation index (2010)	Work organisation index new (2010)	0,25	0,51	-0,97	-0,31	0,16	0,54
	Participation AL (LFS)			0,02	0,68	0,00	
	Cognitive factors			0,83	0,31	0,19	
Innovation index (2010)	Work organisation new (2010)	-0,43	0,17	-0,10	-0,03	0,88	0,50
	Cognitive factors			1,06	0,39	0,08	
	GDP per capita			0,00	0,49	0,01	
Innovation index (2010)	Work organisation index new (2010)	-0,54	0,09	-0,84	-0,27	0,26	0,45
	Cognitive factors			1,76	0,65	0,01	
	Share of tertiary education			0,01	0,37	0,04	

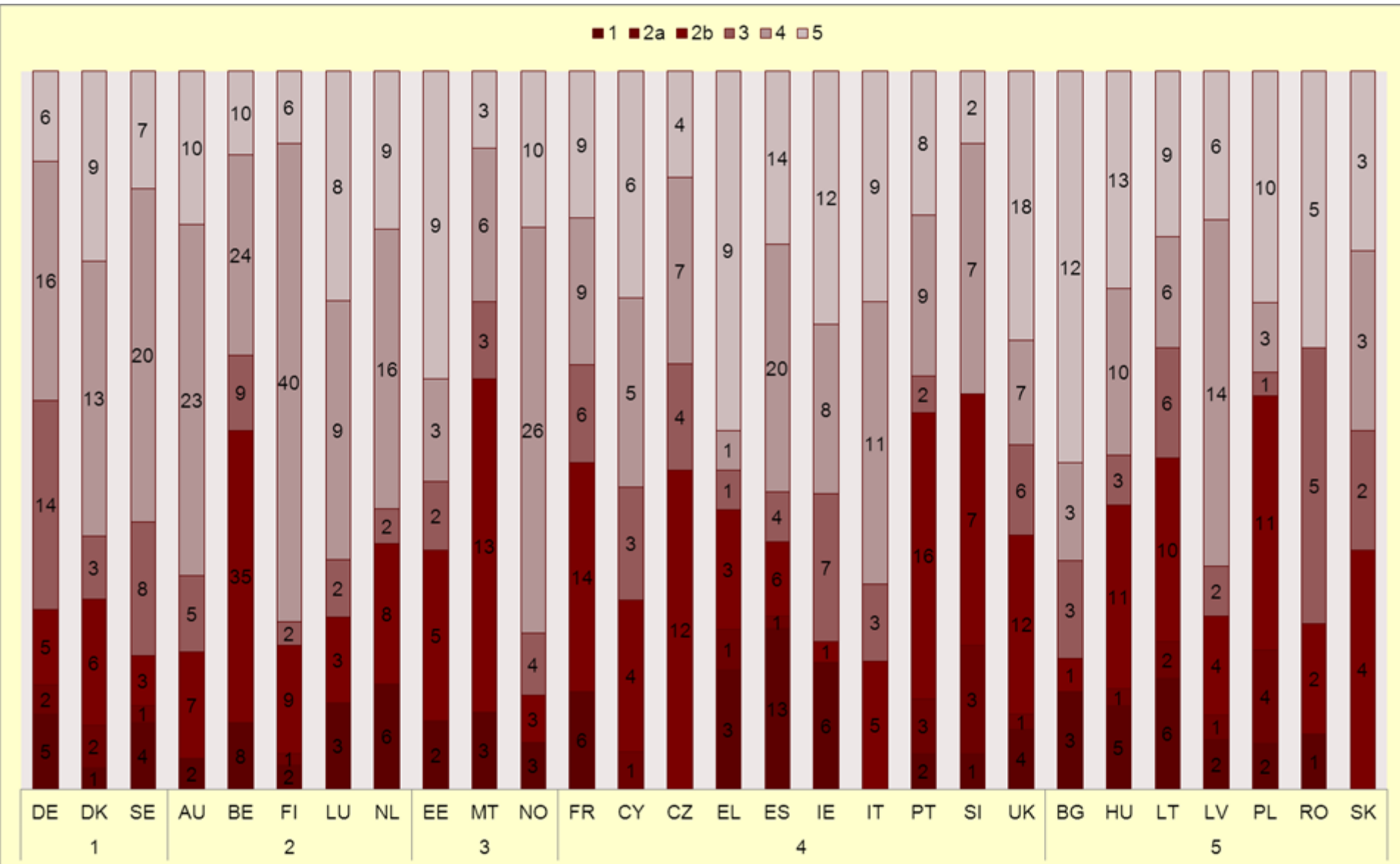
Role of cognitive factor (EWCS) or „work complexity“ is often significant and positive, and (will) be investigated more in-depth during the study

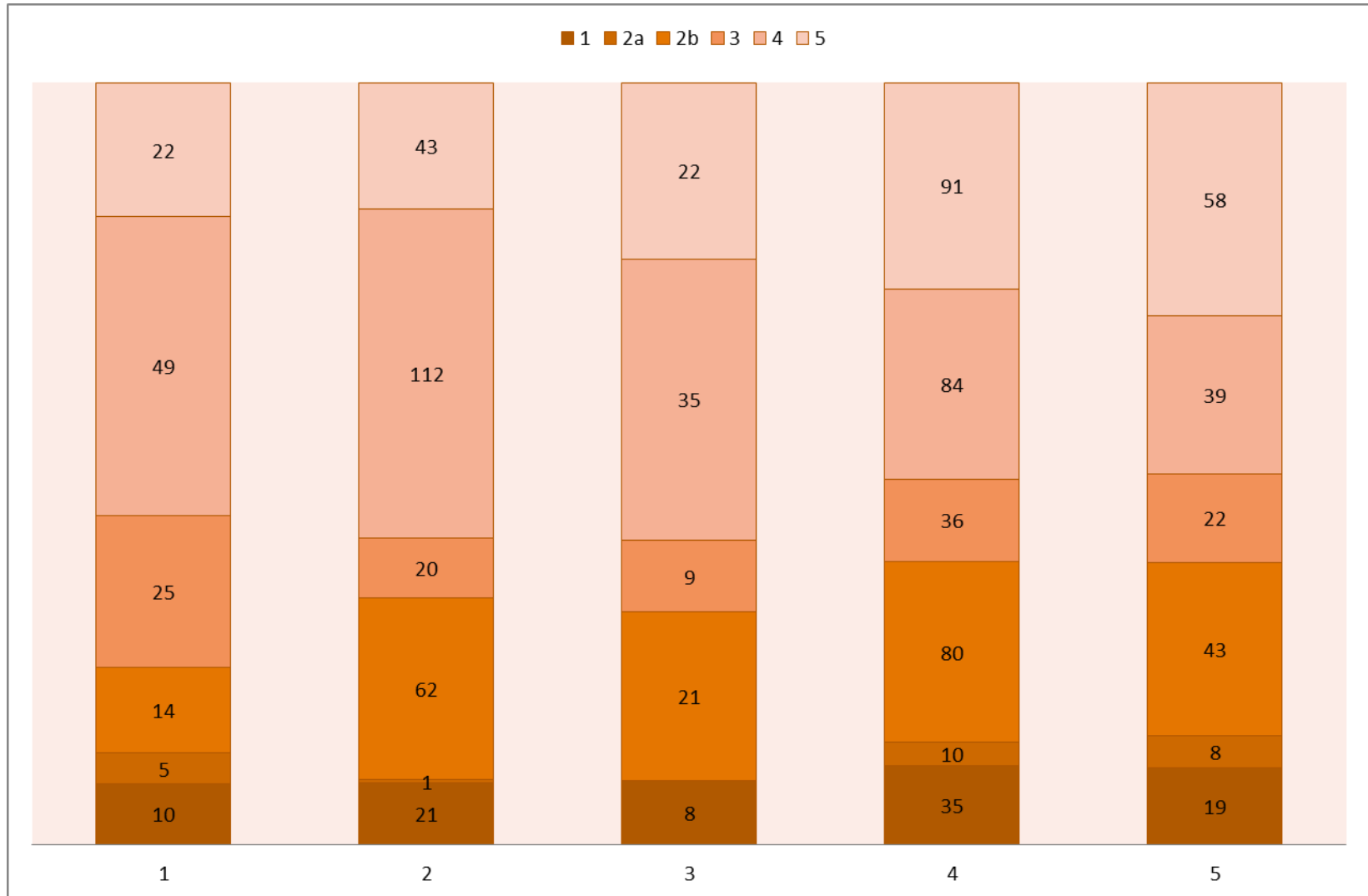


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Type of investment in innovative ability	Distinctive programme patterns	Focus of programme/ service Example Programmes
1: Human capital	Addressed to natural (individual) persons, not necessarily an employed person. Somewhat out of the scope of the study.	Mostly formal basic or continuing education and training; programmes may fund the development and provision of E&T services, or support individual learners by providing funds to pay education fees etc. Researcher support programmes (qualification, mobility, employment)
2a: Structural capital, focus on the workplace	Addresses organisation at workplace level, and (indirectly) human capital patterns as domain-related knowledge and skills, practical experiences, motivation and social skills, in the context of work and work design	Work organisation and workplace design, including learning potentials of work
2b: Structural capital, focus on the organisation	The organisational and technological structures and processes allowing the sustained operation and innovation of the organisation.	Organisational Innovation and Business Development Training and consultancy services for innovation management topics, Financial support (VC, grants, tax credit scheme) for investments in company's R&D (ICT, hardware, software)

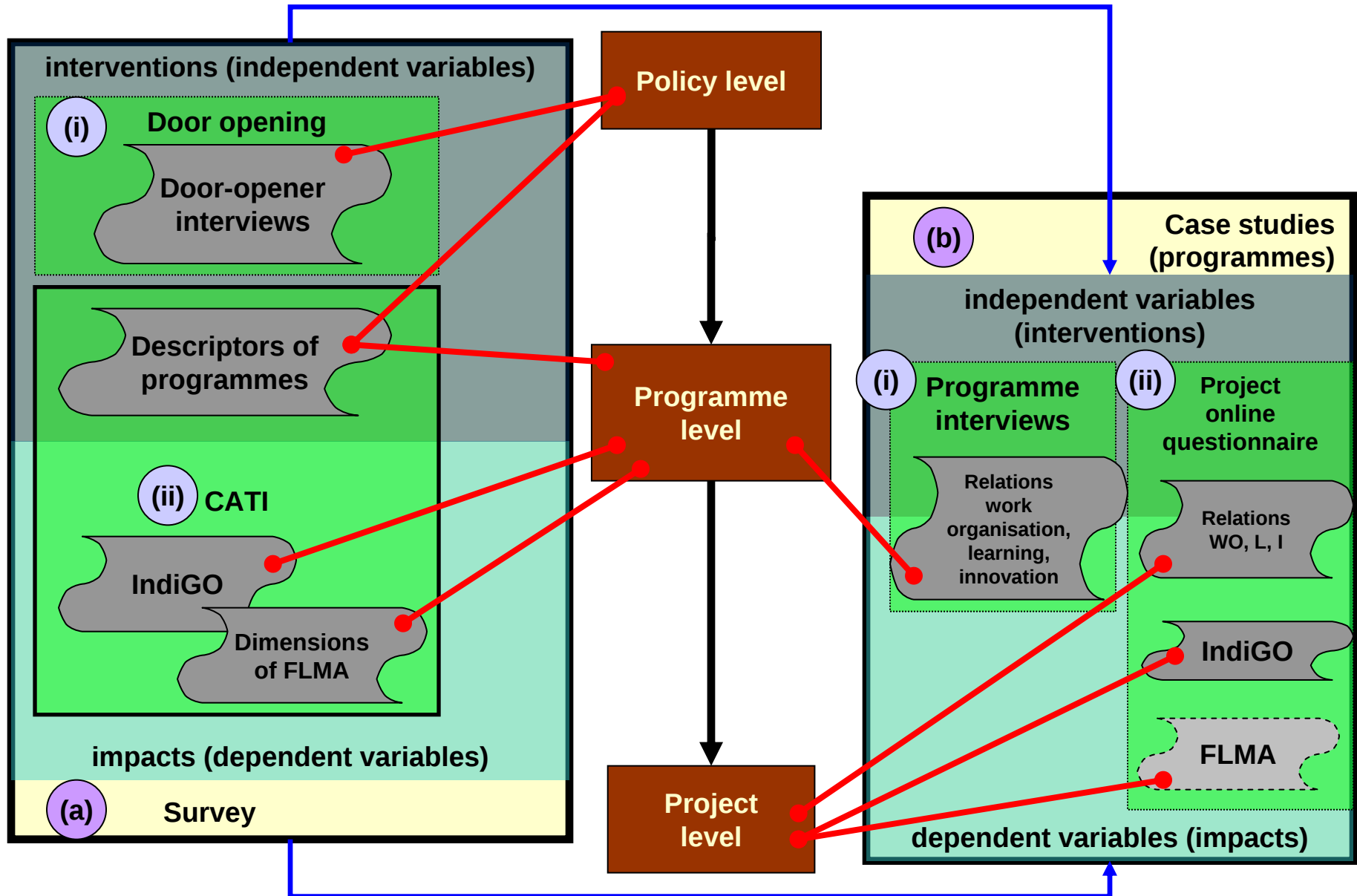
Type of investment in innovative ability	Distinctive programme patterns	Focus of programme/ service Example Programmes
3: Relational capital	Relations to all relevant groups outside the organisation, like stakeholders, customers, suppliers, associations etc., enabling the organisation to take up external input.	Cluster / regional innovation systems programmes and initiatives Technology Transfer, Knowledge Transfer, Cooperation between educational institutions and enterprises Networking/cooperation of companies User-driven innovation projects
4: Stimulation of R&D&I investment in shared-budget programmes	The programmes support thematic or horizontal RDI activities at the organisation. Collaborative research is included here as well.	Technological Research, Development and Innovation (R&D&I) Basic, applied and experimental research within a company or between companies or public research bodies or both
5: Other types of programmes	These programmes are outside the scope of the study, but listed in order to complete the portfolio. Their effect on enterprises is mostly indirect.	E.g. general investment in R&D infrastructure (e.g. technology centres), access to finance, etc. Setting-up research centres, incubators, research infrastructures, etc. Support to VC organisations Prizes, awards, IPR, etc.





Country	Programme	Type	Cluster
SE	Regional Growth Through Dynamic Innovation Systems	3	1
DK	Programme for userdriven innovation	4	1
DE	Central Innovation Programme SME	4	1
DE	IKT 2020 Schwerpunkt Mikrosystemtechnik	4	1
DE	Arbeiten - Lernen - Kompetenzen entwickeln. Innovationsfähigkeit in einer modernen Arbeitswelt	2a	1
SE	Management and Work Organisation Renewal	2a	1
DK	The Business Innovation Fund	2b	1
DE	Exzellenztandem + Forschungsassistent	2b	1
AT	Cooperation & Innovation	3	2
BE	"Competence pools" - Flanders Synergy (FS)	3	2
FI	Serve	4	2
AT	Forschungskompetenzen für die Wirtschaft	2a	2
FI	The Finish Workplace Development Programme Tykes	2a	2
NL	Innovation Performance Contracts	2b	2
NO	The Industrial Ph.D Scheme	1	3
EE	Cluster Development Programme	3	3
NO	Programme for Regional R&D and Innovation	3	3
NO	Norwegian Centres of Expertise	3	3
MT	National Research & Innovation Programme	4	3
NO	User-driven Research based Innovation (BIA), Brukerstyrt Innovasjonsarena	4	3
CZ	Education for competitiveness	1	4
CY	Research for Enterprises; Action I: New Products and Services, Action II: Collective Research	3	4
IT	Regional Announcement: Law 236/03, year 2000. D.G. Education, Training and Work.	2a	4
IE	Workplace Innovation Fund	2a	4
EL	Support to Companies for Hiring Highly Qualified Scientific Staff	2b	4
IE	Graduates 4 International Growth (G4IG) Company Information	2b	4
IE	Training Networks Programme (TNP)	2b	4
IT	Jobs Placement in Palermo	2b	4
UK	Coaching for High Growth	2b	4
EL	Support of Employment of Research Staff in Enterprises	2b	4
ES	Impiva	2b	4
IE	Lean Business Offer	2b	4
SI	Direct Funding for Joint Development and Investment Projects (RIP)	2b	4
UK	Innovation, Advice and Guidance Program (IAG)	2b	4
UK	Scottish Enterprise, Innovation Support Service	2b	4
PL	Human Capital Operational Programme; Measure 2.1.1. Human Capital Development in Enterprises	1	5
BG	Innovation and Technolgy Transfer Programme	3	5
LT	Inogeb LT-1	3	5
SK	Promoting Co-operation between Universities, the Slovak Academy of Sciences and the Business Environment	3	5
BG	National Innovation Fund	4	5
HU	National Technological Program	4	5
LV	Work Youth Practice	2b	5

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Quantitative aspects and descriptive questions:

- **General information**

Title of the programme, acronym of the programme, duration of the programme, responsibility for the programme, policy background, budget of the programme, funding etc.

- **Focus of the programme**

Geographical focus, aim of the programme (promote organisational development, organisational learning, develop skills/human capital etc.), types of collaboration, types of project funding etc.

- **Output of the programmes**

Are the effects and impacts measured during the programme?

Is there any monitoring or evaluation process foreseen to research the effects and impact of the programme concerning the KSC development?

Are there monitoring or evaluation processes/methods concerning the return on investment and the programme success?

- **Questions addressing KSC development**

How is the development of knowledge, skills and competences (KSC development) addressed in the programme? (addressed explicitly, implicitly etc.)

Human capital	Structural capital	Relational capital
Domain-related knowledge and skills	Corporate culture	Relations to customers
Practical experience	Cooperation and communication within the organisation	Relations to suppliers
Social competences	Equipment regarding information technology, software, and other technological systems	Relations to investors/shareholders
Motivation	Knowledge transfer and storage	External cooperation with educational institutions
Leadership skills	R&D infrastructure for product innovation	External knowledge acquisition
Corporate education and personnel development	R&D infrastructure for process innovation	Engagement in associations, Engagement in Corporate Social Responsibility (CSR)
	Structural organisation	Image/Brand
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- When designing the programme, were any effects planned or expected regarding ‘...’ (e.g. domain- related knowledge and skills, or any other element from *Table 1*)?
- If yes, how was the expected magnitude of the effect (to be rated on a scale from 0 to 3, as indicated in *Table 2*)?
- How was the magnitude of the effect actually observed in the operation, monitoring or evaluation of the programme (to be rated on a scale from -3 to +3 ⁽¹⁾, as indicated in *Table 3*)?
- Please describe the actual effects (qualitative description, examples).
- Are any effects expected for the future? If yes, which kinds of effects (qualitative description)?
- Were the actual effects single occurrences, or did they have more sustainable impacts on the respective organisations/companies, enduring over some time?

No effects	Small effects	Medium effects	Large effects
0	1	2	3

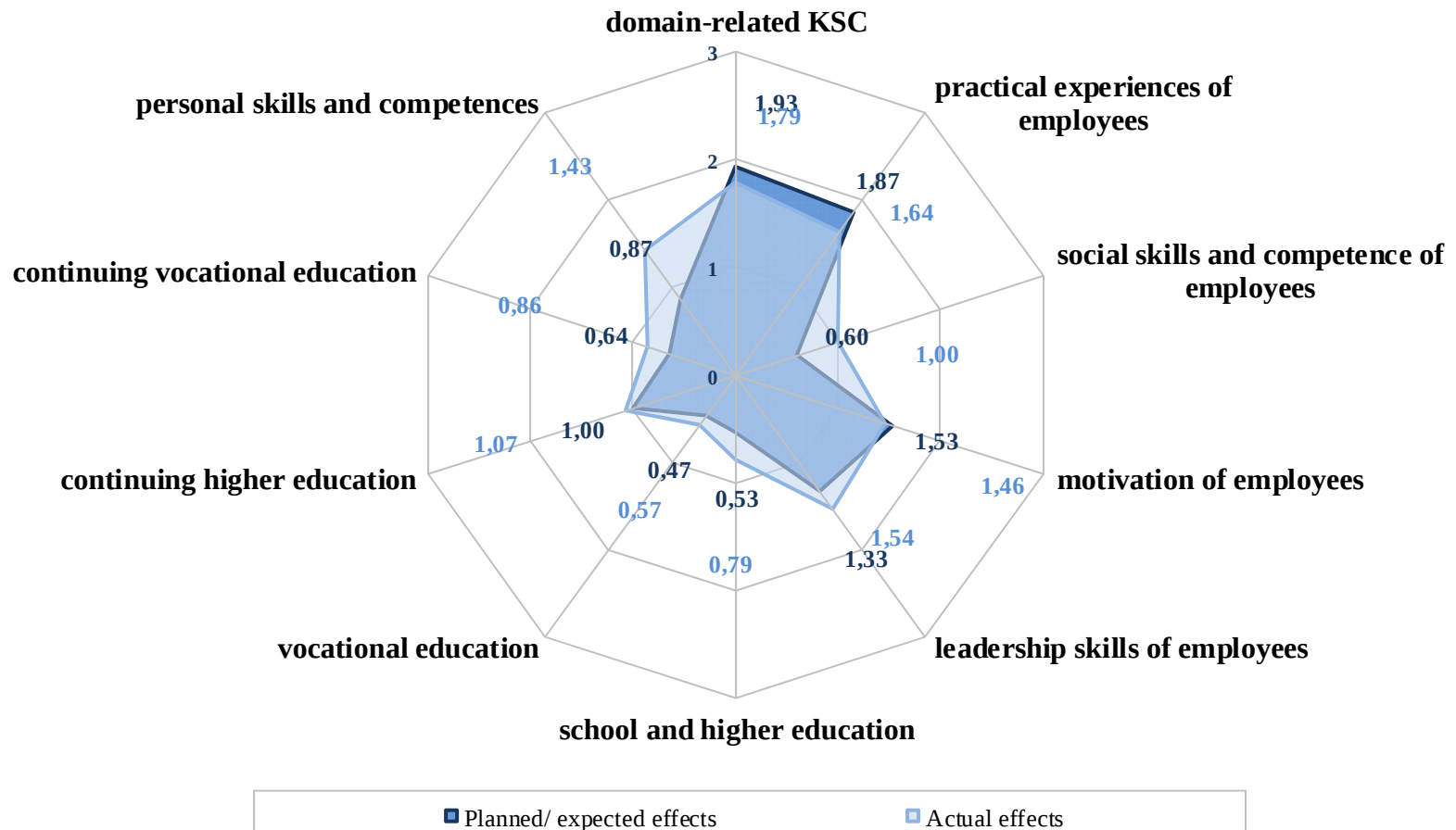
Table 2: Scale for assessing expected effects

Negative effects				Positive effects		
large	medium	small	No effect	small	medium	large
-3	-2	-1	0	1	2	3

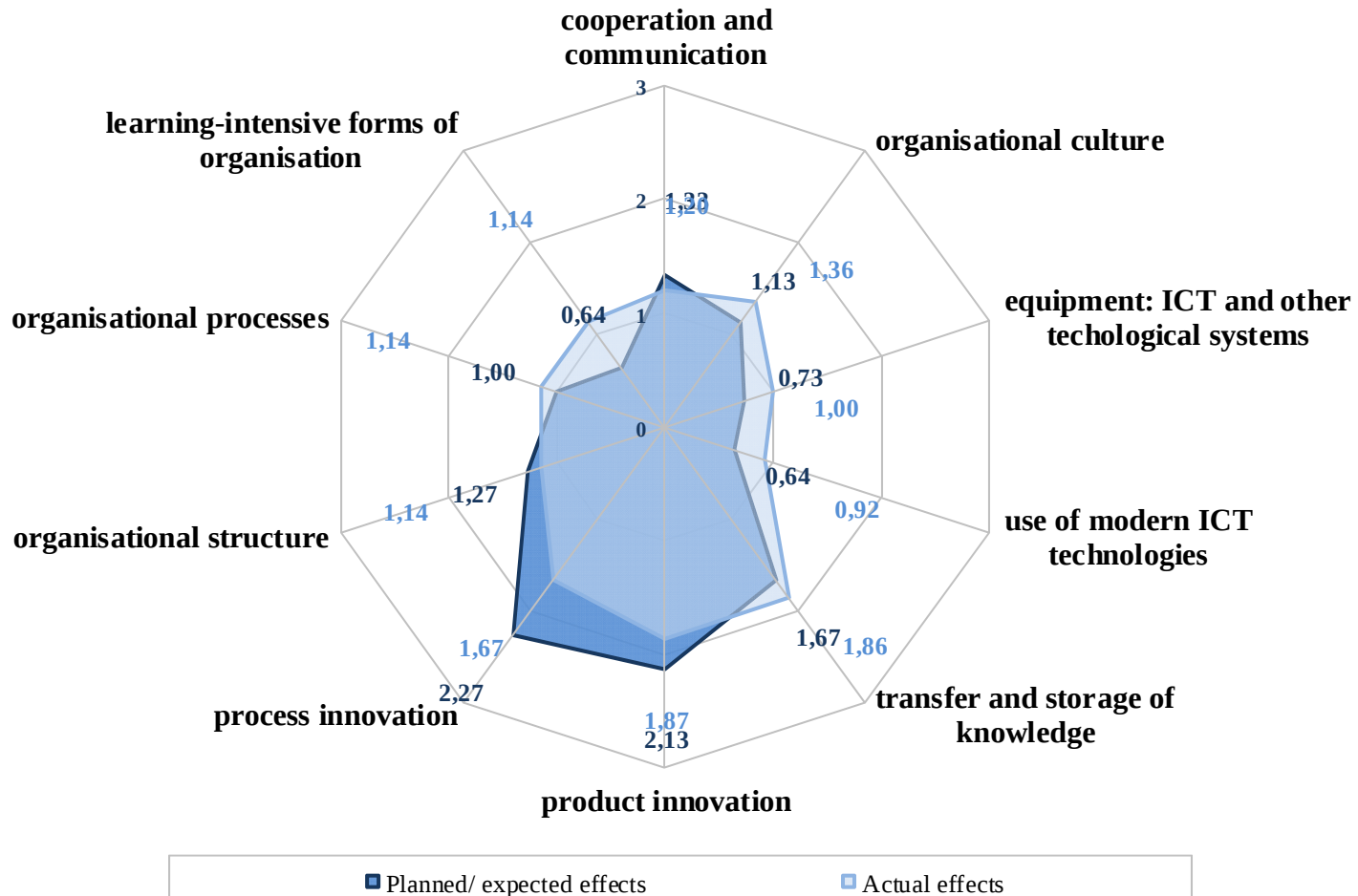
Table 3: Scale for assessing actual effects

⁽¹⁾ The negative part of the scale was introduced to allow for the possibility of detrimental effects of the respective programmes, e.g. eliminating possibilities of skill development by certain organisational or technological innovations.

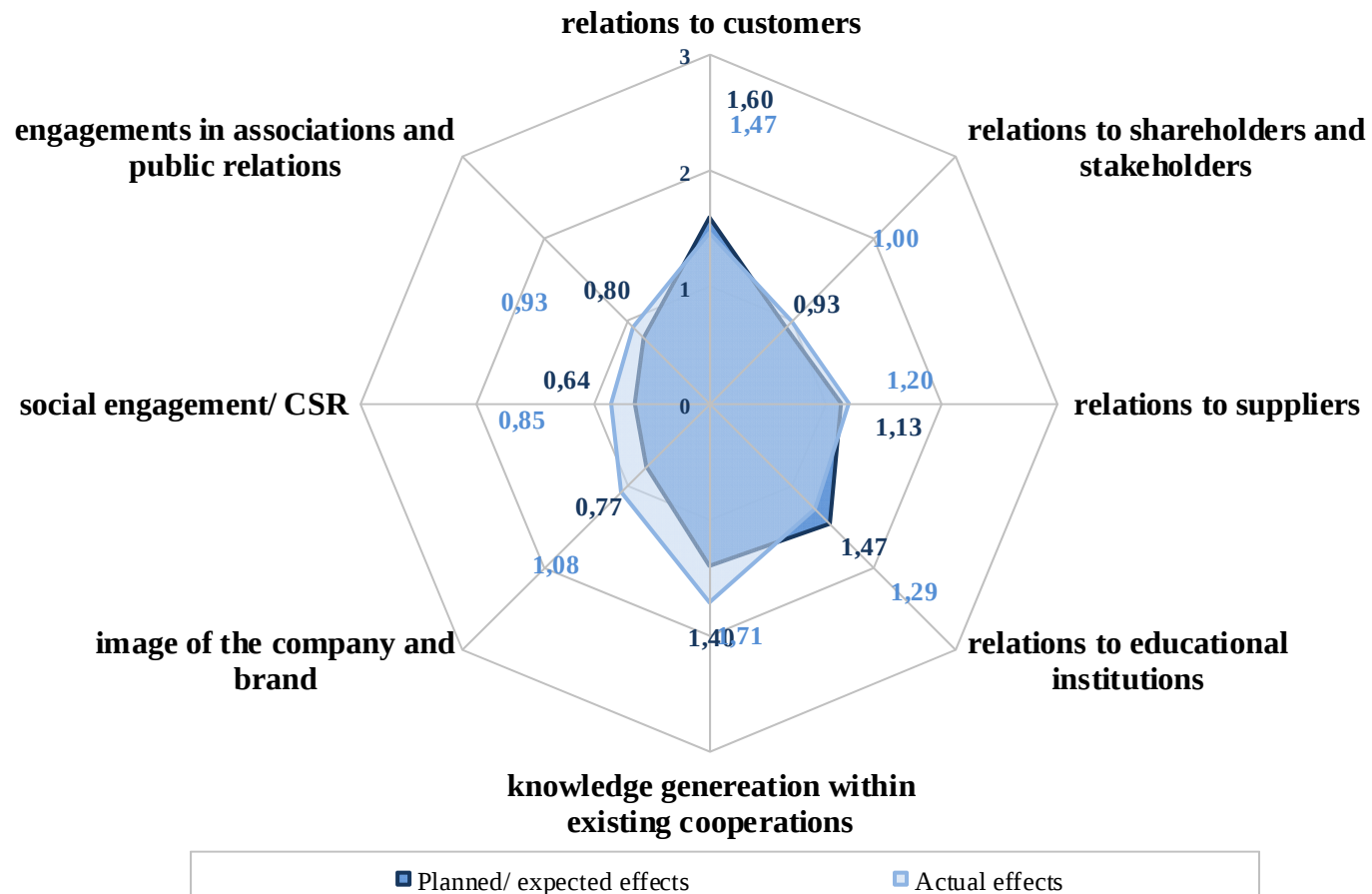
Expected and actual effects - human capital type 2b



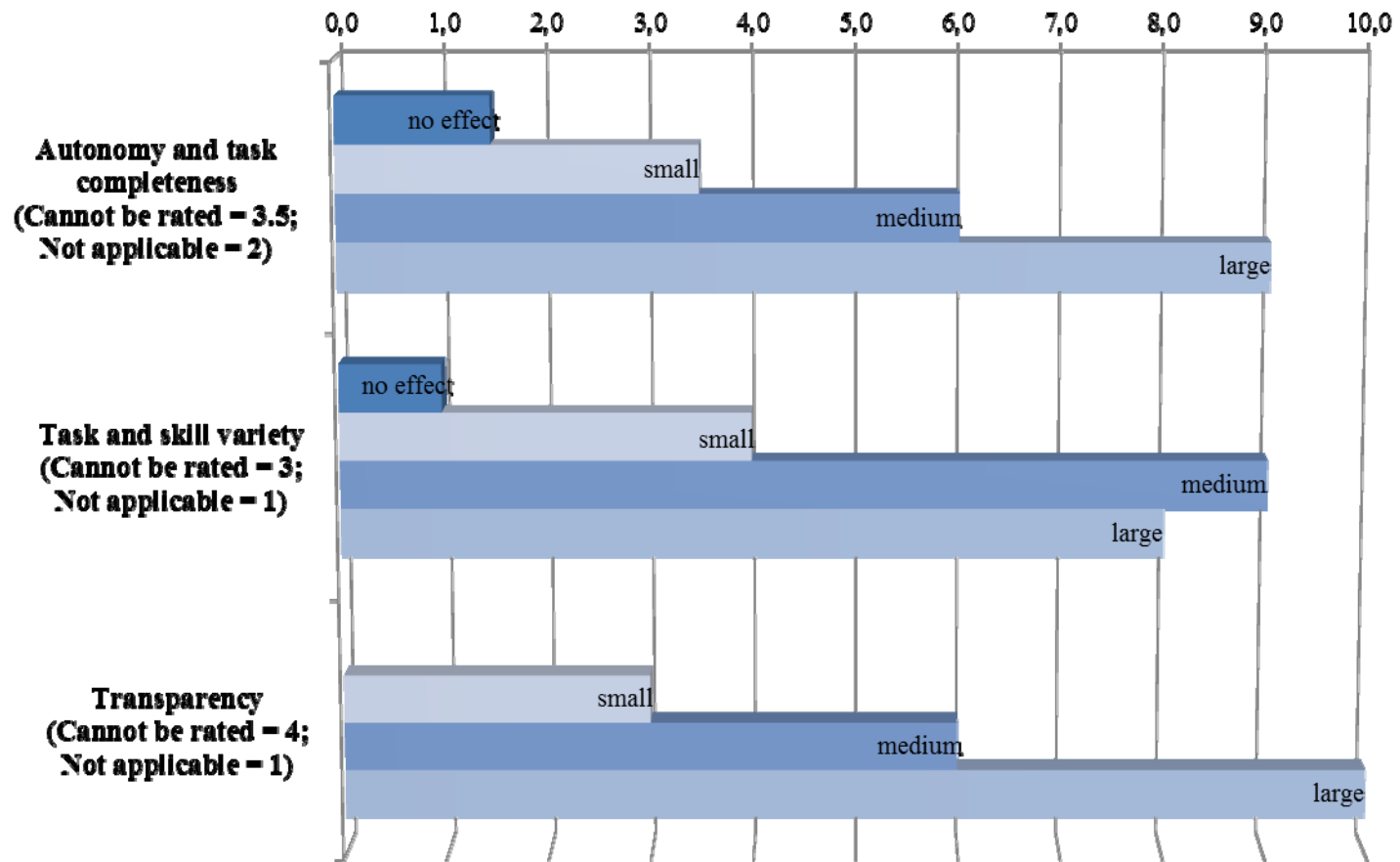
Expected and actual effects - structural capital type 2b



Expected and actual effects - relational capital
type 2b



Probably effects on...



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- Relations between work organisation, workplace learning and innovation can be expected theoretically, and found empirically
- Workplace organisation and workplace learning are related to innovation (almost) as closely as well-established predictors of innovation performance
- Governments design and fund programmes addressing human, structural and relational capital as determinants of corporate innovative ability
- There are generally few programmes type 2a, focussing on workplace organisation, work design, and workplace learning
- Countries differing in organisational and learning cultures, and innovative performance, use similar sets of programme types, but with some differences in distribution, focus and emphasis between these types

- Most programmes address all three dimensions of intellectual capital, but with obvious differences in focus and emphasis
- Some core impact dimensions, like infrastructure for product and process innovation, and organisational structures, are highly emphasised, but difficult to achieve
- There are unintended / unexpected effects in several impact dimensions, like corporate culture, image of the company/brand, and learning orientation of work organisation
- Programme managers / owners assess their programmes as having moderate to large impacts on core dimensions of the learning orientation of workplace organisation and design

Thank you