Università degli Studi di Padova
Dipartimento di Scienze Economiche e Aziendali "Marco Fanno"

Digital Manufacturing Lab

Report 1
Industry 4.0 in Italian SMEs

October 2017

Research goals

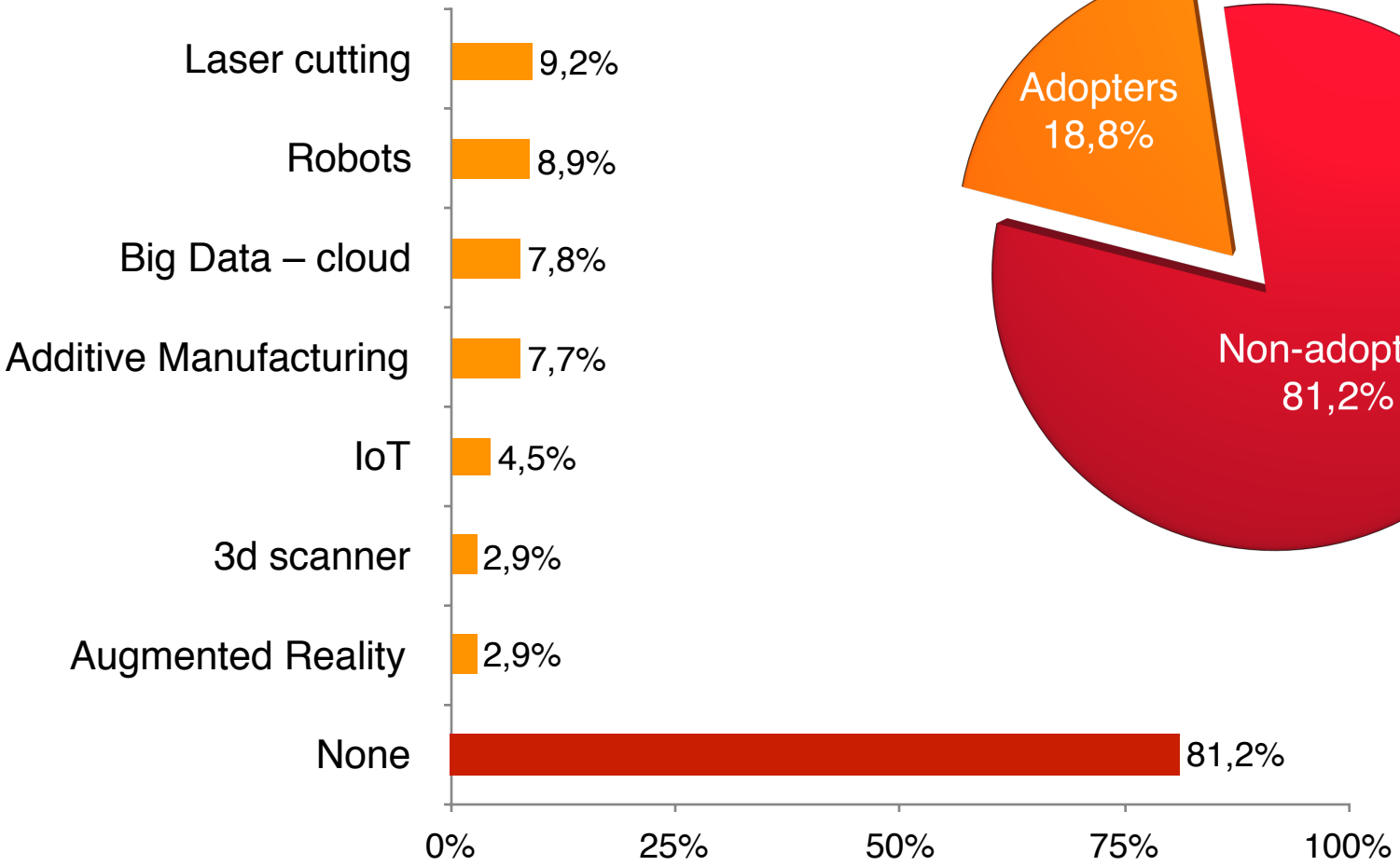
- Fully supported by DSEA funds, the first research promoted by Digital Manufacturing Lab aims at:
  - carrying out a first **map** of degree of Industry 4.0 technological investments
  - understanding **advantages** and **results** achieved in the introduction of such technologies
  - exploring **reasons preventing** firms in the adoption of those technologies
  - deepening analysis on **impacts** concerning **manufacturing organization** at the geographical level (internationalization) as well as in terms of **environmental sustainability**

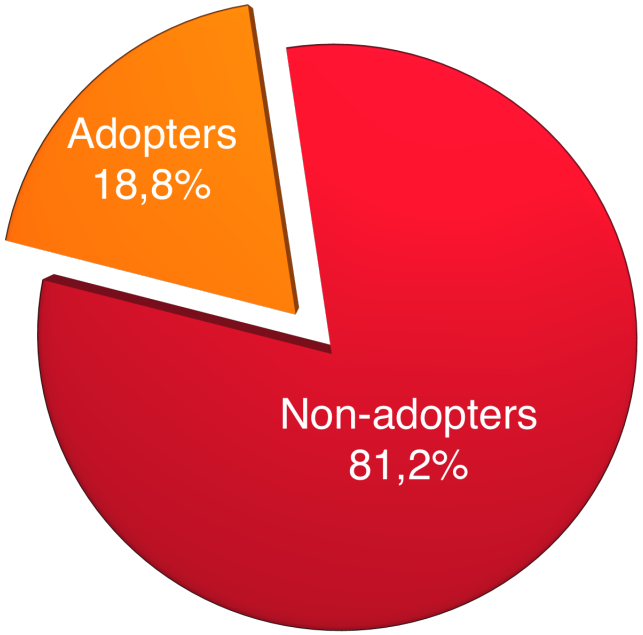
Methodology

- Research on a sample of **5,421 manufacturing firms** selected as follows (source AIDA database):
  - Made in Italy industries (Home furnishing, Mechanics, Fashion)
  - Geographical location: Northern Italy (Piedmont, Lombardy, Veneto, Trentino-Alto Adige, Friuli Venezia Giulia, Emilia-Romagna)
  - Firms with 2015 turnover > 1 Ml € (firms with 2015 turnover < 1Ml € in industries characterized by industrial districts)
- **Mixed method**: CAWI addressing entrepreneurs and Chief Operations Officers (survey) and case studies
- Interviewed firms: **668 firms** (**12.3%** response rate) (May - September 2017)

Adopting firms

Adoption Industry 4.0

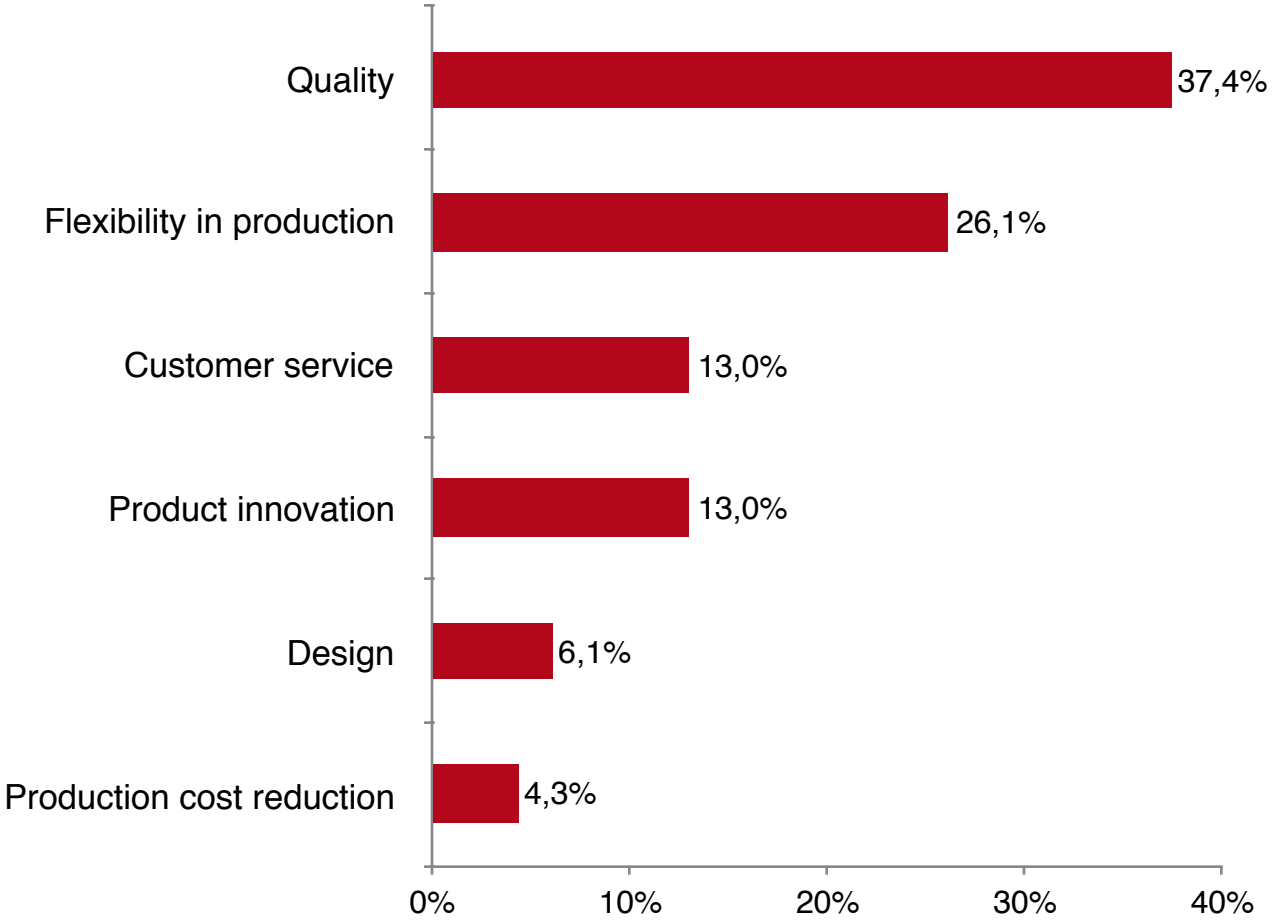




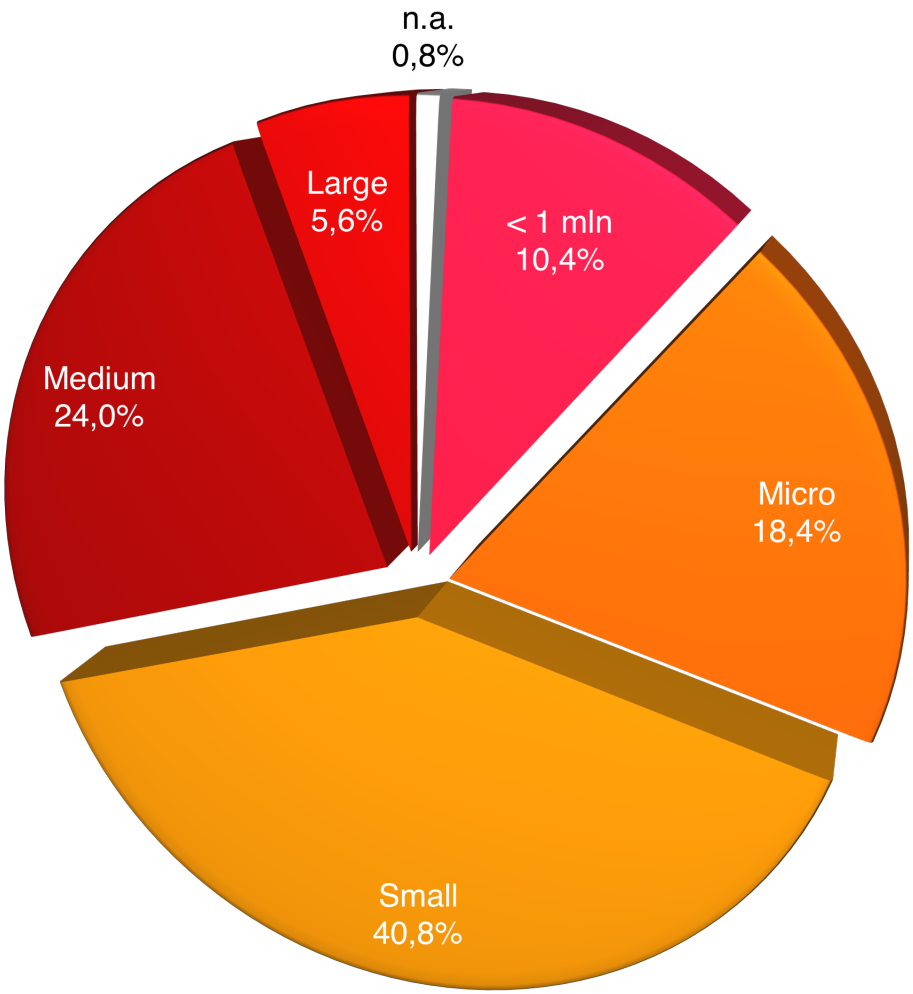
Profile of adopters

Average turnover (2016)	13 Ml Euro
Employees (average 2016)	55.4 total 35 in operation 4.7 in R&D 2.7 in marketing
% Export (average 2016)	44.3% (first market 27.3%)
R&D expenditure (% on turnover)	6%
Main activity	48.7% B2C – 51.3% B2B (average weight 1° client on turnover: 28%)
Production output	48.9% bespoke products 18.7% customized products 32.4% standard products
Location of manufacturing (value)	61.0% Region 33.6% Italy 5.4% Abroad
Location of suppliers (% on total suppliers)	38.3% Region 48.0% Italy 13.7% Abroad

Adopters: first source of competitive advantage

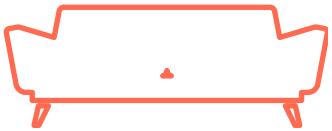


Adoption Industry 4.0 by turnover



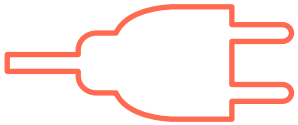
Micro firms (< 2 mil €), small firm (2-10 mil €), medium firm (10-50 mil €), large (> 50 mil €)

Adopters by industries



25.6%

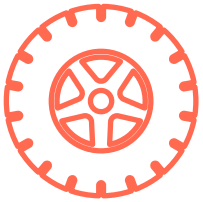
12%



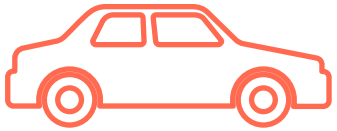
16.8%

9.6%

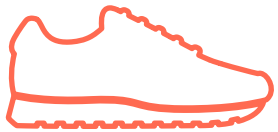
15.2%



4.8%

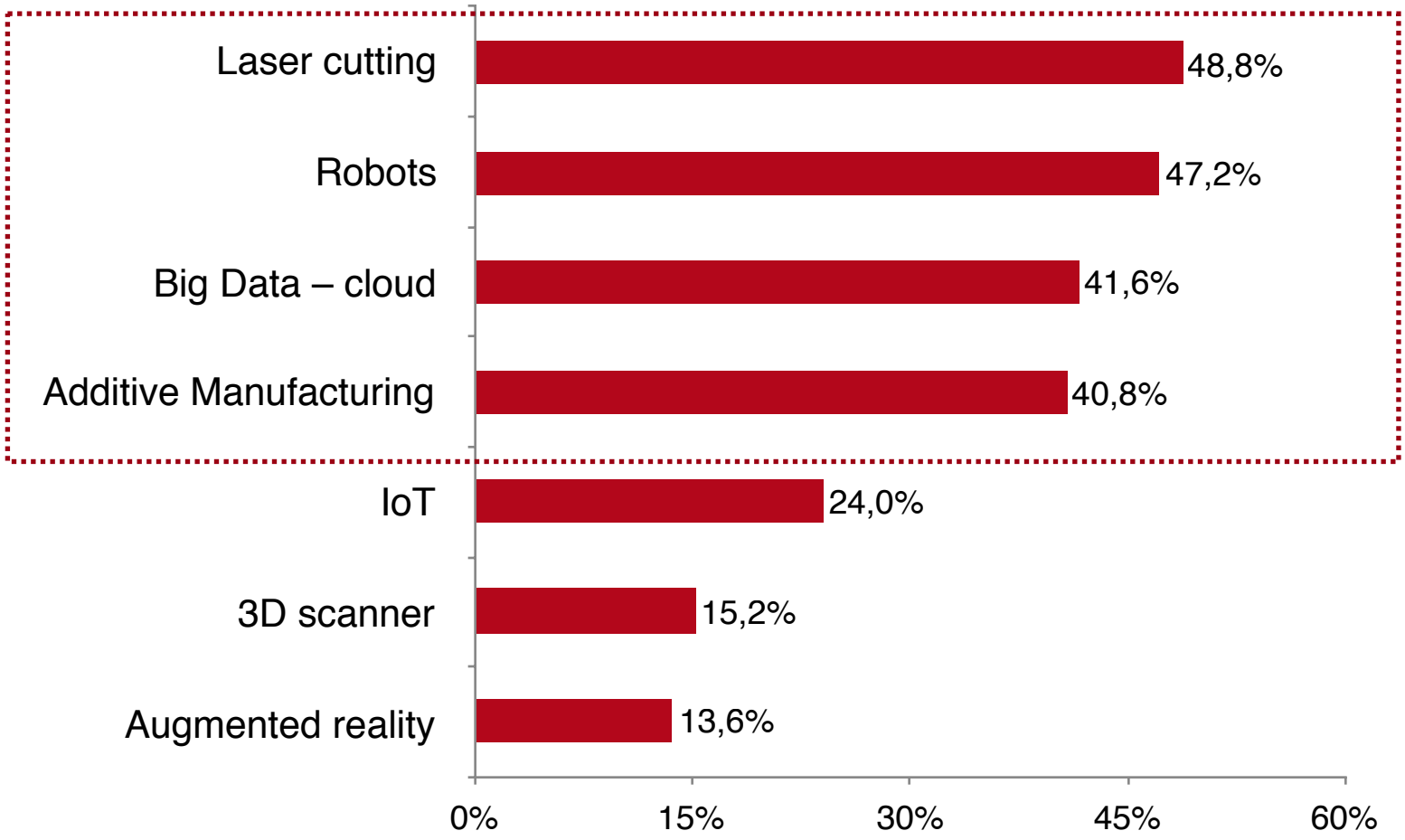


14.4%

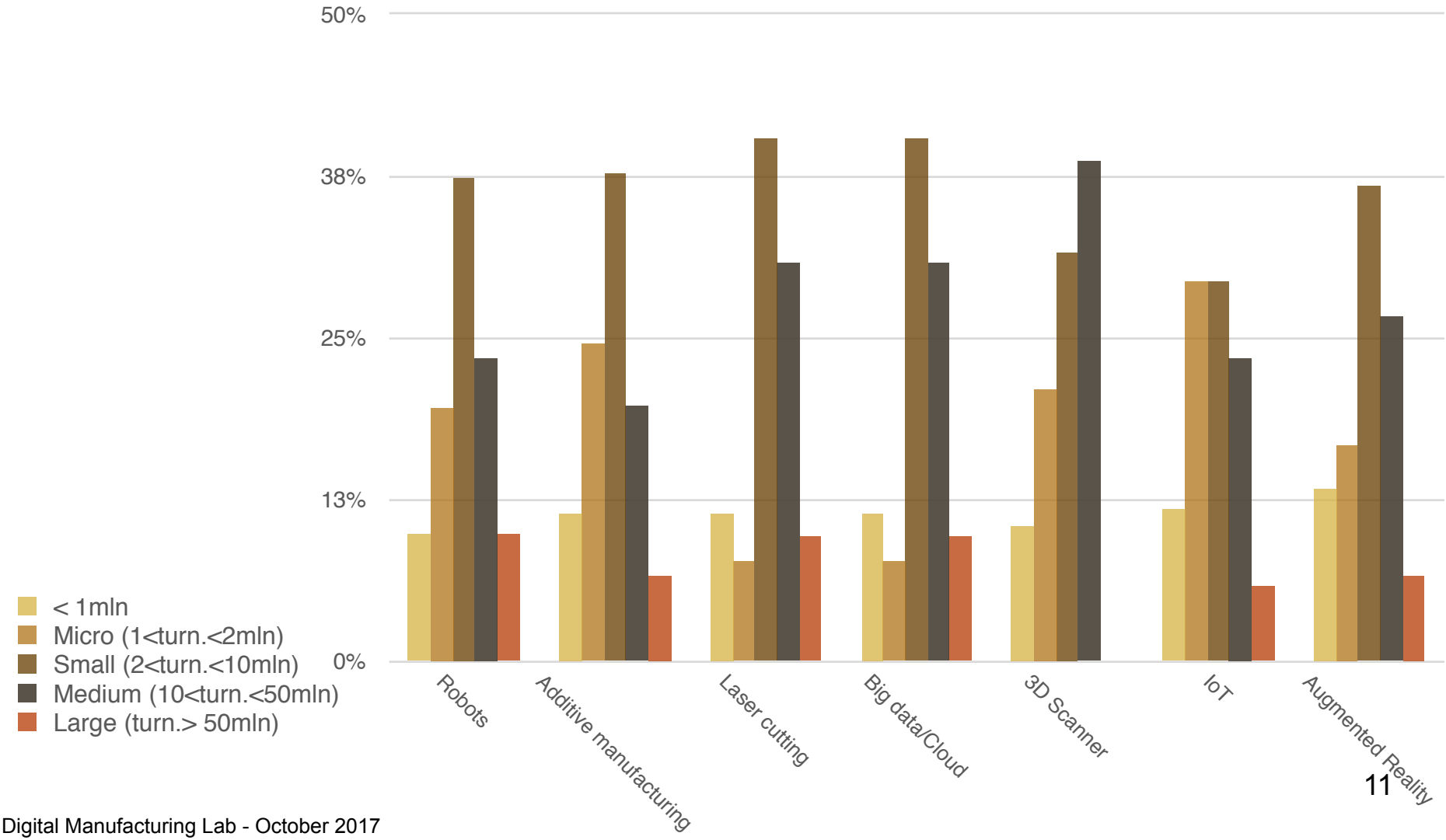


1.6%

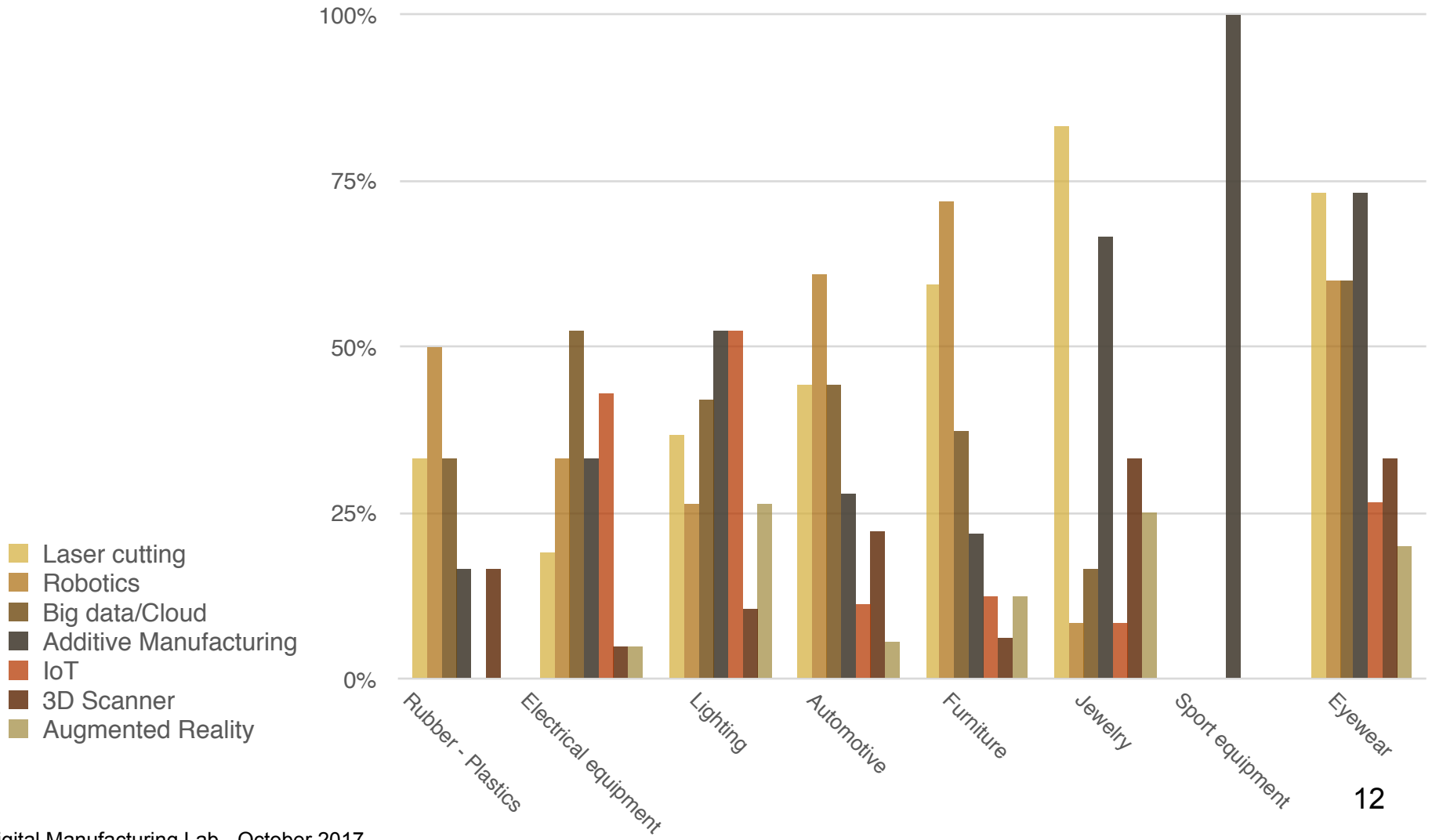
Adopters: Industry 4.0 investments



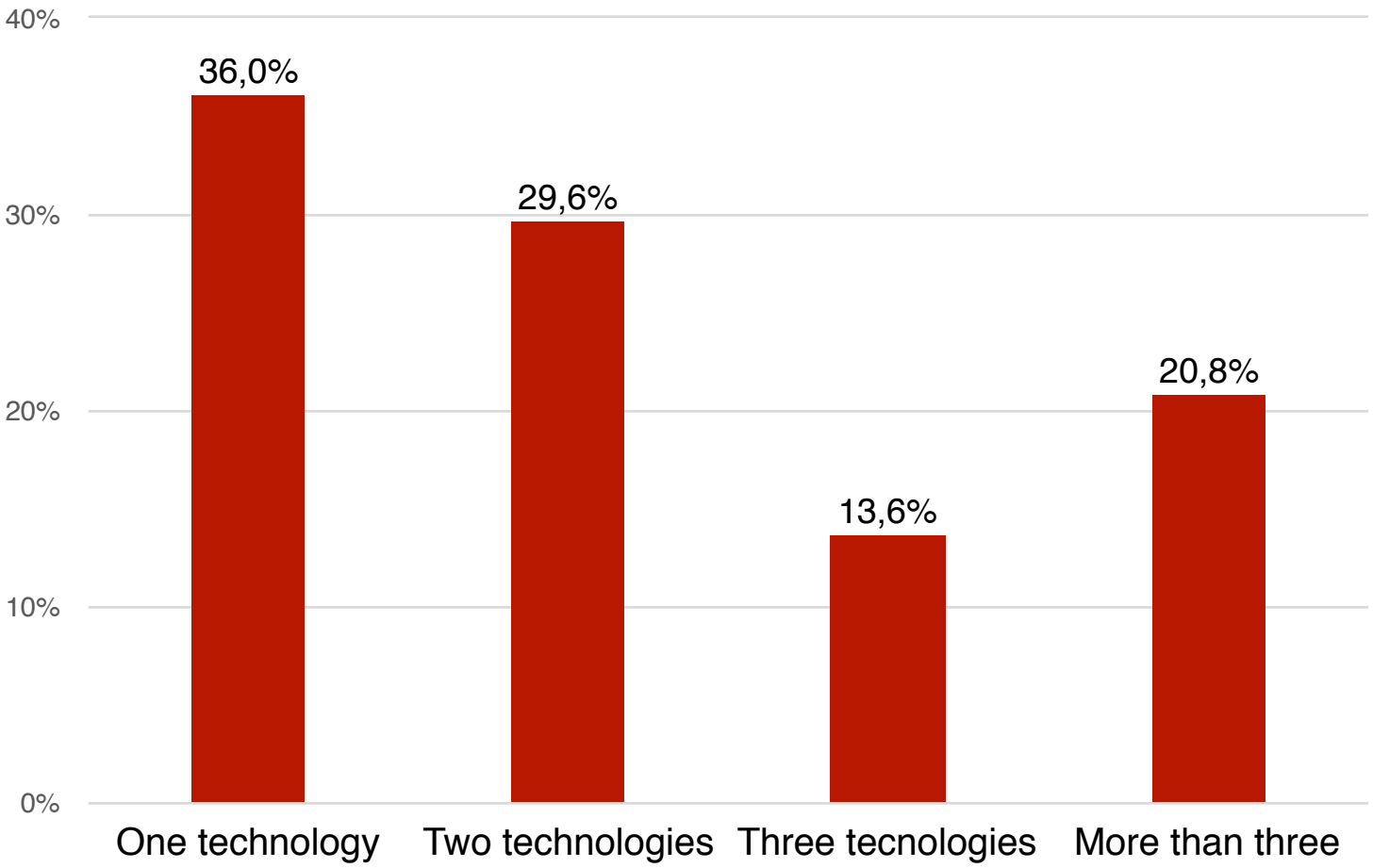
Industry 4.0 by firm size



Industry 4.0 by industries

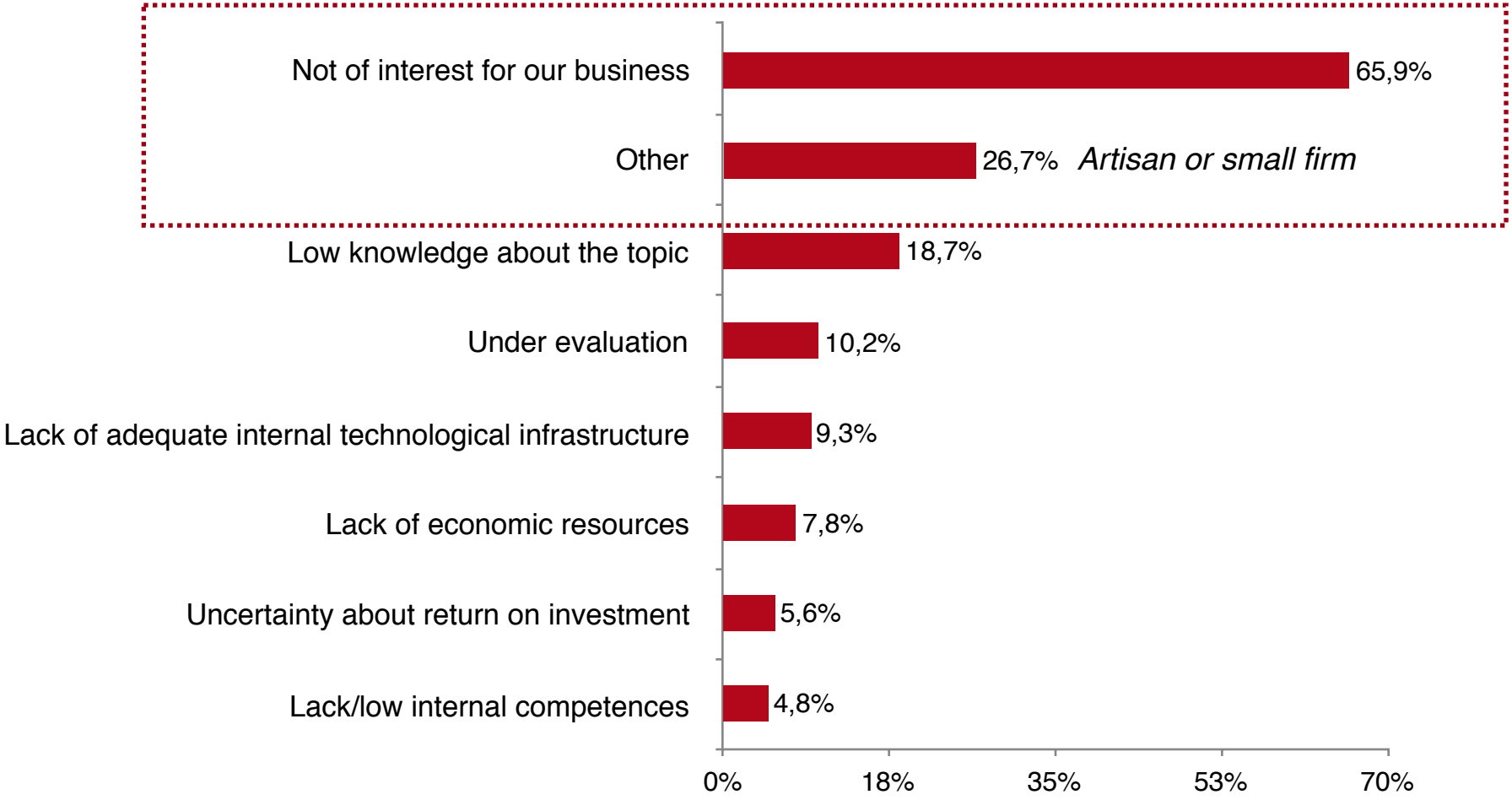


Number of adopted technologies



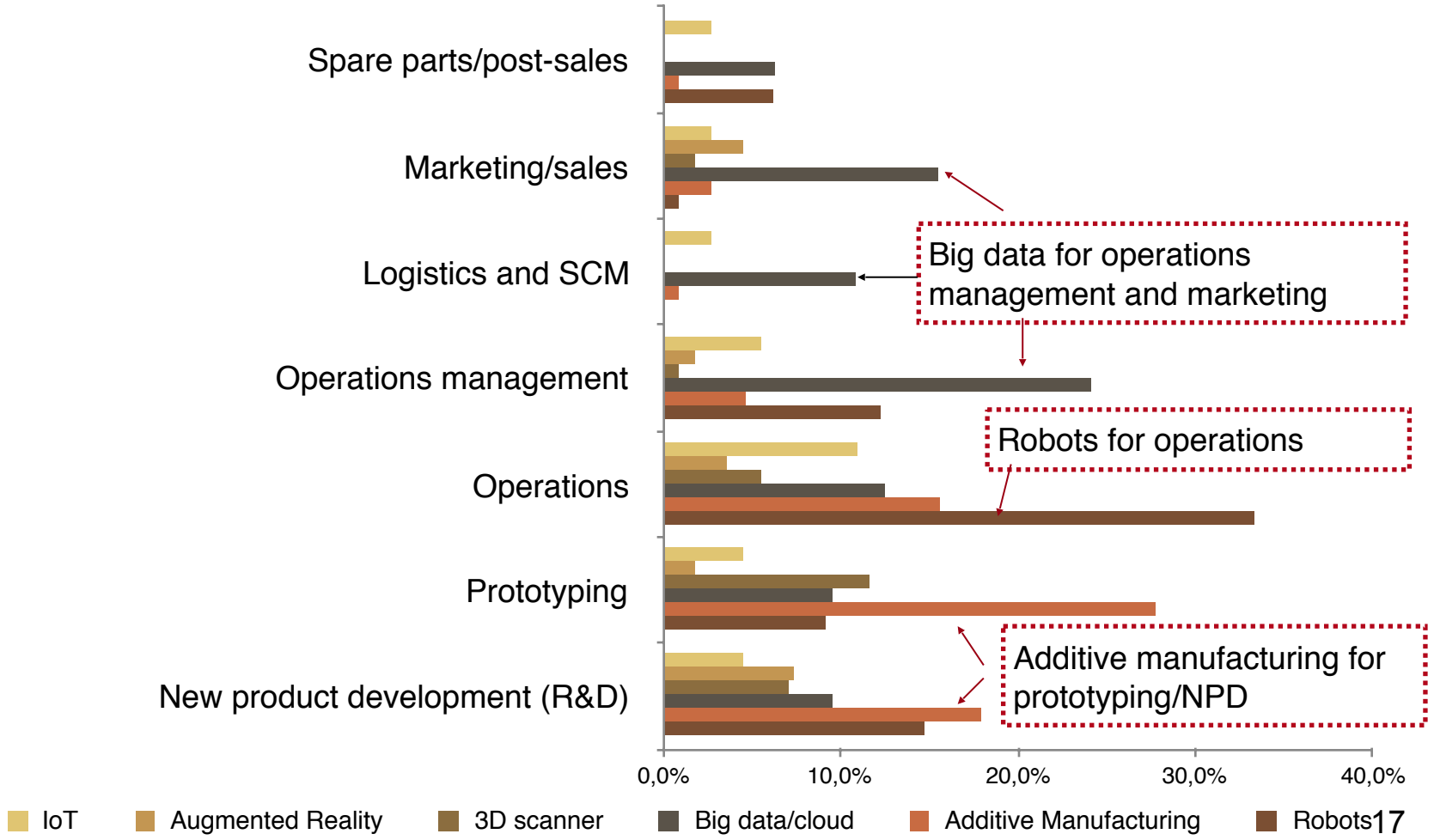
Non-adopting firms

Reasons for not investing in Industry 4.0

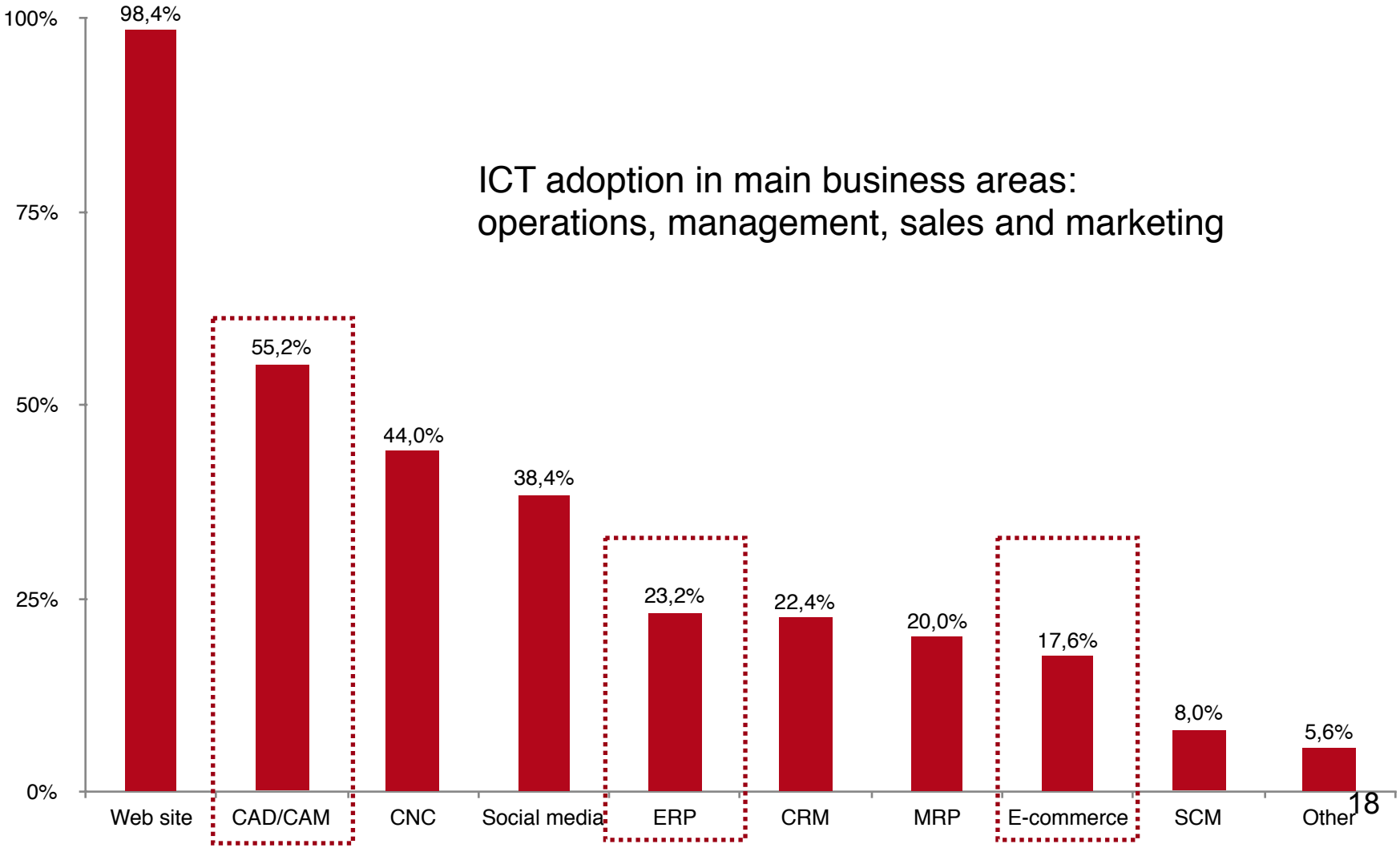


Industry 4.0 and areas of application

Value chain activity and industry 4.0



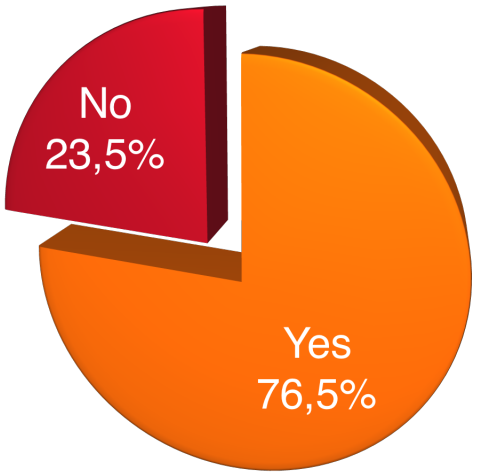
ICT adoption



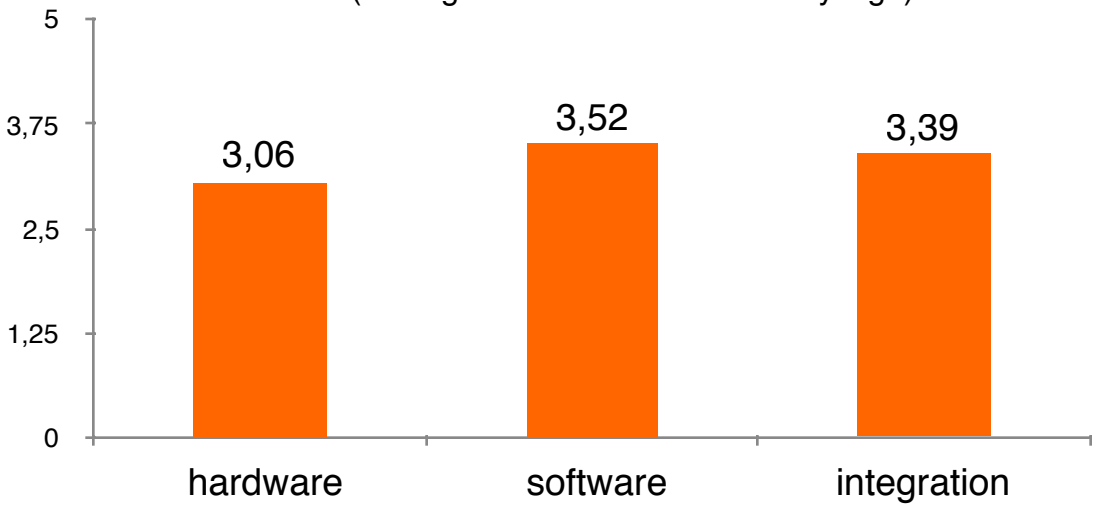
Management of Industry 4.0 projects

Industry 4.0 projects

Customization Industry 4.0 Investments

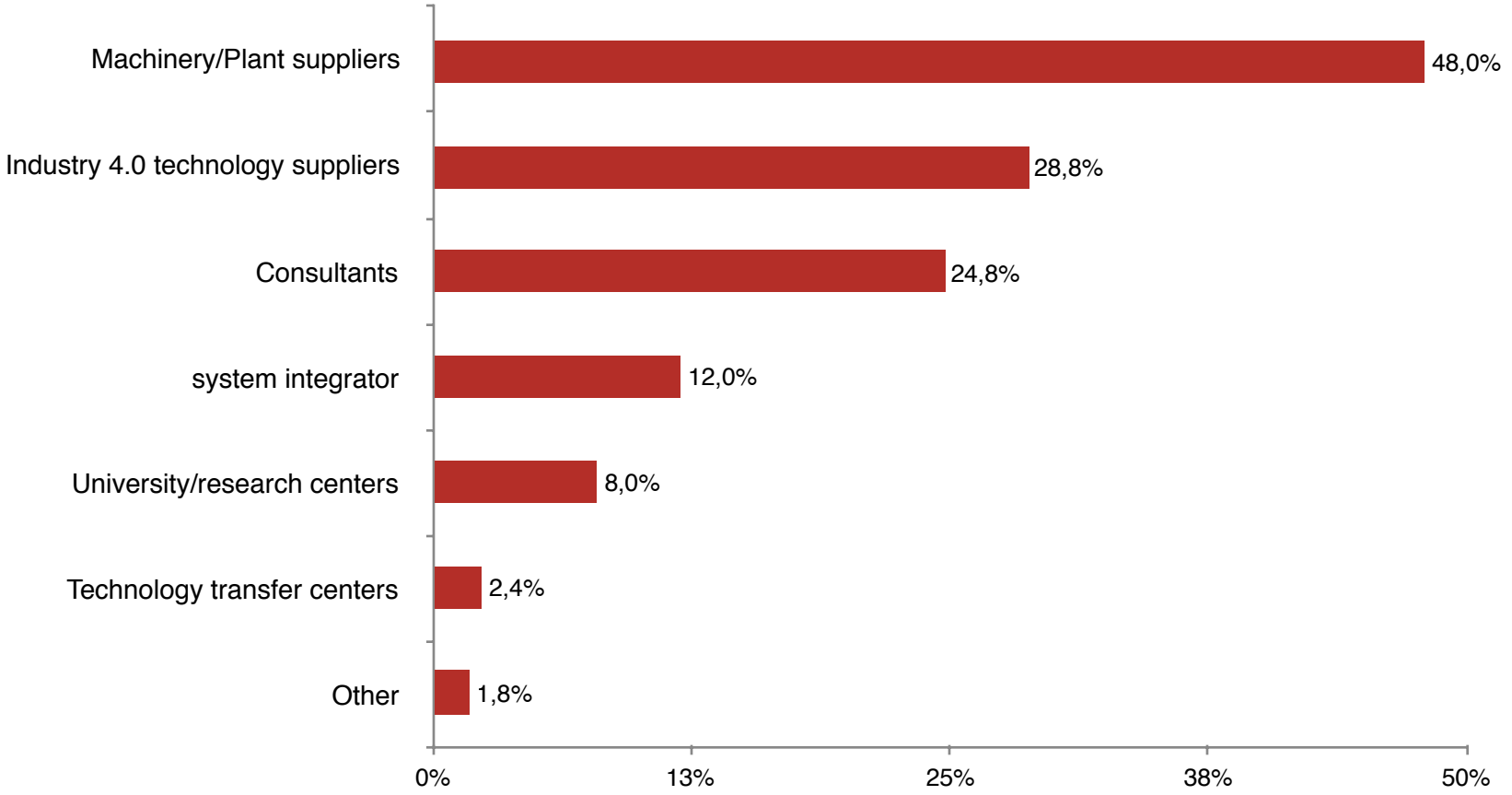


Domain of customization
(average value - 1 not at all/5 very high)



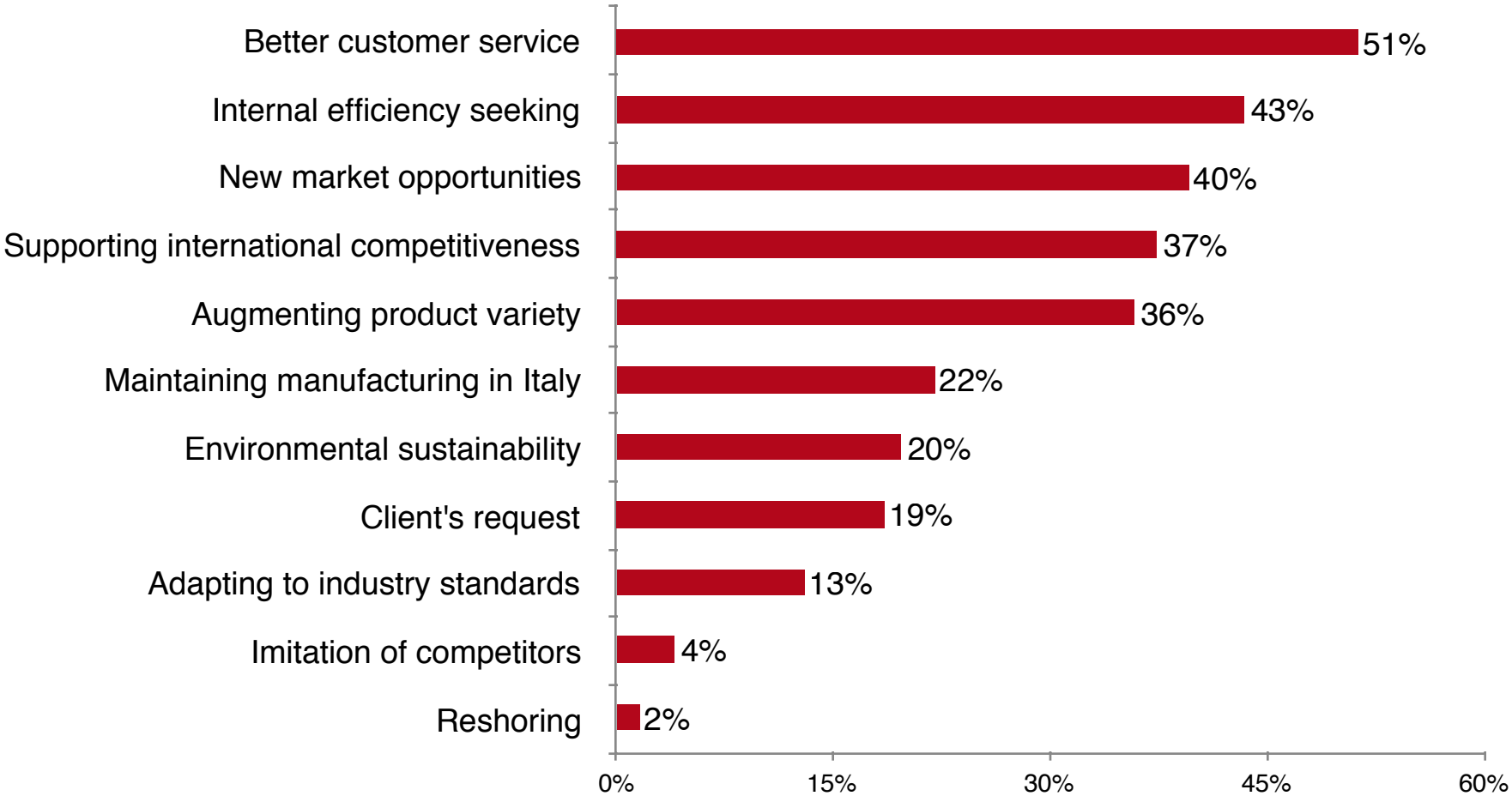
Investments in industry 4.0 projects (% on turnover): 11%

Partners to select and develop Industry 4.0 projects



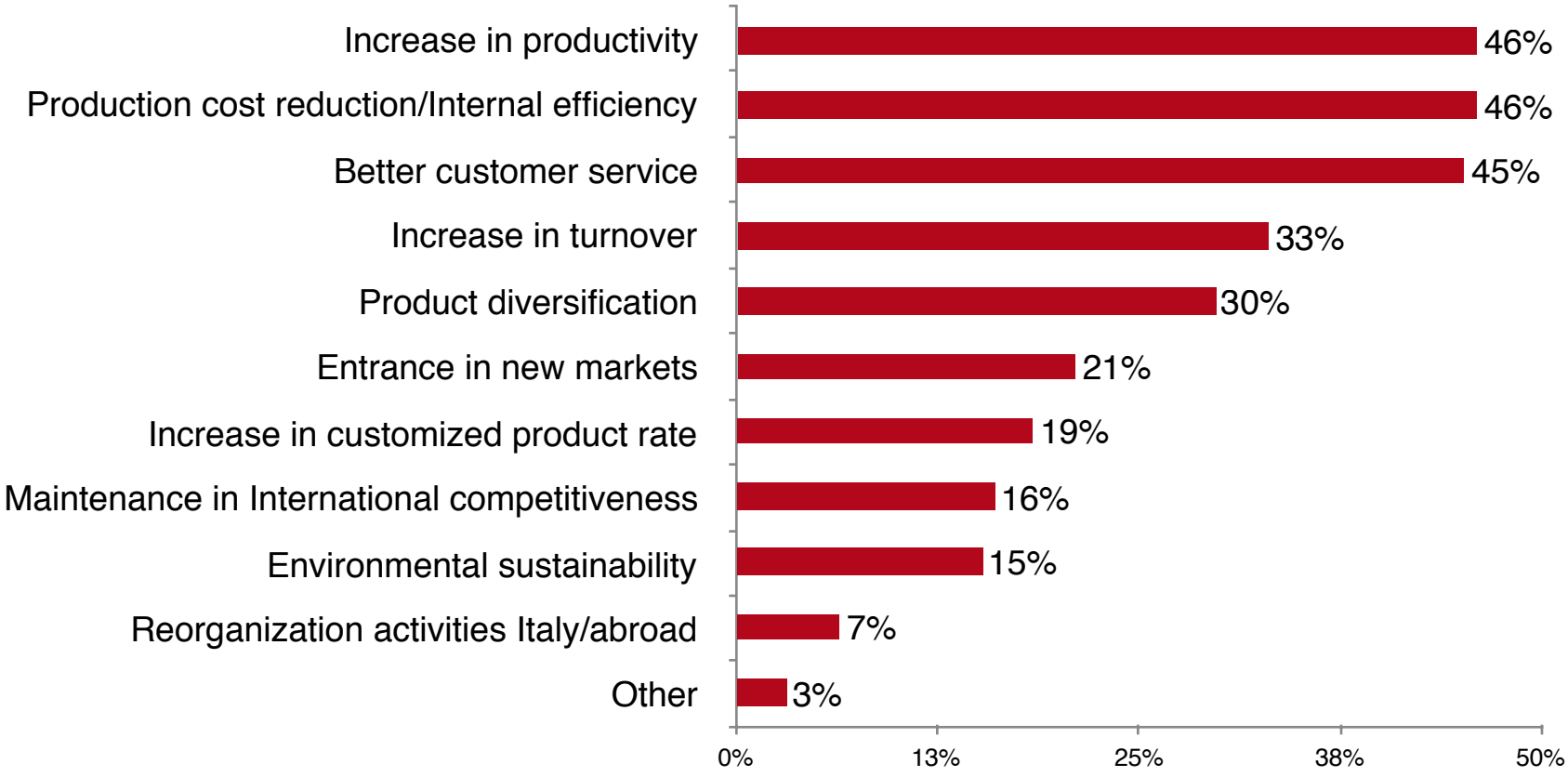
Reasons for investments and results achieved

Reasons investiments in Industry 4.0

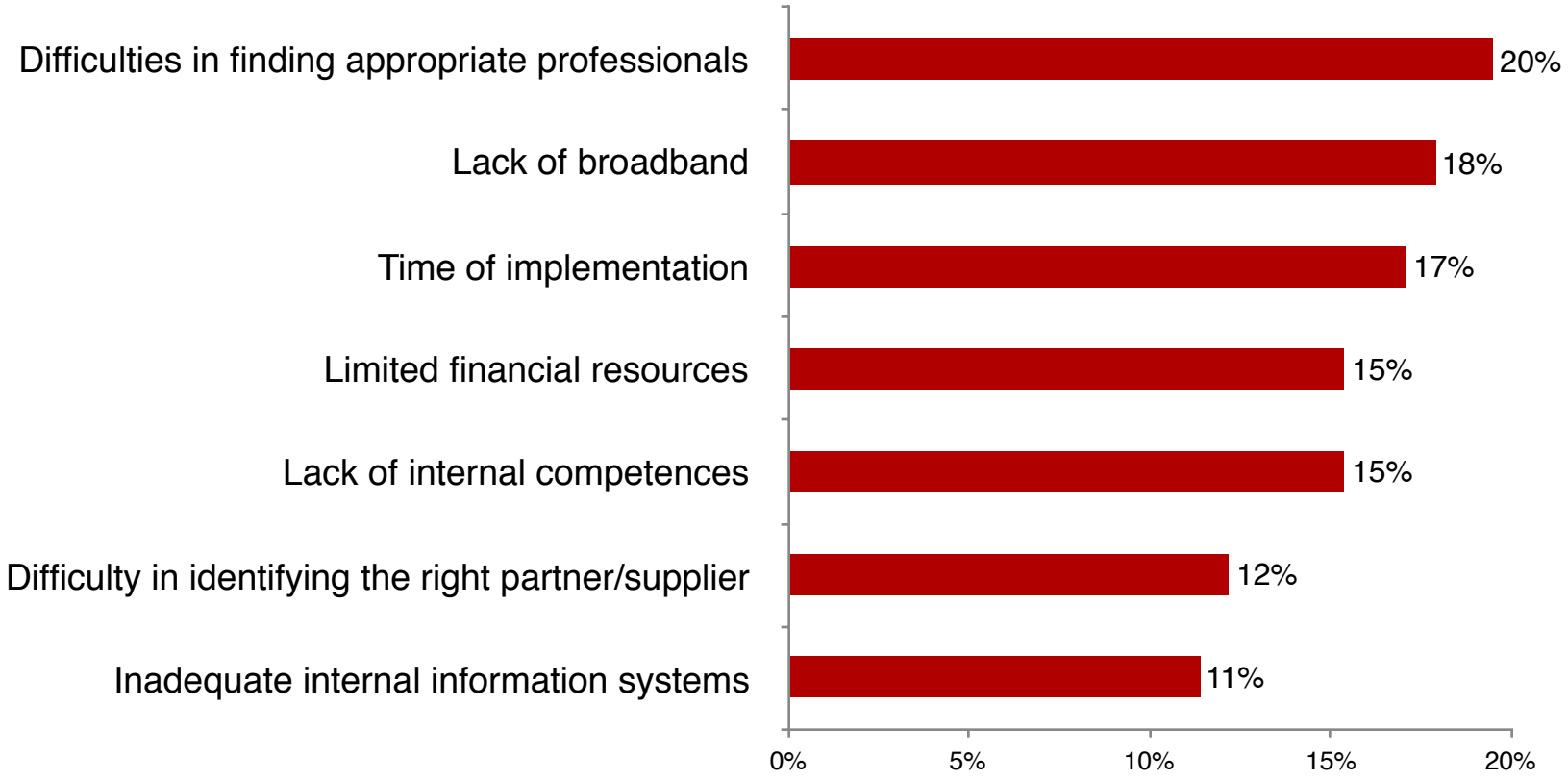


% firms with value 4-5 (high/very high)
(relevance of motivation - scale 1 - 5)

Impacts of investments in Industry 4.0

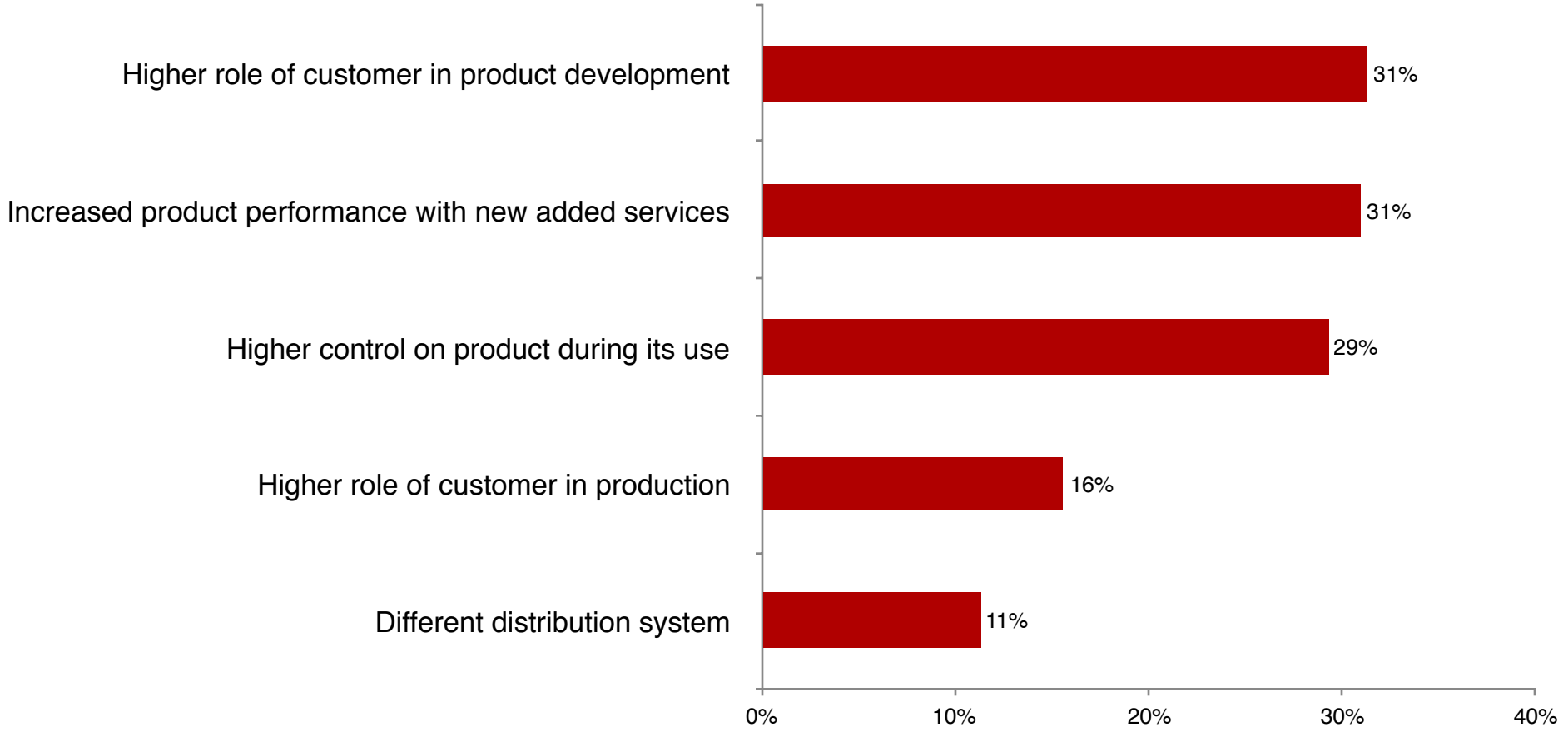


Difficulties in adoption of Industry 4.0 technologies



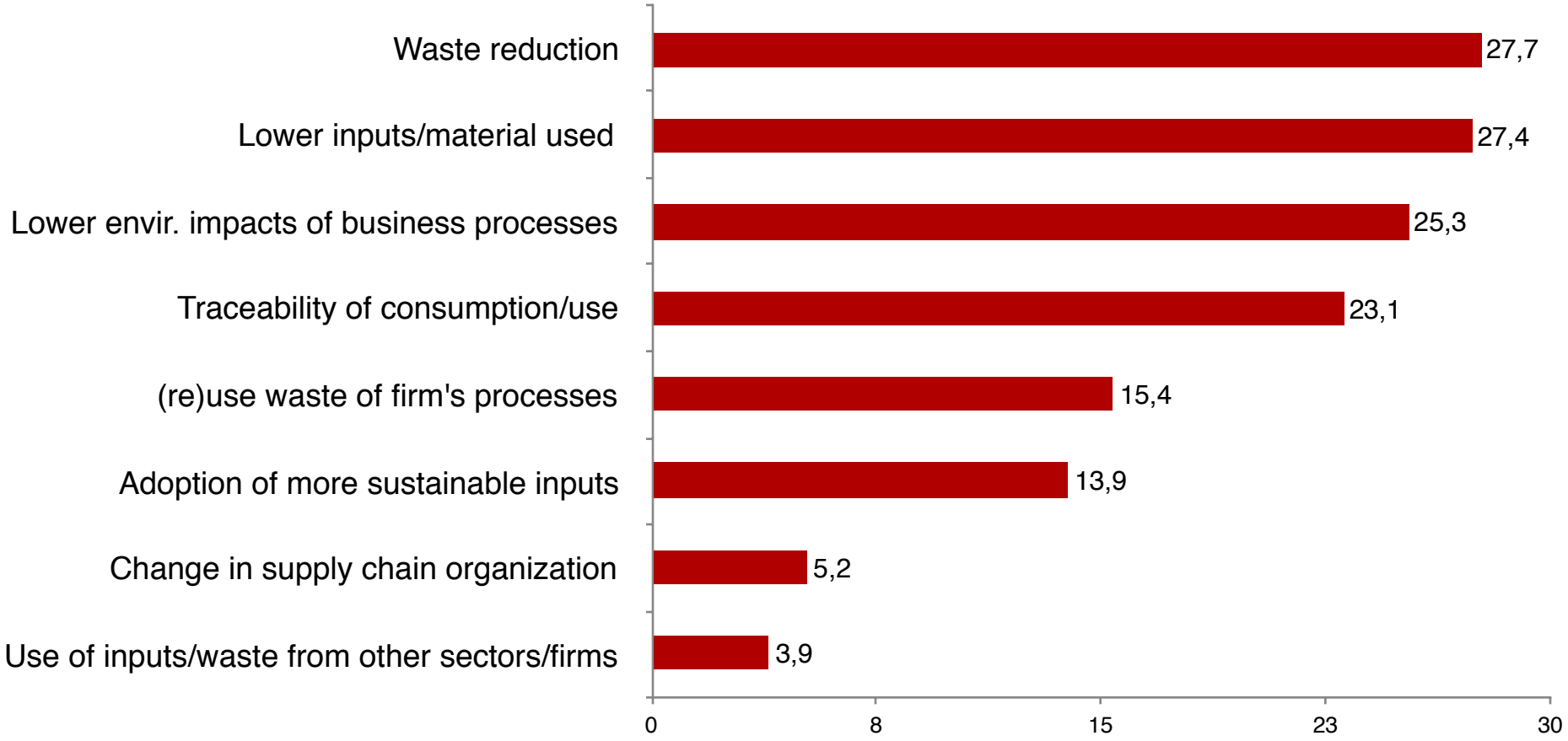
% firms with value 4-5 (high/very high)
(relevance of motivation - scale 1 - 5)

Impacts on the product



% firms with value 4-5 (high/very high)
(relevance of motivation - scale 1 - 5)

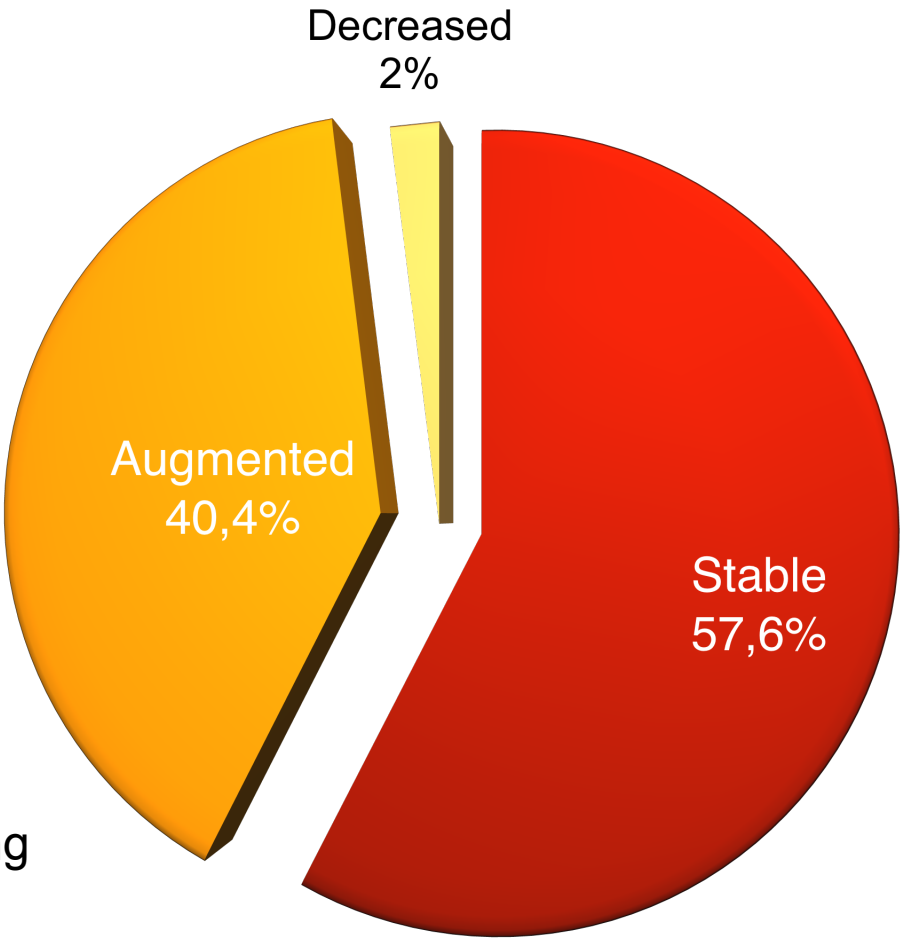
Industry 4.0 and sustainability



% firms with value 4-5 (high/very high)
(relevance of motivation - scale 1 - 5)

Employment

Investments in Industry 4.0: impacts on employment



No significant differences among firms by size

Industry 4.0 and business performance

Investiments in Industry 4.0 and performance

- **Positive** impacts of industry 4.0 investments on business performance (analysis on **average ROE** 2016-2015-2014 and on **average** 2016-2015-2014 **EBIDTA/sales** between **adopters and non-adopters**)
- In particular positive impact on ROE refers only to the adoption of **1 or 2 technologies** (not significant for higher number of technologies
- Comparing different technologies, positive impact on ROE is related to **robots**

Executive summary

Executive summary 1

- Diffusion of Industry 4.0 is still limited. Only about **19%** of interviewed firms adopt at least one Industry 4.0 technology.
- Adopters have been using those technologies for a **long time**, before national fiscal incentives promoted in 2017. Average year of adoption: **2007-2013.**
- Firms investing in industry 4.0 are **not only large firms**. Even medium- and small-sized firms are able to invest in such direction. In fact **40%** of adopters is a **small** firm (2 - 10 Ml Euro of turnover).

Executive summary 2

- Technology adoption is influenced by **industry**. Our research highlights industry differences: **3d printing in jewelry and eyewear, IoT** in **lighting**, robots in **automotive** and **furniture**.
- Industry 4.0 technologies are adopted mainly to product **customized** products. 68% of adopters produce bespoke or customized products, while only 32% of them standard products.
- Technologies are applied **differently within the firm:** 3D printing mainly in prototyping and new product development, robots in operations, big data for operations management and marketing.

Executive summary 3

- **Reasons** for adoption are related to achieve **better customer service** (51.2%), followed by **efficiency** (43.4%).
- Impact-wise, firms mention three main results achieved: increase in **productivity** (46%), **efficiency** (46%), increase in quality of **customer service** (45%).
- **Increased value related to product** in terms of customization (co-design), related services and traceability/control on product
- **Positive** impact on **performance (ROE) of Industry 4.0 (1 or 2 technologies)**, where particular role is played by **robots.** It is important to **start** the investment and not the incremental number of technologies

Executive summary 4

- Industry 4.0 requires **high degree of customization** (77% of adopters have requested customization in hardware/software or in the integration with existing technologies).
- Those technologies require **ad hoc projects of implementations**, they are not *off-the-shelf* technologies ready to be used immediately. **Accompanying activities** are essential and the primary partners are firm's technological suppliers
- Investments in Industry 4.0 technologies/projects have increased firm's **innovation capabilities**
- Three main difficulties in the adoption process: **lack of internal/external competences, broadband and time of implementation**

Executive summary 5

- The main motivation for not-adopting firms is the perception that those technologies are **not of interest for their business** (66%).
- This result is confirmed by the second motivation: being a **small firm/artisan** (27%).
- **More than 90%** of not-adopting firms are in fact **micro or small firms.**