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▶ **To cite this version:**

Hélène Prost, Joachim Schöpfel. A Review of French PhD Theses on Sustainable Development. The Grey Journal, 2024, 20 (2), pp.111-125. hal-04597021

HAL Id: hal-04597021

https://hal.univ-lille.fr/hal-04597021

Submitted on 1 Jun 2024

A Review of French PhD Theses on Sustainable Development

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Abstract

The purpose of our study is to assess the French PhD theses on sustainable development, with two objectives: to give a scientometric overview on the French PhD landscape in the field of sustainable development; and to show how PhD theses (as a major part of grey literature) and related tools can be helpful for the scientometric study of science. The review is based on data from the French national portal theses.fr. The results of our study provide a detailed review of the French PhD research on sustainable development, including the main French research universities in the field of sustainable development and the most eminent academic scholars, the disciplinary distribution of the research on sustainable development, and the accessibility of the PhD theses on sustainable development (open science).

Keywords

Sustainable development, PhD theses, grey literature, scientometrics, open science, France

Introduction

For more than 30 years, sustainable development has become a major challenge for mankind. Sustainable development refers to a concept that emphasizes meeting the needs of the present without compromising the ability of future generations to meet their own needs. It involves balancing economic, social, and environmental considerations to ensure that development occurs in a way that is equitable, responsible, and respectful of the planet's natural resources and ecosystems. The concept of sustainable development gained significant attention after the publication of the Brundtland Report in 1987 by the World Commission on Environment and Development (WCED). The report defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987).

Sustainable development is often pursued through policies, practices, and strategies that promote renewable energy, responsible consumption and production, biodiversity conservation, social inclusivity, poverty alleviation, and climate action. The United Nations' 2030 Agenda for Sustainable Development, with its 17 Sustainable Development Goals (SDGs), provides a comprehensive framework to guide global efforts toward achieving sustainable development in various areas. Key principles of sustainable development include economic prosperity, social equity, environmental protection, inter-generational equity, participation, and collaboration, in a long-term perspective.

In particular, the UN 2030 Agenda calls for enhanced scientific research capacity to achieve the targets of the SDGs. Scientific research and development are required to produce solutions for problems like climate change and global warming, air and water pollution, land degradation, loss of biodiversity or limited resources. Grey literature is part of the solution, insofar it is a vector of fast and rich communication of research results through communications, working papers, reports, posters, theses and so on (Schöpfel & Farace, 2018). Moreover, grey literature is also a reliable and relevant way to learn more about the topics, institutions, and actors in the field of research on sustainable development.

For this last purpose, PhD theses are of particular interest because they offer a representative perspective on the current academic research at universities worldwide[1] and because many theses are freely available in open repositories[2]. PhD theses are generally the result of 3-4 years of research and the first valuable document in the career of a researcher; at the same time, they are administrative documents necessary to obtain the doctoral degree. Sometimes, they are considered as the result of teamwork; in any case, they contain information about supervisors and institutions delivering the diploma (Stock & Paillassard, 2010).

Up to day, there are several hundreds of systematic reviews on sustainable development and related topics. They generally focus on journal articles and neglect (if not exclude) what they call "unpublished and not peer reviewed literature", i.e., grey literature (Schöpfel & Prost, 2021). By way of illustration, here are some recent highly cited reviews, retrieved with the Web of Science Core collection. From eight reviews published between 2019 and 2023, only one includes grey literature, such as PhD and Master theses, reports and conference presentations (Mensah, 2019). The other reviews exclusively analyze journal articles and (less often) academic books (Findler et al., 2029; Hallinger & Chatpinyakoop, 2019; Corona et al., 2019; Di Vaio et al.,2020; Rasoolimanesh et al., 2020; Ranjbari et al., 2021; Ruggerio, 2021). Another systematic bias is the focus on English, excluding other languages like Chinese, Spanish, German or French.

What we want to show is that, especially in the field of sustainable development, a complementary review of grey literature can produce reliable and valid results. The following study will provide a scientometric analysis of French PhD theses on sustainable development, based on a public dataset from the French Bibliographic Agency for Higher Education[3]. The objective is twofold: to give a scientometric overview on the doctoral research in France in the

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[1] See the thesis resources of the Networked Digital Library of Theses and Dissertations https://ndltd.org/thesis-resources/find-etds/
[2] See the statistics of the global Directory of Open Access Repositories OpenDOAR https://v2.sherpa.ac.uk/opendoar/
[3] ABES https://abes.fr/

field of sustainable development; and to show how PhD theses, as a major part of grey literature, can be useful for the scientometric study of science.

Methodology

The review is based on data from the French national portal theses.fr[4]. This portal gives access to 446,579 PhD theses defended in French universities since 1971, together with 78,109 theses under preparation (accessed August 23, 2023). For our study, we downloaded the dataset "*Thèses soutenues en France depuis 1985*" which contains the metadata of French doctoral theses defended since 1985 and which is available on the French public open data platform data.gouv.fr[5]. The dataset has been produced by the French Bibliographic Agency of Higher Education (ABES)[6] and was last updated on January 20, 2023. It is published under an Open Licence (Licence Ouverte) version 2.0.

The ABES data file was downloaded in csv format on August 16, 2023. It contains metadata of 431,997 theses. The metadata includes information about the author, the jury (supervisor, other members), the institution (university, graduate school), the content (title, abstract, discipline, subject), the year and the accessibility (embargo, open access).

The csv dataset was processed with the business intelligence and data analytics software Omniscope (Visokio). We built up the sample in two stages:

1. The search for "sustainable development" or "développement durable" in all metadata, including title, abstract, subject indexing, and graduate school produced 2,326 theses.
2. Additional search for entry terms and related concepts of the preferred term "sustainable development" of the UNESCO thesaurus[7] produced 1,141 other theses (see Appendix).

The final sample consists of 3,467 theses which represent 0.8% of the total number of theses in the ABES file.

Results

Evolution

We identified 3,467 French doctoral theses defended since 1985 on sustainable development and/or related concepts. The annual number steadily increased from 8 in 1985 to a ceiling of 180 to 200 theses from 2011 on (figure 1).

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[4] Theses.fr https://theses.fr/fr/

[5] *Thèses soutenues en France depuis 1985* https://www.data.gouv.fr/fr/datasets/theses-soutenues-en-france-depuis-1985/

[6] Agence bibliographique de l'enseignement supérieur (ABES) https://abes.fr/

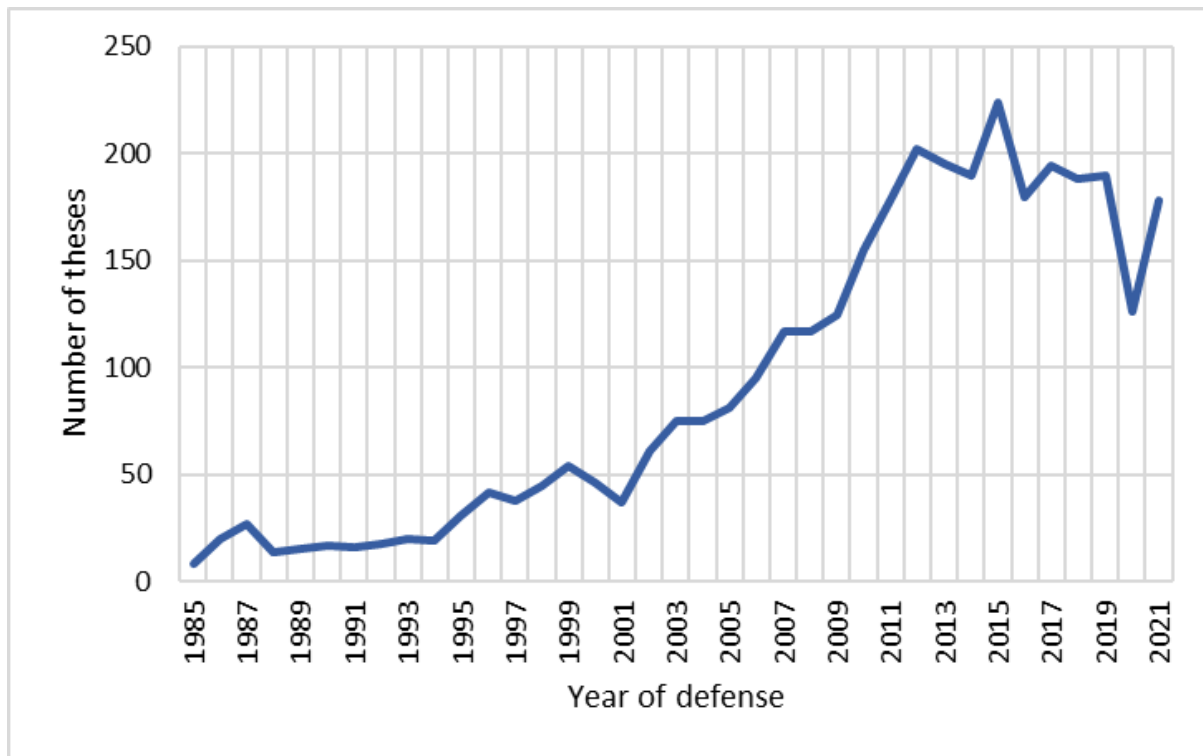[7] UNESCO Thesaurus https://vocabularies.unesco.org/browser/thesaurus/en/

Figure 1. Evolution of defended theses on sustainable development (1985-2021)

The decline in 2020 is attributable to the COVID-19 pandemic; the figures for 2022 (53 theses) and 2023 (1 thesis) are not complete and have been excluded.

Until 2001, the theses on sustainable development represented 0.1 to 0.5% of all defended theses. This percentage increased steadily over the years, reflecting a growing interest for this topic. The actual percentage is 1.4 to 1.6%.

85% are written in French, 13% in English, 2% in other languages.

Institutions

The doctoral theses in the field of sustainable development have been defended in 166 universities and other Higher Education Institutions (HEIs). Their distribution is similar to a long tail; while 20% of the institutions represent 52% of all theses, 80% of theses have been defended in 42% institutions (figure 2).
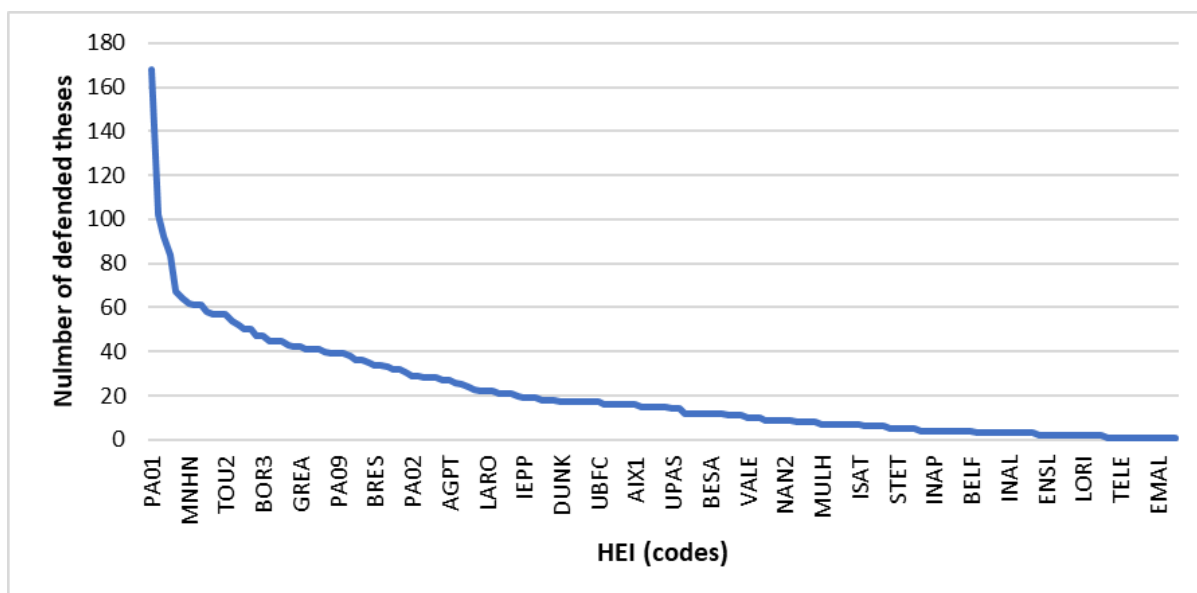
Figure 2. Number of theses per HEI (N=166 institutions)

In other words, we can identify some important universities with doctoral research in the field of sustainable development, i.e., a couple of universities with more defended theses than others (table 1). These ten institutions together represent 819 theses on sustainable development (23.6%). However, we cannot speak of a kind of excellence cluster of some highly significant institutions because doctoral research related to sustainable development has been conducted in roughly 80% of all French HEIs.

Universities	Number of theses	In %
Paris 1	168	4,8
Compiègne	102	2,9
Nice	92	2,7
Paris 10	84	2,4
Aix-Marseille	67	1,9
Montpellier	64	1,8
Muséum d'Histoire Naturelle	62	1,8
Strasbourg	61	1,8
Reims	61	1,8
Lyon	58	1,7

Table 1. The ten most important institutions (N=166 institutions)

Six institutions of table 1 are members (or part of members) of the Udice union of ten leading French universities working for excellence in research, performance in higher education and

the development of attractive innovation ecosystems[8]. Paris 10 (Nanterre) is a large university with a focus on social sciences and humanities, with more than 1,500 PhD students; while the University of Montpellier puts forward environmental issues and social responsibility, hosts the technical support unit coordinating an assessment supported by the United Nations' Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), and defines its scientific attractiveness through its recent Montpellier Advanced Knowledge Institute on Transitions (MAK'IT) aiming to stimulate the contribution of scientific communities to the analysis, support and acceleration of the transitions necessary to achieve the Sustainable Development Goals (SDGs) in the fields of agriculture and food, environment and health. The University of Technology of Compiègne is ranked among the leading French engineering schools and pursues forms of technological research that answer societal questions generated by environmental issues; and the University of Reims Champagne-Ardenne is a multidisciplinary training and research university positioned and recognised nationally and internationally in the bioeconomy field, with an excellence cluster focused on agriscience, the environment, biotechnology, and the bioeconomy.

The institutional long tail distribution is confirmed by the analysis of the graduate schools (*écoles doctorales*)[9]. The dataset contains information about graduate schools for 2,066 theses (60%). The PhD students have been registered with 280 graduate schools. Their distribution is like a long tail, as 20% of the graduate schools (56) represent 57% of the defended theses (1,174) (figure 3).
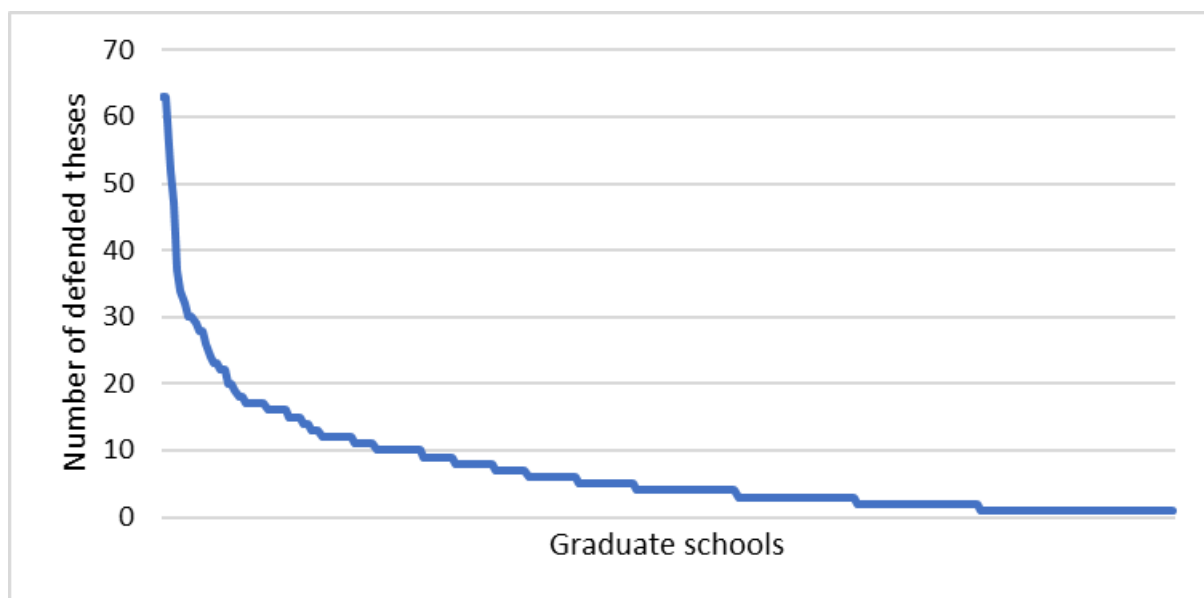
Figure 3. Number of theses per graduate school (N=280 graduate schools, with 2,066 theses)

Table 2 shows the ten most important graduate schools, in terms of number of defended theses. Each of these graduate schools represents between 30 and 60 theses related to sustainable development, in agricultural and environmental sciences, civil engineering, social sciences and humanities, and chemistry.

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[8] Udice https://www.udice.org/?lang=en
[9] See the national registry of graduate schools https://doctorat.campusfrance.org/phd/dschools

Graduate school	Domain	Town	Number of theses	In %
Sciences de la nature et de l'Homme - Évolution et écologie	Agricultural and environmental sciences	Paris	63	3,0%
Sciences pour l'ingénieur	Civil engineering	Compiègne	63	3,0%
Sciences pour l'Ingénieur	Civil engineering	Troyes	52	2,5%
Sciences de l'homme et de la société	Social sciences and humanities	Reims	47	2,3%
GAIA	Agricultural and environmental sciences	Montpellier	37	1,8%
Sciences de la matière, du rayonnement et de l'environnement	Chemistry	Villeneuve d'Ascq (Lille)	34	1,6%
Chimie	Chemistry	Lyon	32	1,5%
Géographie	Humanities	Paris	30	1,5%
Temps, Espaces, Sociétés, Cultures	Humanities	Toulouse	30	1,5%
Sciences sociales	Social sciences	Lyon	29	1,4%

Table 2. The ten most important graduate schools (N=280 graduate schools)

But again, this is just the top of the chart; actually, the official registry contains 287 graduate schools, which means that nearly all graduate schools are involved in the organization and follow-up of doctoral research in the field of (and/or related to) sustainable development.

People and partners

The dataset allows the identification of 6,819 members of a thesis jury. This membership means that they can be considered to a certain extent scientific experts in sustainable development and/or related topics. However, this involvement appears for most of them occasional, not very important, as 88% has been members of only one or two juries. Their distribution follows more a Pareto than a long tail curve, as 20% of the expert members (1,367) have been involved in the juries of 70% theses.

Only 36 experts have been involved in 10-20 theses, most often as thesis supervisor, representing together 446 theses (7%).

Additionally, we identified 2,457 academic supervisors of theses in the field of sustainable development or related topics. Here, the distribution is clearly a long tail distribution: 20% of

the supervisors (491) have directed 41% theses (1,422), while 80% theses (2,764) have been directed by 72% supervisors (1,766) (figure 3).
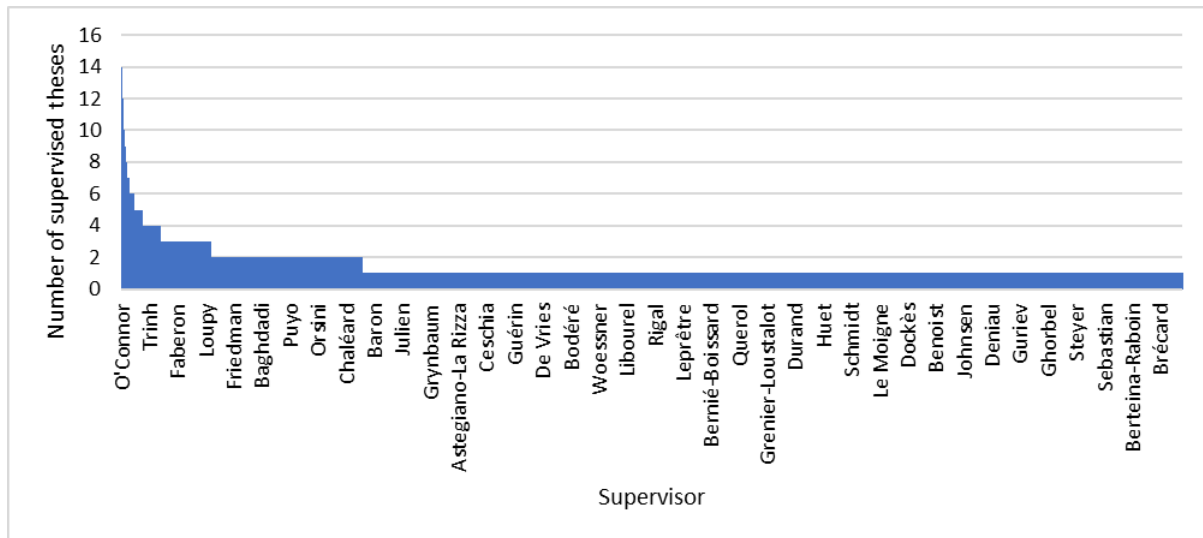

Figure 3. Number of theses per supervisor (N=2,457 supervisors)

Figure 3 shows the name of some supervisors, selected at random. More interesting, table 2 contains the names of the ten most important supervisors (table 2).

First name	Last name	Institution	Discipline	Nb of supervised theses
Martin	O'Connor	University of Paris Saclay	Economics, sustainable development	15
Alain	Piquemal	University of Nizza	International law	14
Eugène	Vorobiev	University of Compiègne	Process Engineering	12
Sylvie	Faucheux	Conservatoire national des arts et métiers (CNAM)	Economics, environment	12
Christophe	Len	University of Compiègne, Chimie ParisTech	Chemistry	11
Michel	Prieur	University of Limoges	International law, environment	11
Raphaël	Romi	University of Nantes	Public law, environment	10

Nathalie	Machon	Muséum National d'Histoire Naturelle	Biodiversity	9
Christian	Brodhag	Ecole des Mines Saint Etienne	Civil engineering, corporate social responsibility, sustainable development	9
René	Passet	University of Sorbonne	Economics, development	9

Table 2. The ten most important supervisors

Table 2 gives an idea of the diversity of the doctoral research but also, of the supervisors' status and expertise. Some examples.

- Martin O'Connor is professor of economics at the University of Paris-Saclay. With research degrees in natural sciences, humanities and economics, and former director of the REEDS laboratory (Research in Ecological economics, Eco-innovation and Tool Development for Sustainability), he works at the interface society-nature, ecological economics, political economy, and social epistemology.
- Alain Piquemal is state councilor and permanent representative of the Principality of Monaco to the United Nations Environment Program (UNEP). He is emeritus professor of international law at the University of Nice Sophia Antipolis (France), former vice-president of this university, in charge of environment and sustainable development and former dean of the faculty of international and european law (IDPD).
- Sylvie Faucheux is a French academic specializing in environmental economics and sustainable development. She is the founder of the Fondaterra partnership foundation (European Institute for Sustainable Development) and chaired the European Association for Ecological Economics, before becoming a board member of the International Society for Ecological Economics. She was a member of the European Consultative Forum on the Environment and Sustainable Development for the European Presidency, and she took charge of the working group on climate change.
- Michel Prieur is a French associate professor specializing in environmental law and honorary dean of the faculty of law at the University of Limoges. He is active in a number of international organizations, including the International Union for Conservation of Nature (IUCN), where he was vice-chairman of the environmental law commission. He is president of the International Centre of Comparative Environmental Law (CIDCE), an international NGO accredited to the Rio (1992), Johannesburg (2002) and Rio+20 (2012) Conferences. He represents France on the European Council of Environmental Law.
- Christian Brodhag is a French politician, environmentalist and academic, professor emeritus at the École nationale supérieure des mines de Saint-Étienne. He has been national spokesman for the Greens, chairman of the French Sustainable Development Commission and interministerial delegate for sustainable development, and he is chairman of the French AFNOR Commission on Sustainable and Intelligent Cities and Territories.

- René Passet is a French economist and development specialist. Professor emeritus at the Sorbonne, he was the first chairman of ATTAC's scientific council. He is considered one of the leading specialists in the new complex or transdisciplinary approaches.

Despite the diversity of their research fields, they share two common points: a personal and outstanding concern for the future of society and environment in the long term, and a civic, public and/or political commitment to sustainable development. We cannot speak of a cluster of excellence, of course; there is no clearly identified group of scientists working together in the same field; but the analysis of the defended theses reveals a "pool of expertise" capable of meeting the challenges of our time, through research, academic work, and education of future scientists.

The dataset contains also information about scientific partnerships for 1,921 theses (55%), including 588 (17%) with several partners. Most partners are public research laboratories, research institutes and specialized HEI; less than 20 theses have been prepared with an industrial partner.

Disciplines

Nearly all theses' disciplines have been indexed with the Dewey Decimal Classification system (ddc), with three whole numbers making up the main classes and subclasses. The complete dataset (all theses) contains 98 different ddc codes while the sustainable development sample has been indexed with 70 ddc codes (71%).

All domains are covered; however, the most important scientific domains covered by our sample are social sciences (ddc:300), pure science, i.e., natural sciences and mathematics (ddc:500), technology (applied sciences) (ddc:600), and history and geography (ddc:900). Together, these four domains represent 90% of all theses related to sustainable development (figure 4).
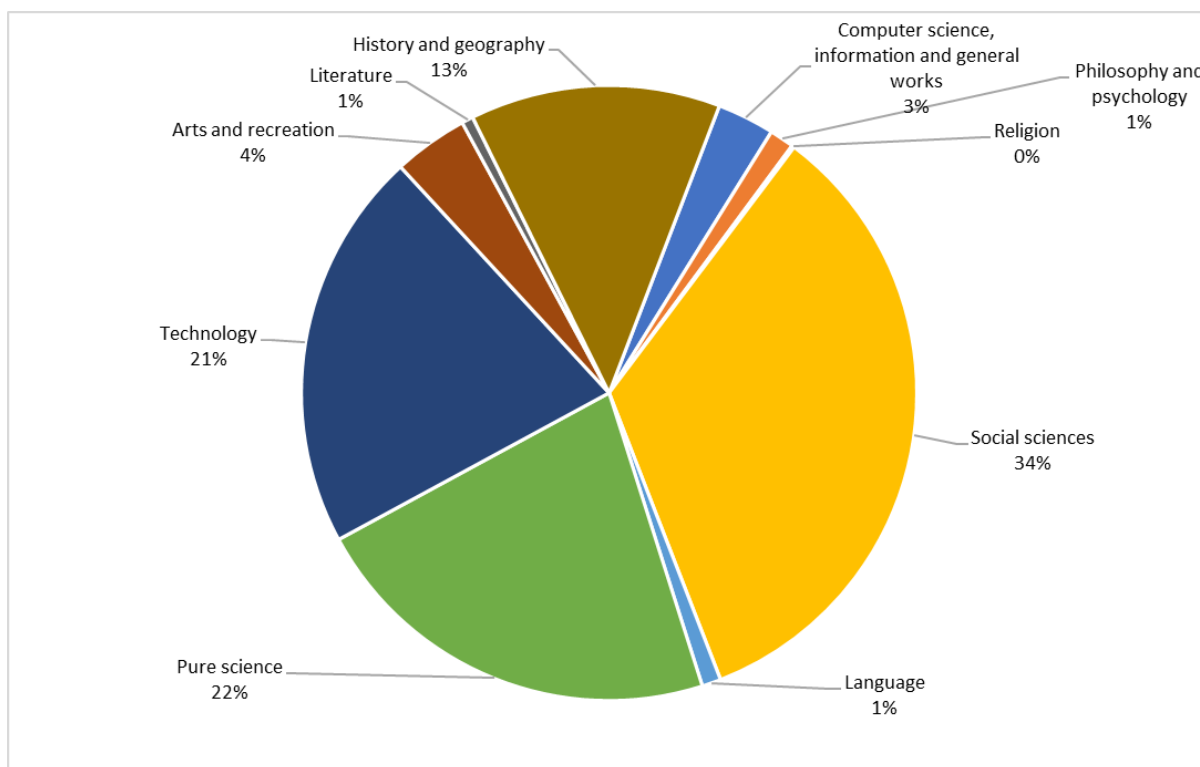
Figure 4. Scientific domains (ddc classes) (N=3810 theses)

A look on the ddc subclasses provides more detailed results of the academic disciplines (table 3). The most important disciplines are economics (15% of the sample), geography (10%), law (10%), chemistry (9%), engineering (8%), biology (7%) and management (7%). Together, the theses defended in these disciplines represent two-third of all theses in the field of sustainable development.

ddc class	Domain	ddc subclass	Discipline	Nb of theses
300	Social sciences	330	Economics	554
		340	Law	370
		300	Social sciences, sociology, anthropology	140
500	Pure science	540	Chemistry, mineralogy, crystallography	338
		570	Life sciences, biology, biochemistry	282
600	Technology	620	Engineering	319

		650	Management and office management	261
700	Arts and recreation	710	Urban planning	113
900	History and geography	910	Geography and travel	376
		900	Geography and history	91

Table 4. Scientific disciplines (ddc subclasses) (N=3,810 theses)

When compared to all defended theses, theses on (or related to) sustainable development represent a relatively more important part in some disciplines. While our sample represents 0.8% of the total number of theses in the ABES file (see above), this percentage is significantly higher in the following five disciplines:

- Urban planning (8.8%)
- Geography (6.6%)
- Social problems and services (5.4%)
- Buildings (4.9%)
- Economics (4.4%)

Figure 5 shows the evolution of the number of defended theses for each of the ten most important disciplines (ddc subclasses, see table 4).

Figure 5. Evolution of the number of defended theses per discipline (ddc subclasses) (2001-2021)

The differences between the ddc subclasses are significant on a p=0.005 level (Chi-square test). The main conclusions can be resumed as follows:

- The importance of natural sciences, in particular chemistry and biology, is increasing over the years. Less but still on a significant level, the number of theses in management and social sciences is also increasing.
- On the other side, the importance of economics and law and (less) geography is decreasing, with less defended theses than expected.
- Third, we can't observe a significant increase or decrease of theses in the field of urban planning and engineering.

Subjects

Beyond disciplines, other metadata enable a more detailed analysis of the themes studied, e.g., title, abstract, and key words. One part of the key words is based on RAMEAU, a French subject indexing language, a derivative of the Library of Congress Subject Headings LCSH), and which is used in France by the Bibliothèque nationale de France, university libraries, numerous public reading and research libraries, and several private organizations[10].

Except for 143 (4%), all theses of our sample have been indexed with one or more RAMEAU subject headings. The complete list is made up of 2,536 headings. Most of them (93%) describe only one or two theses, and only 2% (= 49 headings) are used for the indexing of 10 or more theses. In other words, this list of headings reflects a large diversity of subjects studied, rather than a homogeneous corpus of research. Figure 6 illustrates the 100 most important subject headings.

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[10] RAMEAU https://rameau.bnf.fr/

Figure 5. The 100 most important RAMEAU subject headings (N=3,324 theses)

The research subjects are extremely wide-ranging, covering economic and legal topics as well as management, politics, engineering, technology and even ethics. We didn't match each thesis against the United Nations' 2030 Agenda for Sustainable Development, but we were able to identify for each of its 17 SDGs (including, for instance, Gender equality, Sustainable cities and communities, Responsible consumption and production, and Life below water) one or more subject headings. In other words, the doctoral research of our sample covers the whole range of the international agenda for sustainable development.

Table 5 shows the 15 most important subject headings, the French RAMEAU terminology along with an English translation.

Subject headings (fre)	Subject headings (eng)	Nb of theses
Développement durable	Sustainable development	288
Responsabilité sociétale	Social responsibility	54
Biodiversité -- Conservation des ressources	Biodiversity -- Resource conservation	36
Écologie chimique	Chemical ecology	36
Chimie verte	Green chemistry	33

Conservation des ressources (biologie)	Conservation of resources (biology)	33
Biodiversité	Biodiversity	26
Gestion de l'environnement	Environmental management	26
Urbanisme durable	Sustainable urban planning	26
Aménagement du territoire	Regional planning	23
Éducation au développement durable	Education for sustainable development	22
Environnement -- Droit	Environment -- Law	21
Changements climatiques	Climate change	20
Environnement -- Droit international	Environment -- International law	20

Table 5. The 15 most important RAMEAU subject headings (N=3,324 theses)

This table illustrates some of the most important doctoral research subjects in France, in particular:

- Political action and management: social responsibility, environmental management, sustainable urban planning and regional planning, education for sustainable development;
- Life sciences: biodiversity, and conservation of resources;
- Chemistry: chemical ecology, and green chemistry;
- Law: environmental and, in particular, international environmental law.

Climate change is another, transversal subject of research.

Accessibility

Nearly half of the defended theses on sustainable development are accessible on the Internet. In figures: 1,644 theses can be accessed online (47%), 1,823 are not disseminated in open access but are available in the academic libraries in print format or on microfiche (53%). The percentage of theses in open access increased steadily, from 4% before 2000 to 71% for theses defended between 2020 and 2023 (figure 2).
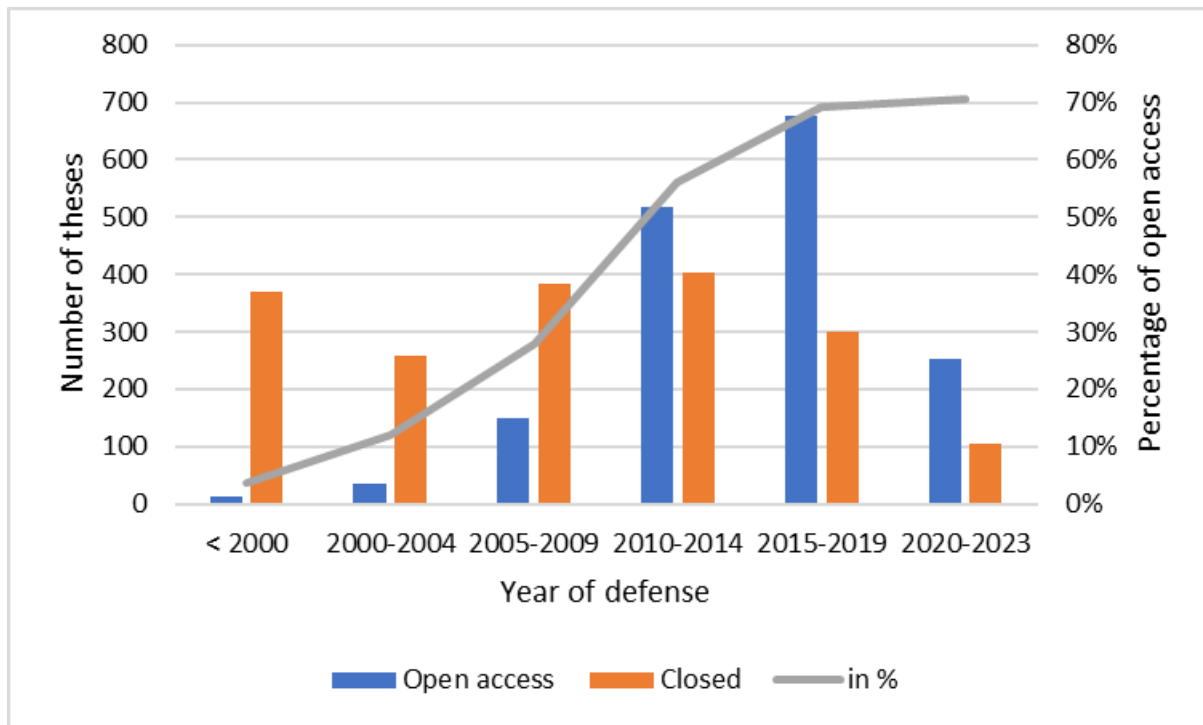
Figure 2. Accessibility of theses on sustainable development (1985-2023)

The open access part of theses in this field is higher than for all French theses over the whole period (31%) but similar for the last four years 2000-2023.

Two complementary observations: For 223 theses (6%), the document which is accessible in open access is not the same as the archived version. 188 theses (5%) have been released under embargo.

Discussion

Our results confirm that a scientometric analysis of grey literature can produce reliable and valid results in a given scientific field, especially regarding disciplines and subjects, institutions, experts, and accessibility. PhD theses are particularly interesting for such a review insofar they are the result of doctoral research projects at most if not all universities. Also, there are two other reasons for their specific interest: one part of the results will not be published elsewhere, in academic journals or books; and, depending on countries and institutions, one part of these results is (only) disseminated in languages other than English. That is to say, PhD theses can provide complementary scientometric information outside of usual systematic review methodology.

However, the scientometric potential of PhD theses and, more generally, of grey literature requires rich metadata, controlled terminology for disciplines and subjects, and standard identifiers for persons and organizations. It requires, too, metadata accessibility and reusability, and a certain degree of representativeness, if not exhaustiveness of the corpus.

From our study with a very rich and complete dataset, we can identify some limitations, on three levels:

- Metadata
  - We identified some errors (probably human errors in cataloging), for instance regarding the institutional identifiers (codes).
  - Some identifiers are missing or not standard, which makes it sometimes difficult to link the data with other information sources, to get complementary information about persons or institutions.
  - The indexing of disciplines and subjects is not based on international standards, or only partly (LCSH).
  - We also identified a language bias, as some metadata is provided in two or more languages, but may be more complete in French than in English, for instance.
- Methodology
  - We retrieved bibliographic records with the term "sustainable development" and other related concepts from the Unesco thesaurus. We hope that this approach has enabled us to identify as many relevant theses as possible but we cannot exclude that we missed some significant theses which do not use this terminology. Some retrieved theses may also be less relevant for the topic, especially those retrieved with related terms.
  - Another limitation of our study is that we did not analyze all relevant metadata. For instance, we did not analyze the thesis' title, the abstract or the specific role of each member of the thesis jury. We were limited by time and resources, but it is obvious that content analysis of titles and abstracts would have produced a more detailed insight not only into subjects but also into applied methodologies and even into results.
- Context
  - A specific problem with doctoral research is the dynamic academic environment; universities are merging and changing names, graduate schools disappear or are launched, and so on. Static metadata does not reflect such changes which makes, for instance, a longitudinal assessment a little bit complicated.

A last observation: What about the future, what can be said about actual tendencies? The ABES dataset contains only defended theses, not doctoral research in preparation. Some information about theses in preparation can be found on the national Theses.fr portal[11], based on declarative metadata (title, abstract, subject, discipline…) produced by the PhD students themselves. As of September 12, 2023, the portal announces 544 theses in progress; 14 will be defended before March 2024. It is not certain whether all other projects will be finalized. However, based on available data, we can make two observations.

The most important universities with doctoral research in progress are Paris-Saclay (= the highest ranked French university appears in the world's top 20 universities according to the Academic Ranking of World Universities 2022), Reims, Bordeaux (another Udice member, see above), Lorraine and Montpellier. Created in 2019 in direct competition with the MIT and other high-level international HEIs, Paris-Saclay is a newcomer, with 9,000 scientists and 4,800 PhD students, 230 research laboratories and 17 graduate schools. Its scientific output represents 13% of the French public research. So, it is more than likely (and not surprising)

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that this university will take the lead in doctoral research in the field of sustainable development in the coming years.

Similar to the past years, the most important scientific disciplines (ddc sub-classes) of these projects are Management and office management, Economics, Law, Geography and travel, and Social sciences, sociology, anthropology. However, all disciplines are covered as before, including information and communication sciences with research, e.g., on media and education for sustainable development (at Bordeaux), on the role and skills of local environmental associations in communication for sustainable regional development, or on the role and values in the communication processes of industrial companies faced with the risks of climate change and the challenges of sustainable development (both at Aix-Marseille).

Concluding remarks

The paper highlights the value of grey literature for the research on sustainable development, in addition to usual systematic review methodology. Our approach can be applied to other resources and document types, on condition of access to quality metadata.

Further perspectives are on two levels:

A content analysis of the title and abstract metadata, a mapping of subjects against institutions and graduate schools, and a mapping of experts. In other words, data analytics as a kind of expert system (or research information management system) based on the ABES dataset.

An exploration of other datasets, such as conference presentations, preprints, reports, Master dissertations or working papers, to identify other data sources for similar complementary scientometric studies.

Data availability

The reused initial dataset is available at the following address: *Thèses soutenues en France depuis 1985* https://www.data.gouv.fr/fr/datasets/theses-soutenues-en-france-depuis-1985/

The dataset of our sample is available on the French research data platform recherche.data.gouv https://doi.org/10.57745/M119IV

Acknowledgment

We would like to acknowledge Bénédicte Mala, Master student in information and documentation sciences at the University of Lille, for a preliminary study on French PhD theses on sustainable development in the portal Theses.fr.

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Appendix

Search terminology

The sampling strategy was based on the UNESCO Thesaurus, a "controlled and structured list of terms used in subject analysis and retrieval of documents and publications in the fields of education, culture, natural sciences, social and human sciences, communication and information"[12]. We limited the search to the French UNESCO vocabulary, as all metadata of the ABES file contain French information about the content (title, abstract…).

Preferred term

Développement durable

Entry terms

Développement écologique
Développement soutenable
Développement viable
Durabilité de l'environnement
Durabilité écologique
Écodéveloppement
Viabilité écologique

Related concepts

Autosuffisance
Bien public mondial
Chimie verte
Conservation de l'environnement
Conservation des ressources
Économie bleue
Economie verte
Ecotourisme
Education pour le développement durable
Équilibre écologique
Évaluation de l'impact sur l'environnement
Gestion de l'environnement
Ressources non renouvelables
Source énergétique non renouvelable

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[12] UNESCO Thesaurus https://vocabularies.unesco.org/browser/thesaurus/en/