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**Working Paper**

## Cleantech Industry Survey 2023: Financing, regulatory, innovation and human capital issues

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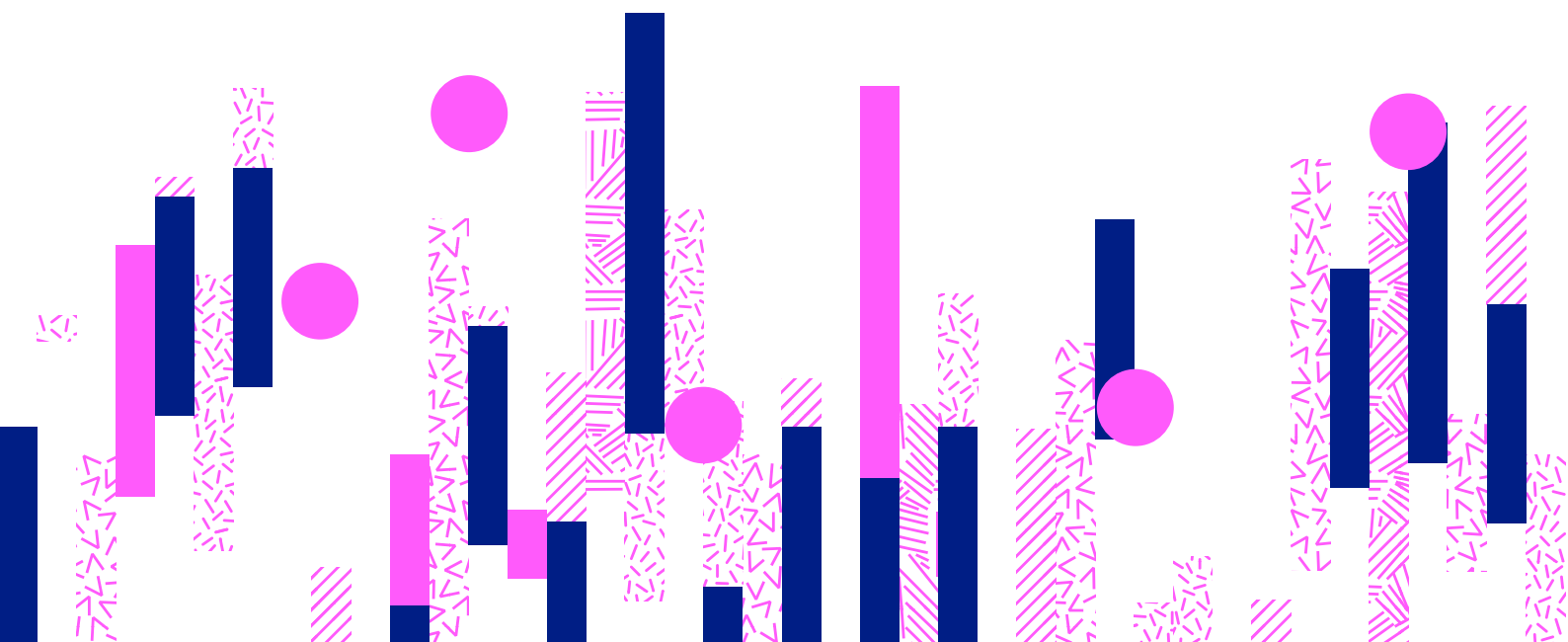
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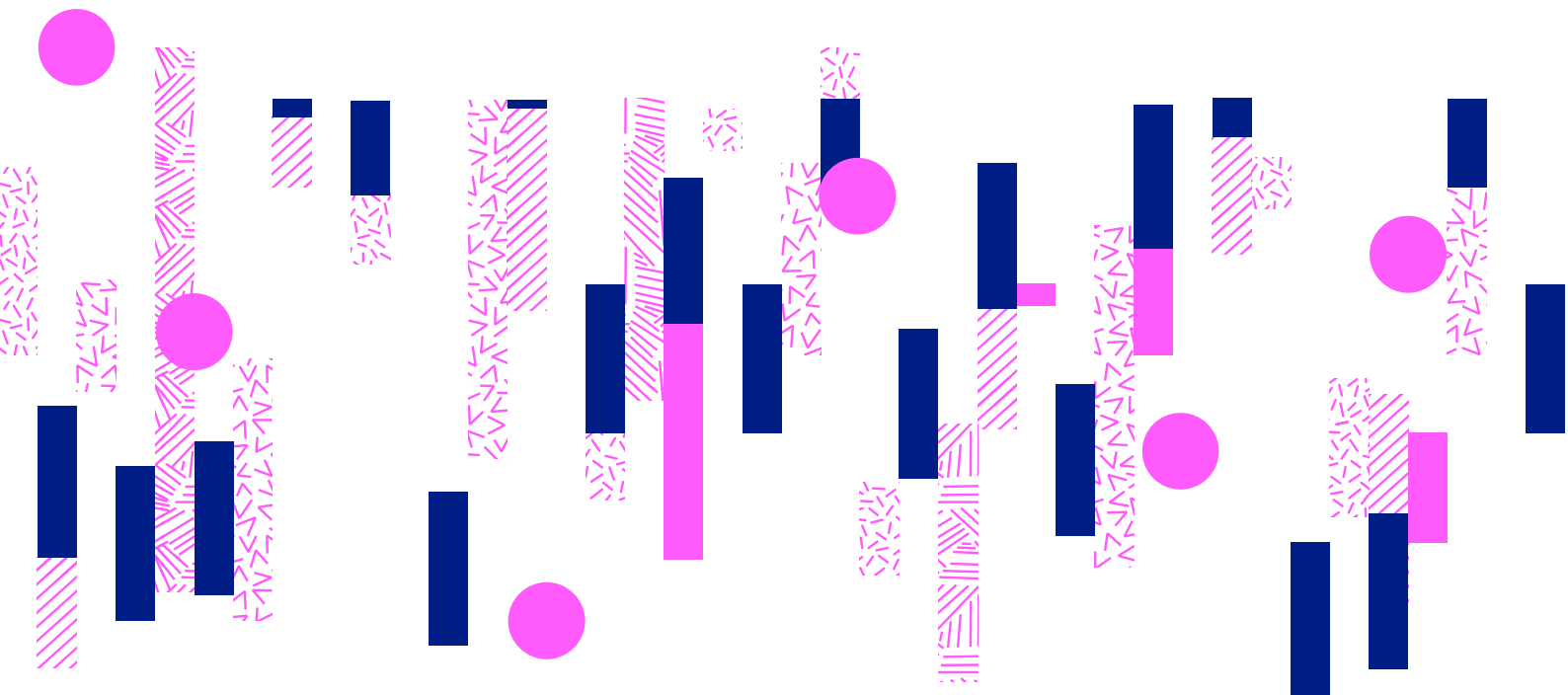


# Cleantech Industry Survey 2023

## Financing, regulatory, innovation and human capital issues

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Andrea Odille Bosio, Annalisa Croce, Laura Toschi, Elisa Ughetto



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**EIF Market Assessment & Research**

# Preface

Dear Reader,

This survey was run within the project CLEU “The cleantech industry in the European Green Deal: policy challenges and the finance landscape for SMEs” funded by European Investment Bank (EIB)’s University Research Sponsorship (EIBURS) programme (2022-2025).

The EIBURS provides grants to help EU universities and academic research centres to develop activities in selected research areas in addition to those that would normally be carried out by the beneficiary and on topics of major interest to the EIB Group (European Investment Bank and European Investment Fund). The CLEU project is coordinated by the Market Assessment and Research Division of the European Investment Fund (EIF) and conducted by **Politecnico di Torino, Politecnico di Milano and University of Bologna**.

The EIF plays a crucial role in promoting Cleantech companies and initiatives in Europe. As the EIB Group’s specialist provider of risk finance to benefit SMEs across Europe, the EIF provides financing and support to enhance access to capital for Cleantech startups and businesses. Today, the EIF offers various financial instruments such as venture capital and private equity investments, private credit and loan guarantees specifically targeting Cleantech sectors including renewable energy, energy efficiency, sustainable mobility, and circular economy.

Currently, the EIF manages several initiatives that aim to stimulate investments in EU Cleantech companies. For example, the InvestEU Joint SME-RID Windows, through its Climate and Environmental Solutions product, contains up to EUR 800m pocket to increase access to equity finance for innovative SMEs that develop or adopt clean technologies or environmental sustainability solutions. In addition, the EIB’s RCR mandate managed by EIF provided EUR 350m in 2023—for sustainability and green transformation investments. This amount was increased by an approximately EUR 250m following the EIB Contribution to the REPowerEU plan. The RCR contribution to Sustainability and Green Transformation is expected to grow gradually over the next years.

By expanding our understanding of the Cleantech sector through the CLEU project, policymakers can further improve the design of targeted support schemes to accelerate the adoption of clean technologies, reduce greenhouse gas emissions, improve environmental sustainability, and promote sustainable resource utilization, thus driving the European green transition and positioning the EU at the forefront of the global Cleantech industry. Therefore we invite you to delve into this introductory analysis and explore the first findings of the CLEU project and wish you an informative and engaging reading experience. A subsequent paper is planned to further elaborate on these findings.

Kind regards,

*Helmut Kraemer-Eis*

EIF Chief Economist



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- Company
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- Supply chain

# EIF Cleantech Survey results: key highlights

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## Access to finance, with clear and streamlined regulatory framework, are key pillars for a thriving cleantech sector

- **Limited access to external finance** is one of the main barriers in the cleantech sector. Approximately half of respondents intend to raise external funding, expecting to raise more than EUR 5m in the next five years and 33% expecting to raise more than EUR 50m. Given the capital-intensive nature of the sector, these potential funds raised are predominantly earmarked for cleantech specific activities. The most commonly used types of financing include **internal financing, bank debt, grants and equity**. **Public funding is considered critical although it presents challenges** due to its complexity and time-consuming nature of the application processes.
  - The **stringency and uncertainty of standards and regulations** is another barrier to entering the cleantech sector. Regulations create uncertainty, which has been identified as having a significant impact on cleantech activities. **Undesirable effects** that policies and regulations can have on the cleantech sector include **excessive administrative burden and operational uncertainty**. Policies that strongly affect cleantech business are environmental policies and policies related to the introduction of new technologies. However, if properly designed, policies can also be catalysts for technological development, especially those which focus on reducing tax burdens.
  - Cleantech companies have **relevant skills available in-house**, such as sustainability skills, soft skills, finance and accounting skills, and business and strategic planning skills. Intellectual property management and legal skills are often not available but will be needed in the future, with a preference for outsourcing.
  - Respondents prefer to carry out their (Research and Development) **R&D in-house** or in **collaborative research projects**. They mostly use patents to protect their intellectual property. Technological uncertainty affects the activities of cleantech companies to a significant extent.
  - There is general confidence that the European Green Deal (EGD) will create a **predictable and clear regulatory environment**. However, the targets may be too ambitious and enforcement of the EGD may be challenging. Overall, better coordination between EU member states is needed.
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# EIF Cleantech Survey : key highlights

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## The European Cleantech dataset

- The survey was sent to a sample of European cleantech companies resulting from the dataset of cleantech companies described in [EIF Working Paper 2023/91, “Using machine learning to map the European Cleantech sector”](#). The distribution of the survey began on July 18, 2023, and ended on October 15, 2023.
  - Cleantech companies were classified into:
    - **Cleantech Innovators**: referring to companies committed to develop clean technologies
    - **Cleantech Ecosystem**: referring to companies which adopt cleantech technologies, sell services based on cleantech technologies, or provide inputs for the development of cleantech technologies
  - Cleantech Ecosystem were further distinguished into :
    - “**experimenters**” and “**manufacturers**”, which support the realisation of the technology
    - “**distributors**”, “**integrators**”, and “**operators**”, which make the technology available on the market
  - Each Cleantech company was classified into seven different technological categories reflecting the pillars of the European Green Deal
    1. Environmental management
      - 1.1 Air/water/soil pollution abatement/remediation
      - 1.2 Waste management
    2. Resources preservation
      - 2.1 Water conservation/availability
      - 2.2 Sustainable agri-food technologies
      - 2.3 Sustainable raw materials
    3. Industrial energy management
      - 3.1 Sustainable energy production
      - 3.2 Sustainable fuels
      - 3.3 Energy-efficient industrial technologies
    4. Capture, storage, sequestration or disposal of GHG
    5. Sustainable modes of transportation
    6. Sustainable buildings
    7. Others
-

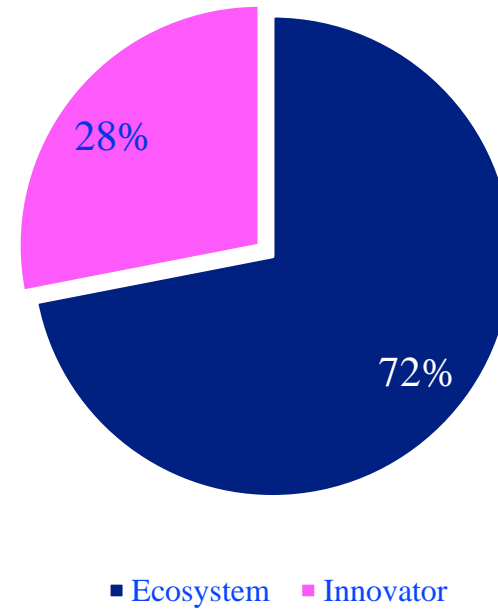


# The EIF cleantech survey

## Number of respondents

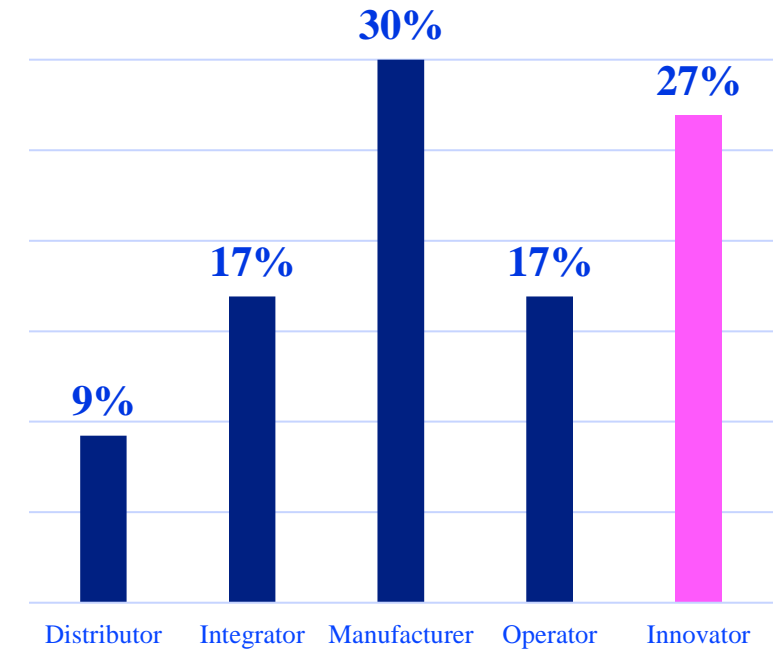
139

## Cleantech innovators and ecosystem players



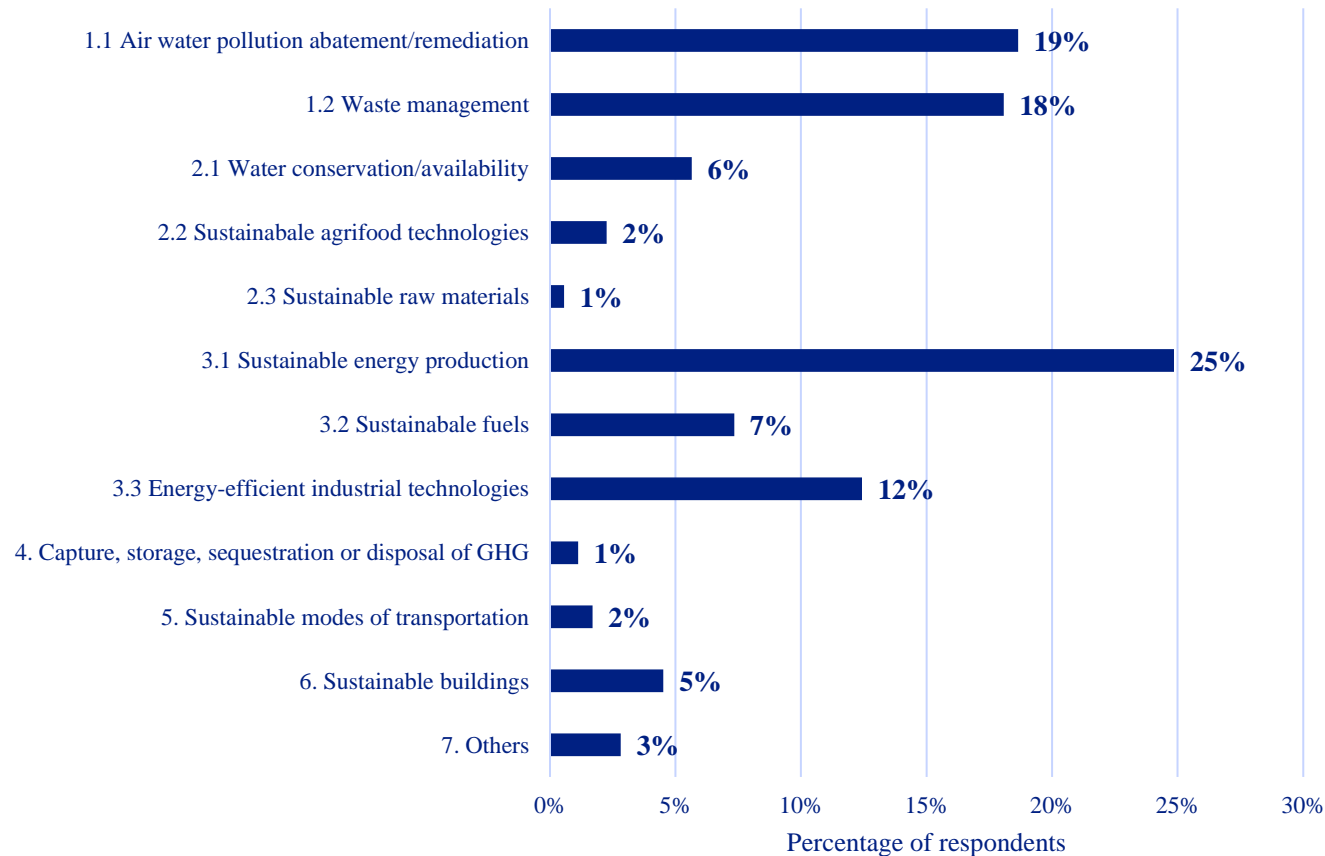
Out of 139 respondents, 39 are innovators (28%) and 100 belong to the cleantech ecosystem (72%).

## Ecosystem segments of respondents



Out of 139 cleantech respondents, 27% are innovators and among cleantech ecosystem players, 30% are manufacturers, 17% integrators, 17% operators and 9% distributors.

# Technological categories of respondents



*Most cleantech companies are involved in environmental and industrial energy management activities*

Almost 40% of the sample is involved in environmental management activities (cat.1), mainly soil and water pollution abatement/remediation (19%) and waste management (18%).

Another 44% are engaged in Industrial Energy Management (cat.3), specifically sustainable energy production (25%), sustainable fuels (7%), and energy-efficient industrial technologies (12%).

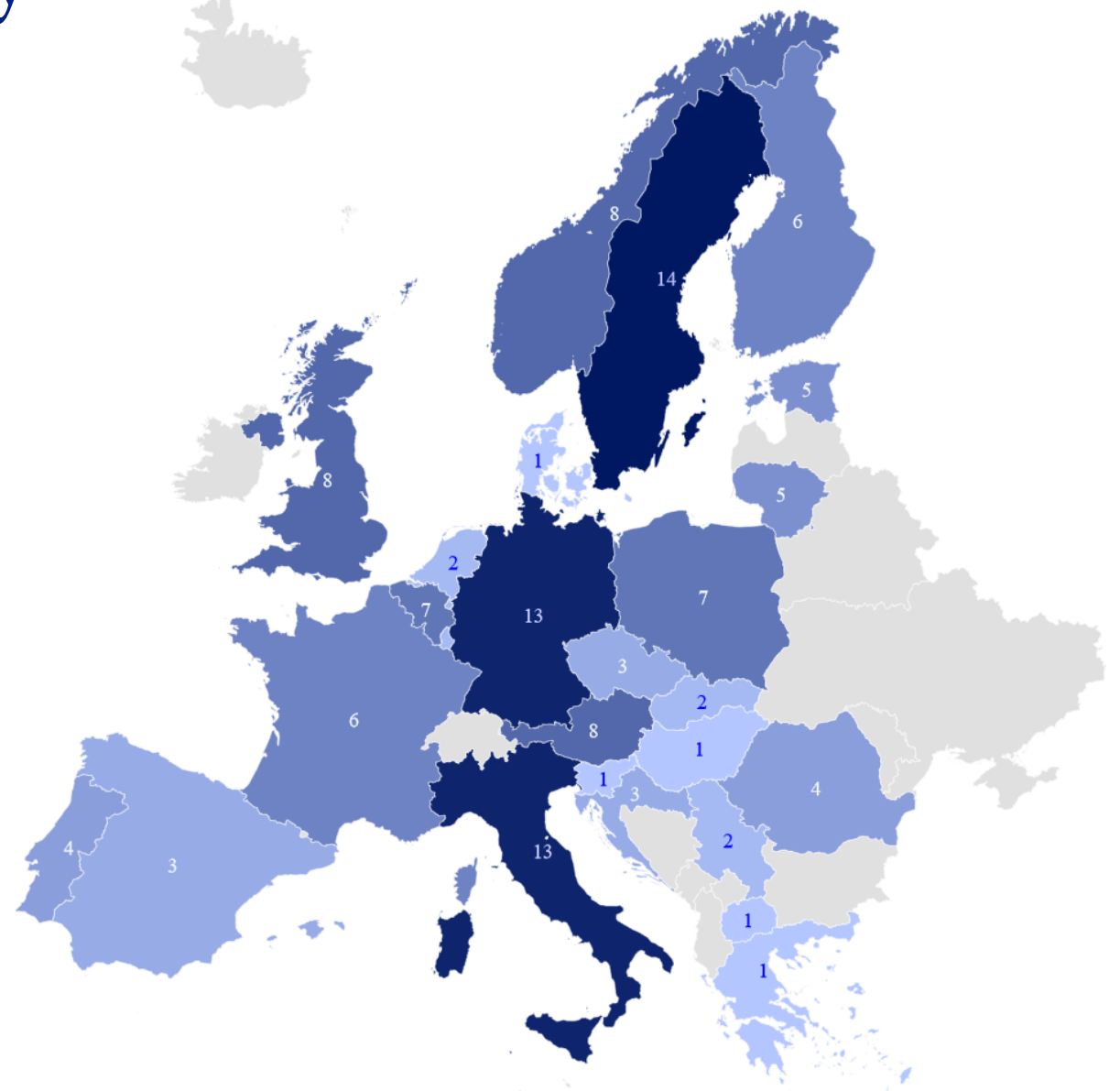
Respondents by technological categories reflecting the pillars of the European Green Deal and the EU Taxonomy. A company may be involved in one or more sub-categories. Technological categories include: 1. Environmental Management (1.1 Air/water/soil pollution abatement/remediation; 1.2 Waste management), 2. Resources preservation (2.1 Water conservation/availability; 2.2 Sustainable agri-food technologies; 2.3 Sustainable raw materials), 3. Industrial energy management (3.1 Sustainable energy production; 3.2 Sustainable fuels; 3.3 Energy-efficient industrial technologies), 4. Capture, storage, sequestration or disposal of GHG, 5. Sustainable modes of transportation, 6. Sustainable buildings, 7. Others (based on 139 respondents).

# Number of respondents by country

*Companies from 25 different European countries participated in the survey*

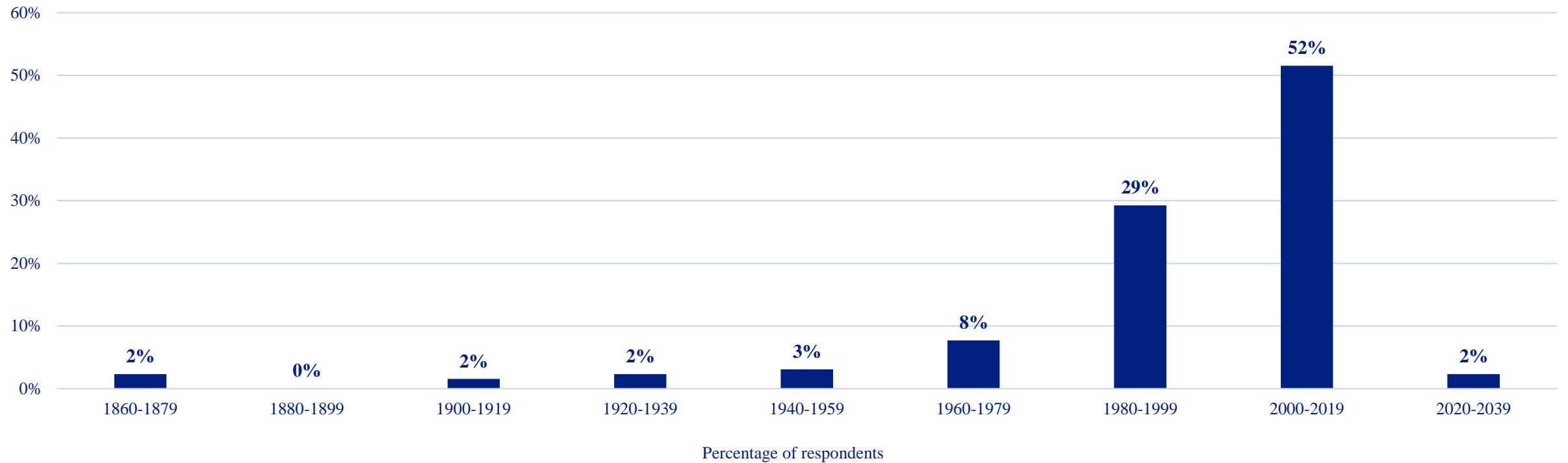
The most participative nations are Sweden, Italy and Germany, which together contribute one third of the responses.

Austria, UK, Norway and Poland also contributed significantly.



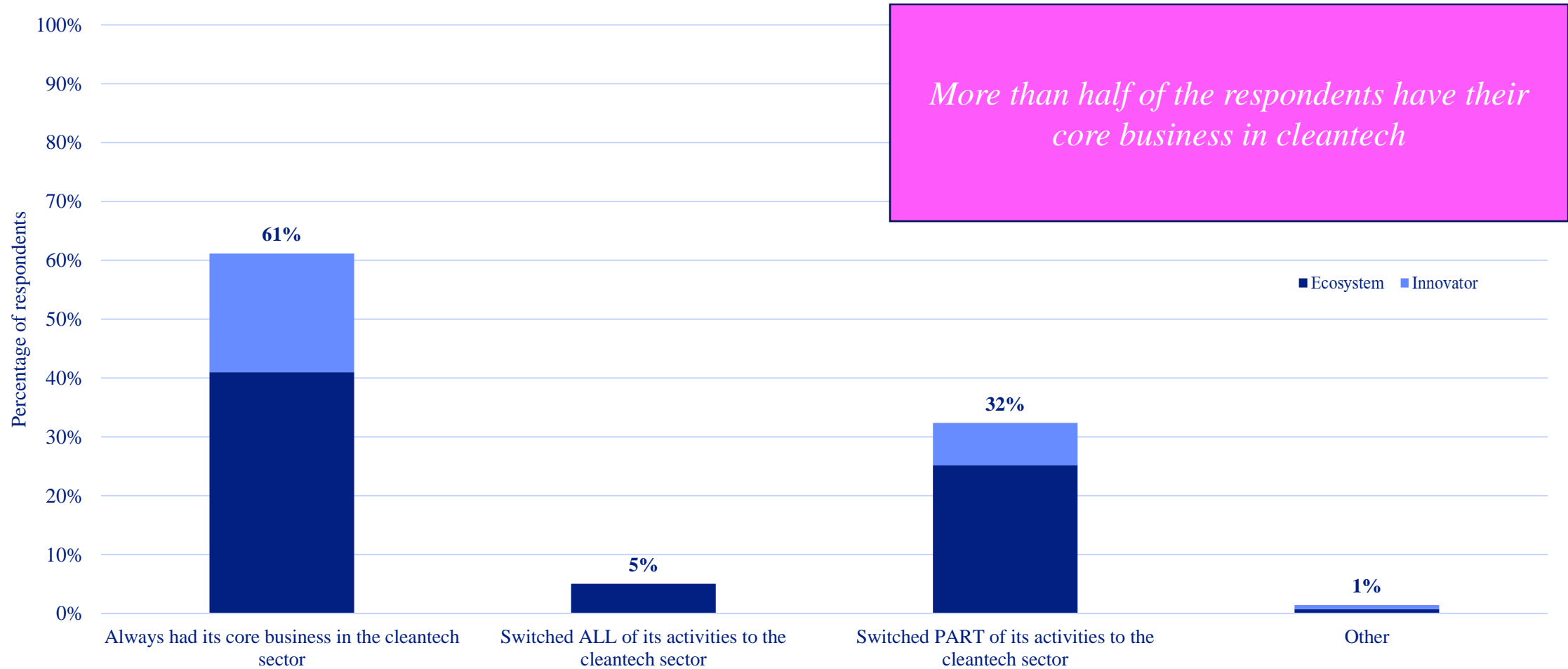
# Foundation year

*Respondents are for a large majority young companies*



Of the total sample of 139 respondents, 83% were founded after 1980 (29% were founded between 1980 and 1999 and 54% after the year 2000).

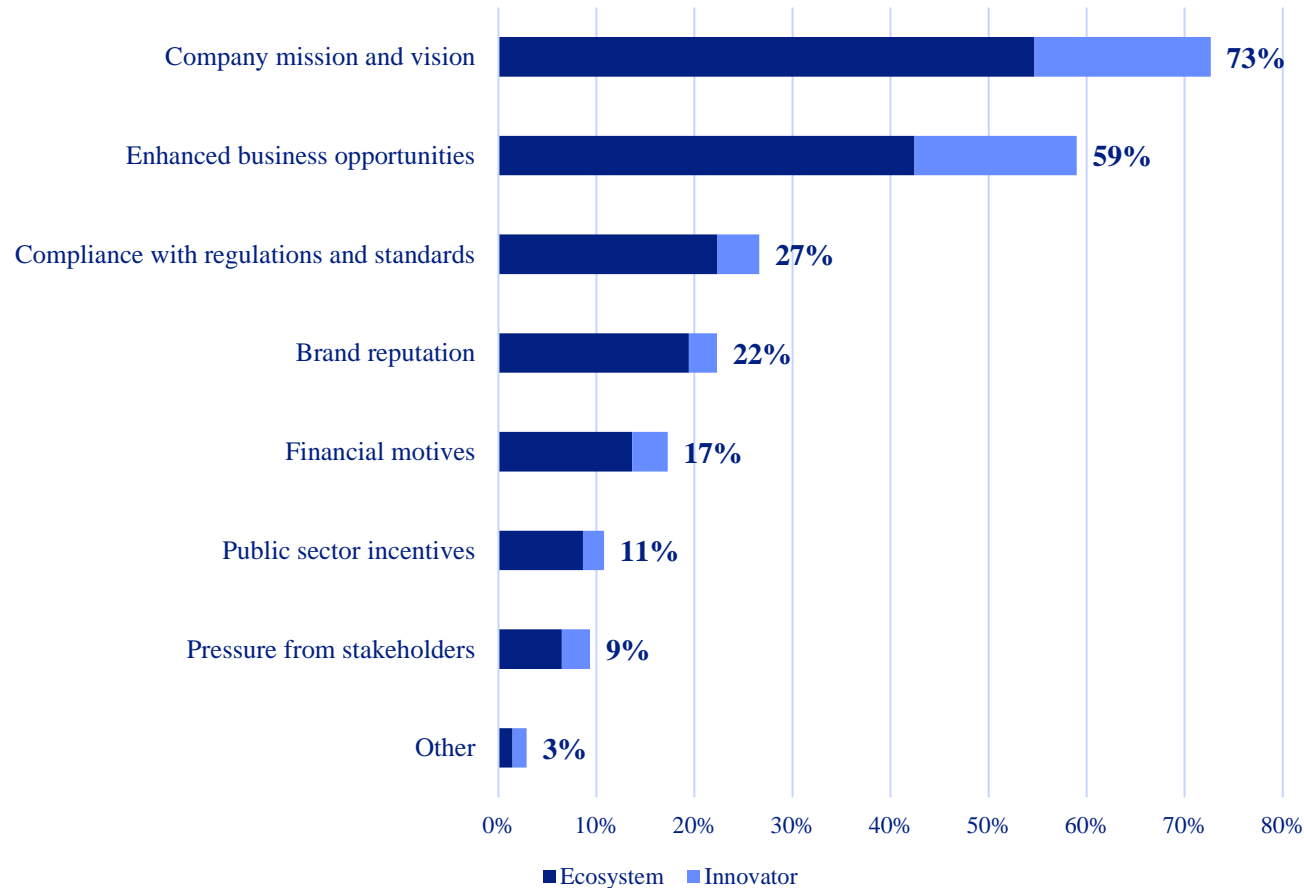
# Approach to the cleantech activity



*Out of 139 companies operating in the cleantech sector, 85 declared to have their core business in cleantech (67% are ecosystem players), while 52 moved all or part of their activities to the cleantech sector at some point in time.*

Q: “Concerning the decision to operate in the cleantech sector, which of the following statement is mostly appropriated?” (single choice) (based on 139 respondents)

# Drivers



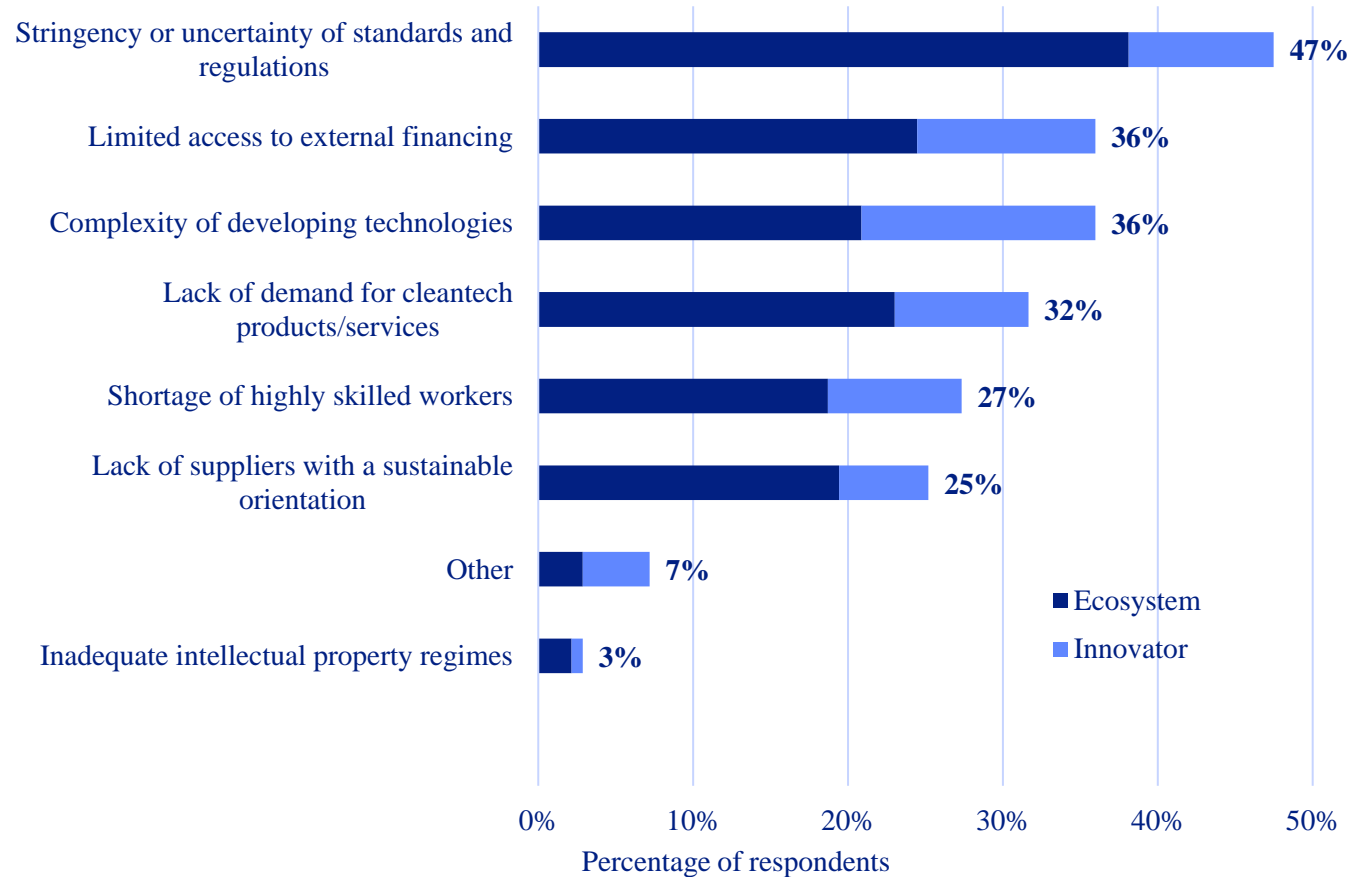
*Company mission & vision is the principal driver to operate in the cleantech sector*

In more than two third of the cases, the company's mission and vision drove respondents to operate in the cleantech sector.

Other primary drivers include the desire to capitalise on specific business opportunities or the necessity to comply with regulations and standards.

Q: “What are the main drivers for your company to operate in the cleantech sector?” (multiple choice) (based on 139 respondents)

# Main difficulties faced after entering the cleantech sector



*The stringency of standards and regulations is the major difficulty when entering the cleantech sector*

The main barrier encountered by respondents when entering the cleantech sector is the stringency or uncertainty of standards and regulations (47%).

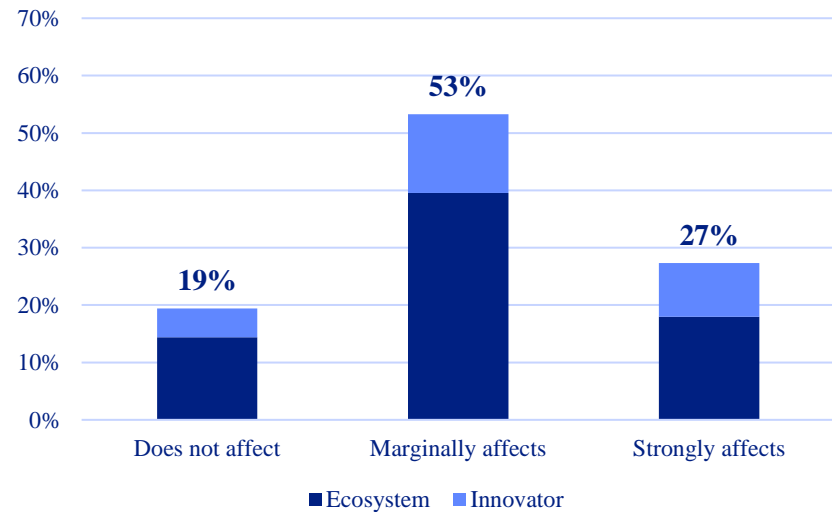
Limited access to external funding and complexity in technology development follow (36%).

Shortage of highly skilled workers (27%) and lack of suppliers with a sustainable orientation (25%) are considered to be less prominent difficulties in accessing the cleantech sector.

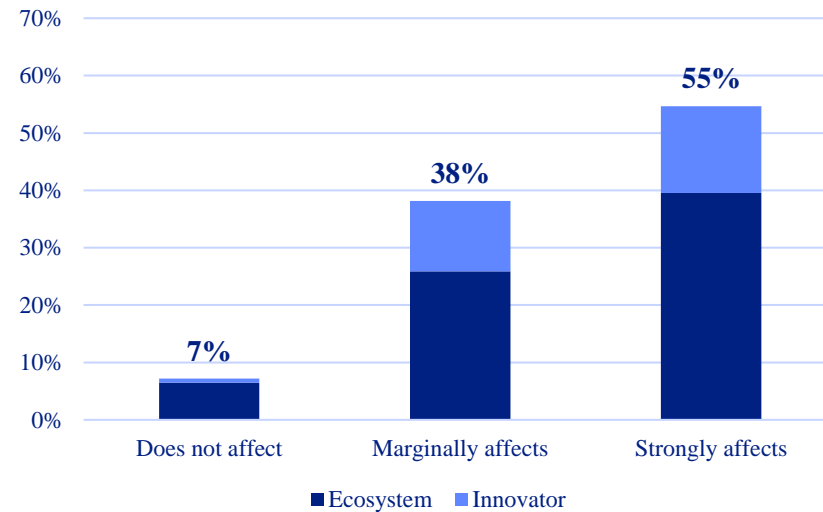
Q: “What are the main difficulties your company faced after you entered the cleantech sector?” (multiple choice) (based on 139 respondents)

# Types of uncertainty affecting the business

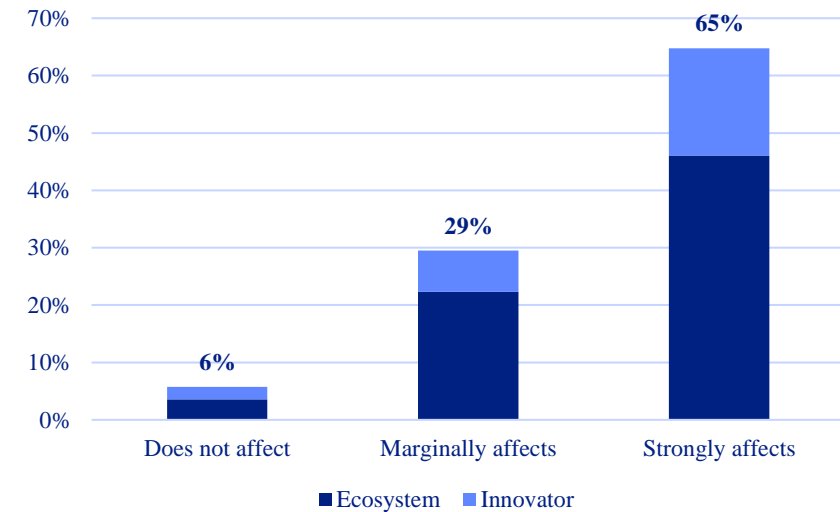
## Technological uncertainty



## Market uncertainty



## Regulatory uncertainty



Q: “How much the following types of uncertainty are affecting your activities?” (single choice for each category) (based on 139 respondents)

Regulatory uncertainty (65%) and market uncertainty (55%) have the most significant impact on respondents’ activities.

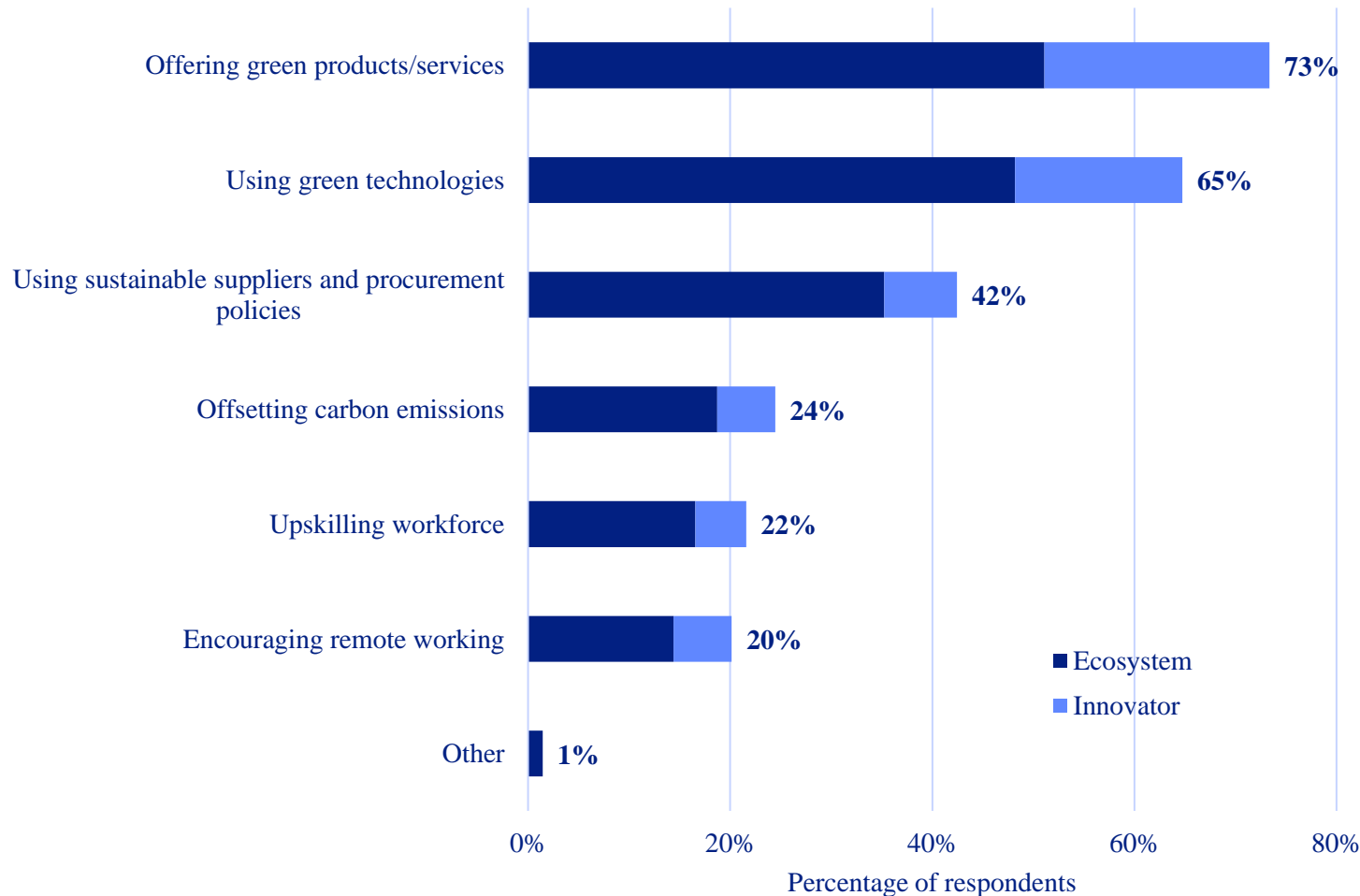
Technological uncertainty is also impactful, with more than 50% of the companies declaring being marginally affected.

There are no marked differences of opinions between innovators and ecosystem players.

*Regulatory and market uncertainty are strongly affecting cleantech companies’ business*



# Actions to meet the goals of the European Green Deal (EGD)



*The most undertaken actions to meet the goals of the EGD are offering green products/services and using green technologies*

About 73% of companies offer green products/services, while 65% use green technologies in order to meet EGD goals.

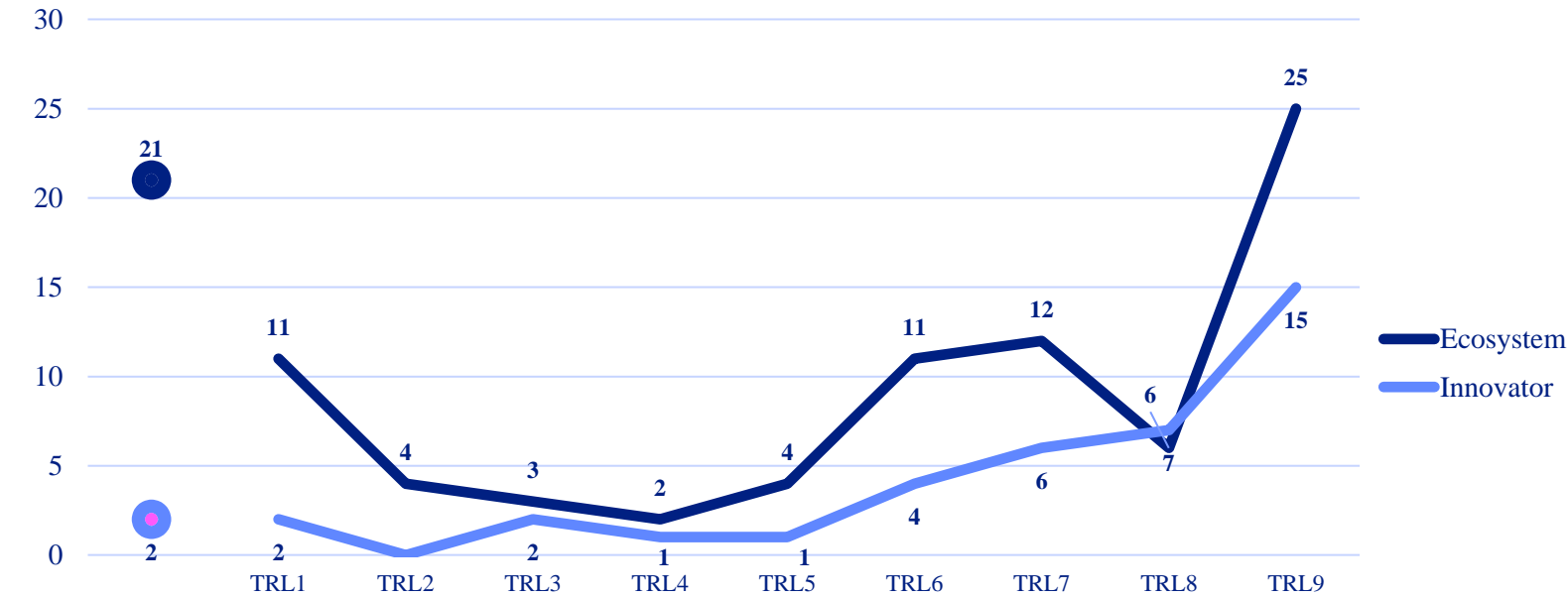
42% percent strive to have a green supply chain, and 24% offset their carbon emissions.

Supporting smart working (20%) or investing in employee upskilling (22%) are the least performed activities.

Q: “What is your company doing to meet the goals set by the European Green Deal?” (multiple choice) (based on 139 respondents)

# Technology Readiness Level (TRL)

Technology Readiness Level



Does not develop clean technologies

*TRL of respondents developing clean technologies is high, mostly above TRL6*

The Technology Readiness Level (TRL) reflects the maturity of a technology and goes from 1 (basic principles) to 9 (full commercialization).

The 16.5% of respondents stated that they do not develop core clean technologies.

In general, the TRL of the respondents is high, and about 74% of respondents developing clean technologies exceed the TRL 6.

34.4% of respondents developing clean technologies were able to bring its technologies to the commercialization stage (TRL 9).

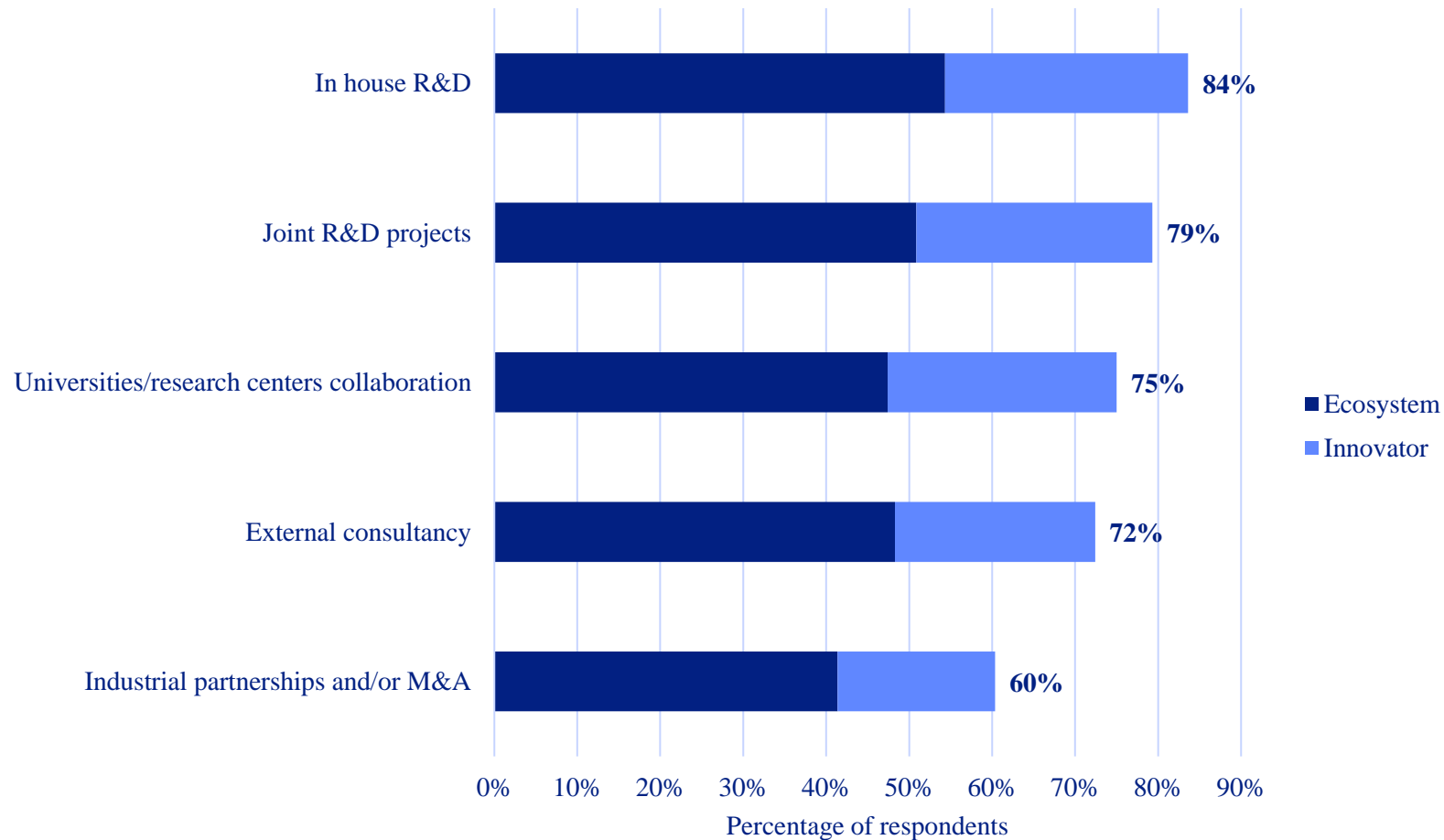
Innovators have higher average TRLs.

Q: “How would you define the readiness level of the core clean technology embedded in the company’s main project (TRL) ?” (single choice)

Note: filter question - this question was asked only to those respondents who declared to develop core clean technologies (based on 116 respondents)

For TRL levels please see: [https://ec.europa.eu/research/participants/data/ref/h2020/wp/2014\\_2015/annexes/h2020-wp1415-annex-g-trl\\_en.pdf](https://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/annexes/h2020-wp1415-annex-g-trl_en.pdf).

# Innovation activities



*In house R&D and joint R&D projects are the two options preferred by the respondents*

Companies prefer to conduct R&D internally (84%) or engage in joint R&D projects (79%).

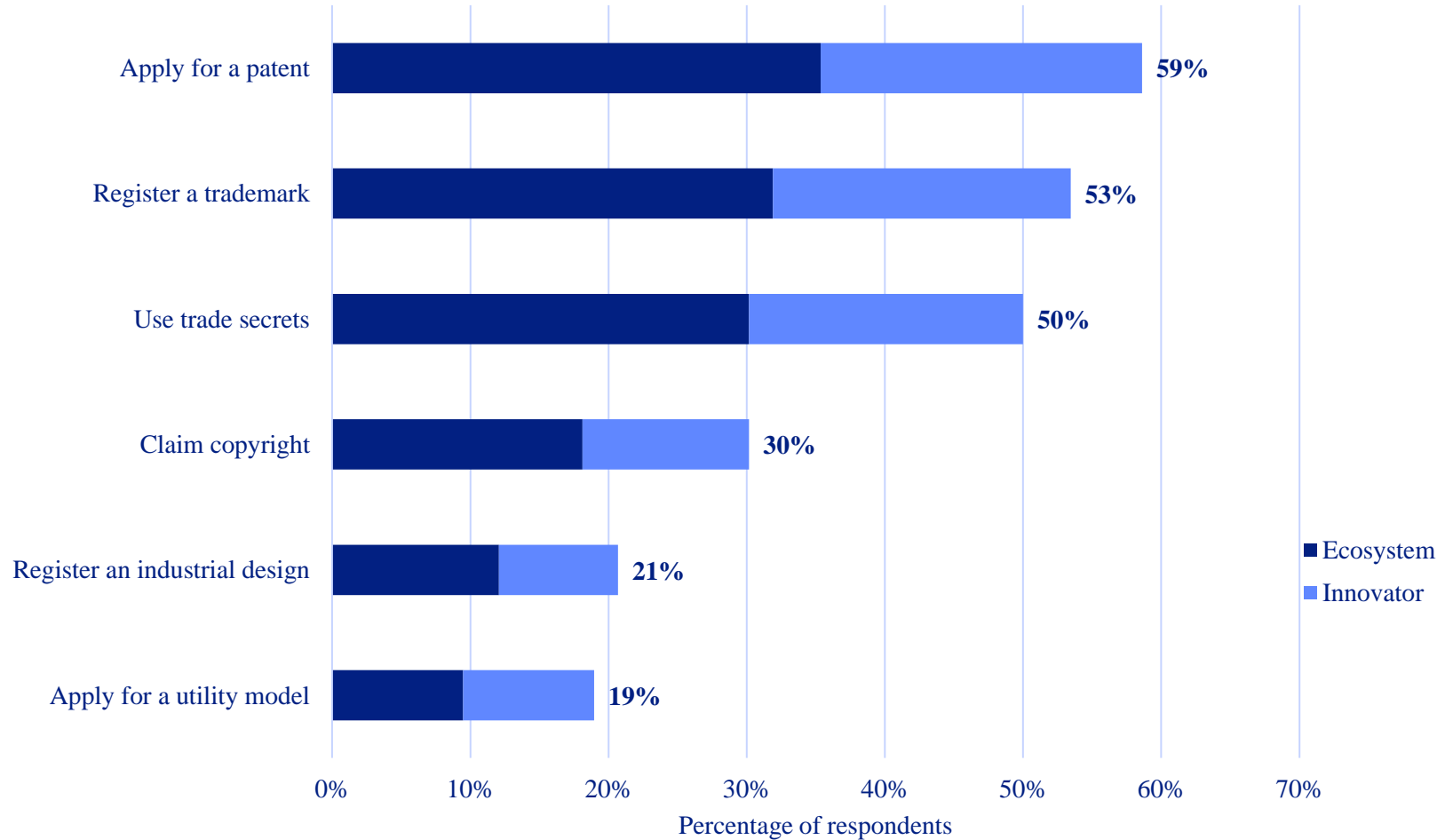
Receiving support from universities and research centres (75%) and consultancy firms (72%) are also popular choices.

Only 60% opt for Industrial partnerships and/or Mergers and Acquisitions (M&As).

Q: “Referring to your cleantech products or services recent innovations, has your company recently engaged in the following innovation activities?” (single choice for each category)

Note: This question was asked only to those respondents who declared to develop core clean technologies (based on 116 respondents)

# Intellectual property protection



*Patent is the most used tool to protect cleantech intellectual property*

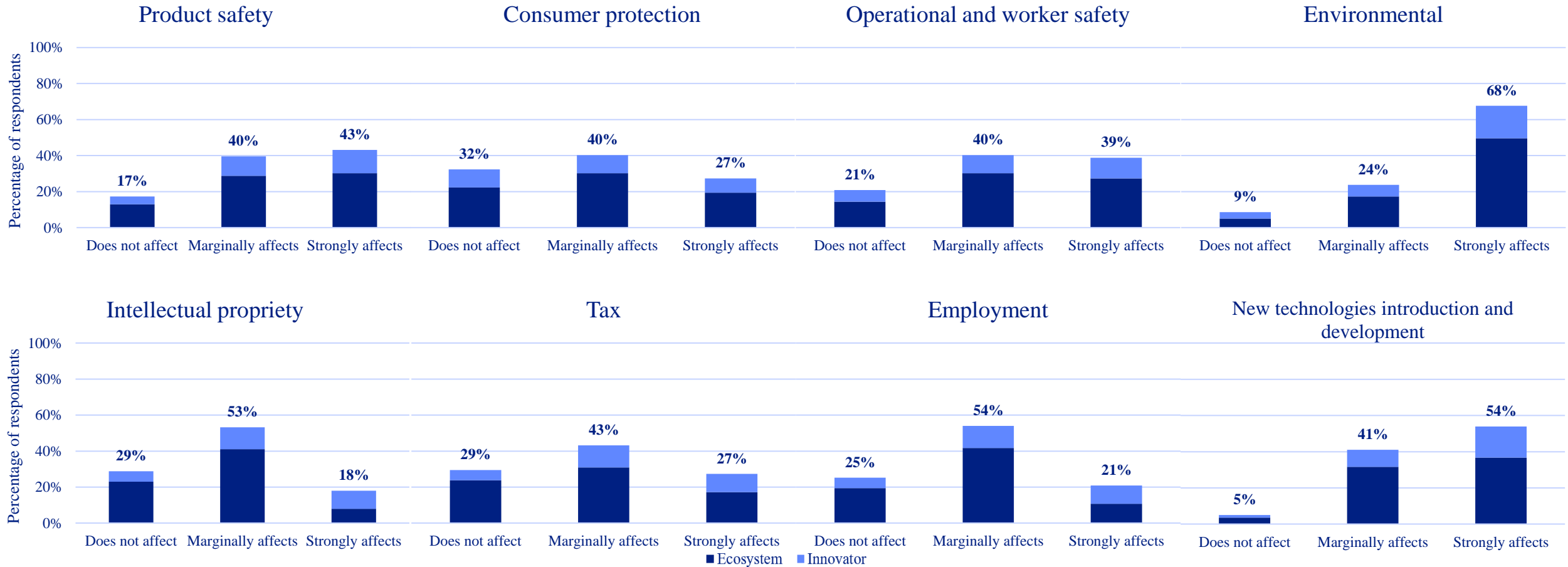
Companies mostly use patents (59%), trademarks (53%) and trade secrets (50%) to protect their intellectual property. Patent is the most used tool to protect innovation outputs.

Copyrights (30%), industrial design (21%) and utility models (19%) are less used.

Q: “What has your company done to protect its cleantech intellectual property?” (single choice for each category)

Note: This question was asked only to those respondents who declared to develop core clean technologies (based on 116 respondents)

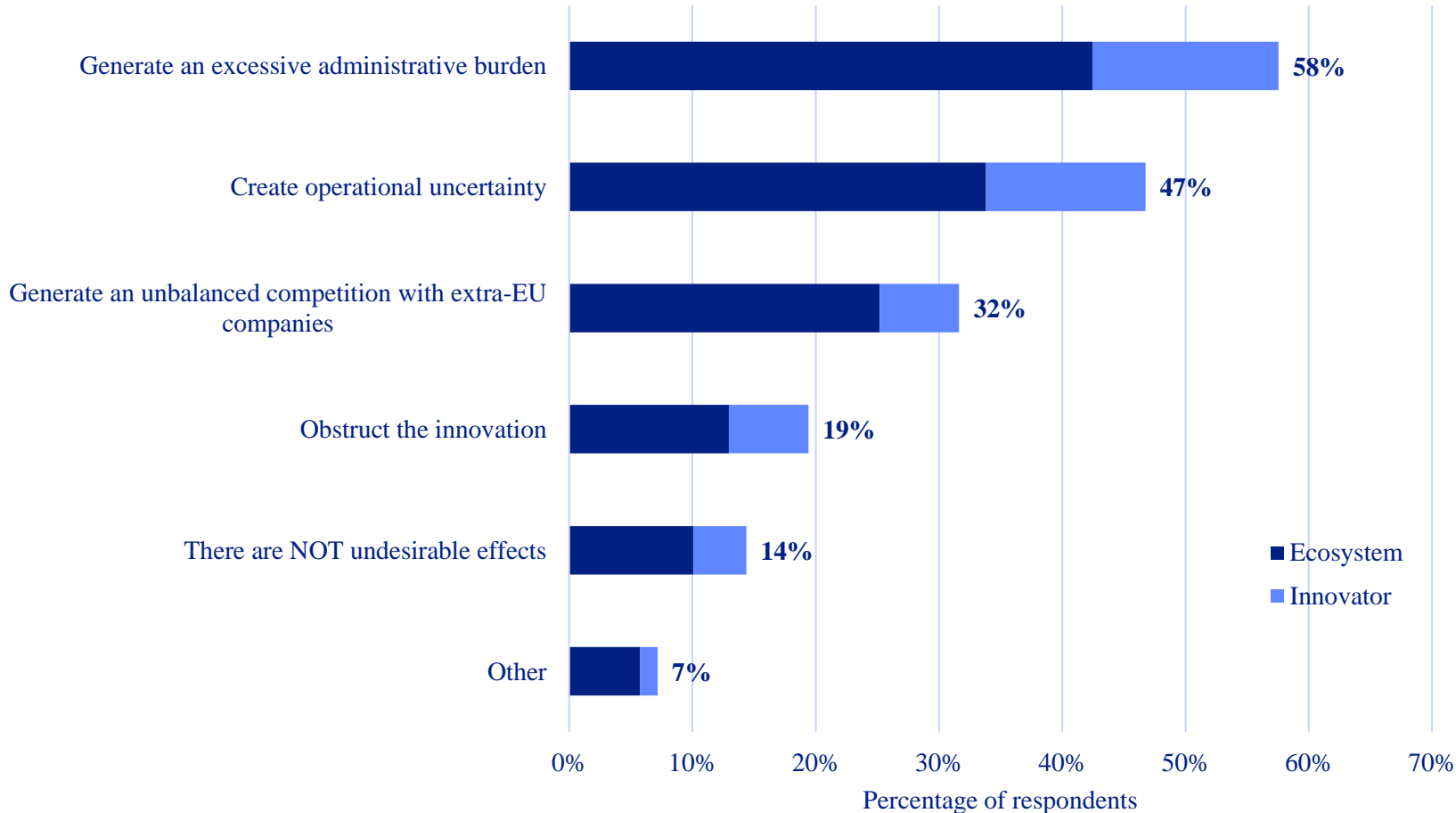
# Policies affecting cleantech activity



Q: “How much are regulations/policies [on the below area] affecting your cleantech activities?” (single choice for each category) (based on 139 respondents)

According to both, innovators and ecosystem companies, policies that strongly affect their business activities are environmental policies (68%) and policies related to the introduction of new technologies (54%). Companies seem to be less concerned of the potential effects associated with intellectual property and employment policies.

# Undesirable effects of recent policies and regulations



*Excessive administrative burden and operational uncertainty are perceived as the most undesirable effects of policies and regulations*

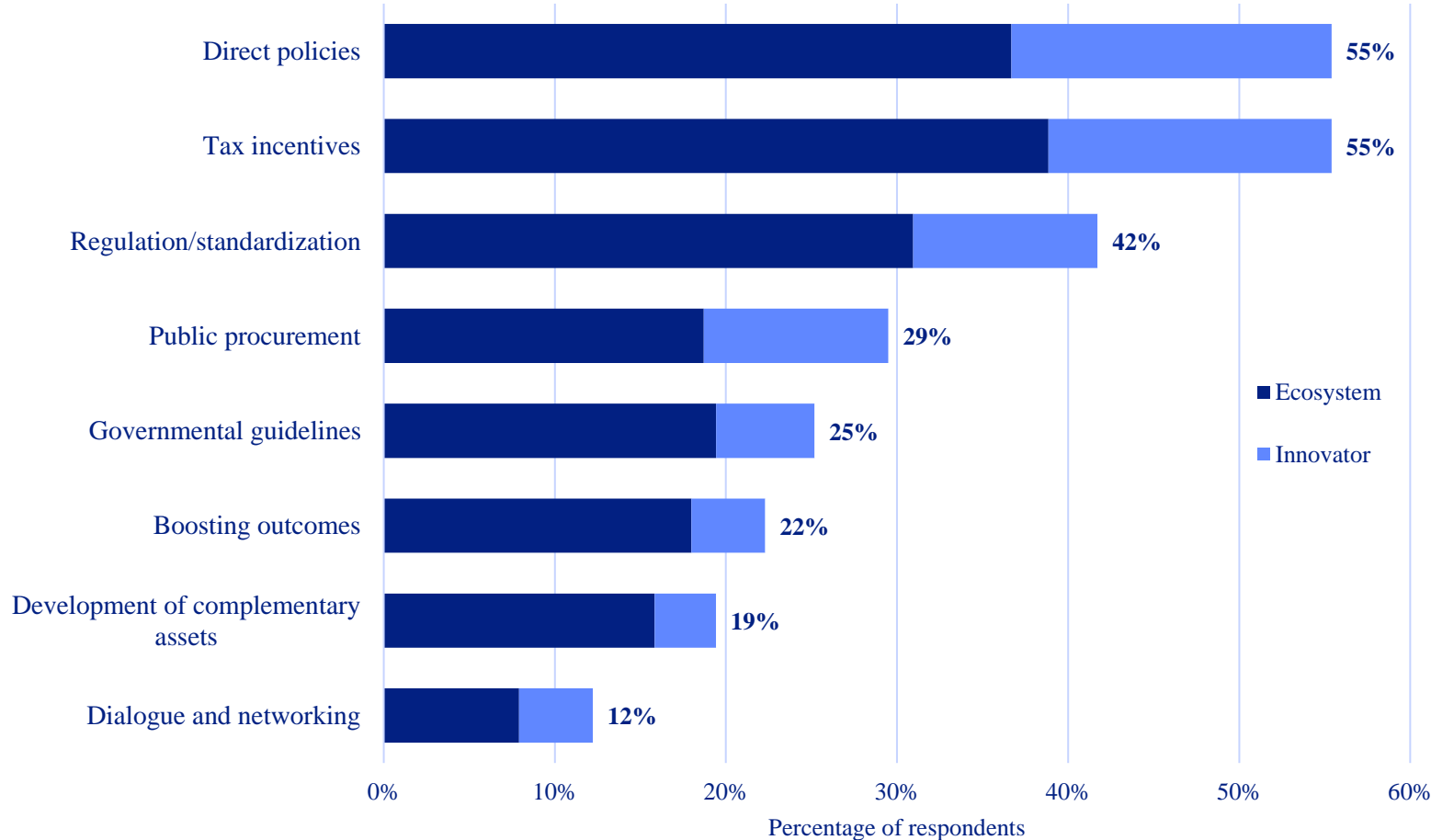
Companies declare that the most undesirable effects of policies and regulations are the excessive administrative burden (58%) and the operational uncertainty they create (47%).

More rarely, they report challenges related to unbalanced competition with non-EU companies (32%) and obstruction of innovation (19%).

Only 14% of respondents declare they do not foresee undesirable effects.

Q: “What are the undesirable effects of recent regulations/policies on your cleantech activities?” (multiple choice) (based on 139 respondents)

# Technology development strategies



*Tax incentives, direct policies and new regulations and standardisation are the most effective policies to support technological development*

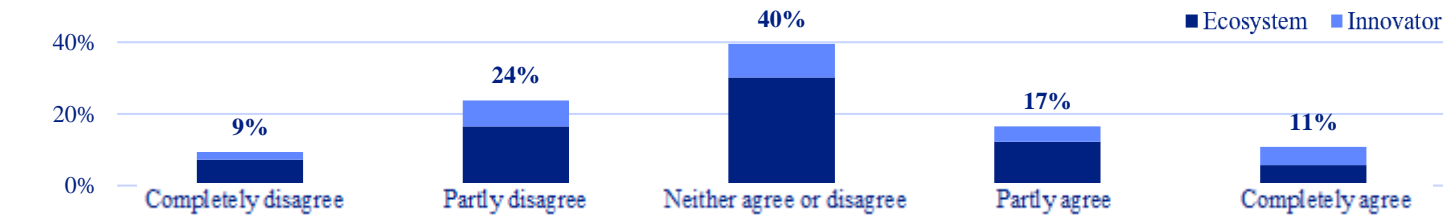
Both innovators and ecosystem companies emphasise tax incentives (55%), direct policies (55%), and new regulations and standardisation (42%) as the most effective policies to support technological development.

Boosting outcomes (22%), dialogue & networking (12%) and developing complementary assets (19%) appear to be less effective in supporting technological advancements.

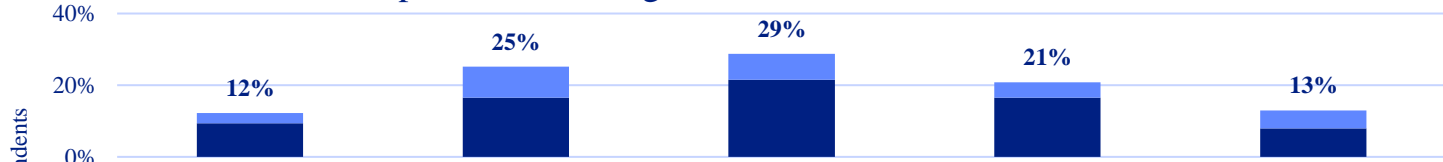
Q: “Which of these regulations/policies can mostly support technological development in the cleantech sector?” (multiple choice) (based on 139 respondents)

# Perception of current regulations

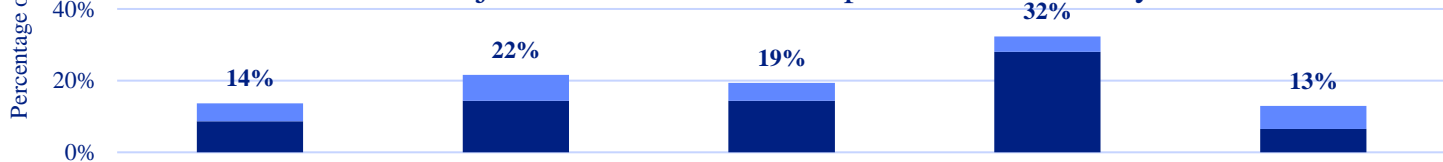
The monitoring activities are clearly disclosed



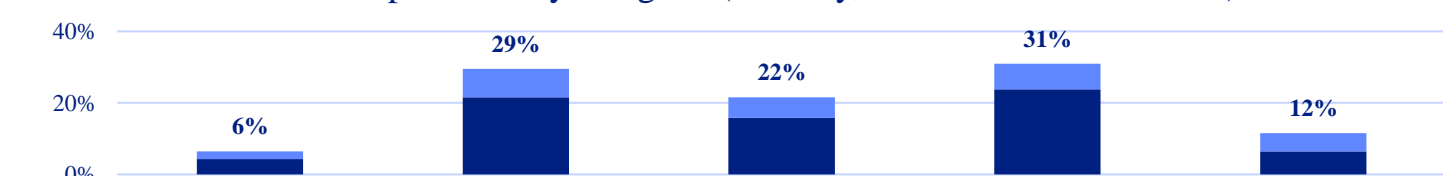
The prioritization of goals and measures is well defined



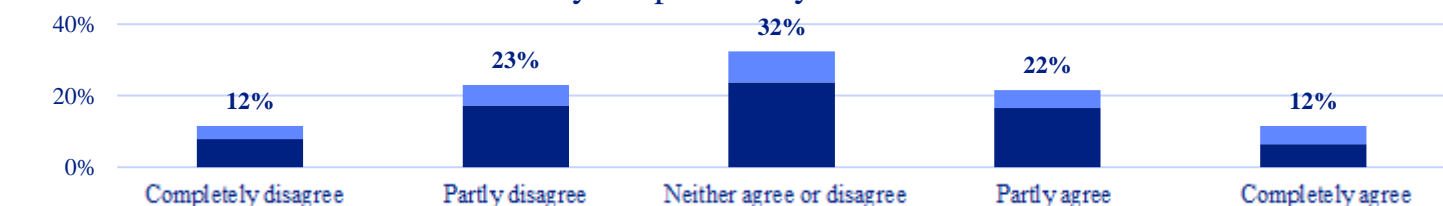
The objectives are set in a transparent and clear way



The scope is clearly designed (territory, duration and addressees)



They are practically enforceable



*Scope and objectives of current policies are clear and well-designed for almost half of respondents*

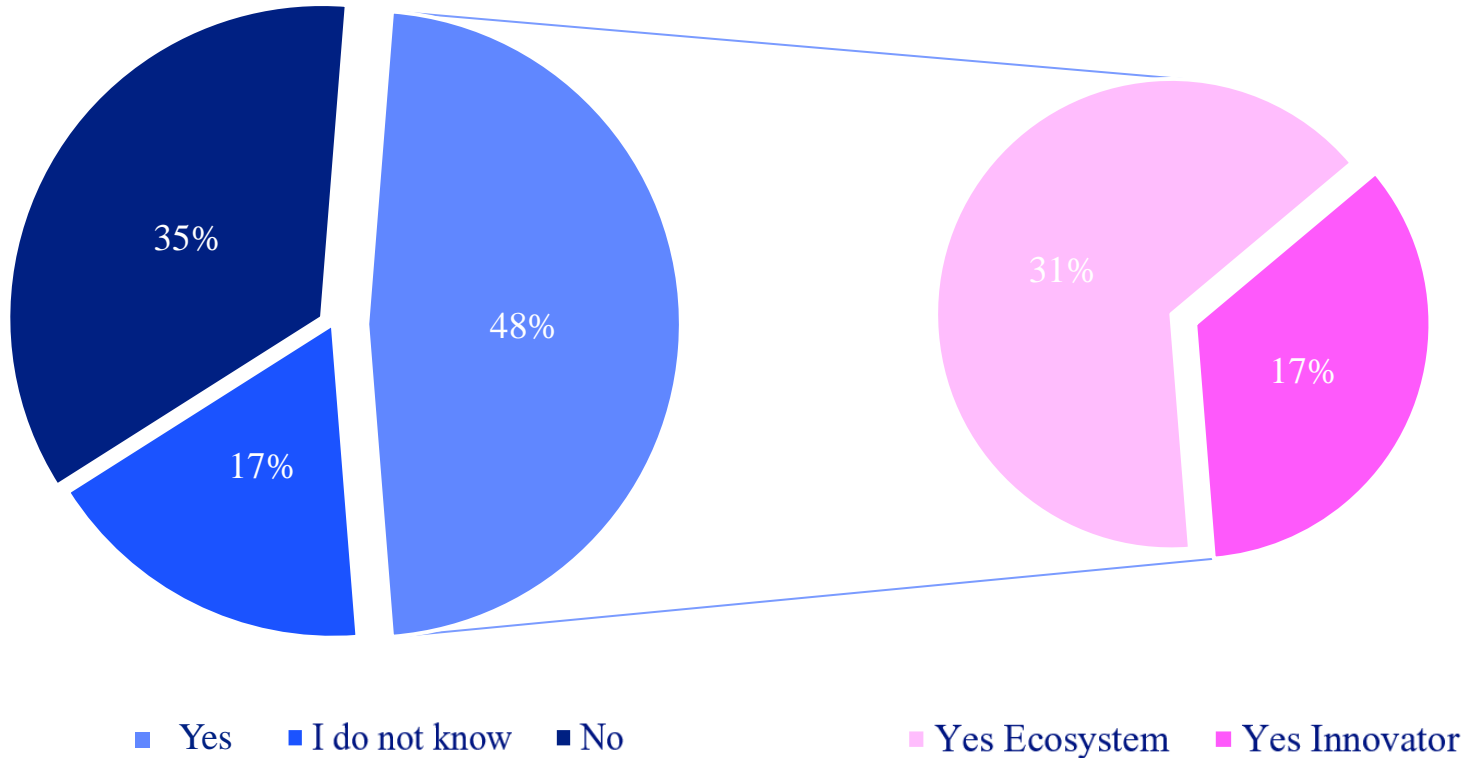
More than 40% of respondents find the objectives and measures of current regulations and policies transparent and clear and the scope being clearly designed.

34% of respondents believe policies are practically enforceable and that the prioritisation of goals is well defined.

Q: “Referring to the main regulations/policies relevant to your core cleantech activities, how much do you agree on the following statements?”  
(single choice for each category) (based on 139 respondents)



# External fund raising



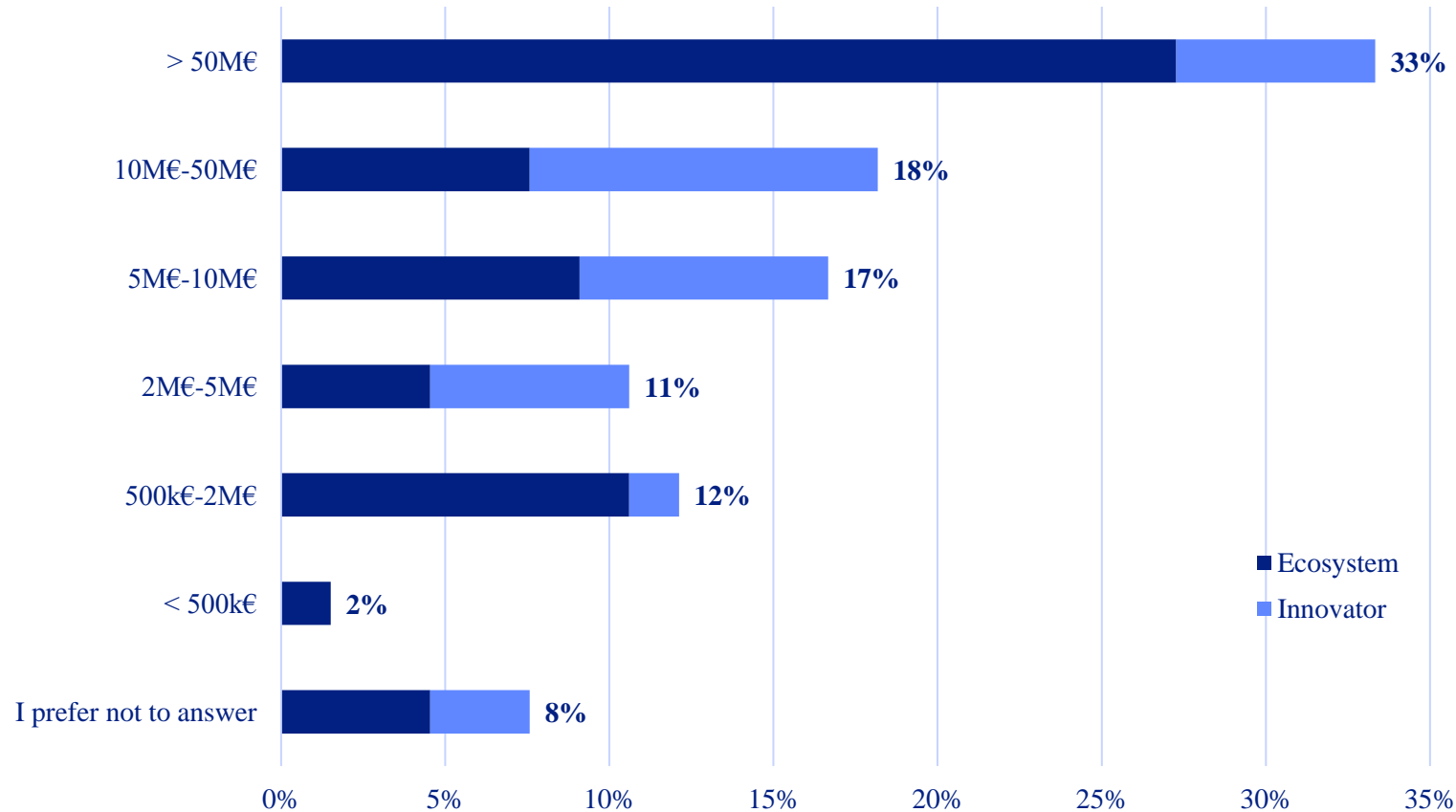
*About half of the companies intend to raise external funds*

About half of the companies intend to raise external funds (31% are ecosystem players and 17% are innovators).

35% of respondents do not have any intention to raise external sources of financing.

Q: “Does your company have any plans to raise funds from EXTERNAL investors for its ongoing activities?” (single choice)

# Expected amount to be raised



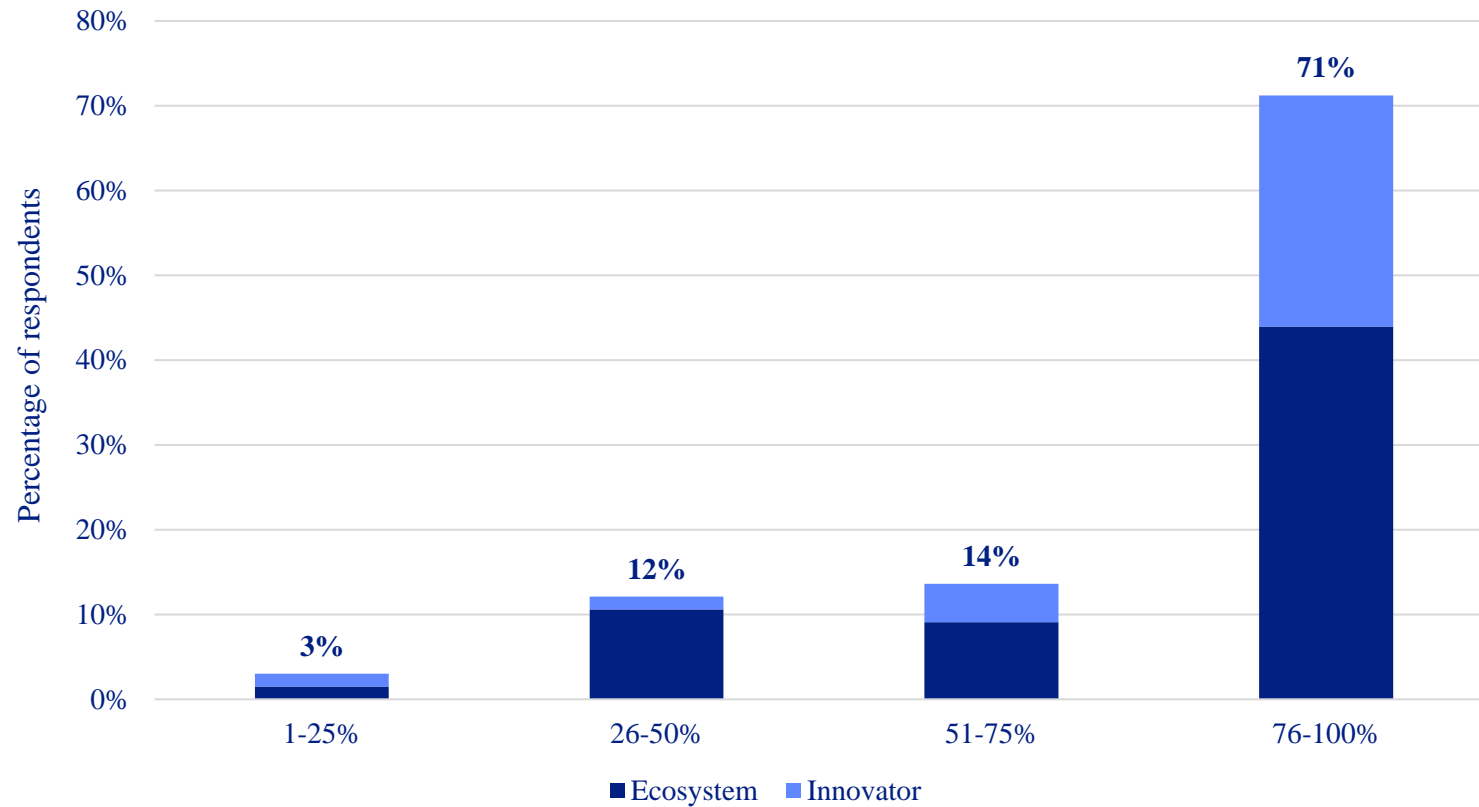
*Expected amounts to be raised exceed EUR 50m for 33% of the respondents*

33% of the respondents require over EUR 50m to meet their financial needs in the near future.

68% of respondents expects to raise between EUR 5m and 50m in the next five years.

Q: “How much do you want to raise for your activities in the next five years?” (single choice) (based on 66 respondents)

# Share of raised funds devoted to cleantech activities



*Raised amounts are mainly targeting cleantech activities*

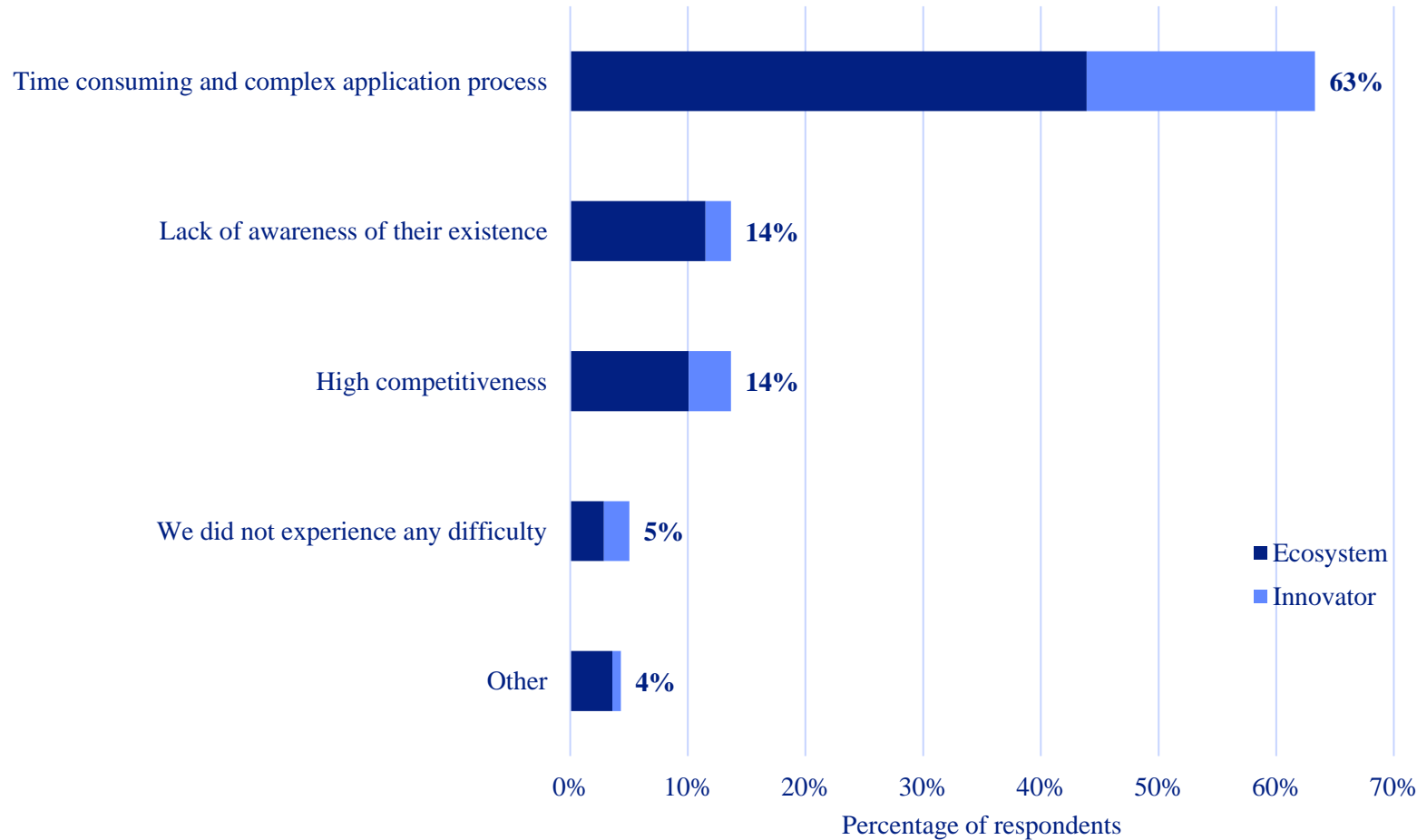
Most companies (71%) intend to dedicate a large part of their raised funds to cleantech activities (between 76% and 100%).

Only 3% of companies intend to devote less than 25% of the raised funds to cleantech activities.

Q: “How much of the funding you intend to raise will be dedicated to support cleantech activities?” (single choice)

(based on 66 respondents)

# Main challenges of public funding



*The main challenge of public funding is the time consuming and complex application process*

The majority of companies (63%) find the application process time-consuming and complex.

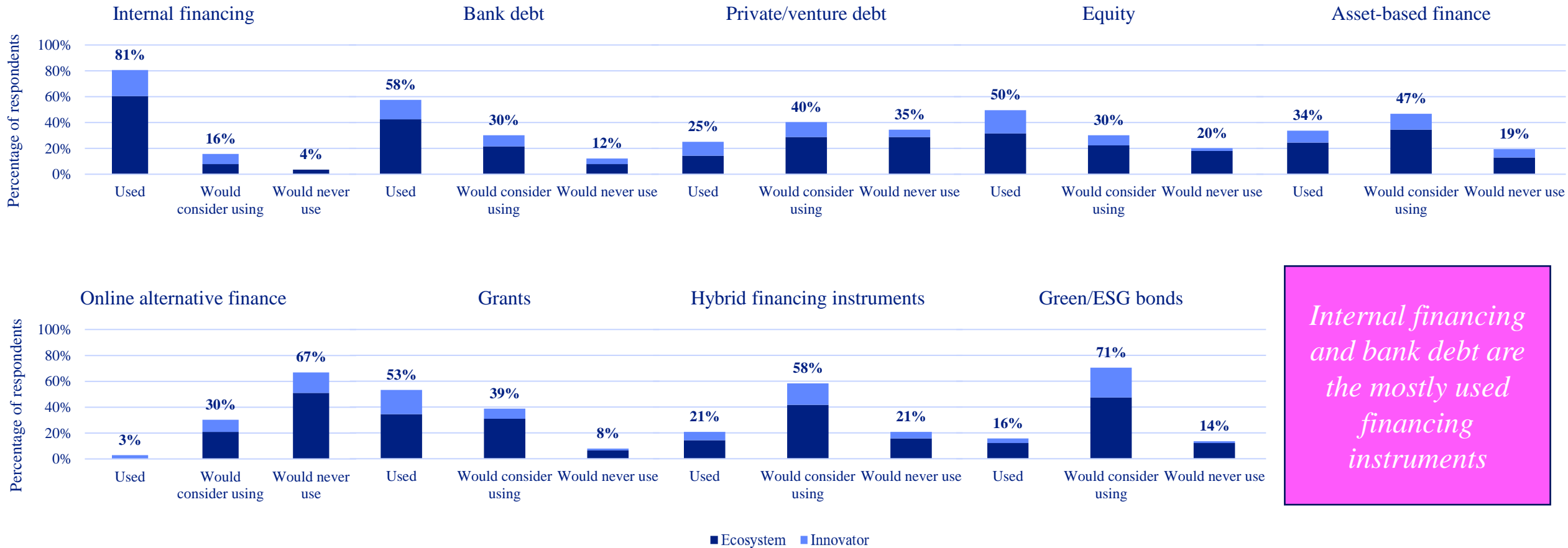
14% of respondents believe that there is high competition when accessing public funds.

Furthermore, 14% of respondents report a lack of awareness of the existence of public funds.

Only 5% of the companies have never encountered difficulties in accessing public funds.

Q: “What is the main challenge in participating in public funding programmes?” (single choice) (based on 139 respondents)

# Financing instruments preferences

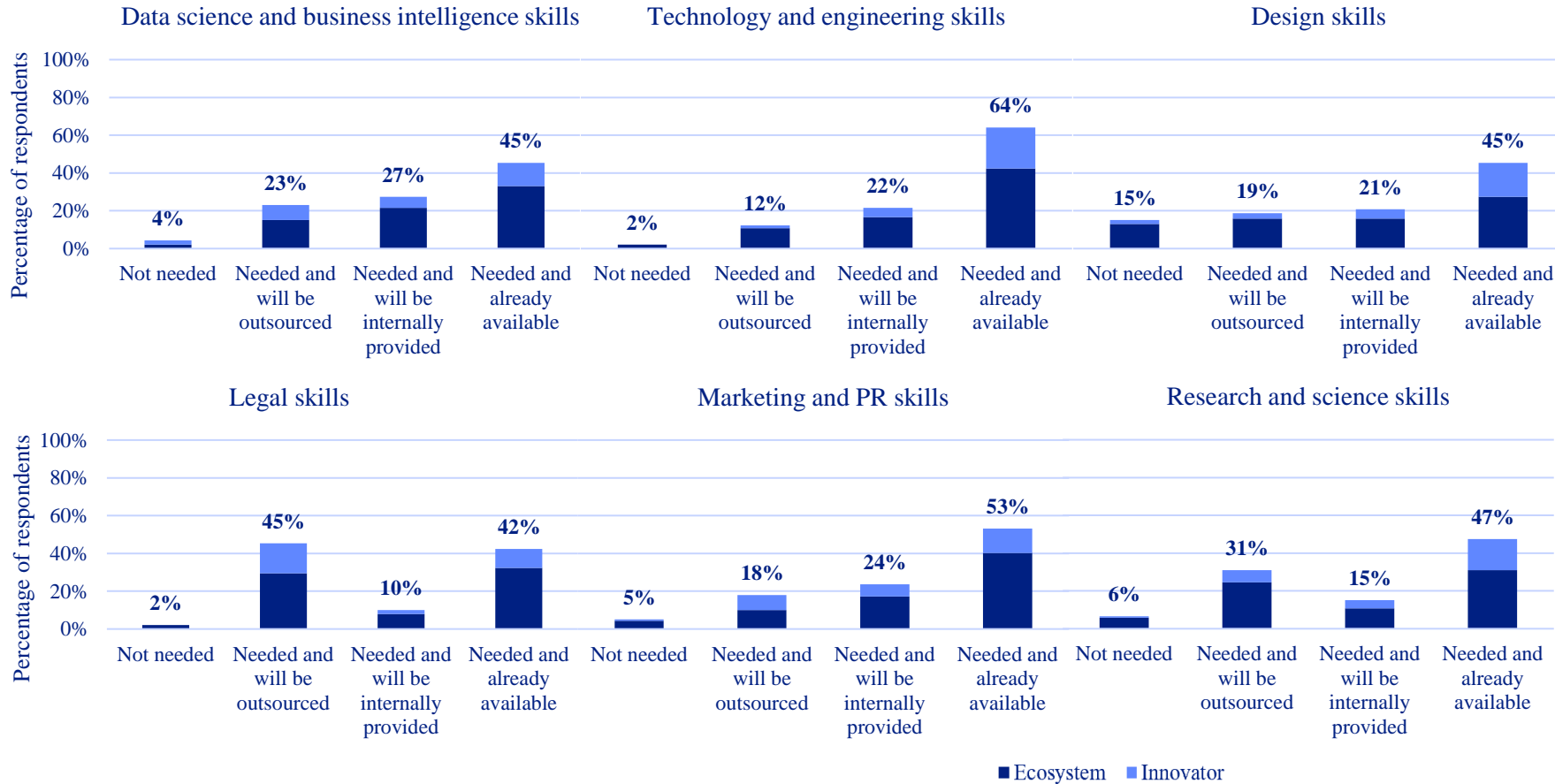


*Internal financing and bank debt are the mostly used financing instruments*

Q: “Has your company used or would consider using the following financing instruments?” (single choice for each category) (based on 139 respondents)

Among the most commonly used types of financing are internal financing, bank debt, grants and equity. In the future, companies are likely to opt also for green/ESG bonds, hybrid financing, asset-based financing and private/venture debt. Online financing is an option that companies prefer to avoid.

# Needed skillset (1/2)

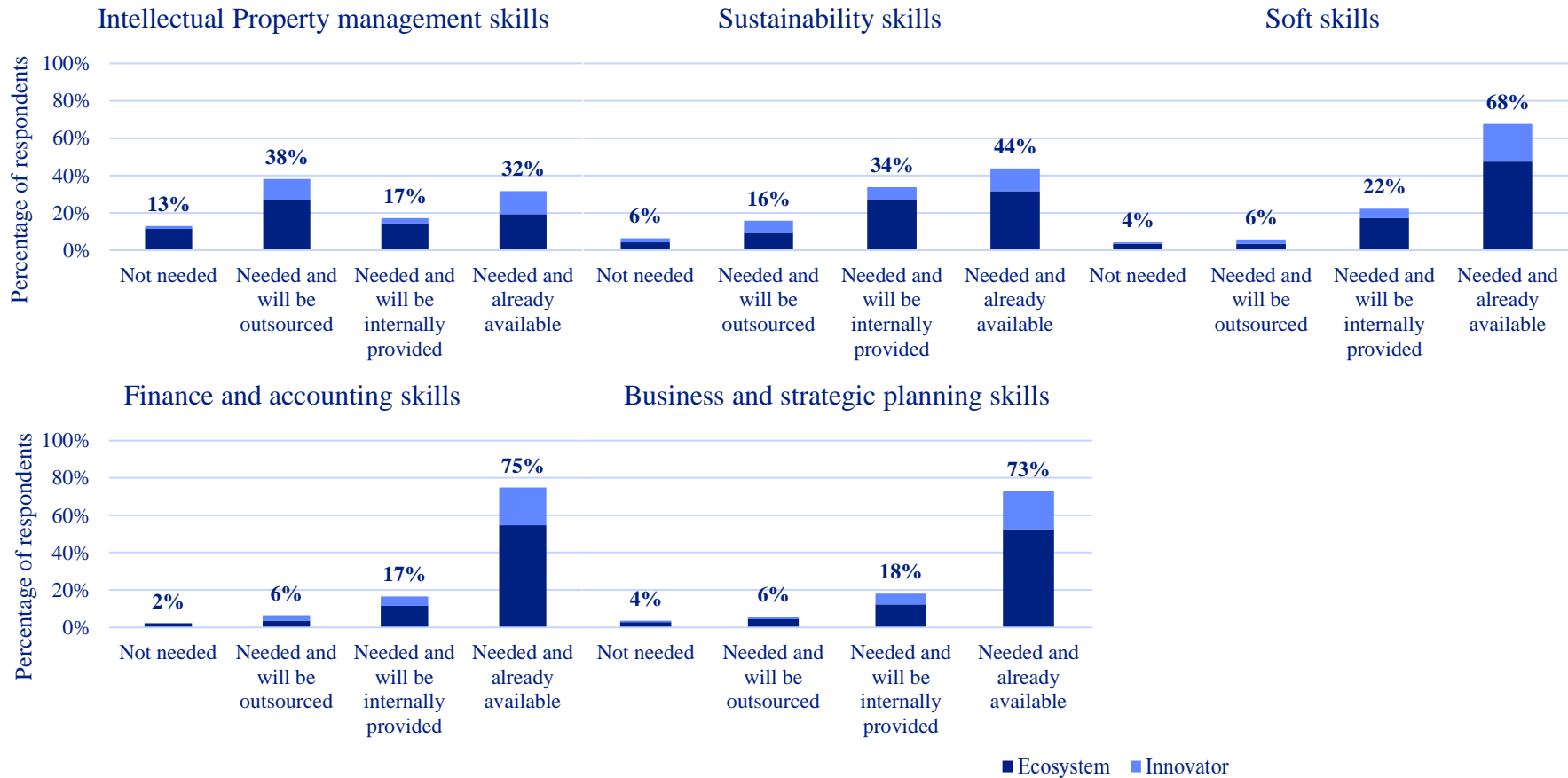


*Legal skills and research & science skills are preferentially outsourced*

Q: “State if the listed skills are needed in your company and if you are going to outsource them” (single choice for each category) (based on 139 respondents)

Legal skills are mostly seen as skills to be outsourced. Respondents have a preference to outsource research and science skills, if not already available.

# Needed skillset (2/2)



*Sustainability skills, soft skills, finance & accounting skills and business & strategic planning skills are mostly available in-house*

Q: “State if the listed skills are needed in your company and if you are going to outsource them” (single choice for each category) (based on 139 respondents)

Respondents report that certain skills are needed but already available in-house: sustainability skills, soft skills, finance & accounting skills and business & strategic planning skills. Skills in intellectual property management are for the 55% not available but needed in the future, with a preference to outsource them.

# Localisation of suppliers

*Suppliers are mainly located in the European Union*



Q: “Where are your suppliers mainly localized?” (single choice)

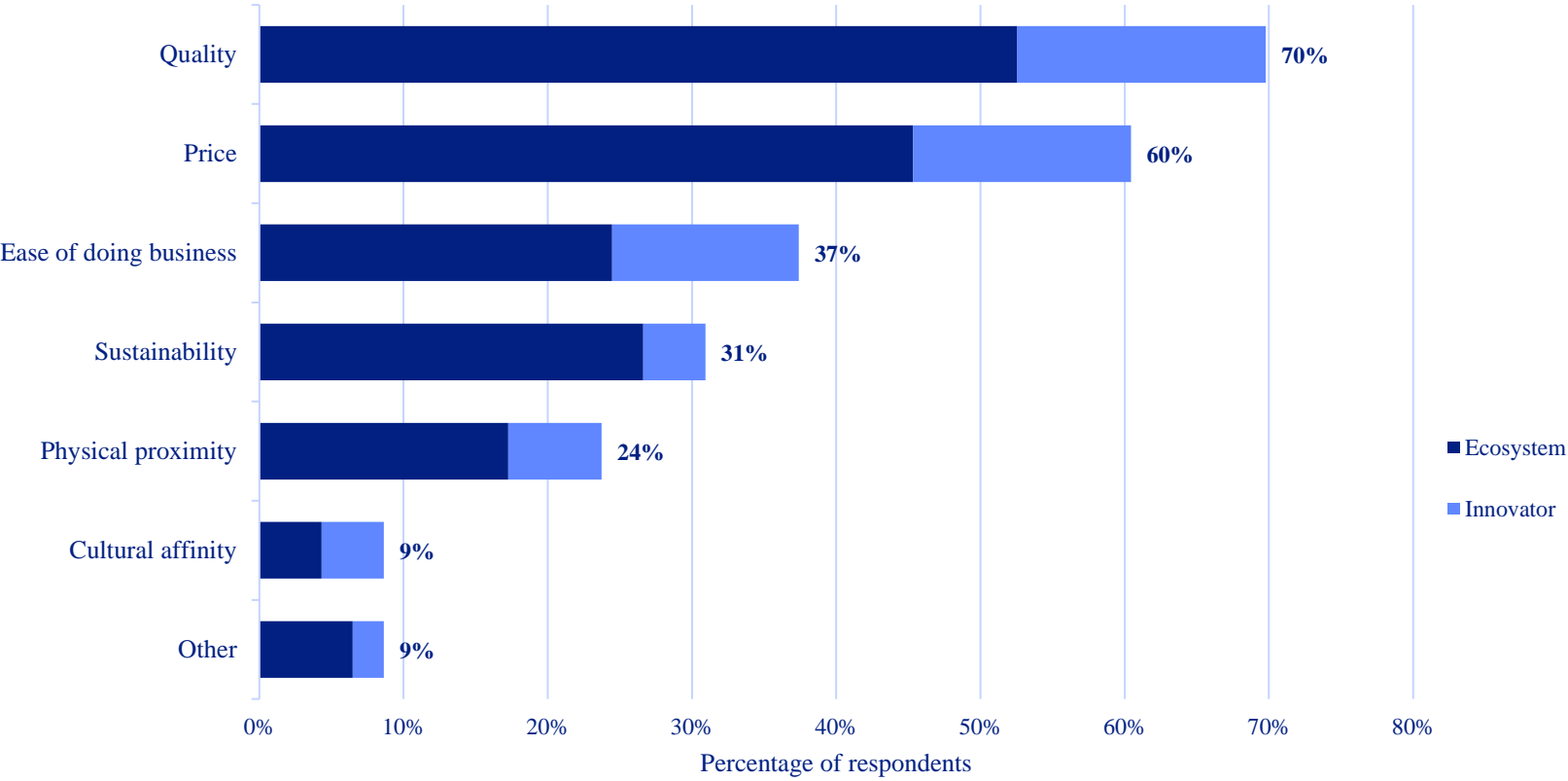
Note: 'EU' refers specifically to any EU member state except their own, where suppliers may be located.

Few companies manage to have a local supply chain, only 3% of innovators and 10% of ecosystem companies succeed. Most companies manage to have a supply chain within the European borders, with 18% of both innovators and ecosystem respondents with a national supply chain.



# Suppliers’ pool selection

*Quality and price are the main reasons to select suppliers*



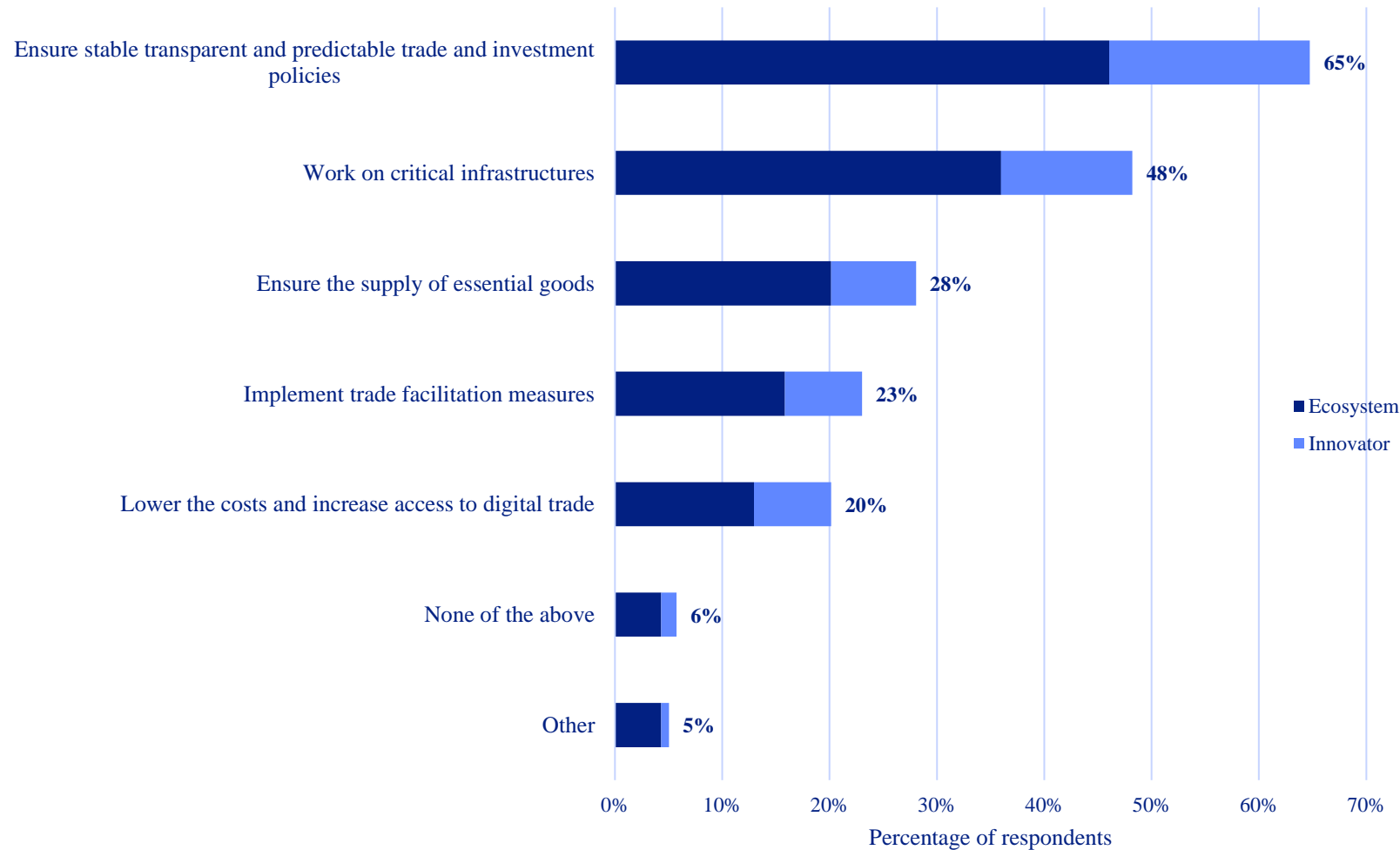
Quality (70%) and price (60%) drive companies' purchasing choices.

The ease of doing business (37%) is also considered.

Proximity (24%) and cultural affinity (9%), on the other hand, seem to be more negligible factors.

Q: “Which are the main reasons for the selection of the current pool of suppliers?” (multiple choice for each category) (based on 139 respondents)

# Supply chain national resilience strategy



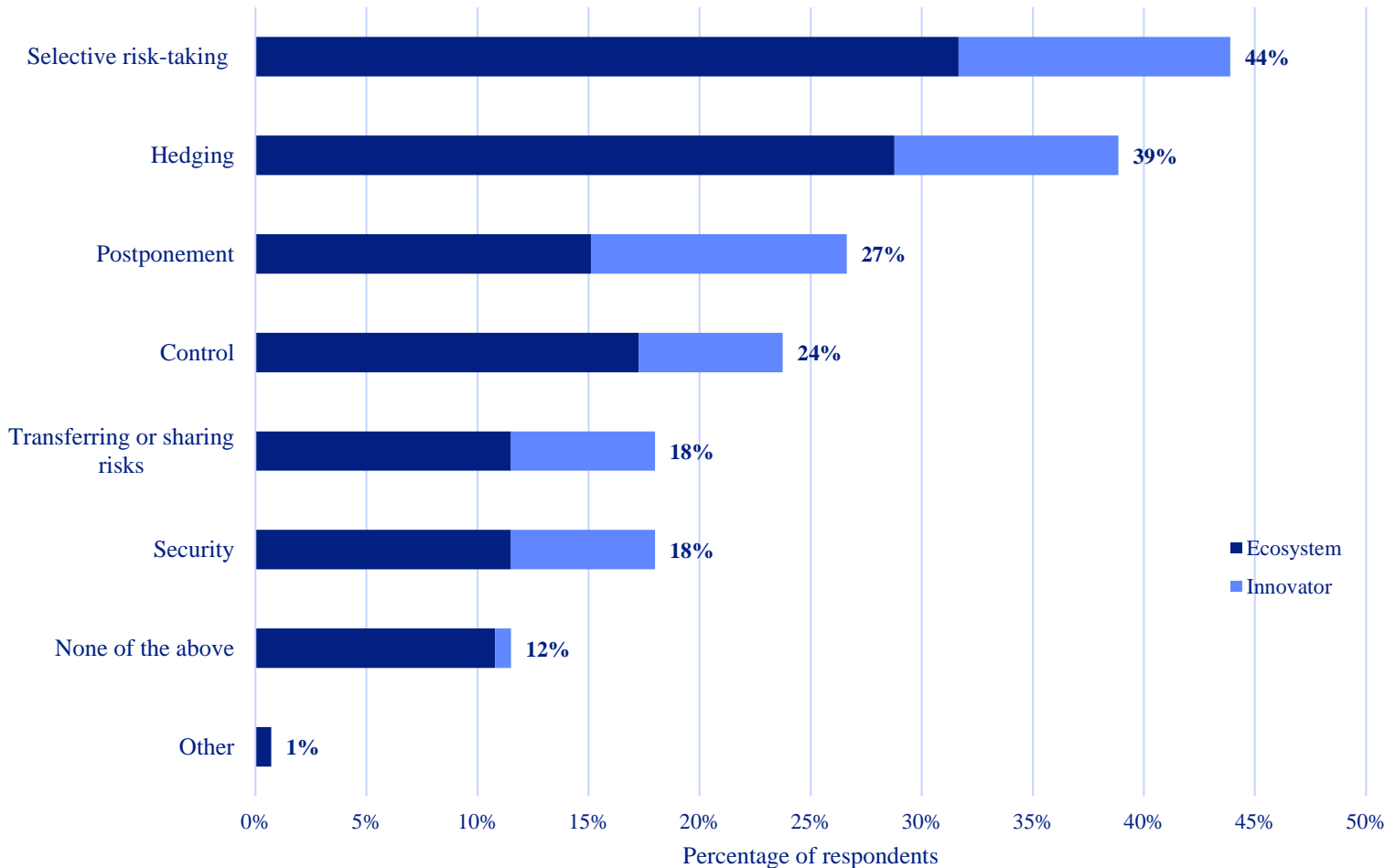
*Transparent trade and investment policies are needed to enhance supply chain resilience at country level*

According to most respondents, more transparent trade and investment policies (65%) can help enhance supply chain resilience at country level. Nearly half of companies also believe that critical infrastructure interventions (48%) should be pursued by governments to reach this goal.

Trade facilitation (23%), ensured supply (28%) and lower costs of essential goods (20%) may also make a relevant, although smaller contribution, to improve national supply chain's resilience.

Q: "Which of the following policy goals should the government pursue to improve the resilience of supply chains in your country?" (multiple choice for each category) (based on 139 respondents)

# Firm resilience strategy



*Selective risk-taking and hedging are considered the most important actions to make supply chains more resilient*

Selective risk-taking (44%) and Hedging (39%) are considered the most important actions to make supply chains more resilient.

Postponement (27%) and Control (24%) are still considered but are assigned a lower ranking in importance.

Transferring or sharing risks (18%) and Security (18%) are the least frequently adopted actions.

Q: “Which of the following actions is your company considering to make its supply chain more resilient?”  
 (multiple choice for each category) (based on 139 respondents)

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The European Investment Fund (EIF) is Europe's leading risk finance provider for small and medium sized enterprises (SMEs) and mid-caps, with a central mission to facilitate their access to finance. As part of the European Investment Bank (EIB) Group, EIF designs, promotes and implements equity and debt financial instruments which specifically target the needs of these market segments.

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