The Use of Data and Analysis as a Tool for Cluster Policy

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EUROPEAN CLUSTER ALLIANCE

The use of data and analysis as a tool for cluster policy

AN OVERVIEW OF INTERNATIONAL GOOD PRACTICES AND PERSPECTIVES PREPARED FOR THE EUROPEAN COMMISSION

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PREFACE

In the autumn of 2007, the European Commission (DG Enterprise and Industry) proposed four working areas related to clusters and cluster policies. One of these was 'Measuring the economic impact of cluster policies'.

The leadership of this working area was offered to the BSR InnoNet – given its ongoing activities in the field of cluster analysis. FORA, the research and analysis division within the Danish Enterprise and Construction Authority (DECA) and lead partner on the analytical work within the BSR InnoNet, took on the responsibility for the working area.

The aim of the working area is to provide the European Commission with specific recommendations that identify which analytical tools and methods best support the formulation of fact-based cluster policy in Europe.

This document aims at providing an overview of existing good practice examples of different tools and analytical methods used during the cluster policymaking process, serving as a key input from which recommendations to the Commission can be made.

The document has been written by Marie Degn Bertelsen, Lotte Langkilde and Emily Wise with support from research assistant David Boysen Jensen (FORA), and financed by the Danish Enterprise and Construction Authority (DECA).

DECA would like to thank everyone who contributed, including all the experts whose methods are described in this paper.

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EXECUTIVE SUMMARY

The global map of businesses is increasingly dominated by geographically concentrated groups of companies and related economic actors and institutions. These are called industry clusters, clusters of knowledge, or simply clusters. Interactions between companies, knowledge institutions and the public sector contribute to job creation, higher wages and surplus. The effects are attributed to clusters being an effective set-up for spurring innovation and competitiveness.

A range of international studies have presented results which indicate that clusters have a positive impact on innovation and economic growth. In light of this knowledge, a large number of countries and regions have embraced the concept of clusters and work to develop clusters through initiatives, programmes or cluster-specific innovation policy. On a European level, the Commission has taken on the role of addressing informational and networking needs of member countries, and facilitating knowledge-building on this topic.

In response to various requests for a more fact-based ground for cluster policy formulation in Europe, DG Enterprise and Industry proposed a working area focused on measuring the economic impact of cluster policies. The working area has involved a number of activities: identifying experts, hosting a workshop to present and discuss various good practice examples, and describing good practice examples using a common framework.

This document aims to provide an overview of existing good practice examples of different tools and analytical methods used during the cluster policymaking process. The ultimate objective with this work is to forge a strong, unbiased position from which to make recommendations on fact-based cluster policy in Europe.

The result of the first phase of activities for the working area was the identification of experts who develop tools and analytical methods in order to help formulate public policy. Each analytical method was described using the same four headings: Policy use of analysis, Outcome of analysis, Object of analysis, and Data, illustrated by a categorisation wheel.

Several good practice examples of databases for benchmarking clusters, cluster-based economic strategies, industry and cluster studies, and policy-tailored cluster analysis were presented at the workshop in Copenhagen. The examples presented in Copenhagen are described in this document, by use of a categorisation wheel.

Databases for benchmarking clusters are powerful diagnostic tools that policymakers can use to map and benchmark clusters across regions and countries. Providing an overview of cluster composition, these databases highlight varying strengths, and help policymakers target emerging or declining areas for action. Examples are described in Chapter 3.

Cluster-based economic strategies are recommended action plans for a group of companies and related actors. These strategies can be used to understand business environment factors and cluster performance in a specific location, helping to inspire and inform policy formulation. These detailed strategies can also be used in implementation and learning phases to follow-up on cluster performance or changes in a cluster's business environment over time, in order to evaluate the success of existing policies. Examples are described in Chapter 4.

Industry and cluster studies are broader examinations of the cluster and industry. These studies help policymakers identify areas of the economy on which to focus, explain general trends in the industry and how these may be handled differently in different geographical locations. Industry and cluster studies can be used during the justification, diagnosis and formulation phases to understand how business environment factors affect cluster performance in different locations. One example is presented in Chapter 5.

Policy-tailored cluster analysis encompasses the different analytical tools and methods that policymakers use at different stages of the policymaking process. Industry and cluster databases are used to identify areas of strength and weakness, highlighting possible targets for policy action. Other diagnostic analyses such as detailed cluster or benchmarking studies are used to provide insight on how different business environment factors affect cluster performance. Evaluation and benchmarking analyses are used at different periods of policy implementation. Chapter six presents examples of several countries (France, Finland, Scotland and Denmark/Baltic Sea Region countries) and how they use various tools and analytical methods as inputs throughout the policymaking process.

The summary chapter presents some general observations regarding the use of tools and analytical methods as inputs to cluster policymaking, as well as a summary of discussion from the Copenhagen workshop

CHAPTER 1

Introduction

In response to various requests for a more fact-based ground for cluster policy formulation in Europe, DG Enterprise and Industry proposed a working area focused on measuring the economic impact of cluster policies.

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BACKGROUND

Clusters and cluster activities have received an increasingly high priority from governments at regional, national and trans-national levels. As a result, in 2006 the European Commission:

- Launched four 'InnoNets' under the PRO INNO initiative
- Set up the Cluster Mapping Project under the Europe INNOVA initiative
- Established the European Cluster Alliance

These initiatives acknowledged the need for a thoroughly documented, fact-based foundation for all work on clusters throughout Europe.

In the autumn of 2007, the European Commission (DG Enterprise and Industry) proposed four working areas related to clusters and cluster policies.

One of these was **'Measuring the economic impact of cluster policies'** [1].

This working area aims to provide the Commission with specific recommendations that identify which data to collect and which analytical tools and methods best support the formulation of fact-based cluster policy in Europe.

The working area was divided into four key activities:

- Identifying **international good practices** – experts and their analytical methods – within fact-based cluster policy
- Hosting a **workshop** for experts to present and discuss good practice tools and methods together with members of the European Cluster Alliance
- **Documenting** good practice methods and discussions from the workshop
- Submitting a **policy paper**, recommending a way forward for the Commission to support fact-based cluster policy in Europe

This document summarises the first two activities and provides key input to the policy paper.

1. Given its ongoing activities in the area, the BSR InnoNet accepted leadership of the working area. FORA, which leads the analytical work within the BSR InnoNet, has been running the activities for this working area.

WHAT IS FACT-BASED CLUSTER POLICY?

A policy is a deliberate plan of action that guides decision-making toward a rational outcome [2]. Cluster policy refers to the range of actions aimed at improving cluster performance. The definition of cluster policies proposed in the European Commission's recent staff working document is specific governmental efforts aimed to support clusters [3].

Cluster policies can fall into one of three categories: facilitating policies, traditional framework policies and development policies (see box next page). All aim at improving the innovation potential and performance of clusters, and, as a result, economic productivity and growth.

Public policy decisions are based on a number of factors including historical and local practices, political priorities, and facts. Policy is said to be fact-based when it is derived – in part – based on concrete and measurable information or data. This is contrasted with policies that are derived solely based on history and local practices, or political priorities. When facts are included in the mix, it provides the evidence needed for policymakers to make sounder and longer-lasting decisions.

2. From http://en.wikipedia.org/wiki/Policy

3. For additional, more detailed information on the concept of clusters and main definitions, see European Commission Staff Working Document SEC(2008)2637, pp. 5-6; 31-36.

This document will provide some detailed examples of good practice methods in a field that is still relatively new [4]. Real fact-based input to cluster policy formulation is still difficult to find. Statistics have not been structured according to clusters, and most regional and national policy initiatives have not been in place long enough to provide hard evidence of the benefits of public policy support for clusters. Although providing fact-based input to the policymaking process is challenging, it is not impossible. This document will describe examples of good practice from around the world – and the types of input that can be used at different steps of the policymaking process.

Policymaking is a complex process made up of many decisions and many unresolved issues. Should the public sector get involved? Is action even necessary? Which activities should the public sector prioritise?

4. According to the European Cluster Policies report, about half of Europe's countries first started applying 'cluster policies' around the year 2000.

Cluster Policies can be defined as specific governmental efforts aimed to support clusters. According to the recent Commission Staff Working Paper, these governmental efforts can be sorted into categories: facilitating policies, traditional framework policies and development policies.

Facilitating policies are directed towards creating a favourable microeconomic business environment for growth and innovation. Support from the public sector tries to enhance the specific conditions that could improve a cluster's performance.

Traditional framework policies, such as industry and SMEs policies, research and innovation policies, and regional policy often use the cluster approach to increase the efficiency of a specific instrument.

Development policies aim at creating, mobilising or strengthening business strategies and co-operation between organisations and people through knowledge-sharing at a regional or cluster level. The public sector can support broader programmes such as Pôles de Competitivité in France, or directly target specific clustering efforts such as NorCom – ICT in Northern Jutland.

How can the public sector evaluate the success of its policies? Which new policies does the public sector need to prioritise? The public sector needs fact-based input to answer all of these questions – and assist the decision-making process.
In an effort to provide an overview of the various decisions that must be made when formulating cluster policy, we have used an existing description of the process of innovation policymaking and applied this for cluster policymaking.
The CIRCLE Model illustrates the decision-making process for innovation policymaking (see Figure 1). The process is comprised of four steps, and the continuous activity of policy learning:

- **Justification** – the policy rationale which establishes why the public sector should be involved in a particular area
- **Diagnosis** – the detailed analysis of the general context for a targeted area to highlight strengths and weaknesses and identify possible actions
- **Formulation** – the prioritisation of alternative strategies and actions
- Implementation – putting the strategy into operation

At the core of the whole process, **learning** refers to the continuous activity of learning from results of policy actions and applying this knowledge as in input to future policymaking processes.
This model, applied to the process of creating policies for clusters, illustrates the types of questions that policymakers ask – and the different types of factual input they need to make effective policy decisions.

Justification phase

Policymakers need to understand the effect of public sector involvement and regulation. They need hard evidence that clusters and clustering endeavours have a positive economic impact, and they need to understand the role played by the public sector. However, there are few examples of data and cluster analytical methods that support this phase of the policymaking process. One example of fact-based input at this step could be analyses that provide evidence of the economic impact of clusters and cluster policies.

Justification refers to the discussion on why policimakers should intervene in the innovation process, that is, what is the rationale for innovation policy.

Diagnosis consists of the analysis of the external situation, that is, the context.

Formulation involves the analysis of the different possible strategies of the policy makers (what can they do) and the selection of the alternatives that should be implemented, giving the diagnosis of the problems in the system as well as the capabilities and resources available to the policymaker at one given moment in time.

Implementation of the strategy means putting it into praxis in the specific system of innovation it aims at influencing.

FIGURE 1

Diagnosis phase

Policymakers need facts on industrial structure, including areas of growth, decline and inter-dependencies between industries and sectors. They need detailed analysis on how specific clusters [5] are performing [6] at any given moment, and how different factors in the business environment, such as skills levels, collaboration with academic and research institutions, government regulations, or access to labour or capital, affect cluster performance, and what alternative actions could be taken.
International cluster databases use a variety of indicators to highlight areas of strength as well as areas, whether emerging or in decline, which could be ear-marked for action. In-depth analyses of these sectors or clusters provide insight into how a cluster functions and how different factors in the business environment can have an impact. And they point out where policy action could be focused.

Formulation phase

The specific policies that support clusters and their surrounding environment formulated at this stage are a natural development of the analysis and recommendations made in the preceding justification and diagnosis phases. In the policy formulation phase, policymakers need input on which activities to pursue. Which alternative strategies and activities, either to strengthen linkages or strengthen the business environment, could be recommended? Which policies have been successful elsewhere? Which activities should be given a high priority?
Consultants, specialising in business strategy, and policy analysts, with insight into innovation policy priorities and business conditions, are key to this phase of the process. Fact-based input is based on the analysis of regional or national conditions and policy priorities. As yet, there are very few examples of cluster analytical methods that enable the international benchmarking of cluster-specific framework conditions.

Implementation phase

During this phase, policymakers need access to analysis and evaluation of the performance of clusters and cluster initiatives over time. These results give policymakers insight into operations, enabling them to see which policies realise their goals. They can then use these insights to justify new investments, revise existing policies, and inspire new policy measures.
Fact-based input is a crucial part of any policymaking process. As the CIRCLE model shows, different types of data and analysis need to be applied to the process of creating fact-

5. Or cluster initiative, cluster effort, innovation network or other 'object of analysis'

6. Based on a number of different indicators including employment, productivity, exports, patents and publications, new products and citations, and new establishments.

based cluster policies. In later chapters, the phases of the CIRCLE model will be used as reference points when concrete examples of good practice are presented.

PURPOSE AND STRUCTURE OF THIS DOCUMENT

The document has three main objectives:
1. To provide an overview and specific examples of international good practice in the field of cluster analysis as an input to policy formulation
2. To summarise the discussion between recognised experts and stakeholders of the European Cluster Alliance about using data and analysis as tools for formulating cluster policy
3. To support the policy paper – recommending which data to collect and which methods to use at a European level

The document has been divided into seven chapters. After introducing the scope of the project in Chapter One, Chapter Two presents the process used to identify and categorise international good practices in the field of cluster analysis as an input to policy formulation.
In the four chapters that follow, analytical methods are presented from each of the following four groupings:
- Databases for benchmarking clusters
- Cluster-based economic strategies
- Industry and cluster studies
- Policy-tailored cluster analysis

The final chapter comprises some general observations and a summary of the discussion from the Copenhagen workshop.

CHAPTER 2

Identifying international good practices

The result of the first phase of activities for this working area was the identification of experts who develop tools and analytical methods in order to help formulate cluster policy. To make them easier to compare, each analytical method was described using the same four headings: Policy use of analysis, Outcome of analysis, Object of analysis, and Data.

As we have already seen in Chapter 1, each stage of the policymaking process requires specific types of fact-based inputs. There are many civil servants, think tanks and government agencies over the world who work toward the same goal: to develop policies in support of national or regional clusters. At the moment, they all work with different types of data and analytical methods.
In order to understand and gain insight from these different approaches, the working area's first phase focused on identifying good practices at both regional and international levels. To do this, two steps were followed:
1. **Identify experts** – identify who collects and analyses data on clusters as an input to public policy formulation
2. **Categorise good practice methods –** categorise analytical tools and methods under four headings: policy use of analysis, outcome of analysis, object of analysis and data

The following sections provide a description of each step and the results achieved.

FIGURE 2

QUESTIONNAIRE
Snowball indentifying experts
'rolling' over 4-months
Sent to a total of 246 people internationally
83 respondents
61 identified themselves as experts

DESK RESEARCH
Broad range of expertise
Internet research and telephone interviews
"Short list" of 41 experts

FINAL ROUND OF QUESTIONNAIRE
'Short list' sent out to all 246 initial recipients
Asked to confirm or provide additional names
19 additional names received

RESULTING LIST OF 60 INTERNATIONAL EXPERTS WORKING WITH COLLECTING AND ANALYSING DATA ON CLUSTERS

IDENTIFYING EXPERTS

In order to examine good practice in the area of fact-based input to cluster policies, the first step was to identify a set of experts who work in this field. This process is illustrated below, and explained in the text that follows.
The snowball methodology (see box) was used to start the process.

The snowball methodology is well-known and broadly used within social sciences to identify 'hidden and hard-to-reach populations'. In brief, the snowball methodology consists of identifying respondents who are then used to refer on to other respondents. The 'snowball' method of identifying sample populations differs from the normal principles sampling; however, the use of this method provides a means of accessing more impenetrable social groupings.

To set the ball rolling, a brief questionnaire was sent to a number of international analysts who specialise in the collection and analysis of data in support of fact-based cluster policy. Each expert was asked three questions:
1. Do you work with collecting and analysing indicators on the business environment (1) for clusters?
2. Have you – or your organisation – developed your own method for analysing the business environment for clusters?
3. Do you know any other analysts who work with collecting and analysing indicators on the business environment for clusters?

Question three harnessed the networks of the first round of respondents, allowing the questionnaire to be passed onto more people with relevant experience and expertise. As a result, the questionnaire reached 246 people between April and July, 2008. Of the 83 that completed the questionnaire, 61 said they had developed their own methods for analysing cluster-specific framework conditions.
The 61 individuals who identified themselves as experts exhibited a diverse range of expertise. Some specialised in providing analytical input to policymakers, while others specialised in academic research. Through desk research and interviews, a shortlist of 41 people – specialised in providing input to policymakers – was identified.
This shortlist was then sent to all of the 246 people who had received the questionnaire, asking them to look through it and provide the names of anyone else they felt should be included. 19 additional names were received and accepted without further investigation. The result was a list of 60 experts around the world who have developed their own tools and methods for analysing clusters (2). This list is attached as Appendix I.

From the outset, two main challenges were faced:
1. Fact-based cluster policy is still in its infancy

Even among policymakers, 'fact-based cluster policy' is not universally understood. Knowledge on the topic is very dispersed, often not codified and therefore not easily found or transferred.
2. Cluster policy for who?

Both public and private organisations formulate cluster policies on many different scales. This study has focused on identifying those who work with providing policy input to public authorities at national and regional level.
The snowball questionnaire was only able to identify a few individuals in this field outside Europe and North America. This is due, in part, to the fact that data is not as broadly available or accessible in other parts of the world – limiting the possibilities of working with fact-based cluster analysis. This is also due to the limited amount of time and resources available for investigating more closely how cluster analysis is used as an input to policymaking in other parts of the world.
Considering these challenges, it is believed that the list of experts represents those people and organisations who work with fact-based cluster policy on national or regional levels in Europe and North America.

1. In the original questionnaire, the term 'cluster-specific framework conditions' was used to refer to the business environment for clusters.

2. At the Copenhagen Workshop 9 additional names were received and accepted without further investigations, bringing the list of international experts to a total of 69,

CATEGORISING GOOD PRACTICE METHODS

This list of 60 international experts highlighted those who work with tools and analytical methods on clusters as an input to public policy formulation, but the list did not provide insight on how the analysis was done, what results were, or how results were used as an input to formulation of cluster policy.
To get a better understanding of these issues, each expert's methods (3) were sorted into four categories:
- **Policy use of analysis** – to specify how the analysis is used for policy and who is using the analysis
- **Object of analysis** – to identify what is being analysed by differentiating between clusters and cluster initiatives
- **Outcome of analysis** – to identify the outcome of the analysis, such as mapping, benchmarking, insight on clustering processes or evaluation of cluster initiatives
- **Data** – to provide detailed information on the data used in the analysis

Each of the four categories was divided into two additional levels of sub-categories. This categorisation wheel (see Figure 3) facilitates the description of each tool or analytical method in as detailed and neutral way as possible. The categorisation wheel has been used to describe different good practice examples (presented in Chapters 3-6).
The four categories and related sub-categories are explained below. To view the glossary of relevant terminology, turn to Appendix II.

Policy use of analysis

The first category, 'Policy use of analysis', is divided into two sub-categories:
How is the analysis used? and Who is using the analysis?
How is the analysis used? clarifies how analytical tools and methods are used to provide input at different stages of the policymaking process (see Chapter 1). Various types of analytical input can be used for different purposes: to identify clusters, to formulate cluster policy, to inspire new policies, to prioritise among policies, and to evaluate existing policies. Some types of analysis can be used for multiple purposes.
Who is using the analysis? clarifies who is using this analysis: regional or national government, international institutions, cluster organisations, institutions and other organisations, industry groups or individual companies.

3. An expert is an individual person. Several experts (belonging to the same organisation or project) can be associated with the same method.

Object of analysis

The second category, 'Object of analysis', is divided into two sub-categories:
Clusters and cluster initiatives.
Clusters highlights that the object of analysis is interconnected companies. Interconnected companies can be identified based on (i) location patterns i.e. on how companies locate in related groups, (ii) industry classifications either directly or through analyses of e.g. input/output tables or (iii) qualitative methods such as surveys or interviews.
Clusters based on location patterns are globally-traded companies that are co-located in a specific region. Co-location is determined by localisation quotients (i.e. agglomeration of employment in co-located industries as described by Porter's cluster categories) [4].
Clusters can also be based directly on industrial classifications or on groupings of industrial classifications derived by e.g. input/output analysis.
A third method, of defining interconnected companies is based on qualitative methods. Qualitative methods include interviews, surveys or the snowball method for example.
Cluster initiatives highlights that the object of analysis is cluster initiatives – defined as organised efforts to increase the growth and competitiveness of economic activities within a geographical area. Organised efforts can be private-led, public-private partnerships, or public-led.

4. Another method of determining co-location of globally-traded industries uses Ripley's K function.

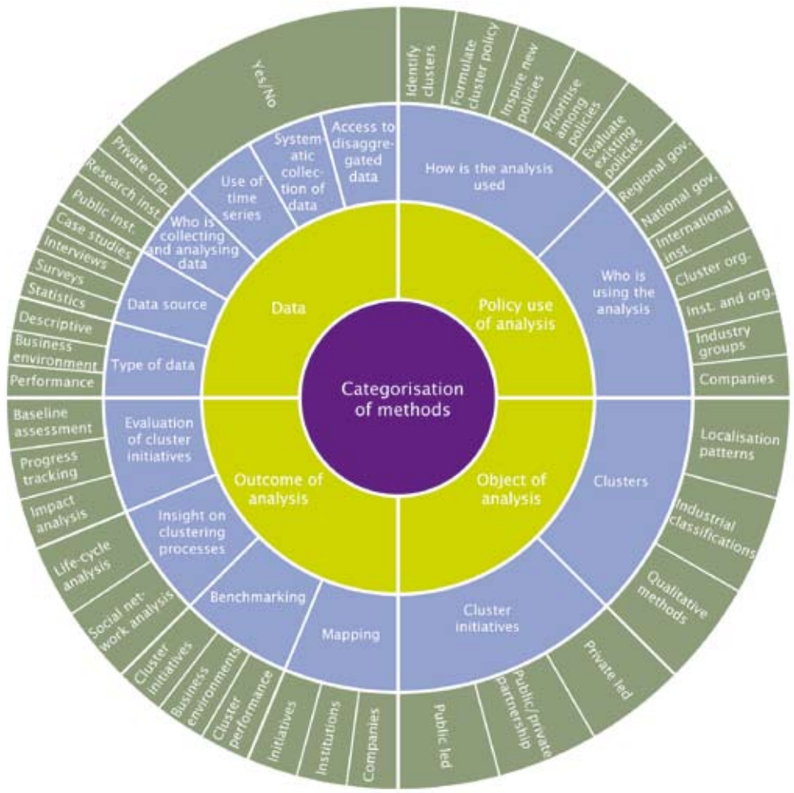

FIGURE 3

Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Sed non risus. Suspendisse lectus tortor, dignissim sit amet, adipiscing nec, ultricies sed, dolor.

Outcome of analysis

The third category 'Outcome of analysis' aims to identify analytical outcomes or tools. Analytical outcomes are divided into four sub-categories: mapping, benchmarking, insight on clustering processes, and evaluation of cluster initiatives.
Mapping illustrates the location and sise of interconnected companies and institutions. You can also map cluster initiatives to give a view of cluster-related activities. Maps can be illustrated by tables, graphs and other illustrations.
Benchmarking refers to different types of comparative analyses of clusters. These analyses can compare a cluster's performance or a cluster's business environment – or both. Benchmarking can also be used to compare cluster initiatives [5].
Mapping and benchmarking studies are often carried out over time to track changes to the structure of an industry or cluster, and measure the long-term performance of clusters.
Insight into clustering processes encompasses both social network analysis and cluster life cycle analysis. Social network analysis is a range of methods to analyse network linkages within and between clusters. Cluster life cycle analysis includes both qualitative and quantitative analyses that describe the development of clusters and the type of activities they engage in.
Evaluation of cluster initiatives are analyses for examining the results of cluster initiatives. Baseline assessments establish the starting point for evaluations, which can take place after different periods of time. Progress tracking monitors the development of specific efforts and activities of the cluster initiatives. Impact analyses evaluate how cluster initiatives affect cluster performance.

5. See Ketels, Sölvell and Lindquist (2003), Cluster Initiative Greenbook.

Data

The fourth and final category, 'Data' is divided into six sub-categories: type of data, data source, who is collecting and analysing data, use of time series, systematic collection of data and access to disaggregated data.
The first sub-category ***type of data*** describes the type of data used in the analysis – including performance and business environment data (see Appendix II), as well as descriptive indicators, such as the number of members in a cluster organisation or the degree of participation at meetings.
The second sub-category ***source of data*** clarifies data collection methods – including statistical sources such as international or national statistics, surveys, interviews or case studies.
Statistics and standardised surveys tend to be most useful in comparative analyses, while interviews and case studies can provide more detailed information.
The third sub-category refers to the source of data analysis, that is, ***who is collecting and analysing data?*** Was the analysis being carried out by a public sector institution, or was it outsourced to a research institution or private organisation? Some of these sources of data analysis are more objective than others.
The fourth, fifth and sixth sub-categories are yes/no questions. The first question ***use of time series*** was to clarify if data was collected for different points in time, allowing analysis of changes over time.
The second question ***systematic collection of data*** was to clarify if data was collected systematically - that the same methods for data collection and analysis were used consistently.
And the third question ***access to disaggregated data*** was to clarify if access to disaggregated data is openly available or protected by IPRs.
After the analytical methods have been sorted based on the four categories, it is easier to understand how the analyses have been carried out, what the results were, and how these results have been used as inputs to the formulation of cluster policy.
Several good practice examples of data tools and analytical methods were presented at the workshop in Copenhagen. In the four chapters that follow (Chapters 3-6) these examples will be described using the categorisation wheel presented above.

CHAPTER 3

Databases for benchmarking clusters

Cluster databases are powerful diagnostic tools that policymakers can use to map and benchmark clusters across regions and countries. Providing an overview of cluster composition, these databases highlight varying strengths, and help policymakers target emerging or declining areas for action. This chapter looks at two different databases used to benchmark clusters. Both were presented at the workshop in Copenhagen: The European Cluster Observatory – commissioned by the European Commission (DG Enterprise and Industry) and developed by the Stockholm School of Economics and The Cluster Mapping Database – developed by the US strategy consultancy company Monitor Group.

In addition to the two databases presented at the workshop, the chapter elaborates on three addition databases which can be used for benchmarking clusters and which were identified in the snowball: (i) The US Cluster Mapping Project Database (ii) The Russian Cluster Mapping Initiative Database and (iii) The BAK Basel Economics Database.

THE EUROPEAN CLUSTER OBSERVATORY MAPPING DATABASE

The European Cluster Observatory Mapping Database is a cluster database that gives policymakers an overview of regional and national clusters and their relative strengths. The database is used to map and benchmark statistical industry clusters across 259 regions in 32 countries – 27 countries in the EU, plus Iceland, Norway, Switzerland, Turkey and Israel. Mapping of clusters is based on the agglomeration of employment in co-located industries. The database is developed and managed by the Centre for Strategy and Competitiveness (CSC) at the Stockholm School of Economics [1].

Policy use of analysis

How is the analysis used?

The European Cluster Observatory Mapping Database is a diagnostic tool used to identify clusters.
By identifying clusters, the database gives policymakers an overview of the composition of clusters in their economy.

Who is using the analysis?

The main goal of the European Cluster Observatory Mapping Database is to inform regional and national governments, international institutions and cluster organisations about the location and specialisation of European clusters. The database is however accessible for everybody interested in getting a picture of the European cluster landscape.

Object of analysis

Clusters

The object of analysis is clusters based on localisation patterns.

Building on Michael E. Porter's definition of cluster categories, clusters are defined by the agglomeration of employment in co-located industries. Cluster categories are based on the US SIC industrial classification system that has been translated into the European NACE industrial classification system. This definition gives rise to 38 European cluster categories in 259 predominantly NUTS 2 regions.

Outcome of analysis

Two outcome of analysis are (i) mapping and (ii) benchmarking.

Mapping

The database can be used to create a statistical mapping of cluster categories in the database's 259 regions. The initial mapping of the 38 cluster categories across the 259 regions resulted in about 10,000 clusters [2]. Only those clusters with an employment of more 1000 people were included in the final mapping.

Benchmarking

Benchmarking of cluster performance is based on employment data.

To measure the regional strength of clusters, the database applies a **star-method** which is based on three different measurements for employment – cluster size, cluster specialisation – compared to other regions and cluster employment share of a region's overall employment. Clusters are awarded between zero and three stars according to how well a cluster scores on the three measures. Clusters with 3 stars are large in absolute employment, specialised compared to other regions and account for a relatively large share of the total regional employment and are therefore considered valuable to the regional economy. In addition to stars, clusters can also receive a star on a blue background, to show

1. The European Cluster Observatory also contains (i) a mapping of cluster organisations (ii) reports on national and regional cluster policies and programs and (iii) cluster library containing information on cluster cases and other cluster-relevant documents aimed at inspiring policy makers on European cluster policies and program. The material can be accessed from the Observatory's homepage.

2. The methodology used for identifying statistical clusters operates with 38 cluster categories. Based on the assumption, that these cluster categories are available in all 259 regions in the database, the initial mapping resulted in about 10,000 statistical clusters (259 regions * 38 cluster categories).

that the cluster is located in a region with a high innovation performance and in a country with strong exports in that particular sector.

1300 one-star clusters, 500 two-star clusters and 150 three-star clusters are identified in the European Cluster Observatory Mapping Database.

Data

Type of data

The type of data used in the database is cluster performance data and non cluster-specific business environment data.

Cluster performance is measured by the use of employment data.

Non cluster-specific regional business environment is characterised by two measures:

- An innovation index – used to measure if a cluster is located in a region with high innovation performance.
- Export data - used to measure if a cluster is located in a country where the sector shows high exports.

Data source

The source of data used in the database is statistical and survey data.

- Employment data has been gathered from national statistical offices and Eurostat and builds on the latest available data in the period 2001-2006.
- Exports data is based on the International Cluster Competitiveness Project conducted by the Institute for Strategy and Competitiveness at Harvard Business School.
- The Innovation index draws on seven indicators from the European Regional Innovation Scoreboard (RIS-index) including both statistical and survey data. Indicators such as human resources, employment in manufacturing, expenditure on R&D and patents are included in the index.

Who is collecting and analysing data?

Data is collected, analysed and categorised by the research institution, Centre for Strategy and Competitiveness (CSC) at Stockholm School of Economics.

Use of time series?

At the moment, the Observatory does not apply time series data.

Systematic collection of data?

The data included in the database has been systematically collected.

Access to disaggregated data?

It is possible to download aggregated tables from the cluster database. However, currently it is not possible to access the disaggregated data or the composition of the cluster categories that lie behind the mapping and benchmarking of clusters in the database.

MONITOR GLOBAL CLUSTER MAPPING DATABASE

The Monitor Global Cluster Mapping Database is a diagnostic tool developed to map and benchmark statistical industry clusters and business environments. The database provides Monitor Group's [3] public and private clients with an overview of the composition of industry clusters, the development of clusters over time and the relative strength of the clusters and the related business environment. Monitor Group started collecting data for the database in 2004, and the database is used as a key tool for fact-based economic strategy and policy recommendations. The database contains data for up to 4,228 regions and 59 countries.

3. Monitor Group is a management consulting and professional advisory service based in Cambridge, Massachusetts, US.

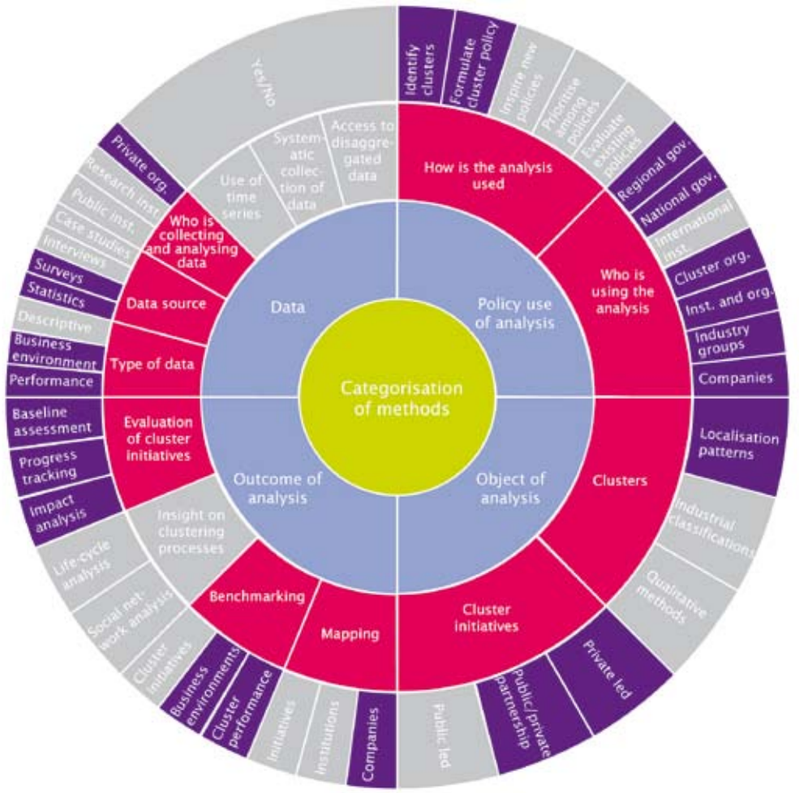

FIGURE 4

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Policy use of analysis

How is the analysis used?

The Global Cluster Mapping Database is used as a diagnostic tool to identify clusters and as an input to formulation of cluster policy.

Who is using the analysis?

The users of the database are Monitor's paying clients from both public and private sector - including policy makers at regional and national governments, industry groups, cluster organisations and companies.

Object of analysis

The object of analysis are (i) clusters and (ii) cluster initiatives.

Clusters

The object of analysis is clusters based on localisation patterns.

The methodology used builds on Michael Porter's cluster categories, defined by the agglomeration of co-located industries. Clusters categories are defined by using native four-digit industrial classification systems relevant to the geographies included in the database (i.e. NAICS, NACE and JSIC). In total, a list of 40 traded, 26 local and 5 natural resource cluster categories have been identified, making it possible to benchmark these clusters across 4,228 regions and 59 countries.

Cluster initiatives

The object of analysis can also be cluster initiatives defined as private, public/private or public led cluster initiatives.

Outcome of analysis

The outcome of analysis is (i) mapping, (ii) benchmarking and (iii) evaluation of cluster initiatives.

Mapping

The database is used for a statistical mapping of cluster companies.

Benchmarking

The database can be used for both benchmarking of cluster performance and benchmarking the business environments that clusters operate in.

Evaluation of cluster initiatives
The database can be used for evaluation of cluster initiatives. Once a baseline has been established it is possible to track progress and assess cluster initiatives with a continuous use of the database.

Data

Type of data

The type of data used in the Global Cluster Mapping Database can be grouped into two categories: performance data and business environment data.

Data used for measuring cluster performance includes: [4]

- Cluster/industry level data – employment, employment growth, employment concentration, establishments, establishment growth, establishment concentration, wages, wage growth, exports, export growth and value-added/revenues

Data used for measuring the business environment is based on 12 major policy areas (see Figure 4) and more than 40 subcategories. All together this results in a total of more than 200 indicators.

Data source

The source of data used in the database includes statistics and survey data.

Statistical data is compiled from a large number of regional and national statistical agencies and organisations.

Survey data is compiled by Monitor from two survey tools:

- *The Executive Insight Survey*
  Providing insight into the business environment of regions and clusters around the world, the Executive Insight Survey contains 86 questions related to the business environment of eight countries and 55 regions. So far, 5,011 executives have responded to the survey.

- *Entrepreneurship Benchmarking Survey*
  Aiming to identify the most important entrepreneurship policies that drive entrepreneurial performance, the Entrepreneurship Benchmarking Survey measures the availability of equity capital, attitudes towards risk and reward, the quality of business and government support services for start-ups, and the nature of cultural attitudes towards entrepreneurship. The survey contains 120 questions related to entrepreneurship policies in 27 countries and 42 regions with responses from 4,025 executives.

4. Not all data is available for all regions.

Who is collecting and analysing data?

Data is collected and analysed by Monitor Group

Use of time series?

Monitor started collecting data for the Global Cluster Mapping Database in 2004 and has updated data three times since then. The data goes back to 1991 for some regions and 1999 for most regions in the dataset. Using time series data, Monitor is able to analyse how clusters develop over time.

Systematic collection of data

Statistical data is systematically collected. Survey data is collected on an ad hoc basis, depending on the progress of Monitor Group projects worldwide.

Access to disaggregated data?

Disaggregated data can be purchased through individual arrangements with Monitor Group and is available to clients working with Monitor. Online access to data will be provided on a subscription basis in the near future.

OTHER DATABASES FOR BENCHMARKING CLUSTERS

Our list of experts and their methodologies included other cluster databases. Two of the databases can be applied to identify statistical clusters and the third database can be used to analyse business structures based on industrial classifications. All three databases can be used for benchmarking.

In the US, The Institute for Strategy and Competitiveness at Harvard Business School, led by Michael E. Porter, developed the Cluster Mapping Project in 2003. This is a database for mapping and benchmarking clusters in the US based on the US industrial classification system US-SIC. The Cluster Mapping Project reveals detailed patterns of growth in 41 cluster categories in the US. The database was developed to help corporations and policymakers identify regional strongholds. The data include official statistical data and survey data for assessment of the regional business environment. Disaggregated data is not available to the public, but some aggregated data can be obtained by contacting the Institute for Strategy and Competitiveness.

In Russia, Baumann Innovation (BI) and the Institute for Strategy and Competitiveness (ISC) have developed the Russian Cluster Mapping Initiative Database to map and benchmark clusters and their business environments across all regions in Russia. This project reveals detailed patterns of industry localisation for 40 cluster categories in Russia that can be compared to countries and regions in the US, Canada and the EU. Developed to help Russian policymakers from federal and regional governments identify regional strengths and target areas for action, the database includes official statistical data and survey data for assessment of the regional business environment. Data is currently available at an aggregated level and can be obtained by sending a request to BI. Access to more disaggregated data is expected to be available online in the near future.

In Switzerland, BAK Basel Economics has developed the BAK database which can be used for benchmarking industrial classifications in up to 60 sectors across 500 regions. The database does not operate with standard cluster categories. Instead, the database provides the flexibility to define individual cluster categories based on the specific need of a benchmark analysis [5]. The database includes indicators of economic performance as well as quantitative indicators of the quality of location factors and business environments. Users can access the database by paying a membership fee which includes delivery of time series data, participation in the annual benchmark forum and an annual report.

5. In 2005 the BAK database was used to map and benchmarking the Life Science Industry in 15 Life Science Locations in western Europe and North America. The cluster category for the Life Science Cluster was defined by three industrial classifications: pharmaceuticals, agrochemicals, and medical devices. The data used in the benchmark study were collected at NACE 3-digit level. For a reference to two studies and the use of the database for benchmarking see "MetroBasel report – World Class in Life Science" and Monitoring Life Science Locations, Results 2007/2008 – Executive Summary, both by BAK Basel Economic.

CHAPTER 4

Cluster-based economic strategies

The development of cluster-based economic strategies has become increasing popular for the past 5-10 years. As a consequence, regional and national governments turn to consultants for help in developing these strategies.

Consultants use different analytical tools and methods at different stages of the policymaking process. Industry and cluster databases are applied by some consultants as a diagnostic tool to identify areas of strength and weakness and to highlight possible targets for policy action. Benchmark studies are also used by other consultants to provide insight on how different business environment factors influence a cluster's performance. And evaluations of cluster initiatives are used by groups of consultants to provide policymakers with an insight into cluster operations and to see which policies realise their goals.

This chapter looks at two different methods for providing input to cluster-based economic strategies. Both were presented at the workshop in Copenhagen: the method used by the US strategy consultancy Monitor Group and the method used by the Spanish consultancy Competitiveness.

In addition, the chapter elaborates on two other methods which are used to provide input to formulation of cluster–based economic strategies and which were identified by the snowball: (i) the method used by Regional Technology Strategies, US, and (ii) the method used by the Economic Competitiveness Group, US.

MONITOR GROUP

Monitor Group is a strategy consultancy based in Boston, US, working with regional and national governments and major companies around the world on developing cluster-based economic strategies. Monitor applies a wide set of data to obtain a fact-based understanding of the composition of an economy´s clusters and the business environment that these clusters operate in. Monitor's method can be used to evaluate cluster initiatives by tracking the development of a series of indicators over time.

Monitor provides factual input to policymakers at all four stages of the cluster-based policymaking process: justification, diagnosis, formulation and implementation.

Policy use of analysis

How is the analysis used?

The analysis by Monitor is used to identify clusters and to formulate new cluster policies that can increase the capacity for innovation and competitiveness of a region and its clusters.

When working with regional and national governments on developing cluster-based economic strategies, Monitor provides fact-based policy recommendations on three parameters:
1. Where should the region compete?
2. How can the region differentiate itself?
3. What policies are needed for increasing the innovative and competitive capacity of the region

Who is using the analysis?

The results of Monitor's analysis are used by regional and national governments, international institutions, cluster organisations, industry organisations, industry groups and major companies.

Object of analysis

Clusters

The object of analysis is clusters defined by localisation patterns.

Monitor bases their analysis of clusters on Michael Porter's definition of agglomeration of co-located industries (see also chapter 3).

Outcome of analysis

The three outcomes of analysis are (i) mapping (ii) benchmarking and (iii) evaluation of cluster initiatives.

Mapping

Monitor applies their Global Cluster Mapping Database to map statistical clusters and sub-clusters.

Benchmarking

Benchmarking of cluster performance and business environments are used to evaluate the competitive potential of the region and the business environment that these clusters operate in.

Benchmarking cluster performance is carried out to provide a picture of a region's clusters in order to identify what differentiates the region from other regions.

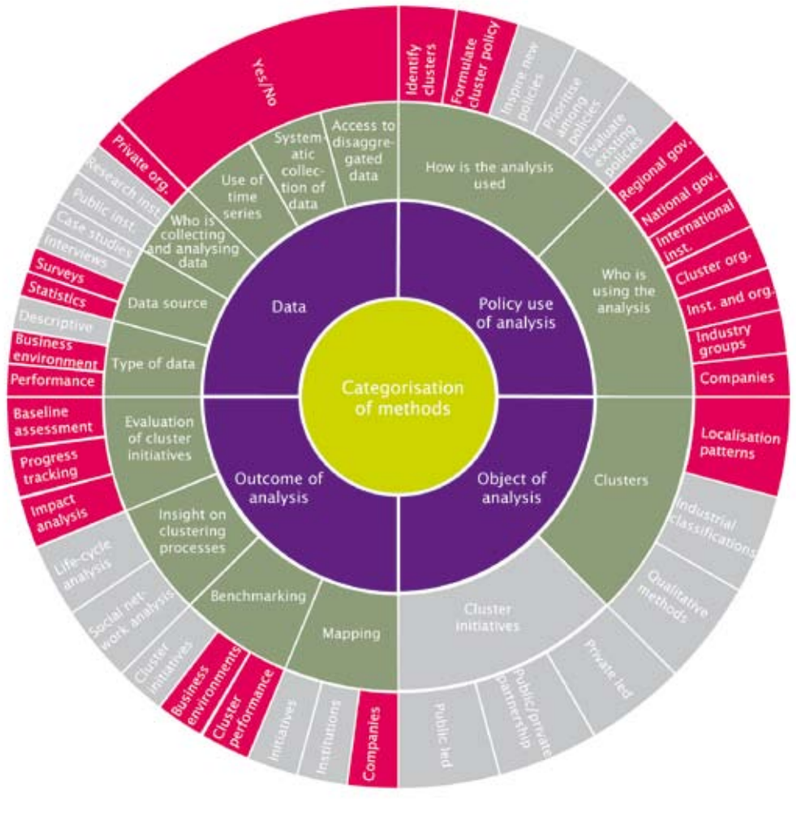

FIGURE 5

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Benchmarking of regional business environment is used to identify what capabilities are needed to grow the cluster economy. By benchmarking the business environment in 12 different policy areas (see Figure 4 p. 25), Monitor obtains a picture of possible areas for improvements in the regional business climate.

Evaluation of cluster initiatives

The results from Monitor´s analysis can be can be used to evaluate cluster initiatives. By tracking the development of a series of indicators over time, it is possible to make a baseline assessment, a progress tracking and an impact analysis of cluster initiatives included in a cluster-based economic strategy.

Monitor applies three quantitative tools for evaluation of cluster initiatives: The Global Mapping Cluster Database, the Executive Insight Survey and the Entrepreneurship Benchmark Survey

Baseline assessments are used to start the process of evaluating the effect of cluster initiatives over time. The tool used for baseline assessments is the Executive Insight Survey. Ongoing results from the survey will provide policymakers with an insight on how business executives assess the business climate after the cluster-based economic strategy is implemented.

Progress tracking is applied to monitor the progress of different actions put forward in the cluster-based economic strategy. The tool used for tracking progress is standard project management tools, using traffic light colours to signal if a certain action is implemented, pending or requires special attention.

Impact analysis is applied to evaluate the effect of the strategy on a region's innovation capacity and on economic productivity. The tool used for impact analysis is Monitor´s Global Cluster Mapping Database.

Data

For a description of the data used by Monitor in different parts the categorisation wheel, see Chapter 3.

COMPETITIVENESS

Competitiveness is a strategy consultancy based in Barcelona working with regional and national governments and companies on developing cluster strategies. The methodology used by Competitiveness is aimed at improving the competitiveness of cluster companies and is used as input to regional and national cluster-based economic strategies. The core activity of Competitiveness work is Cluster Reinforcement Initiatives (CRIs) aimed at strengthening a strategic segments of a cluster´s value chain.

By use of qualitative methods, Competitiveness provides factual input to policymakers in the diagnosis, formulation and implementation phases of the policymaking process.

Policy use of analysis

How is the analysis used?

The analysis by Competitiveness is used to identify clusters – more specifically, to identify strategic segments of a cluster´s value chain that need to be strengthened.

When working with regional and national governments on developing cluster-based economic strategies, Competitiveness applies two steps in their analysis:
1. Screening of regional clusters – aimed at identifying the competitive potential of companies in the region
2. Cluster Reinforcement Initiatives (CRIs) – aimed at developing new business models that can help cluster companies strengthen strategic segments of their value-chain in order to increase innovation and competitiveness

Who is using the analysis?

The analysis is used to some extent by regional and national governments, but is mainly by cluster companies. Region and national governments use the results from the analysis to refine specific support tools for a cluster as well as their horizontal policies for the general business environment. Cluster companies use the analysis to refine their business strategies and to identify the parts of cluster value-chain they need to reinforce.

Object of analysis

The object of analysis is (i) clusters and (ii) cluster initiatives.

Clusters

Clusters are defined by qualitative methods including interviews and meetings with key regional stakeholders (from companies, knowledge institutions and regional authorities) to identify the competitive potential for cluster companies in the region.

Based on a screening of the competitive potential of cluster companies, Competitiveness provides their clients with a portfolio of possible cluster initiatives that can be drivers of a cluster-based economic strategy and which are aimed at improving the competitive position of the region's clusters.

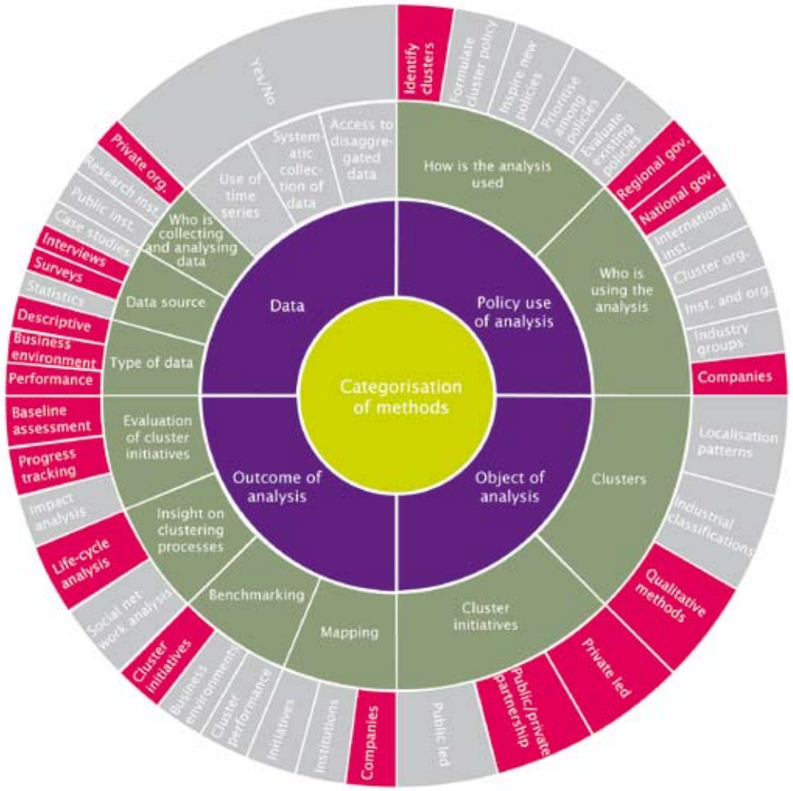

FIGURE 6

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Cluster initiatives

The core activity of Competitiveness work is Cluster Reinforcement Initiatives (CRI) which are cluster initiatives aimed at strengthening the strategic segment of a cluster's value-chain by building a new business model for the cluster companies that can increase innovation activity and competition for the companies in the cluster [1].

1. See case study on Seafood in Yorkshire and Humber in the Library at the European Cluster Observatory´s homepage www.clusterobservatory.eu

The Cluster Reinforcement Initiatives can be private led, with companies taking the lead and using Competitiveness to provide strategic input as to where a group of companies can compete. But Cluster Reinforcement Initiatives can also be public/private led partnerships, where both public and private actors take responsibility for different activities aimed at developing a business model for the cluster companies.

Outcome of analysis

The outcome of Competitiveness analysis is (i) a mapping of cluster companies, (ii) benchmarking cluster initiatives, (iii) insight on clustering processes, and (iv) evaluation of cluster initiatives.

Mapping

Mapping of cluster companies focuses on identifying those companies who are part of a specific value-chain in a cluster. The methods used are qualitative, focusing on identifying the core competencies of companies and supporting institutions in the cluster.

Benchmarking

Benchmarking used by Competitiveness focuses on specific segments of a cluster´s value chain and can be used to compare with other clusters that are competing in the same segment of the value chain. The benchmarking can also be used to benchmark clusters with a different value-chain which is performing remarkably well (i.e. by benchmarking special logistics for fresh products by the Dutch flower cluster to the fresh seafood cluster in Humber, UK).

Insight on clustering processes

Competitiveness applies a cluster life cycle analysis to measure the change process that takes place during the CRI process. Focus is on measuring (i) attitudes towards change (ii) belief in the proposed business model and (iii) change in behaviour among cluster companies towards the necessary actions aimed at building a competitive advantage in the proposed business model.

Evaluation of cluster initiatives

Competitiveness applies two tools for evaluation of cluster initiatives: baseline assessment and progress tracking.

For baseline assessments, the Cluster Competitiveness Report (CCR) survey tool is used to measure to what extent a cluster initiative affects the business environment and policy over time.

For progress tracking, Competitiveness applies their own management tool. For each cluster initiative, a set of action lines are developed. The analysis focuses on evaluating the impact of the actions with regards to attitudes and behaviour change as well as implementation rate of proposed action lines. Cluster initiatives can be evaluated annually on the basis of how many of the specified action lines have been implemented.

Data

Type of data

The type of data used by Competitiveness for evaluating cluster initiatives can be grouped into two categories: business environment data and descriptive data.

Business environment data is based on the Cluster Competitiveness Report Survey and builds on the Diamond model developed by Michael Porter. The survey contains 78 questions relating to:

- company strategy and behaviour
- supporting cluster institutions
- customised questions to clusters participating in the survey

Descriptive data is used to measure the change process taking place among participants in the Cluster Reinforcement Initiative. Included are measures of how many people attend the meetings, the number of new participants at the meetings, and how many hours companies dedicate to the clustering effort.

Data source

The source of data used is survey data.

Who is collecting and analysing data?

Descriptive data is collected and analysed by consultants from Competitiveness. Survey data is collected and analysed by the Cluster and Competitiveness Foundation.

Based on currently available information, clusters participating in the Cluster Competitiveness Report Survey have to pay a subscription per registered cluster as a start-up fee and an annual maintenance fee per registered cluster to the Cluster and Competitiveness Foundation. The fees cover updating the database, training the cluster rapporteurs (person collecting the data in the region) and producing the customicustomiseded Cluster Competitiveness Report.

Use of time series?

Users subscribing to the Cluster Competitiveness Report Survey can obtain aggregated information on their own clusters based on time-series data. The first data was collected in 2005 and has been updated every year for those clusters that have subscribed to the survey.

Systematic collection of data?

Data is systematically collected every year from clusters who are participating in the survey.

Access to disaggregated data?

Data is currently only available at an aggregated level to clusters subscribing to the Cluster Competitiveness Report Survey.

OTHER EXAMPLES OF CLUSTER- BASED ECONOMIC STRATEGIES

The results from the snowball identified other experts who work with developing cluster-based economic strategies. Below two examples are provided.

Regional Technology Strategies, Inc.

Regional Technology Strategies, Inc. (RTS) is non-profit corporation working with regional and national governments, foundations and organisations in developing, implementing and evaluating regional economic development strategies. RTS pays special attention to historically disadvantaged regions and on uncovering cluster value-chains that cannot easily be identified by statistical mapping of industrial clusters. The methods used by RTS for identifying cluster value-chains are based on assessments of local knowledge of strength and assets, interviews with companies, networks and interest groups, and by examining the regional demand for workers and training. Once key clusters have been identified and their potential uncovered, these clusters are brought forward as drivers of a cluster-based economic strategy.

Economic Competitiveness Group

The Economic Competitiveness Group (ECG) is a consultancy company based in San Francisco, US, specialising in assisting regional and national governments in developing and implementing cluster-based economic strategies. The point of departure for ECG´s strategy recommendations is how to grow the competitiveness of a region's clusters. By using both qualitative methods (i.e. interviews with key stakeholders in the clusters and meetings) and cluster studies, ECG bases their cluster-based strategy recommendations on 6 key areas: (i) human resources (ii) access to technology (iii) access to finance (iv) business climate (v) physical infrastructure and (vi) quality of life.

CHAPTER 5

Industry and cluster studies

Industry and cluster studies act as a tool to help policymakers understand detailed information about industry and cluster structures – identifying which areas of the economy to focus on. The studies also highlight areas of growth and decline, general trends in the industry, and how different business environment factors influence the development of industries and clusters – helping policymakers to formulate and prioritise among policies. Some studies enable comparisons to be made between different regions in a country, or between different countries – inspiring new policies. These studies are valuable for policymakers in the justification, diagnosis and formulation phases of the policymaking process.

This chapter starts by looking at a study of Life Science Clusters in the US which was presented by Impresa Consulting at the Copenhagen workshop. The chapter moves on to elaborate on a cluster study of the maritime industry, which was also identified in the snowball.

SIGNS OF LIFE – THE GROWTH OF BIOTECHNOLOGY CENTERS IN THE US

With worldwide growth in the demand for biotechnology, US states have a strong incentive to support and develop their biotechnology clusters. As a result, stakeholders at both national and state levels are interested in getting a broad picture of the strengths and weaknesses of their biotechnology clusters, and to find out if – and how – they can best support the development of these clusters.

In their study, ***Signs of Life: The Growth of Biotechnology Centers in the US*** [1], Joseph Cortright and Heike Mayer provide an analysis of biotechnology activity in the 51 largest U.S. metropolitan areas. The method used by Cortright and Mayer for analysing biotechnology clusters can be summarised by six steps:

1. Analyse general characteristics of US biotechnology industry
2. Map US biotechnology clusters across 51 metropolitan areas based on employment data
3. Benchmark biotechnology clusters based on a composite measurement for research- and commercialisation activities
4. Measure the change in concentration of research and commercialisation activity in the biotechnology industry over time
5. Analyse key determinants of success for top-9 biotechnology clusters
6. Provide recommendations to policymakers

1. Signs of Life: The growth of Biotechnology Centres in the U.S. was commissioned by the Center for Urban and Metropolitan Policy at the Brookings Institution

The result highlights that the industry is heavily concentrated in nine regions, driven by two key ingredients necessary for biotech growth: strong research, and the ability to convert that research into commercial activity. By comparing the 51 metro areas on their research and commercialisation capacities, this report can help inform policymakers who are thinking of investing in the development of biotechnology clusters.

Policy use of analysis

How is the analysis used?

The analysis is used to identify biotechnology clusters and to evaluate existing policies that target the US biotechnology industry.

Using data gathered on various aspects of biomedical research and commercialisation in order to assess the relative amount of biotechnology activity in 51 metropolitan areas, the study identifies the top biotechnology clusters in the US.

Through more detailed analysis of those metropolitan areas that have above-average levels of research and commercialisation activity, the study provides an overview of the business environment factors that drive the success of these clusters, providing policymakers with the facts needed to compare and assess biotech activities in their own region.

By studying the general trends of the industry and analysing indicators for research and commercialisation activity, Cortright and Mayer provide an overview of the general characteristics of biotechnology clusters in the US, and provide insight on what drives development of these clusters.

Who is using the analysis?

The results of the analysis are used by regional and national governments, cluster organisations, industry groups and companies who have an interest in the biotechnology industry.

Object of analysis

Clusters

The object of analysis is clusters, based on a tailored usage of industrial classifications.

The definition of the biotechnology industry is not separately identified in the standard classification system or in the North American Industry Classification System (NAICS).

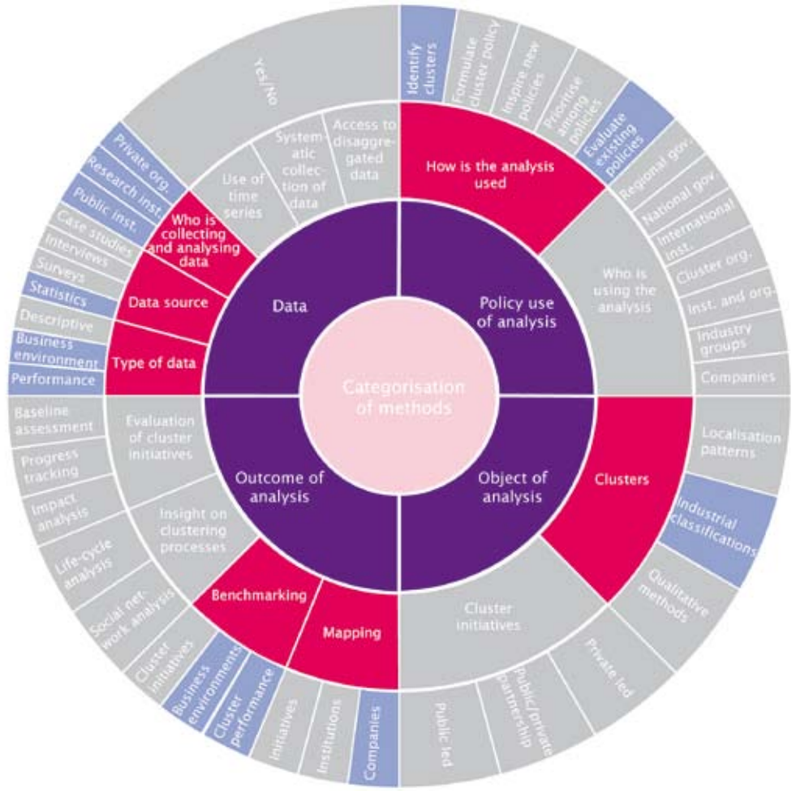

FIGURE 7

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To study the industry, analysts created their own database, using a series of firm-level and institution-level databases that encompass activities related to biotechnology [2]. In addition, analysts used aggregate employment data in two NAICS classifications: Pharmaceutical and medicine manufacturing (NAICS 4-digit, 3254) and Research and Development in the Physical, Engineering, and Life Sciences (NAICS 5-digit, 54171).

2. Defined as the application of knowledge about cellular and genetic processes to human diagnostics and therapeutics

Outcome of analysis

The two outcomes of analysis are (i) mapping and (ii) benchmarking.

Mapping

The analysis provides a mapping of biotechnology clusters companies across the 51 metropolitan areas in the US. The analysis also looks at the patterns of change in industry concentration between the 1980s and 1990s.

Benchmarking

A benchmarking of cluster performance and business environments is used to identify top-performing biotechnology clusters in the US and to identify key determinants of success for these clusters.

Two composite indices are applied for benchmarking: A composite index for biotechnology research activity and a composite index for commercialisation activity. The higher a metropolitan region scores on an aggregated measurement of the two composite indices, the higher the likelihood that the clusters will be identified as a top-performing biotechnology center.

The results from the benchmark analysis identified four groupings of biotech clusters: biotech leaders, biotech challengers, pharmaceutical centers, special cases and research centers. The biotech leaders were comprised of the nine top biotechnology clusters in the US. The next step of the analysis was to study the key determinants for the success of these nine clusters.

Data

Type of data

This cluster study uses both performance and business environment data.

Performance data includes: number of firms, firm employment, sales by firms, expenditures on R&D, firm revenues and IPOs.

Business environment data can be grouped into two categories: indicators of research activity and indicators of commercialisation activity.

- 1. Indicators for measuring research activity include:
  R&D grants, patents and education indicators (measured by life scientists, institutions granting PhDs and top-ranked R&D universities)

- 2. Indicators for measuring commercialisation activity include:
  Venture capital, R&D partnerships, established firms and start-ups

Data source

The analysis was based on statistics.

Statistics were compiled from publicly available databases. The authors compiled databases of firms, of venture capital investors, of venture capital investments, and of research and development deals, to develop geographic profiles of each metropolitan area in the US.

Who is collecting and analysing data?

Data is collected by public institutions, research institutions and private organisations including the National Institutes of Health (NIH), US Patent Office, Economic Census, National Science Foundation, PricewaterhouseCoopers, Biospace and The International Business Information directory.

Use of time series?

The study used time series data for NIH spending, venture capital investments, establishments of biotechnology firms and patents for analysing the growth of the industry over time. Some of the data used dates back to 1980.

Systematic collection of data

The study has only been conducted for the biotech industry in the US.

Access to disaggregated data?

The majority of the data used to analyse the US biotechnology industry is available in aggregated form in Cortright and Mayer's Signs of Life – the Growth of Biotechnology Centers in the US. The underlying data is available in disaggregated form from the organisations that produce it.

OTHER EXAMPLES OF INDUSTRY AND CLUSTER STUDIES

The results from the snowball identified other experts who work with developing cluster-based economic strategies. Below the study by a group of Norwegian researchers is presented.

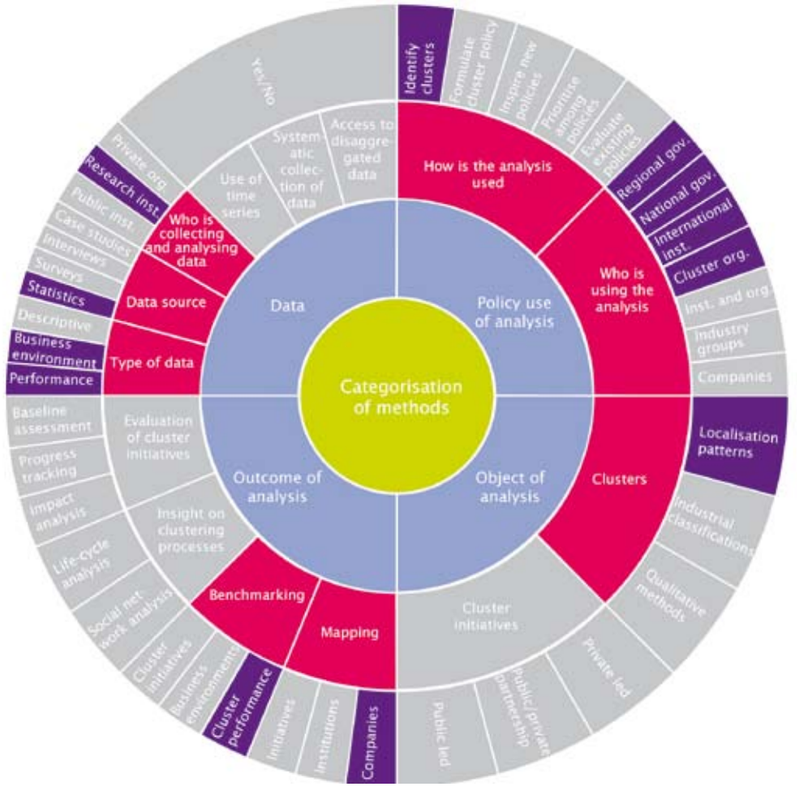

FIGURE 8

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Attracting the winners – the competitiveness of five European maritime industries [3]

Across the EU, countries and regions are competing on being attractive locations for maritime companies. As a result, regional and national governments are interested in knowing what drives the long term development of the maritime industry, which countries are most attractive locations for the maritime business, and what the future prospect of the maritime industry may be.

To examine these questions, a research team from the Centre for Value Creation at the Norwegian School of Management, led by Erik W. Jacobsen and Torger Reve, did a benchmarking study on the maritime industry in five European countries (Denmark, Germany, the Netherlands, Norway and the UK).

The object of analysis was clusters, defined by industrial classifications (including companies working with manufacturing – yards and equipment makers, and companies working with services – shipping, service providers and ports).

The benchmark analysis focused on 5 areas:

- Past-performance of the industry
- Country attractiveness
- Cluster dynamics
- Company competitiveness
- Public policy

Based on the results from the benchmark analysis, the study resulted in a series of observations which can be taken into account when developing the Norwegian maritime industry in the future.

The data used on the study included quantitative (databases), and qualitative data (i.e. surveys and interviews).

3. The study was carried out in the period 2001-2003. The methodology used and the results from the study is expected to be published by the end of 2008.

CHAPTER 6

Policy-tailored cluster analysis

Different analytical tools and methods are used at different stages of the policymaking process. Policymakers use industry and cluster databases as diagnostic tools to identify areas of strength and weakness, highlighting possible targets for policy action. Policymakers use other analytical tools such as detailed cluster or benchmarking studies to provide insight on how different business environment factors affect cluster performance. Analytical tools also provide insight used to formulate policies. Evaluation and benchmarking studies are examples of analyses used at different periods of policy implementation.

This chapter presents examples of four countries (France, Finland, Scotland and Denmark/Baltic Sea Region countries), and how they use various tools and analytical methods as inputs throughout the policymaking process. Some methods are focused on analysing cluster development, while other methods are focused on analysing clusters' specific business environment. Most analytical methods are tailored for national use, yet a few methods can be used for international benchmarking of clusters.

In addition, the chapter briefly elaborates on analytical methods used in Canada and Norway.

The OECD's report on ***Competitive Regional Clusters – National Policy Approaches*** from May 2007 explains that many governments are starting up national programmes to promote cluster-based approaches. The programmes aim to link companies, people and knowledge at a regional level, and create strong regional specialisation to meet the challenges of increased competition and globalisation. According to the EU's report of January 2008 on ***Cluster Policy in Europe***, these activities are growing in importance. "Two thirds of the countries in Europe have published policy papers in which the cluster approach is part of their national innovation policy…(and) all European countries have cluster programmes on a national and/or regional level."

Although "all European countries have cluster programmes", each country develops its own type of policy and uses data and cluster analysis in a unique way to assist the policymaking process. As explained in Chapter 1, cluster policies can raise the efficiency of a cluster's microeconomic business environment, or mobilise or reinforce the business and operating strategies shared by individual players within a particular cluster or network of clusters.

The European Commission refers to the first type of cluster policies as ***cluster facilitating and framework policies*** – i.e. creating a favourable microeconomic business environment for growth and innovation; and the second type as ***cluster development policies*** – i.e. creating, mobilising or strengthening business strategies and co-operation.

At the Copenhagen Workshop, representatives from four countries presented cases that showed how they use data and analytical methods as input in the policymaking process. Ministerial representatives from two countries, Finland and France, made presentations on how they use data and analysis as input for cluster development policies [1]. A representative from Scottish Enterprise presented examples of analytical methods that can be used as input to both cluster development and cluster facilitating policies. And a Danish representative provided an example of an analytical method that can be used as input to formulating and prioritiprioritisinging cluster facilitating and framework policies.

This chapter presents a summary of these four specific examples – illustrating how data and analysis have been used to help analyanalysee and formulate cluster policy in Finland, France, and Scotland. The fourth example explains the cluster analytical model that is currently being piloted within the BSR InnoNet project. In addition, the chapter briefly elaborates on analytical methods used in Canada and Norway.

1. Few countries claim to have national cluster policies. Instead, countries use different names for cluster-based approaches, including 'Centres of Expertise' (in Finland), 'Poles of Competitiveness' (in France), and 'Priority Industries' (in Scotland).

FINLAND

The Ministry of Employment and Economy's innovation environments team applies a cluster-based approach to develop complementary skill-sets and research strengths within Finland's national strongholds. The team uses data and analysis to justify their decisions to target particular areas, and to track progress over time.

Within the Ministry of Employment and Economy, the Innovation Department is responsible for the development, implementation and success of innovation policy in Finland. It promotes the growth of businesses and sectors, internationalisation and renewal, and tries to ensure that innovation is a widespread phenomenon in both the private and public sector. Within the department, the innovation environments team is focused on developing Finland's centres of expertise – using a cluster-based approach as part of regional innovation. The division also works with linking Finland's centres of expertise with innovation centres internationally.

Following an extensive research programme in the early 1990s that identified 10 national mega clusters, Finland began adopting a cluster-based approach to promote structural change, to upgrade and create production factors on the basis of national strongholds. Over time, this work has evolved from 'picking the winners' to enhancing framework conditions. Currently, the innovation environments team uses two key policy tools to pool resource into clusters: the centre of expertise programme (CoE) and the strategic centres for science, technology and innovation (SHOKs).

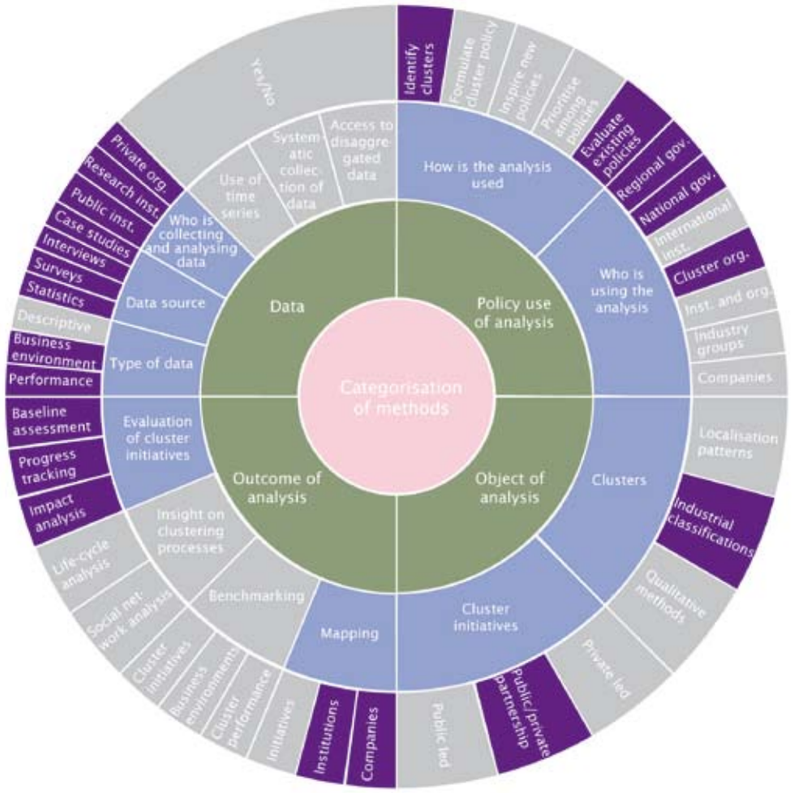

FIGURE 9

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2. See http://www.oske.net/en/what_is_oske/ for additional information

3. The 13 national clusters are: Living business, Digibusiness, Food, Development, Energy Technology, Health Bio, Health and Well-being, Ubiquitous Computing, Toourism and Experience Management, Maritime, Nanotechnology, Forest Industry, Cleantech and Intelligent machines.

The Centre of Expertise (CoE) programme [2] aims at increasing regional specialisation and strengthening of cooperation between centres of expertise in 13 areas of national importance [3]. Centres of Expertise are made up of company, research and public sector stakeholders, focused on regional strengths and specialispecialisationation (bottom-up). The regional centres are coordinated on the national level by a multi-sectoral committee (top-down).

The Strategic Centres for Science, Technology and Innovation (SHOKs) are nationally-coordinated thematic centres based on longstanding cooperation to carry out shared research. Finland's Science, Technology and Policy Council has decided to form SHOKs in five areas: forestry, metal products and mechanical engineering, energy and environment, health and well-being, and ICT industry and services.

Although Finland's work with innovation environments has been driven by a pragmatic approach, data and analysis has been an important input to justify target areas and track progress over time.

Policy use of analysis

How is the analysis used?

The Innovation Environments team uses analysis to identify clusters and evaluate existing policies.

The team uses national statistics and in-depth cluster studies to highlight Finland's comparative advantages and provide detailed analysis of the business environment in these areas. Regular evaluations help the team track progress and assess the impact of policy initiatives.

The analysis can be used to provide factual input at all phases of the policymaking process (justification, diagnosis, formulation, implementation and learning).

Who is using the analysis?

The Innovation Environments team at the Ministry is the main recipient of analysis. In addition, cluster initiatives (or centres of expertise) and regional government use the analysis.

Object of analysis

The different types of analysis used by the innovation environments team are focused on different objects of analysis: (i) clusters and (ii) cluster initiatives.

Clusters

Clusters defined in terms of industry classification and input/output analysis (primary industries, special inputs, associated services, related industries and customers) are the object of analysis for detailed cluster studies.

Cluster initiatives

Evaluation exercises focus on cluster initiatives as defined by the public and private stakeholders involved.

Outcome of analysis

The two outcomes of the analysis used by the innovation environments team are (i) mapping and (ii) evaluation of cluster initiatives.

Mapping

One of the outcomes from cluster research done in the 1990's was a series of cluster maps – illustrating how different companies and institutions were linked together, and how these clusters contributed to the overall business economy. These cluster maps have been updated over time and serve as a key input to the public sector in determining policy targets.

Evaluation of cluster initiatives

Evaluation of cluster initiatives is another analytical output, resulting from distinctly different methods than the mapping. Each Centre of Expertise (CoE) and Strategic Centre for Science, Technology and Innovation (SHOK) must fulfill certain criteria in order to be selected for public sector support. Some examples of selection criteria are: national significance, relevance to programme objectives of expertise, growth and internationalisation quality, and degree of innovativeness. This initial evaluation forms a baseline assessment from which cluster performance can be tracked over time.

In addition, impact analyses are conducted on centre, cluster and programme levels in order to assess impact in four areas: expertise and innovation, business growth and competitiveness, internationalisation, and coordination, management and networking.

Data

Type of data

For mapping, primarily performance data is used. For evaluation of cluster initiatives, both performance and business environment data are used.

Performance data includes such things as employment, productivity, number of establishments, patents, export ratios, etc.

Business environment data includes indicators of expertise (or skills levels), levels of networking and internationalisation.

Data source

Data is gathered from the range of sources: national statistics, surveys, interviews and case studies.

Cluster maps are developed from industrial statistics, supplemented by firm-level data that the individual centres of expertise collect themselves.

Evaluation of cluster initiatives are based on different data sources, depending on the specific needs.

Who is collecting and analysing data?

The Ministry has developed and maintains the OskeNyt database – which can be used to systematically track and evaluate cluster development. In addition, the Ministry commissions cluster studies to external research institutions (e.g. ETLA) and private organisations. Evaluation of cluster initiatives are conducted either by the Ministry, or by the cluster initiative themselves.

Use of time series?

The OskeNyt database is updated annually. Detailed cluster studies, maps and evaluations are conducted as needed.

Systematic collection of data?

Standard statistics for Finnish companies are collected and compiled systematically in the OskeNyt database. Other data is collected on an ad-hoc basis.

Access to disaggregated data?

Disaggregated data in the OskeNyt database is available, for those with a user ID [4].

4. For additional information on the OskeNYT database, please see http://www.tekel.fi/in_english/tekel_network/tekelnyt/

FRANCE

In 2004, France launched its new industrial policy – targeted at building centres of competitiveness in order to increase regional specialisation, innovation, and international attractiveness. To realise this policy, an inter-ministerial fund was set up to finance collaborative research projects undertaken by competitiveness clusters. The Directorate General for Enterprise (within the Ministry of Economy, Finance and Employment) has a shared responsibility to monitor progress, and uses a structured method for evaluating France's 71 competitiveness clusters.

In the autumn of 2004, the Prime Minister launched a new French industrial policy. The policy's objectives were to build centres of competitiveness (pôles de competitivité) to step up specialisation in French industry, create good conditions for new lines of business with a high international profile, and enhance the appeal of different parts of France. An inter-ministerial fund of 720 million Euros for the 2006-2008 period was set up to finance collaborative research projects carried out by centres of competiveness – or competitiveness clusters.
Every six months there is a call for new research projects, and applications are evaluated based on a number of selection criteria including: projected results in terms of value creation, economic activity and jobs; the potential for development of new products or services; and the project's consistency with the cluster's overall development strategy.
The Ministry of Economy, Finance and Employment's Directorate General for Enterprise, together with the Inter-ministerial Agency for Spatial Planning and Competitiveness (DIACT), share the leadership of an inter-ministerial working group (GTI) responsible for monitoring the centres of competitiveness. To fulfil this responsibility, the GTI uses a structured method for evaluating France's 71 competitiveness clusters. Their method of evaluation is described below.

Policy Use of Analysis

How is the analysis used?

The GTI uses data and analysis to evaluate existing policies.
First, they use multiple selection criteria to decide if the applying competitiveness cluster is a good candidate for support. Later, additional data is used to track progress and see if each cluster has fulfilled its goals. The results from the tracking are used to evaluate the leverage effect of the policy initiative.

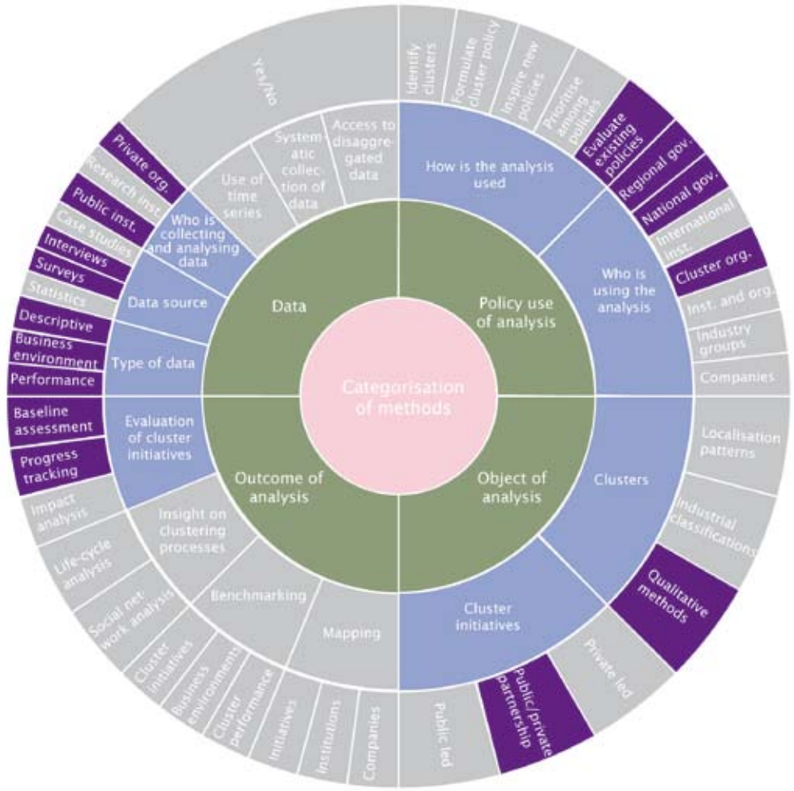

FIGURE 10

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This analysis can be used primarily during the implementation and learning phases of the policymaking process.

Who is using the analysis?

The analysis is primarily used by the national government (the GTI), yet regional government and cluster organiorganisationsations also use the analysis as an input to their own strategy formulation processes.

Object of analysis

The object of analysis is (i) clusters and (ii) cluster initiatives.

Clusters

The object of the selection process is clusters, defined by qualitative methods – participating companies delivering their own data on employment, turnover, etc.

Cluster initiatives

The object of analysis for the GTI is cluster initiatives based on public-private partnership. In France, cluster initiatives are defined as a group of businesses, training centres and research units in a given geographical location which are working together to generate synergies for shared projects in innovation and with enough critical mass to become visible internationally. The cluster initiatives selected for public sector support are called competitiveness clusters.

Outcome of analysis

Evaluation of cluster initiatives

The initial selection forms a baseline assessment.
To be considered a competitiveness cluster, cluster initiatives must fulfil four key criteria: a development strategy that remains compatible with the economic development plan in the cluster's local area; sufficient international visibility in the relevant industry and/or technology; a partnership between players and a structured, operational mode of governance; and the capacity to generate synergies in research and development which result in the creation of new wealth with high added value.
Public statisticians track progress over time through an annual scoreboard for each competitiveness cluster.

Data

Type of data

Evaluations are comprised of performance, business environment, and descriptive data.
Performance data includes such things as employment concentration and patents.
Business environment data includes strength of human resources, entrepreneurship (SME integration and enterprise creation), cluster governance and levels of networking.
Descriptive data includes member lists and company size.

Data source

Data is gathered through surveys and interviews of the competitiveness clusters.

Who is collecting and analysing data?

Public statisticians are responsible for compiling the data for the annual scoreboard. Data is collected from the individual competitiveness clusters. Independent private organisations conduct the national impact analysis.

Use of time series?

Currently, only one year of annual scoreboard data has been collected.

Systematic collection of data?

There are standard procedures for collecting annual scoreboard data. The national impact analysis will be conducted after the policy has been under implementation for three years. Future impact evaluations will be planned, as needed.

Access to disaggregated data?

Summary results from the evaluations are publicly available. Disaggregated data on each competitiveness cluster is also available, following normal rules of data discretion.

SCOTLAND

Scottish Enterprise is Scotland's main enterprise, innovation and investment agency. Scottish Enterprise contributes to government's strategic priorities for economic growth by building the competitive advantage of Scotland's key industries and businesses – focused on six priority industries. Analysis is used to provide inputs to the strategy (or policymaking) process for these priority industries: to provide a baseline, to gauge industry involvement and monitor progress of 'cluster development', and to evaluate performance of industry sectors (and Scottish Enterprise's contribution) over time.

Scottish Enterprise (SE) is the main economic development agency that contributes to the realisation of Scottish Government's strategic priorities for sustainable economic growth. Helping shape strategic priorities for sustainable economic growth, Scottish Enterprise (SE) is the Scottish Government's principal economic development agency. SE seeks to reinforce the competitive advantage of Scotland's key industries and businesses by: maximising the competitive advantage of key industries, helping companies to realise their growth potential, and helping companies to exploit new ideas.
SE has prioritised six national industries (as well as supporting five other regional growth industries) [5] in which it works to strengthen business strategies between companies and other stakeholders, and to improve the business environment factors that drive performance.

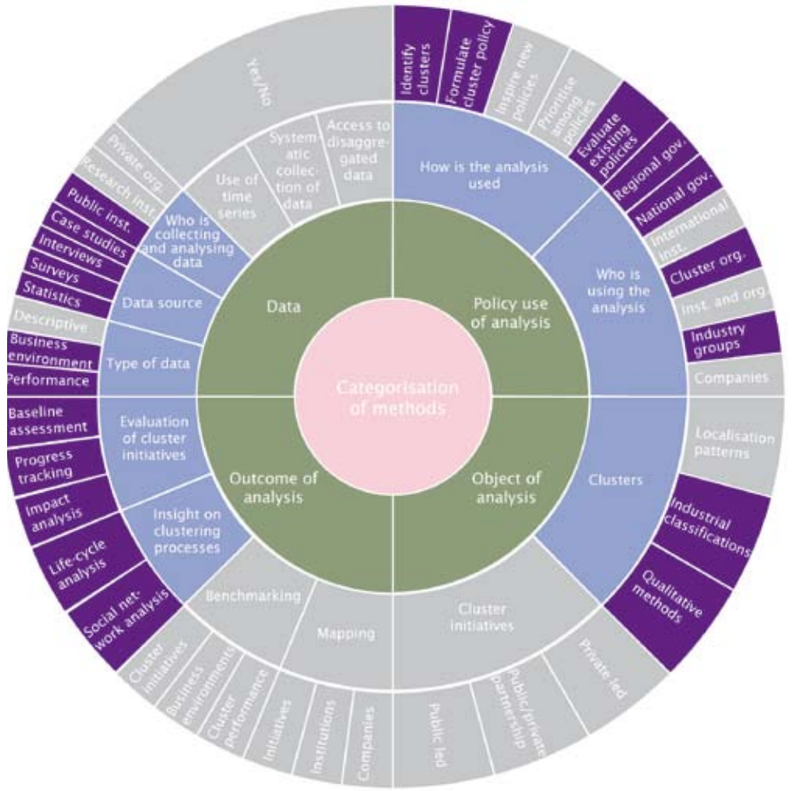

FIGURE 11

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Policy use of analysis

How is the analysis used?

SE uses analysis to continuously provide inputs to the strategy (or policymaking) process for its priority industries: to identify clusters, formulate cluster policy, and evaluate cluster policies – at all stages of the policymaking process (justification, diagnosis, formulation, implementation and learning).
Analysis is used to provide evidence of the importance of these industries for the Scottish economy – to identify clusters for policy action.
Analysis is used to provide a baseline for industry/sector performance and a snapshot of the business environment – to identify strengths and weaknesses and formulate cluster policy.
Analysis is also used to assess the stage of development of a cluster and identify the interventions that should be made in order to encourage and support that development – to evaluate existing policies and inspire new policies.
Who is using the analysis?
The analysis is primarily used by the national government (the priority industry teams and other internal stakeholders at Scottish Enterprise). However, cluster organisations and industry groups also use the analysis.

5. The six priority industries are: Tourism; Food &Drink; Financial Services; Life Sciences; Energy; and Digital Markets and Enabling Technologies. The five regional growth industries are: Textiles; Aerospace, Defense and Marine; Chemicals; Construction; and Forest Industries.

Object of analysis

Clusters

The object of analysis for SE is clusters defined by industry statistics and qualitative methods.
The cluster approach was first adopted in Scotland following research undertaken with the Monitor Group in 1991-93 to identify Scotland's strength in key industries. In 2005, SE undertook a review of their clusters and industries approach to understand not only current strengths, but also the potential future impact and growth. This review was informed by the industry itself – which provided company-level data and information on their value chain linkages.
The outcome of this review was a revised definition of national clusters (six Priority Industries), with original groupings adapted and self-defined by industry themselves.

Outcome of analysis

The two outcomes to the analytical methods developed and used by SE are (i) insight on clustering processes and (ii) evaluation of cluster initiatives.

Insight on clustering processes

SE uses both social network analysis and life-cycle analysis to explore the effects of social capital on cluster growth.
Social Network Analysis was one method used to try and capture this area, yet this method did not provide the desired level of depth. SE has subsequently developed its own methodology (using system thinking) to map the sophistication of linkages and collaboration that grows as a cluster develops. SE calls this method the Cluster Dynamics Model.
The Cluster Dynamics Model is a five-stage theoretical model used for cluster life-cycle analysis. The Model helps explain how a successful cluster would develop and the changes in behavior and company interaction that might be seen at each stage. The use of this model (including the accompanying descriptions and question set) has been successfully used with the Scottish Priority industries or clusters, and tested with international partners in a number of diverse regions.

Evaluation of cluster initiatives

Evaluation of cluster initiatives aims at measuring the performance of SE's priority industries over time: assessing a baseline, tracking progress and analysing impact on the Scottish economy. The evaluations cover three broad areas: impact on the company base, impact on the research base, and impact on the business environment.
Evaluation of the impact on the company base captures the difference made to the businesses within the sectors. Evaluation of the impact on the research base captures the changes in research investment within the sector areas. Evaluation of the impact on the business environment captures wider impacts on the sector and captures the improvements to the broader business environment for the sectors (e.g. ability to access funding, skills available, market position, networks evolved etc.).
The result of these analyses is a map of strengths and weaknesses of the business environment factors for each sector at different stages of company development.

Data

Type of data

SE bases their analyses on performance and business environment data.
Performance data includes: employment, turnover, gross value added, net capital expenditure, patents, number of spin-offs and number of projects with industry.
Business environment data includes indicators of financial, human, physical, intellectual, market and social capital.

Data source

Scottish Enterprise uses both national statistics, surveys and interviews as data sources.

These are supplemented by specific sector case studies, commissioned by SE. Publicly-available data is used as much as possible to ensure repeatability and reliability.
Company-level data was compiled using standard industrial classifications, supplemented with company-level data built 'bottom-up' in order to reflect the actual make-up of the sectors.
Research data was collected from Scottish Funding Council statistics, supplemented by case studies.
Business environment data was collected from a range of public (mostly national) sources. This was supplemented by interviews (conducted by priority industry teams), surveys and case studies.

Who is collecting and analysing data?

Scottish Enterprise (a public institution) collects and analyses the data themselves. Some surveys and case studies are commissioned to external parties.
Use of time series?
Firm-level data for the five previous years is available. Research and business environment data has only been collected for one year.

Systematic collection of data?

Firm-level statistics are collected annually in a systematic way.
Other data (generally collected via interviews conducted by priority industry teams) is collected once every 3-5 years, to fit in with evaluation and strategy processes.

Access to disaggregated data?

As SE is a government agency, supporting both stakeholders of the priority industries and policymakers, disaggregated data on priority industries is openly available. Some data, which has been compiled in response to specific government requests, is not available publicly.

DENMARK

FORA is a research unit under the Danish Ministry of Economic and Business Affairs. FORA's goal is to ensure a fact-based platform for development of business and innovation policy. Together with other partners in the Baltic Sea Region, FORA has developed and piloted the BSR Cluster Benchmarking Model. This benchmarking model provides policymakers with facts regarding cluster-specific business environment factors and their effect on cluster performance, compared to other geographies – serving as a tool to learn from others and formulate fact-based cluster policy.

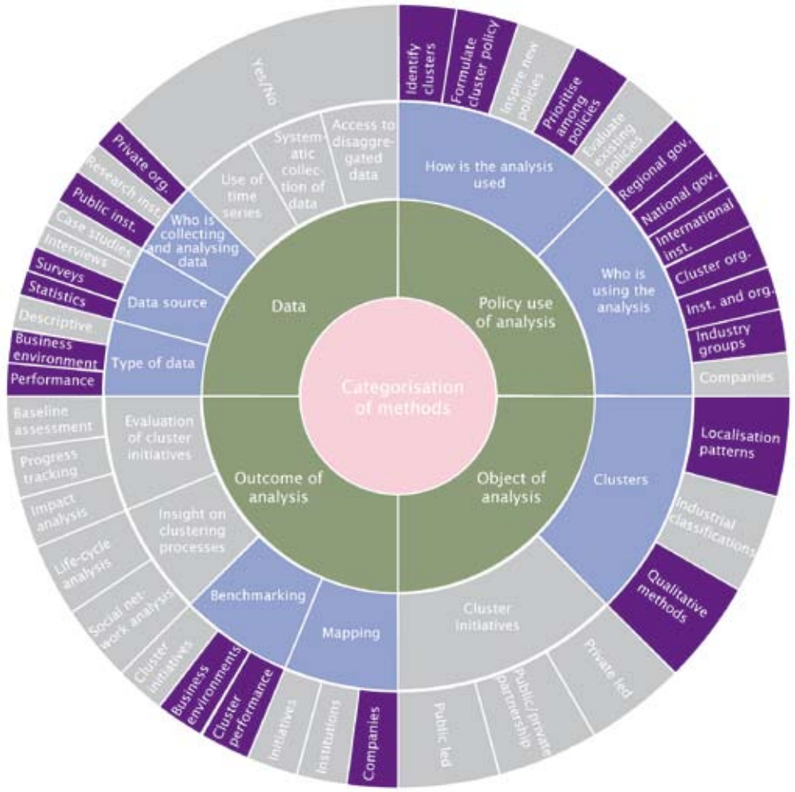
Within the context of the BSR InnoNet project, FORA has worked to develop an analytical model for benchmarking clusters and cluster policies. The model is being developed and tested in collaboration with partners in ten Baltic Sea Region countries. The BSR Cluster Benchmarking Model provides policymakers with facts regarding cluster-specific business environment factors and their effect on cluster performance, compared to other geographies. This benchmarking model is a tool to learn from others and formulate policies that are based on factual input.

Policy use of analysis

How is the analysis used?

At present, the model is being developed in order to identify clusters, formulate cluster policy and prioritise among policies.
A range of indicators are used to identify clusters in the 31 BSR regions, and monitor clusters' performance and business environment over time. This provides factual input that can be used to formulate cluster policy.
The model also enables policymakers to benchmark cluster performance and business environment in one region, relative to other regions in the BSR. This provides factual input

FIGURE 12



to prioritise among policy alternatives.
The analysis can be used to provide factual input at all phases of the policymaking process (justification, diagnosis, formulation, implementation and learning).

Who is using the analysis?

When compiled, the analysis is to be used by all the partners in the international institution – the BSR InnoNet project. Project partners (including regional and national level ministries and innovation agencies) are using the analysis to map and benchmark performance of clusters in the BSR.
The model can also be used by cluster organisations, institutions and industry groups.

Object of analysis

Clusters

The object of analysis for the BSR Cluster Benchmarking Model is cluster, defined by localisation patterns and qualitative methods.
The BSR Cluster Benchmarking Model is based on the same definition of clusters used in the European Cluster Observatory. In consultation with partners in each of the ten countries, minor revisions were made to the 38 cluster categories in order to more accurately reflect the composition of clusters in the BSR. As a result, the BSR Cluster Benchmarking Model focuses on 35 cluster categories.

Outcome of analysis

The two outcomes of analysis are (i) mapping and (ii) benchmarking.

Mapping

Maps of companies (grouped by cluster categories) provide a snapshot of the cluster landscape over time (in terms of size, concentration and value creation), and in that way highlight clusters that may be interesting for policy action.

Benchmarking

The benchmarking model is used to identify regions where cluster performance and business environment factors are best – i.e. identifying targets for peer review. This provides policymakers with input that can be used to prioritise among different policies.
Benchmarking analysis of cluster performance and business environments can also be used to understand how different business environment factors (e.g. education levels, access to capital, etc.) affect cluster performance.

Data

Type of data

The BSR Cluster Benchmarking Model uses both performance and business environment data.
Performance data includes employment and average wages as a proxy for productivity.
Business environment data includes indicators of access to human resources, access to specialised knowledge, entrepreneurship levels, networking and collaboration levels, and importance of public regulation.

Data source

National statistics and surveys are both used as data sources.
Employment and wage data have been gathered from national statistical offices and Eurostat, and reviewed at FORA to ensure reliability and comparability. Data on the six business environment factors (mentioned above) are gathered through standardised internet surveys – sent to three target groups (companies, knowledge institutions and experts) in each of the 31 BSR regions. To date, business environment data has been collected for the life science cluster – as a pilot. Business environment and performance data for the life science cluster will be analysed (using econometric methods) in order to test the impact of clusters' business environment on cluster performance.

Who is collecting and analysing data?

FORA (a public institution) is responsible for collecting and analysing the data, in collaboration with other public sector partners in the BSR InnoNet project. FORA commissions some parts of the analytical work to private organisations, yet maintains overall responsibility for the quality and policy relevance of the analysis.

Use of time series?

Employment and wage data has been collected for two years (2000 and 2004). Business environment data can be collected by sending out the survey on an annual basis.

Systematic collection of data?

FORA and project partners have collected data in a systematic way – documenting methods so that data can be collected in the same way at regular intervals and in other regions in the future.

Access to disaggregated data?

As FORA and its project partners are all public sector organisations, disaggregated data is available. However, because the BSR Cluster Benchmarking Database uses the ISC/CSC cluster code (which is protected by IPR), access to disaggregated data is limited to project partners, and details on the cluster code cannot be published.

OTHER EXAMPLES OF POLICY-TAILORED CLUSTER ANALYSIS

In addition to the four countries mentioned above, there are other examples of policy-tailored cluster analyses used as inputs to cluster policymaking.

In Canada, the National Research Council has invested over $500 million since 2001 in a series of cluster initiatives aimed at developing regional capacity in science and technology-based innovation, with the broader goal of supporting national economic growth. As a result, NRC requires methods to track progress and evaluate its cluster initiatives over time. The NRC – together with the Innovation Systems Research Network and private organisations – has developed an approach to evaluate cluster initiatives (the NRC Cluster Framework) and provide insight on clustering processes over time. The method is built on the concept of the cluster lifecycle, recognising that the role of public institutions as well as the resulting policy outcome can change as clusters evolve through various phases of development. Furthermore, the NRC model differentiates between current conditions (inputs) and current performance (outputs), and specifies those areas in which NRC interventions have an influence. Performance and business environment data is collected through statistics and interviews conducted by NRC staff.

Similarly, Innovation Norway has developed its own methodology to evaluate cluster initiatives that participate with the Norwegian Centres of Expertise programme. The evaluation method includes a baseline assessment, which is repeated on a regular basis to track progress. Innovation Norway has developed the model in collaboration with a private consultancy, Oxford Research, who is responsible for collecting and analysing the data. Data is compiled from company-level statistics, surveys (including cluster registration forms) and interviews with companies, knowledge institutions and other stakeholders. Data encompasses cluster performance, business environment and descriptive indicators. Data for all indicators has been collected once (at the start in 2006). Some data (including descriptive/activity data) is collected systematically every year. Some data is collected after three years, and some is collected after seven years.

Other countries such as Greece and Sweden have also developed methods for mapping business structures and evaluating cluster initiatives. Each of these methods has been tailored to fit the national policy context.

Summary

CHAPTER 7

OBSERVATIONS

Having used the categorisation wheel to describe how different analytical tools and methods are used as an input to formulation of cluster policy, one general observation can be made.

Different analytical tools and methods are necessary at different stages of the policymaking process

Policymakers require different types of fact-based input at different stages of the policymaking process. In most cases policymakers will use different analytical methods and tools to provide input at each stage of the policymaking process (see below). Only a few of the analytical methods presented in this paper can be used to provide input at every stage of the policymaking process.

- Databases for benchmarking clusters aim at providing input to the justification and diagnosis phases to identify targets for policy action and justify further analysis.
- Cluster-based economic strategies are economic development strategies with a special focus on how to grow the competitive potential of a region and its clusters. The analytical methods and tools used include top-down and bottom-up analysis and provide factual input to four phases of the policymaking process: justification, diagnosis, formulation and implementation.
- Industry and cluster studies are in-depth studies of a given cluster or industry. These studies provide policymakers with information on strengths and weaknesses, explain general trends in the industry and provide recommendations to policymakers on future developments of the industry. These studies can be used in the justification, diagnosis, formulation and learning phases of policymaking.
- Policy-tailored cluster analyses are the various types of tools and analytical methods used at every stage of the policymaking process – justification, diagnosis, formulation, implementation and learning – to target new focus areas, identify regions or countries to learn from, justify new investments, inspire new policy measures, assess the results of previous policy strategies and revise existing policies.

SUMMARY OF DISCUSSION FROM THE COPENHAGEN WORKSHOP

In general, policymakers develop their own analytical tools and methods to provide fact-based input to policy formulation in their countries. The definition of clusters used in these countries is defined to fit the specific national context. Evaluation methods are tailored to fit with the needs of national policy initiatives. And international benchmarking and learning from peers is not commonly used.

Though most current policy practice is tailored to meet specific needs nationally, discussion at the Copenhagen workshop highlighted a number of common needs for data, tools, and analytical methods on clusters:

There is a need for a standardised cluster database

The participants expressed a need for standardised databases which can be used to identify clusters, and act as input to formulation of fact-based cluster policy. To broaden the usage of data for fact-based cluster policy, the participants expressed a need for a wider range of cluster specific indicators: both indicators for measuring cluster performance (i.e. wage/productivity data and firm level data) and indicators for measuring business environments for clusters. To ensure standardised and updated data, participants highlighted the benefits of engaging national statistical offices in collecting data.

… which is open and flexible

Policymakers confirmed the need to have standardised definitions of clusters and sub-clusters, but stressed that data was only useful if it reflected the local context. A combination of 'top-down' and 'bottom-up' methods for analysing clusters was recommended.
To enable 'bottom-up' methods for defining clusters, policymakers expressed a need for a database with open and transparent access on a disaggregated sub-cluster/industry level. This would enable analysts to confirm that cluster compositions match the specific contexts in which they operate. If cluster compositions do not reflect the local reality, analysts must also have the possibility of flexibly adjusting cluster compositions to fit the local context.
Given that the composition of clusters and sub-clusters can vary from region to region, users must have open access to disaggregated (sub-cluster) data in all regions – in order to enable comparisons between clusters and regions.

…and easy to use

Participants at the workshop expressed a desire to have an analytical tool that provided both data and analysis with an easy-to-use interface. Users should be able to choose the composition of the cluster/sub-cluster, the indicators they wish to include in the analysis, and even the types of analysis (or algorithms) they wish to apply to the chosen data.
The tool should also allow the user to generate standard types of output (tables, graphs, maps and other figures).

In addition, other analytical inputs are in demand:

...methods for benchmarking internationally

Policymakers expressed the benefits of being able to learn from peers internationally. It was suggested to explore the possibility of initiating international benchmarking through an open source approach to data collection – accumulating knowledge over time which would enable international comparisons that were useful.

…studies on how cluster policies affect cluster performance

It is commonly accepted that it is difficult to determine how cluster policies directly affect cluster performance. Regardless, policymakers agreed that it was important to analyse changes in the business environment and the link to cluster performance – and to ensure that the general trends are moving in the "right" direction.

…data on international attractiveness and interest in international collaboration

With increasing interest in attracting international partners and establishing international linkages, there is a demand for additional data. Policymakers request data on levels of international attractiveness – to guage the relative attractiveness of clusters in their countries. In addition, policymakers and cluster organisations alike would find it useful to have information on other clusters' interest and readiness to collaborate internationally.

…and methods for identify emerging clusters

Clusters are not static. The dynamics of global competition mean that clusters and sub-clusters change over time. Emerging clusters are not easily identified by standard statistical methods. Therefore other methods to analyse the changes and emerging linkages are important. Inspiration, information and potentially education on other methods are in demand.

APPENDIX I

LIST OF INDIVIDUALS AND ORGANISATIONS RESULTING FROM THE SNOWBALL QUESTIONNAIRE

Akifumi Kuchiki	Institute of Developing Economics, Japan External Trade Organisation
Alec Hansen	Economic Competitiveness Group
Alexei Prazdnichnykh	Bauman Innovation
Andreas Steffes	Basel Economics
Andrew Davies	OECD
Andrew Reamer	Brookings Institution
Anne Raabye Brønden	Copenhagen Economics
Anne Marie Riis	REGLAB
Ashish Lall	National University of Singapore and Asia Competitiveness Institute
Bjarne Jensen	REGLAB
Burk Kalweit	ASTRA - the Alliance for Science and Technology Research in America
Burke Murphy	Minnesota Department of Employment and Economic Development
Charles Colgan	University of Southern Maine
Christian Ketels	Harvard Business School & Stockholm School of Economics
Claire Nauwelaers	Maastricht University
David Arthurs	HAL (Hicklings, Arthur, Low)
David Audretsch	Entrepreneurship, Growth and Public Policy, Max Planck Institute
David Wolfe	University of Toronto
Edward Feser	University of Illinois
Elisabeth Waelbroeck-Rocha	BIPE
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APPENDIX II

DEFINITIONS OF TERMINOLOGY USED

In the context of this work, we have used a number of terms which may be interpreted in many ways. In order to prevent misunderstandings, the terms we use – and the definitions we have applied in this context – are listed below.

Cluster

Clusters are geographic concentrations of interconnected companies, specialised suppliers, service providers, firms in related industries, and associated institutions in particular fields that compete but also cooperate (Michael Porter in On Competition, 1998). Market and competition form clusters.

Cluster Initiative

Cluster initiatives are organised efforts to increase the growth and competitiveness of a cluster within a region, involving cluster firms, government and/or the research community (Sölvell et. al. in Cluster Initiative Greenbook, 2003).
Organised efforts can involve companies only. More often, cluster initiatives involve a partnership between private and public sector actors. Research in the Cluster Initiative Greenbook has shown that the main activity areas that cluster initiatives address include: HR upgrading, cluster expansion, business development, commercial collaboration, innovation and technology, and business environment upgrading. Successful cluster initiatives tend to move from a project status into more formal organisations over time (Ketels, et.al. in Clusters and Cluster Initiatives, 2008).
The existence of a cluster (an agglomeration of companies) does not necessarily mean that actors have organised efforts to improve performance (i.e. a cluster initiative).

Cluster Organisation

A cluster organisation is a more formalised institutional set-up, generally having the responsibility for leading cluster initiatives. A cluster organisation often has an office/address, a cluster facilitator/manager, a budget, a website, etc.

Cluster Performance

Cluster performance is measured in terms of economic outcomes. Outcome measures include indicators such as employment, wages and exports. Outcome measures illustrate the cluster's impact on the regional or national economy.
Other outcomes of clusters include things like reduced costs (from labour-pooling or technology-sharing) and innovation (from knowledge-sharing and networking).

Cluster-Specific Business Environment

Cluster-specific business environment (sometimes called cluster-specific framework conditions) refer to those contextual factors (surrounding a cluster), which affect a cluster's performance. Public policy is typically focused on ensuring positive/supportive framework conditions – sometimes for business in general, sometimes for specific clusters.
Cluster-specific business environment factors can be grouped into different categories, and measured by indicators such as: access to labor or capital, skills levels, collaboration with academic and research institutions, government regulations, etc.


EUROPEAN
CLUSTER
ALLIANCE