

Sources of Productivity Growth I: Pandemia and Lessons from Globalinto Intangibles Survey

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Positioning of Globalinto Survey among other Intangible Assets (IAs) Surveys

The Globalinto Survey adds to the existing studies by:

- a) developing a **more comprehensive view of business' spending on intangible assets** and contributing to the improvement of the micro-level measurement approach,
- b) identifying the **factors influencing these investments**,
- c) assessing their **impact on the enterprise in terms of economic and innovation performance**, and
- d) investigating the **role of relevant policies** and the **impact of the Covid-19 pandemic** on the level of IAs investments.

Business Surveys on intangible assets spending at a glance (1)

Survey	Components of IAs	Measurement Approach	Other issues under Investigation	Sample
ONS (Office for National Statistics), Imperial College London and NESTA (UK), 2009 & 2011	<ul style="list-style-type: none"> • Training (employer funded) • Software • Reputation & Branding • R&D • Design • Organisation / Business Process Improvement 	<ul style="list-style-type: none"> • Expenditures <ul style="list-style-type: none"> ➢ In-house ➢ Purchased • Assets life-lengths / depreciation rates 		<ul style="list-style-type: none"> • 838 UK firms with 10+ employees (Sample Source: firms participated in CIS) • Sample stratified by industry & employment <ul style="list-style-type: none"> ➢ Over-sample to knowledge-intensive industries: Engineering; ICT; Financial Services ➢ Under-sample: Construction; Utilities; Distribution; Accommodation
INAPP and ISTAT (Italy), 2013	<ul style="list-style-type: none"> • Training • Software/Databases • Reputation & Branding • R&D • Design • Organisation and Management & Production Processes Improvement • Other (sector specific) IAs 	<ul style="list-style-type: none"> • Expenditures <ul style="list-style-type: none"> ➢ In-house ➢ Purchased • Assets life-lengths / depreciation rates • Ratio of internal/external use for specific IAs (R&D, Software/Databases, Design) 	<ul style="list-style-type: none"> • Effect of the economic crisis on Intangible Assets Investments 	<ul style="list-style-type: none"> • 10.631 Italian firms with 10+ employees • Sectors: <ul style="list-style-type: none"> ➢ Manufacturing ➢ Services
Innobarometer Survey, 2013	<ul style="list-style-type: none"> • Training • Software • Reputation & Branding • R&D • Design • Organisation / Business Process Improvement 	<ul style="list-style-type: none"> • Expenditures <u>but via qualitative scales</u> <ul style="list-style-type: none"> ➢ In-house ➢ Purchased 	<ul style="list-style-type: none"> • Investments in IAs <ul style="list-style-type: none"> ➢ Expected Benefits ➢ Motivation / Obstacles ➢ Impact ➢ Relation to innovation projects • Innovation 	<ul style="list-style-type: none"> • 11.317 firms with 1+ employees in EU28 and other 8 non-EU countries • Sectors: <ul style="list-style-type: none"> ➢ Manufacturing ➢ Services ➢ Utilities

Business Surveys on intangible assets spending at a glance (2)

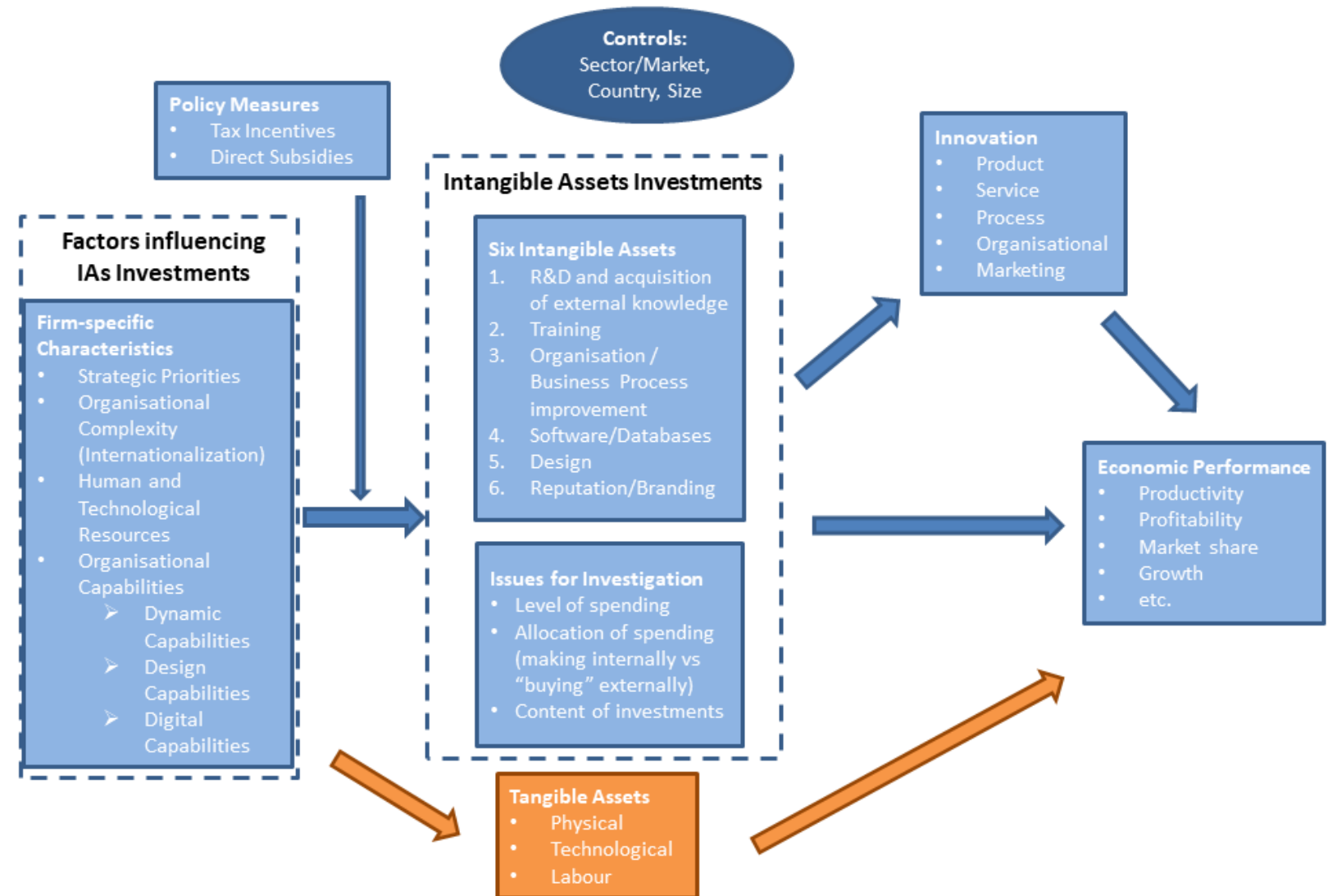
Survey	Components of IAs	Measurement Approach	Other issues under Investigation	Sample
Innobarometer Survey, 2015	<ul style="list-style-type: none"> • Training • Software • Reputation & Branding • R&D • Design • Organisation / Business Process Improvement 	<ul style="list-style-type: none"> • Expenditures <u>but via qualitative scales</u> <ul style="list-style-type: none"> ➤ In-house ➤ Purchased 	<ul style="list-style-type: none"> • Investments in tangibles • The use of design within the firm • Use of innovative manufacturing technologies • Innovation <ul style="list-style-type: none"> ➤ Investments for innovation activities ➤ Innovation performance ➤ Barriers, obstacles and public support for innovation commercialisation ➤ Role of public procurement in innovation development 	<ul style="list-style-type: none"> • 14.118 European firms with 1+ employees in EU28 countries, Switzerland and the United States • Sectors: <ul style="list-style-type: none"> ➤ Manufacturing ➤ Services ➤ Utilities ➤ Construction
European Investment Bank Investment Survey (EIBIS), 2016 onwards (annually)	<ul style="list-style-type: none"> • R&D • ICT • New skills • Organizational improvements 	<ul style="list-style-type: none"> • Decision to invest • Investments intensity 	<ul style="list-style-type: none"> • Tangible investments, • Future investment plans, • Sources of finance, • Financing issues and other challenges-obstacles that businesses face, • Firm performance, e.g. <ul style="list-style-type: none"> ➤ Innovation behaviour 	<ul style="list-style-type: none"> • Approximately 13.300 firms with 5+ employees in EU27, the United Kingdom and, since 2019, in the United States • Sectors: <ul style="list-style-type: none"> ➤ Manufacturing ➤ Services ➤ Construction ➤ Utilities
Globalinto Survey, 11/2020-3/2021	<ul style="list-style-type: none"> • R&D and External knowledge acquisition • Training • Organisation / Business Process Improvement • Software & Databases • Design • Reputation & Branding 	<ul style="list-style-type: none"> • Decision to invest • Investments intensity <ul style="list-style-type: none"> ➤ In-house ➤ Purchased 	<ul style="list-style-type: none"> • Business strategy and export activity • Human & Technological Resources • Dynamic, digital and design capabilities • Firm performance: Innovation and Economic • Policy measures: Tax incentives and direct subsidies • Impact of Covid-19 pandemic on intangible investments, economic performance and digital transformation 	<ul style="list-style-type: none"> • 1.796 firms with 20+ employees (SMEs & Large) in 7 European Countries (Germany, France, UK, Denmark, Greece, Finland and Slovenia) • Sectors: <ul style="list-style-type: none"> ➤ Manufacturing <ul style="list-style-type: none"> ➤ H&MHT ➤ LMT ➤ LT ➤ Services <ul style="list-style-type: none"> ➤ KIS ➤ Less KIS

Surveying business investments in intangible assets is hard, but necessary (Martin and Baybutt, 2021)*

- **An additional challenge** of Globalinto Intangible Survey: The fieldwork progress was significantly affected by the **Covid-19 pandemic**
 - **Many businesses were closed** [e.g., many companies with answering machines informing that company was closed due to Covid-19]
 - **Difficulty to reach the appropriate respondent** due to teleworking [e.g., numerous respondents worked from home, and were only contactable by email]
 - **Lower availability of time** for questionnaire completion [e.g., many businesses reduced staff and opening hours, thus had less time for their usual, day-to-day business responsibilities]
- However, **the timing of the survey allowed the comparison** of IAs investments before (2019) and during the pandemic era (2020)

*IARIW-ESCoE Conference “Measuring Intangible Capitals and their Contribution to Growth”, November 11-12, 2021, RSA House

Conceptual Framework & Valorization of the Survey Results



Valorisation of the Survey research findings

Papers, Book Chapters, and Presentations in Conferences, Workshops, and Seminars

- Papers in a Special Issue of Science and Public Policy (forthcoming), Y. Caloghirou, H. Piekkola, J. Edler, A. Bounfour (guest editors)
- Chapters in the Book based on Globalinto research work entitled: “Measuring intangibles and productivity – a micro, meso and macro perspective” (eds): C. Bloch, A. Protogerou, N. Vonortas) (forthcoming, Routledge)
- Publications in academic journals and Presentations in Conferences, Workshops, and Seminars (authored by members of Globalinto Consortium)

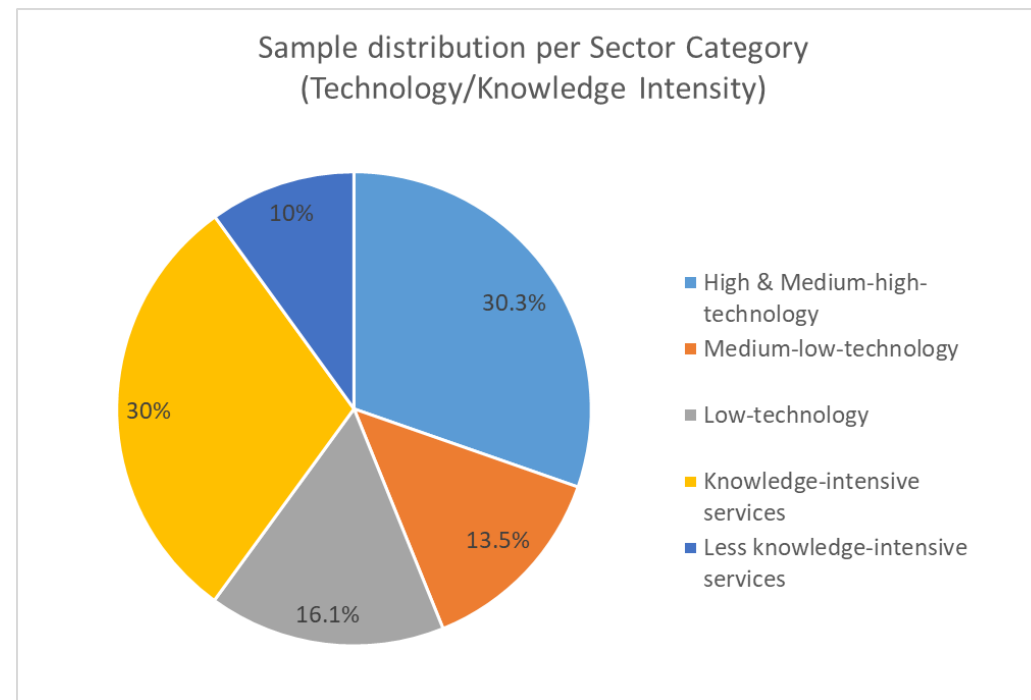
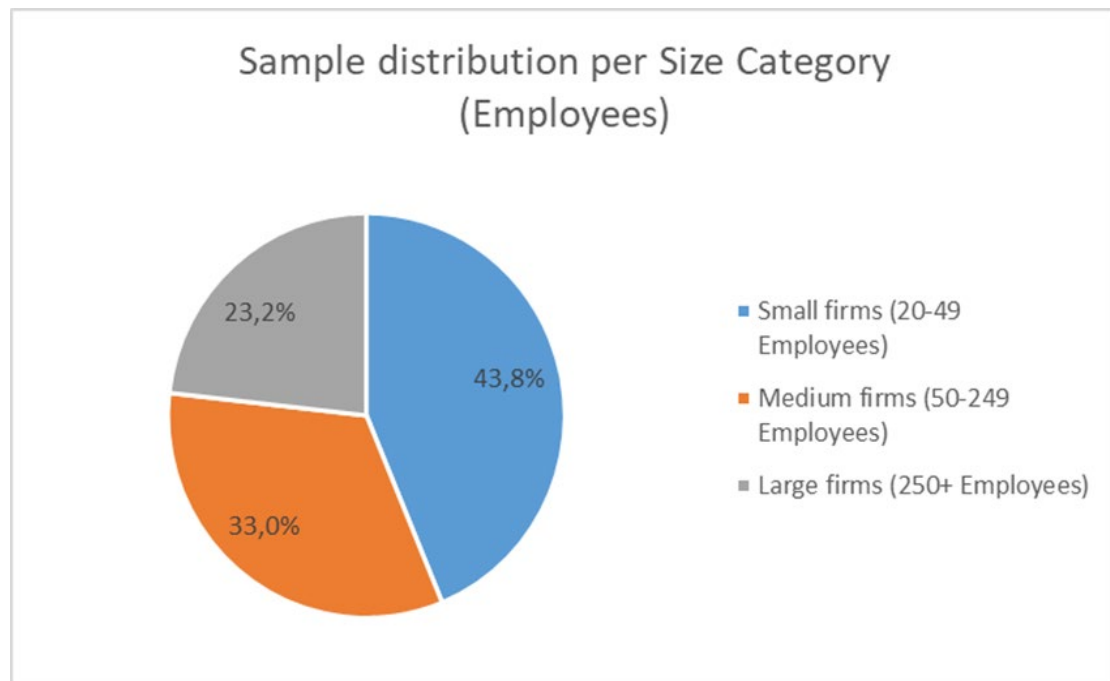
Potential Impact of Survey Findings

- **Academic Community**
 - Providing insights about the role of intangibles in firms' operation and performance, as well as the internal and external factors that influence the existence and intensity of these investments (business strategy and organisational characteristics, competition intensity, policy measures etc.)
- **Surveys for Intangible Assets**
 - Methodological and empirical contribution
- **Business firms**
 - Informing strategic decisions on the appropriate mix of IAs investments and developing specific organisational capabilities so as to improve innovation and long-term economic performance.
- **Public administration and other public organizations**
 - Informing strategic decisions on the appropriate mix of IAs investments and developing specific organisational capabilities so as to improve public organisations efficiency, effectiveness and accountability.
- **Public Policies**
 - Informing policy formulation (system of policies & mix of measures diversified per sector, firm type etc.) at a EU and national level to support IAs development and effective use.
- **Civil Society**

Main Findings and Key Messages

Globalinto Survey Sample

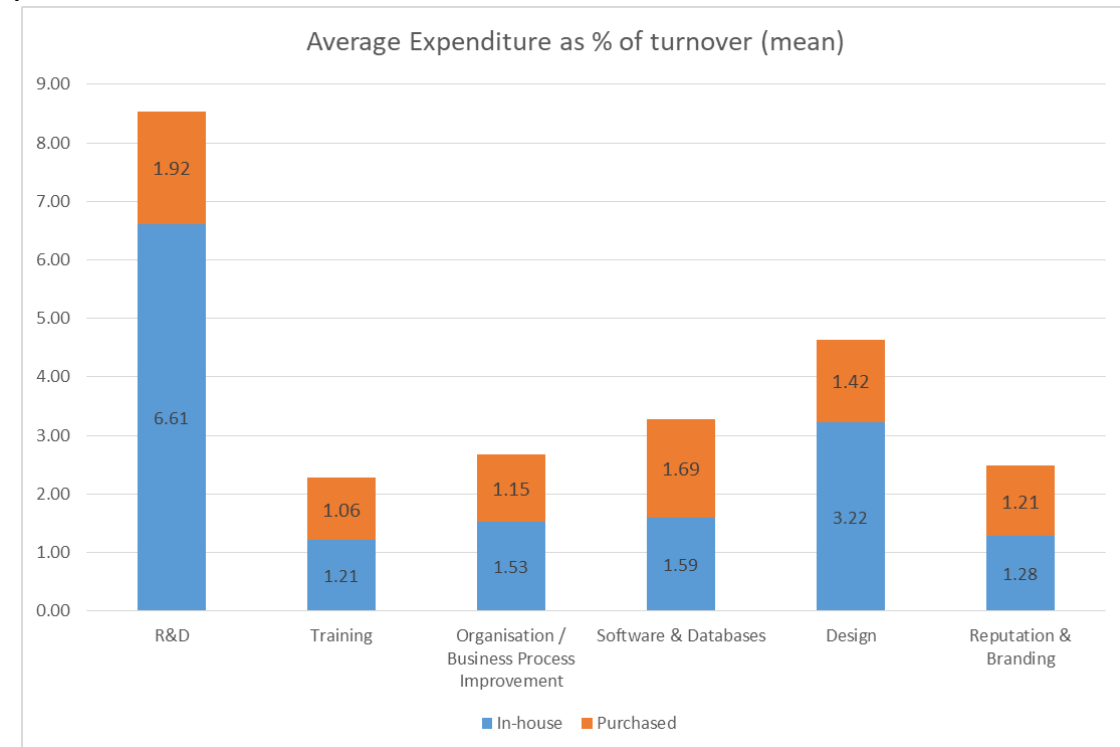
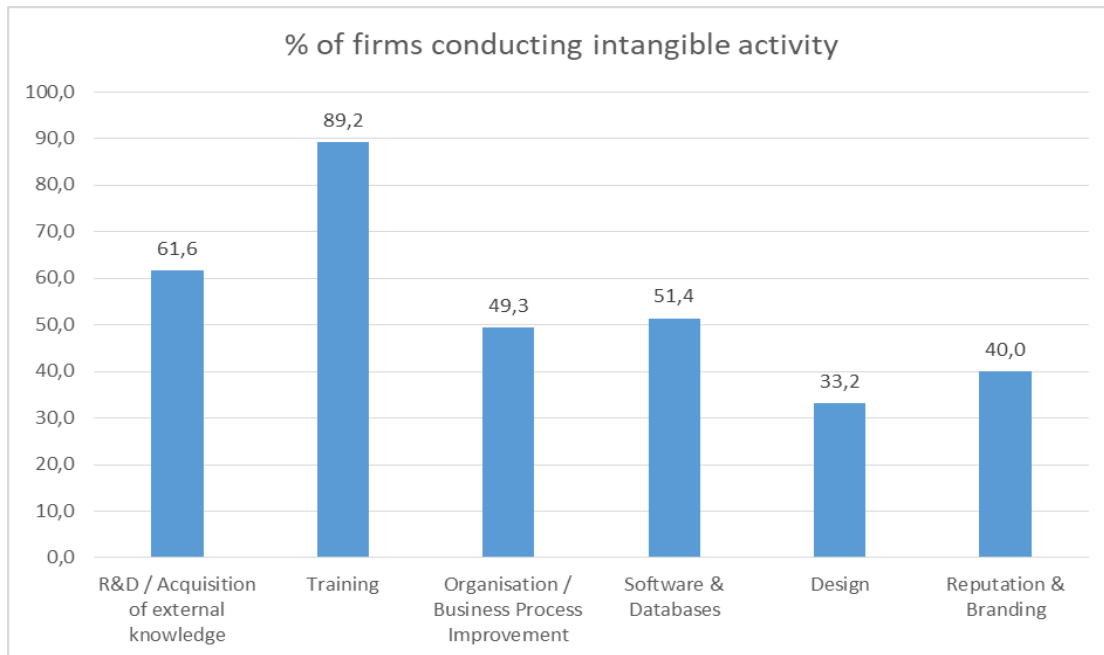
- **1796 firms from 7 Countries** (DE, FR, UK, DK, FI, GR, SI)
- Manufacturing: 60%, Services: 40%
- 60% are high and medium-high tech manufacturing firms and knowledge-intensive services
- Almost two thirds (63.6%) have less than 100 full-time employees
- Most firms (56.4%) do not belong to a business group. 7 out of 10 large firms are part of a business group: **Size matters**



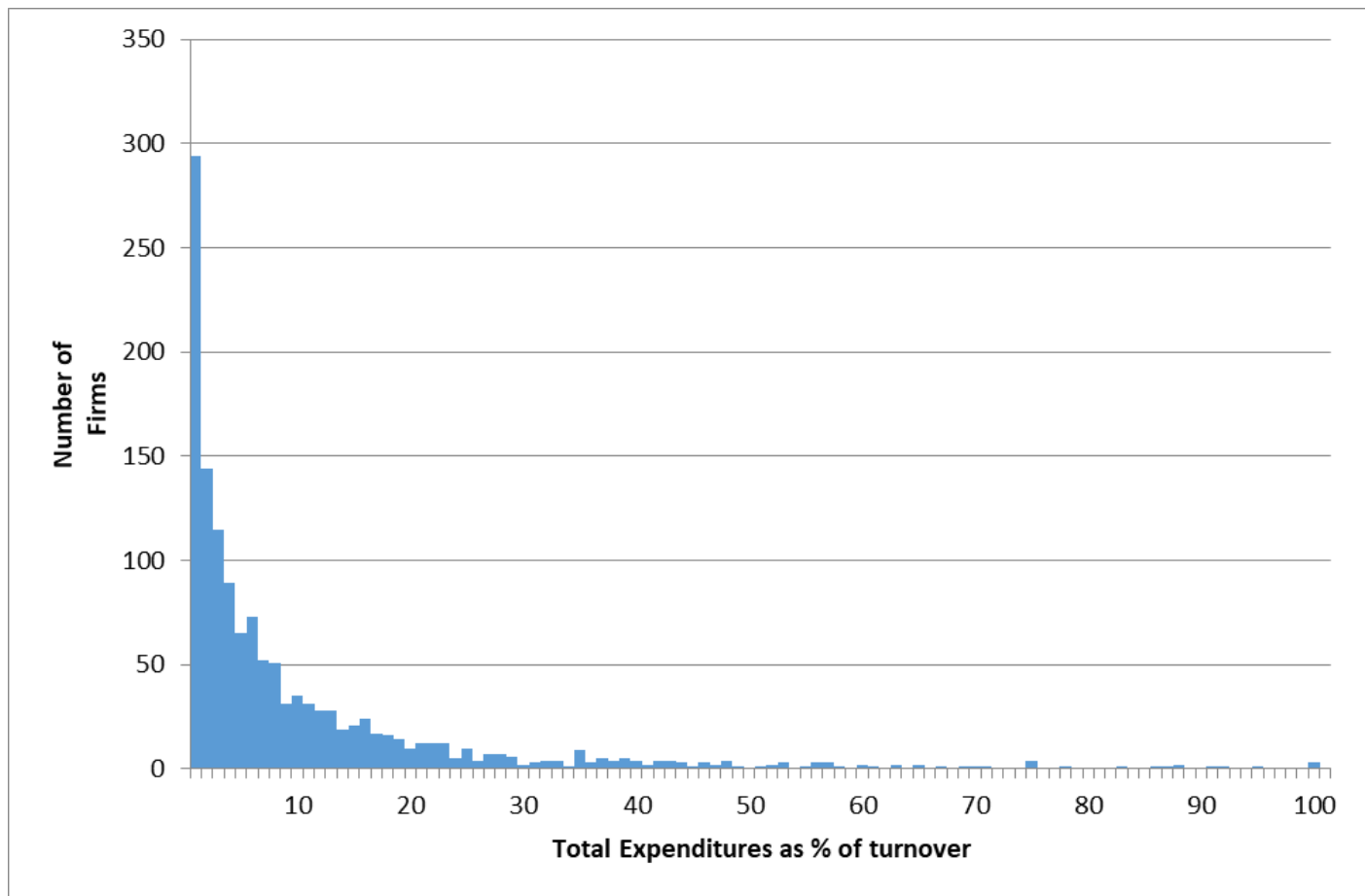
Firms' Intangible activity per asset category

- **9 out of 10 firms** report some **training activity**
- **6 out of 10 firms** spend on **R&D**
- **Half of firms** spend on OBP improvement and Software & Databases
- **4 out of 10 firms** spend on Reputation & Branding
- **1 out of 3 firms** spend on **design activity**
- **Only 65 firms (3.6%)** report **no intangible activity**

- **Size matters:** Larger firms exhibit higher intangible activity
- **2 out of 3 firms** make investments in **3 or more intangible categories**
- **In-house R&D spending** (as % of turnover) prevail followed by in-house design, purchased software and databases, and purchased R&D



Total investment in intangible assets (all IA types): Large heterogeneity of firms



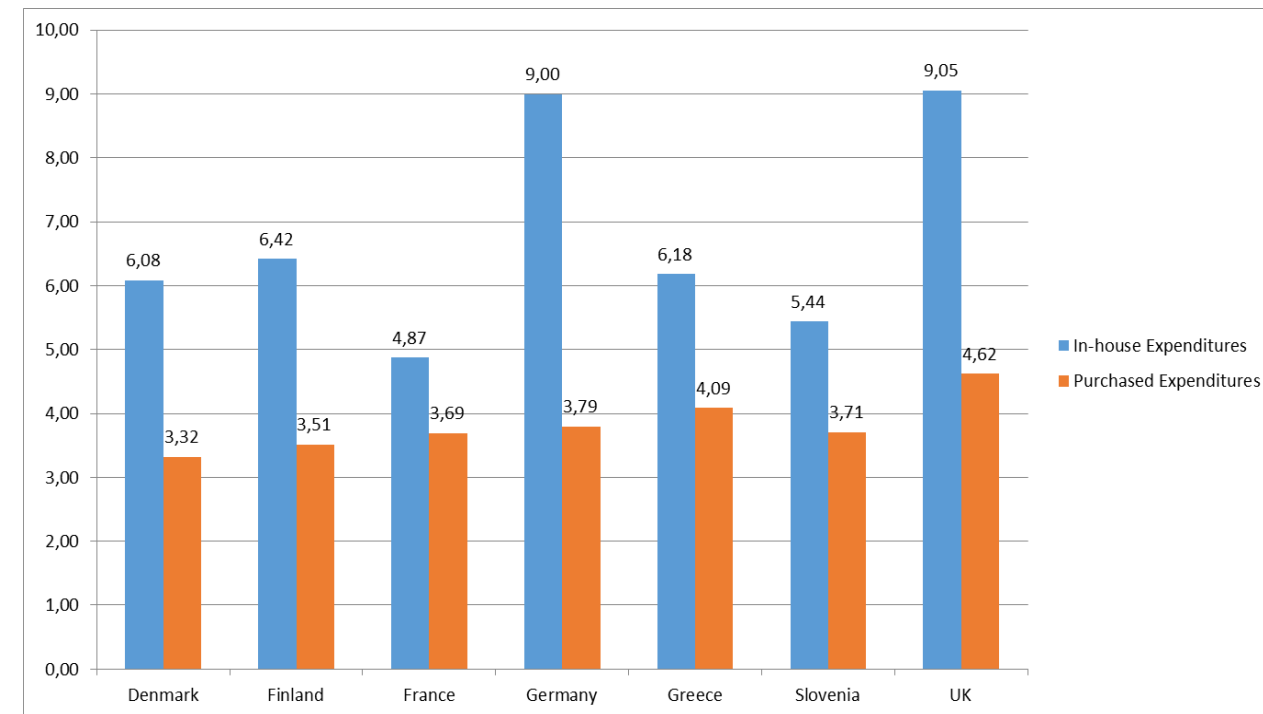
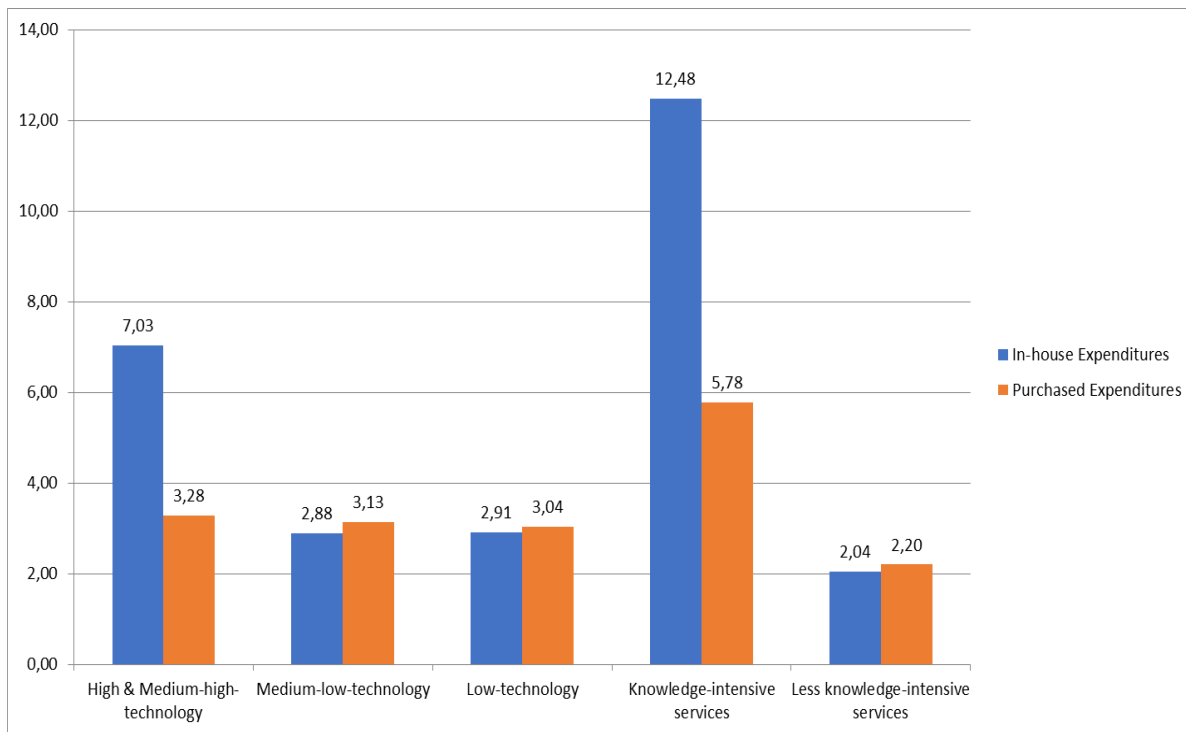
Spending (as % of turnover)	Firms (%)
0 - 1%	21.8
1 - 5%	30.5
5- 15%	27.3
15 - 25%	9.8
25 - 50%	6.8
> 50%	3.8

Valid N = 1351

➤ **445 firms** could not estimate their intangible spending in at least one of the asset categories

In-house and purchased average expenditures as percentage of turnover per sector and country (Valid N = 1351)

- **Sector knowledge intensity matters:** Knowledge-intensive services (KIS) and High- and medium-high (H&MHT) manufacturing firms invest more
- Firms in **high knowledge/technology-intensive** sectors make **much higher in-house investments** in intangibles
- **Large countries invest more** (France appears to be an exception)
- Among small countries, DK and FI invest more
- **In-house investments prevail at the country level**

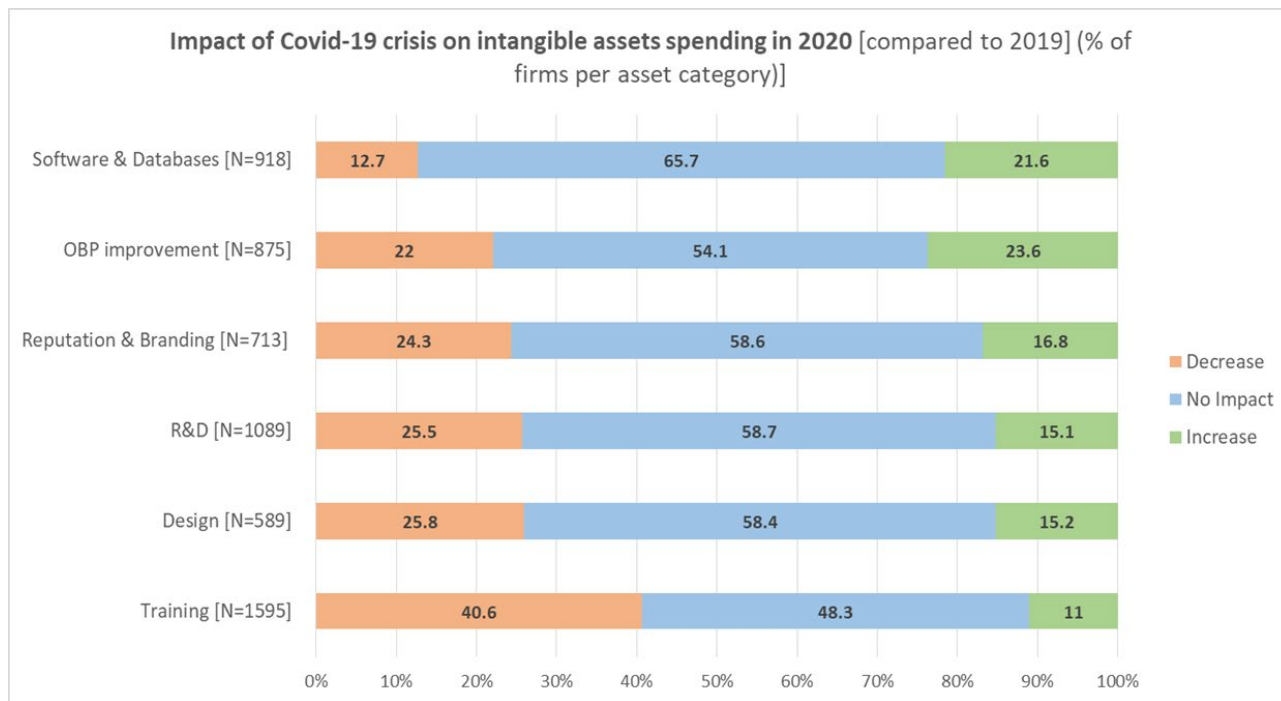


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Impact of Covid-19 crisis on IAs spending in 2020 (compared to 2019)

- Most firms reported “no impact” on IAs spending across types
- Training is most affected by Covid-19 followed by design and R&D.
- Higher number of firms reported “increase” of expenditures in Software & Databases and OBP improvement than “decrease”

- The level of spending decrease is quite higher than the level of increase across categories



IA type	Covid-19 impact on spending (2020)	N	% of Firms	N	% of Change (Mean)	% of Change (Median)
R&D	Decrease	280	25,7	263	-34,8%	-30%
	No Impact	643	59,0			
	Increase	166	15,2	161	35,8%	15%
Training	Decrease	648	40,6	609	-46,7%	-50%
	No Impact	772	48,4			
	Increase	175	11,0	162	29,8%	10%
Organisation	Decrease	193	22,1	177	-43,4%	-50%
	No Impact	475	54,3			
	Increase	207	23,7	188	39,5%	15%
Software & Databases	Decrease	117	12,7	114	-46,5%	-50%
	No Impact	603	65,7			
	Increase	198	21,6	185	29,6%	10%
Design	Decrease	153	26,0	143	-42,3%	-40%
	No Impact	346	58,7			
	Increase	90	15,3	85	36,5%	20%
Reputation & Branding	Decrease	174	24,4	165	-40,7%	-40%
	No Impact	419	58,8			
	Increase	120	16,8	108	26%	13 10%

Covid-19 and digital transformation

- The share of **firms that renewed to high extent their business processes and practices to use more efficiently ICTs (27,3%)** is somewhat **higher than firms that increased their spending in ICT infrastructure (23,5%)**.
 - **Service firms have higher percentages (28,6% and 31,7%)** than manufacturing firms in both issues (20,1% and 24,3%).
- Almost **4 out of 10 firms** sees **Covid-19 crisis as an opportunity** to accelerate their digital transformation
 - **The share of firms in services (47,6%)** is much higher than firms in manufacturing (32%)
- **1 out of 4 firms** sees **Covid-19 crisis as a threat to survive** in the short term
 - KIS are characterized by the lowest percentage (18,3%)
- **2 out of 3 firms** refer that they **will sustain the changes implemented** (in business processes and practices) to adapt and respond to the Covid-19 challenges in the long run

Covid-19 impact on Economic Performance in 2020 (compared to 2019)

- Firms (%) that invest in multiple intangibles' categories were **less affected by Covid-19 pandemic in terms of economic performance**, especially in terms of profit margin and employment

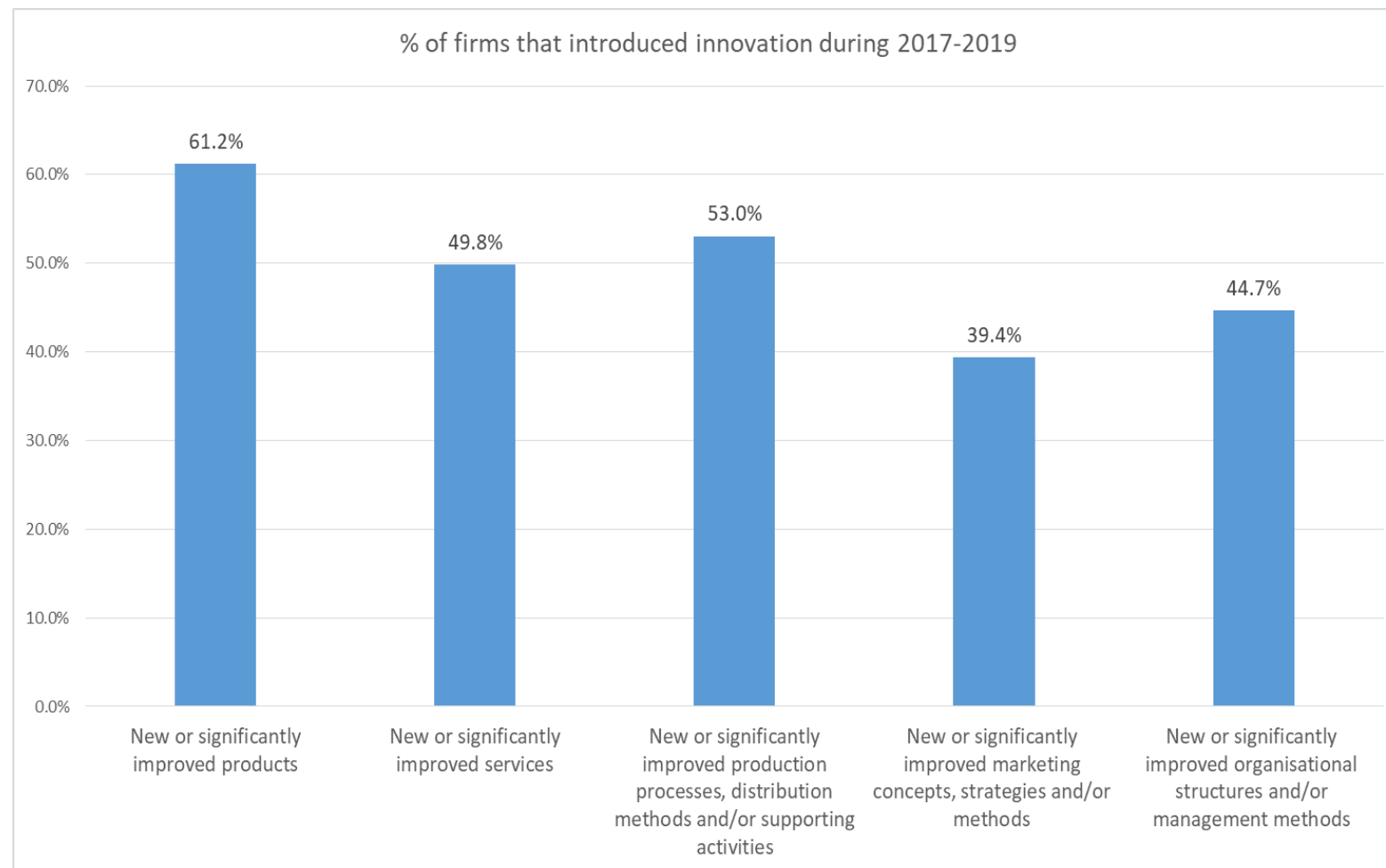
	Covid-19 impact on performance	Total Sample	Number of intangible categories						
			0	1	2	3	4	5	6
Turnover	Decrease	53.9	52.3	58.7	58.3	56.4	52.7	48.1	48.8
	No Impact	25.9	26.2	24.6	22.8	27	24.6	30.9	23.2
	Increase	20.2	21.5	16.8	18.9	16.6	22.8	21	28
Profit margin	Decrease	45.6	46.2	44.9	49	50.5	44.7	40.5	37.7
	No Impact	35.1	38.5	34.7	35.9	32.6	33.7	38.2	36.1
	Increase	19.3	15.4	20.5	15.1	16.9	21.6	21.2	26.2
Employment	Decrease	31.4	25	29.7	34.1	31.7	35.7	28.9	24
	No Impact	49.8	62.5	53.3	48.7	52.1	44.9	49	47.2
	Increase	18.8	12.5	17	17.2	16.2	19.4	22.1	28.8
Overall investment	Decrease	32.8	16.9	31.1	33.9	33	35.6	36.6	27.2
	No Impact	49	69.2	51.1	53.4	48.3	46.7	42.8	43.2
	Increase	18.3	13.8	17.8	12.7	18.7	17.7	20.6	29.6

Intangibles investment and innovation

- Following the resource-based view of the firm (Wernerfelt, 1984; Barney, 1991) and the dynamic capabilities perspective (Teece et al, 1997; Teece, 2007, Teece, 2015), we approach and explore intangibles as a portfolio with different possible contributions to the innovation activities of the firms rather than a compact form of knowledge capital.
- A few papers about intangibles have adopted this perspective so far (e.g., Molloy et al. 2011; Arrighetti et al. 2013; Montessoro and Vezzani, 2016).
- To this end, the Globalinto survey enables us to focus on a wider bundle of intangibles and their related investments, i.e., to consider the intangibles heterogeneity and complexity.

Innovation Performance

- Most firms (over 61%) are **product innovators**
- **53% of firms** have introduced a **process innovation** and **50%** of them a **service innovation.**
- **Organizational innovation** follows with **44.7%**, whereas **marketing innovation** exhibits the **lowest percentage (39.4%)**
- **11.5% of firms** introduced **all innovation types**
- **12.4% did not introduce** any innovation
- **Size matters mainly for product and process innovation**



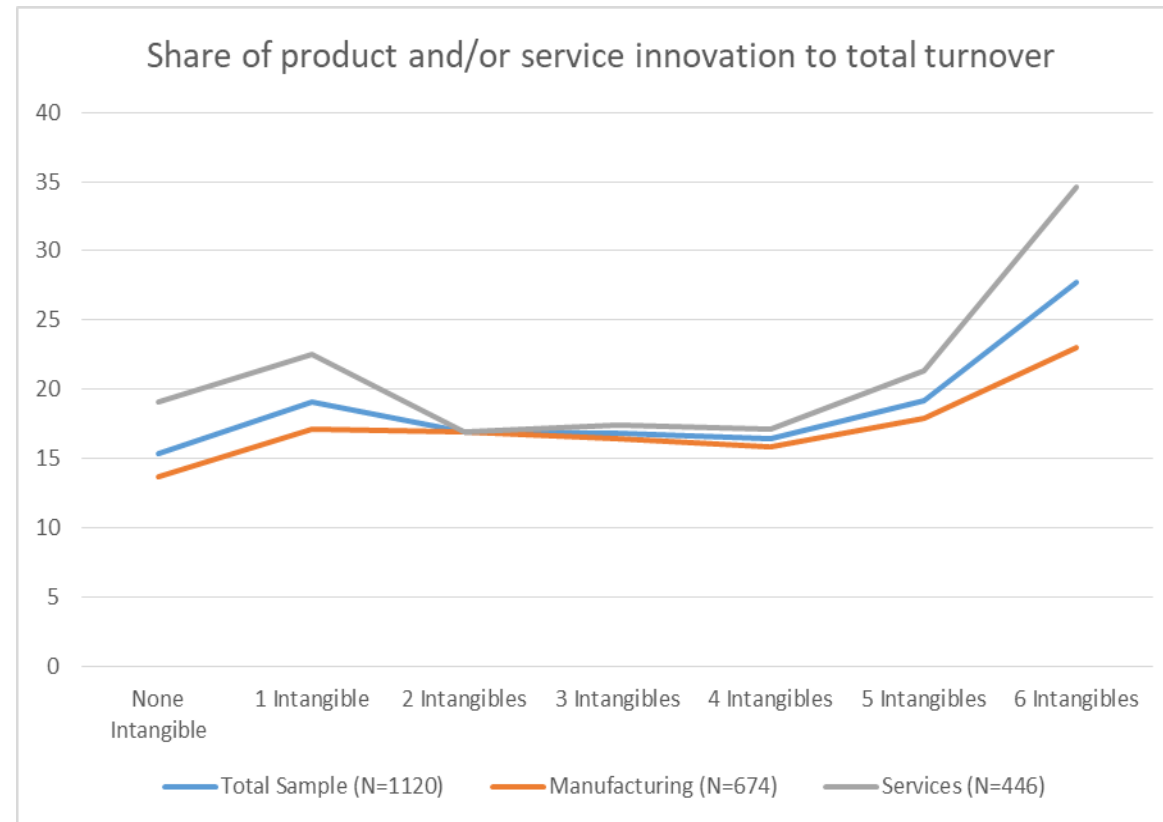
Covid 19 impact: Intangible assets spending (2020) and innovation breadth

During the Covid-19 pandemic (in the course of 2020), those **firms that are more innovative** (in terms of breadth of innovation) **were able to maintain and or increase their intangibles spending**, especially in terms of organization and business process improvement and software and databases.

	Covid-19 impact on spending (2020)	Total Sample	No Innovation	One Innovation Type	Two Innovation Types	Three Innovation Types	Four Innovation Types	Five Innovation Types
R&D and/or External knowledge acquisition (N=1089)	Decrease	25.7	30	21.9	25.5	23	28.1	27.7
	No Impact	59	63.3	66.4	61.4	59	54.4	54.1
	Increase	15.2	6.7	11.6	13.1	18	17.5	18.2
Training (N=1595)	Decrease	40.6	40	42.5	43	39.5	42	34
	No Impact	48.4	49	47.6	47	50.6	47.5	49.2
	Increase	11	11.1	9.9	10	9.9	10.5	16.8
Organization & Business Process Improvement (N=875)	Decrease	22.1	25.4	21.7	24.2	21.3	21.9	19
	No Impact	54.3	54	62.5	55.4	58.4	48.6	46.8
	Increase	23.7	20.6	15.8	20.4	20.3	29.5	34.1
Software & Databases (N=918)	Decrease	12.7	10.3	12.5	13.2	13.5	15.4	9.2
	No Impact	65.7	70.6	71.9	65.5	66.8	58.3	65.3
	Increase	21.6	19.1	15.6	21.3	19.7	26.3	25.5
Design (N=589)	Decrease	26	41.2	22.1	30	18.8	28.8	24
	No Impact	58.7	58.8	66.2	57.1	63.2	55.1	54.2
	Increase	15.3	0	11.8	12.9	18.1	16.1	21.9
Reputation & Branding (N=713)	Decrease	24.4	25	36.8	25.2	24.2	20.8	20.8
	No Impact	58.8	64.3	52.6	59.7	56.2	64.9	53.3
	Increase	16.8	10.7	10.5	15.1	19.6	14.3	25.8

Firms that invest in multiple intangibles' categories report a higher innovative activity

Number of intangible categories	Share of product and/or service innovation revenues to total turnover		
	Total Sample (N=1120)	Manufact. (N=674)	Services (N=446)
0	15.3	13.7	19.1
1	19.1	17.1	22.5
2	16.9	16.9	16.9
3	16.8	16.4	17.4
4	16.4	15.8	17.1
5	19.2	17.9	21.3
6	27.7	23	34.6
TOTAL	18.2	17.1	19.8



Impact of Intangible Assets on Innovation (probit regressions): Investing in IAs appears to be important for different innovation types

Independent Variables		Product Innovation	Service Innovation	Process Innovation	Marketing Innovation	Organizational Innovation
Control variables	Log (no. of employees)	-0.031	-0.026	0.065***	-0.045*	0.024
	Manufacturing (-) vs Services (+)	-0.103***	0.260***	-0.165***	0.069***	0.051*
	Part of an Enterprise Group	0.023	-0.059**	-0.038	-0.002	-0.047*
	Exports as % of turnover	0.001***	-0.000	-0.001	-0.001	0.000
Investments in Intangible Assets (YES/NO)	In-House R&D	0.227***	0.078***	0.052*	0.096***	0.044
	R&D by external providers	-0.023	0.021	0.011	-0.006	0.023
	External Knowledge acquisition	0.028	0.092***	0.022	0.046	0.088***
	Training (by external organisations)	-0.015	0.024	-0.023	0.031	0.015
	Training (using internal resources)	-0.002	0.068**	0.048*	0.038	0.024
	OBP improvement	0.026	0.073***	0.105***	0.037	0.070***
	Software & Database	0.041*	0.079***	0.055**	0.032	0.007
	Design	0.106***	-0.014	0.054**	0.079***	0.032
	Reputation & Branding	0.103***	0.083***	0.053**	0.182***	0.058**
Country Dummies	<i>Included</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>	<i>Included</i>	
No. of Observations	1648	1648	1650	1647	1649	
Log likelihood	-959.81164	-998.22147	-1046.067	-996.27308	-1085.5282	
LR(χ^2)	290.09***	287.97***	188.69***	211.80***	89.39***	
Pseudo R²	0.1313	0.1261	0.0827	0.0961	0.0395	

***: p < 0.01, **: p < 0.05,
*: p < 0.1

Impact of Intangible Assets on share of product and/or service innovation revenues to total turnover (tobit regression)

Independent variables	Innovation share to total turnover		
	ALL	Manufacturing	Services
Log (no. of employees)	-3.654***	-0.753	-5.683***
Manufacturing (-) vs Services (+)	1.479		
H&MHT		5.568***	
LMT		-0.199	
KIS			2.345
Part of an Enterprise Group	-1.706	-3.152**	0.011
Exports as % of turnover	0.057***	0.027	0.071*
Sum of Internal Investments	0.284***	0.440***	0.187***
Sum of External Investments	0.099	-0.057	0.122
Country Dummies	<i>Included</i>	<i>Included</i>	<i>Included</i>
<i>No. of Observations</i>	905	548	357
Log likelihood	-3806.36	-2245.74	-1530.57
LR(χ^2)	81.98	68.10	51.46
Pseudo R ²	0.0107	0.0149	0.0165

- **Internal investments in IAs are positively associated with innovation performance** (share of new or significantly improved products and/or services revenues to total turnover)

Concluding remarks (1/5)

- **Large heterogeneity of firms** regarding the existence and intensity of intangible activity
 - A large share of firms (52.3%) have low expenditures (< 5% of turnover) of firms, and a smaller share of firms (20.4%) exhibit high expenditures intensity (>15% of turnover).
- **In-house intangible investments outweigh investments in intangibles purchased from external providers** (Mean: 6.88% vs 3.85%, Median: 2% vs 1.60%).
- **Size matters: Larger firms tend to have higher activity** in all types of IAs, as they:
 - are **better able** than smaller firms to **exploit economies of scale** in IAs accumulation,
 - can be **more effective in protecting their IAs** and have a **greater incentive to invest**, and
 - are **more capable of supporting a greater uncertainty** related to IAs investments.

Concluding remarks (2/5)

- **Sector matters:** Firms operating in technology/knowledge intensive sectors make **higher investments** in IAs having a higher share of **in-house** investments in their intangibles mix.
- In general, **large countries** appear to make higher expenditures than smaller countries, and particularly much higher in-house investments. **Among small countries, Denmark and Finland** follow the same trend.
- For most firms, the **Covid-19 crisis had no impact on the level of intangible spending** in 2020 related to 2019 across asset types.
- **The acceleration of digital transformation by Covid-19 shock is clearer in services** than in manufacturing
- Firms with investments in **multiple intangibles'** categories were **less affected by the Covid-19 pandemic** in terms of **economic performance**.

Concluding remarks (3/5)

- **Investing in IAs appears to be important for different innovation types at the firm level.**
 - **Some types of investments**, such as R&D and especially inhouse R&D activity and Reputation and Branding are **positively associated with a firm's propensity to innovate across all (or almost all) innovation types.**
 - On the other hand, the array/spectrum of **intangible investments that are important** for innovation **may differ according to the nature of the specific innovation type** examined.
 - ❑ For example, **in house R&D, design and reputation and branding** appear to be **important drivers for product innovation**, on the other hand, the propensity for **process innovation** (i.e., to engage or not in process innovation) appears to be associated with investments in **organization and business process improvement, software and databases, design, reputation and branding**, and only marginally with in-house R&D and internal training activities.
- **Firms that develop intangibles internally are more likely to innovate** (across innovation types) compared to firms that acquire intangibles externally. This finding seems to hold true for firms in **both manufacturing and services sectors.**

Concluding remarks (4/5)

- **Internal development** of intangibles is related to the **strategic choice of ‘making’ rather than ‘buying’** intangibles. External development of IAs could pose problems of knowledge fragmentation and issues of coordination and control which could negatively affect innovation performance.
- **Investments in multiple intangibles assets** are associated with firms’ propensity to get involved in **multiple innovation activities** (more innovation types). Intangibles are interdependent, and companies achieve **synergies** by investing in them all.
- During the **Covid-19 pandemic** (in the course of 2020), those **firms that are more innovative** (in terms of breadth of innovation) **were able to maintain and or increase their intangibles spending**, especially in terms of organization and business process improvement and software and databases.

Concluding remarks (5/5)

- Intangible, knowledge capital is the key source of (future) productivity growth (Pikkola et al., 2011, Roth, 2020 and many other). Particularly important in view of **technological change** and ability of firms to adopt and exploit new technologies (e.g. economic competencies).
- Firms should adopt intangibles as inclusive part of their growth strategy and **actively invest** in complementary resources (intangibles, new technology, tangibles).
- Firms should in general be proactive, agile and intangible investments are only one aspect of such behaviour. Such behaviour overall excels (Bavdař and Redek based on Globalinto data, 2022).
- Policy-makers can raise awareness, support investment, but decisions are made in firms. Firm strategy, behaviour is a crucial aspect of future growth and catch-up: **“Making things happen”** (Parker et al., 2010, on proactive behaviour)

Thank you for your attention