

**CERIS - CIVIL ENGINEERING RESEARCH
AND INNOVATION FOR SUSTAINABILITY**

Scientific Report 2019

Programmed Research for 2020

EXECUTIVE BOARD

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**TÉCNICO
LISBOA**

DECIVIL
DEPARTAMENTO DE ENGENHARIA
CIVIL, ARQUITECTURA E GEORRECURSOS



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SUMMARY

CERIS - Civil Engineering Research and Innovation for Sustainability - is a research unit that operates in the Built and Natural Environment sector. In 2019, CERIS had 110 PhD members, 74 PhD collaborators and 191 Collaborators without PhD, and covered the following domains, with different levels of depth and breadth: Construction, Environment, Geotechnics, Hydraulics, Regional and Urban Planning, Structures, Systems and Management, Transport Systems and Water Resources.

CERIS was formally created in 2015 to integrate three research centres of Instituto Superior Técnico (IST), namely CEHIDRO, Centre of Hydraulics, Water Resources and Environment, CESUR, Centre for Urban and Regional Systems, and ICIST, Institute of Structural Engineering, Territory and Construction. CERIS is hosted by the Department of Civil Engineering, Architecture and Georresources (DECivil) of IST, Universidade de Lisboa (UL). CERIS is a unit of the National Science and Technology System registered with Fundação para a Ciência e a Tecnologia (FCT), the Portuguese research-funding agency, under the reference UID 04625.

This is the fifth report on the scientific activity of CERIS after its creation. It is the first report after the 2017 FCT evaluation, in which CERIS emerged as the only research centre in Civil Engineering classified as Excellent. This result, while a recognition of the relevance of CERIS in the international context, expresses a threat of underestimation of the role of Civil Engineering in strengthening the Portuguese economic fabric.

This report provides information relevant to map CERIS' position in the national and international contexts, addressing issues on organization and operation, particularly in what concerns the integration of scientific objectives and the promotion of internal cooperation, and contextualizing the 2019 performance indices.

To that effect, this report is organized in four main parts. The first focuses on the unit description, including an overview of CERIS and a description of its internal organization, governance structure, technical and administrative staff and supporting laboratory facilities. The second part refers to research objectives, namely the general objectives of CERIS and the specific objectives of the research groups. The third part reports and discusses the main achievements in 2019. Global figures are presented in terms of publications in ISI/Scopus journals, concluded PhD theses and research and consultancy funding. The last part describes the programmed research for 2020 of each research group.

The main points the Executive Board wishes to stress are the following:

- 1) In terms of governance and operation, the merging of centres with different cultures and practices has been demanding, as expected, but is no longer considered an obstacle to the fulfilment of CERIS' mission and objectives. The engagement of an expert in management of Science and Technology should provide the definitive boost to CERIS by articulating the installed expertise, the funding opportunities and the new avenues for promotion of CERIS products made available by social networking and specialised platforms.

- 2) In what regards the breadth and scope of the research, the activities reported by the research groups indicate the need to focus on a less disperse set of topics and actions, in line with the proposed thematic strands and work areas.
- 3) In 2019, CERIS researchers maintained their levels of national and international visibility. They participated in the organization of 37 international and 18 national events and in the scientific committees of 132 international and 41 national events. Members of CERIS have been invited to deliver 116 lectures and short courses, including 10 key-note lectures. Membership of editorial boards remained strong (153 roles), including 2 Editors-in-Chief and 13 Associate Editors in ISI-Scopus journals, as well as the participation in technical committees for drafting codes and standards (32 national and 21 international). While these numbers show that CERIS have international projection, it should be pointed out that the number of Editor in Chief and Associate Editor in high impact journals (Q1 and Q2 ISI-indexed journals) is under the ambition. Also, the number of the key-note lectures in international conferences is below CERIS potential. The number of competitive individual grants attributed to CERIS senior researchers is also low.
- 4) Publication in ISI/Scopus journals slightly increased relatively to 2018 (from 299 to 302 papers). The number of papers in Q1 and Q2 ISI-indexed journals increased (from 206 to 229 papers). In 2019 2.7 ISI or SCOPUS papers were published per CERIS member, the same as in 2018. These numbers show a consolidated improvement relatively to 2013, when 2.0 ISI/SCOPUS papers were published per CERIS member. The number of ISI-indexed Q1 and Q2 papers per researcher with PhD increased to 1.24. The number of other papers indexed in ISI or SCOPUS per researcher with PhD was decreased from 0.54 to 0.40. The ratio for publication in international conference proceedings was 1.7 per researcher with PhD.
- 5) The number of PhD theses concluded in 2019 was 33, 28 of which in IST-UL doctoral programs or in other institutions related to CERIS. The number of supervised doctoral students finishing beyond 2019 was 228, including 160 registered in IST-UL, 8 at UBI, and 5 at FCT-UN. There is a slight reduction of ongoing PhD theses relatively to 2018. However, the ratios per CERIS member (0.30 concluded theses and 2.4 supervised or co-supervised active doctoral theses in 2019) are still close to target values. The distribution of PhD students is heterogeneous in terms of scientific areas and number of students per supervisor.
- 6) The involvement of CERIS in doctoral programs has contributed to the overall trend for improvement in what concerns PhD theses and publications. It should be noticed that three PhD programmes are coordinated by IST-UL, two are in joint participation with other Portuguese universities and four under international consortia, namely through the Portugal-MIT and the IST-EPFL Lausanne Joint Doctoral Initiative. Six of these courses are FCT funded until 2021, mainly through doctoral grants.
- 7) The results summarized above are inextricably linked with research and contract funding in the recent past. Maintaining or improving the 2019 performance in the near future may be influenced by the after effects of the economic crisis, by policies on regional funding that impair the Lisbon area and by the grading CERIS has been awarded in the 2017-18 FCT evaluation of the Portuguese research units. It is expected that the FCT grading will provide leverage to CERIS in public competitions and competitive bidding.

- 8) It may be the case that the impact of the economic crisis (between 2011-2014 Portugal was under the supervision of FMI and European Union through the Portuguese Adjustment Plan) on the capacity of CERIS to secure consultancy projects still endures. Funding from contracted research attained a local minimum in 2013 with 785 k€ worth of industry contracts. Between 2014 and 2017 there was a recovery and funding stabilized around an average of 1190 k€ (with a slight dip in 2016). However, consultancy funding decreased again in 2018 and fell to an all-time low of 500 k€ in 2019. Reduction of public investment in research may still be the root cause of these low values but the possibility that the market has adapted to the crisis by lowering the net value of the consultancy work provided by CERIS should be considered. If this is the case, it is probable that the industry contracts will not return to the values prior to 2010 in the foreseeable future.
- 9) Funding from research contracts including strategic funding from FCT steadily decreased between 2013 and 2017 but remained above 1.25 M€. In 2018, the research funding increased to 2.02 M€ (the best result since 2009), which was seen as the outcome of the success of CERIS researchers in the 2017 FCT tender for projects in all scientific domains. If that was the case, the increase was related to the initial transfer of funds from FCT to CERIS project managing institutions. However, in 2019, research funding hit an all-time low - 1.21 M€. The cause for this strong reduction is not evident. It may simply express a lag in subsequent payments by FCT or some difficulties in budget execution mainly in relation with human resources, in which case a recovery is expected in the next years. However, this reduction may also be indicative of a less positive performance in securing other types of funding, namely EU-funded projects.
- 10) The 2019 incoming funds (ca. 1.71 M€) is rather unbalanced, with R&D funding about 3.4 times the consultancy funding. It is worth mentioning that this ratio has been highly variable in the last few years – research and consultancy funding have converged from 2013 to 2017, as the latter increased and the former decreased. In 2017 parity was approximately achieved. In 2018, research funding increased to about twice consultancy funding, a result that was mostly attributed to the good performance of CERIS in securing research funding. In 2019, the unbalance is the largest recorded in spite of the reduction of research funding. This circumstance should deserve the best attention from CERIS.

1. UNIT DESCRIPTION

This section presents an overview of the CERIS research unit and defines the positioning of CERIS in the National Science and Technology System. The second part of the section defines the organization of CERIS, profiles its research, technical and administrative staff and identifies the supporting laboratory facilities and the main instruments used by CERIS to promote knowledge transfer activities. The section closes with the definition of the criteria used to analyse the scientific profiles and the performance indices presented in Sections 2 and 3.

1.1 General description

Statutorily, CERIS - Civil Engineering Research and Innovation for Sustainability - is a research unit of Instituto Superior Técnico (IST), University of Lisbon (UL), hosted by the Department of Civil Engineering, Architecture and Georresources (DECivil) and integrated in IST-ID, the Association of Instituto Superior Técnico for Research and Development. IST-ID is a private non-profit institution, which primarily aims at carrying out Science and Technology activities, fostering knowledge transfer and promoting the involvement of national and foreign researchers in RD&I activities and projects in their areas of expertise.

Although CERIS was formally created in 2015, through government dispatches 7822/2015 and 12360/2015, its formation as an RD&I unit registered (number 04625) with Fundação para a Ciência e a Tecnologia (FCT), the Portuguese research-funding agency, was proposed in the framework of the 2008-2012 evaluation of the National Science and Technology System, as the merge of three centres of DECivil, namely: CEHIDRO (Centre of Hydraulics, Water Resources and Environment), CESUR (Centre for Urban and Regional Systems) and ICIST (Institute of Structural Engineering, Territory and Construction). Their integration in CERIS enhances a comprehensive thematic coverage, in depth and scope, and promotes synergies in the inherently multidisciplinary Built and Natural Environment sector, which they previously addressed in a non-integrated manner.

At the end of 2019, CERIS benefited from the expertise of 109 PhD members, 74 PhD collaborators (this distinction is explained below) and 191 non-PhD collaborators. CERIS has no parallel in the national context in what regards size and scope, and has the profile and the critical mass needed to attain a strong international presence in the sector. This key-driver for the creation of CERIS was set on a wider vision of the national research system and results from discussions initiated in 2010 on national and international prospects. It was based on the ASCE report 'The Vision for Civil Engineering in 2025' and framed by three key documents: 'Europe 2020', 'Horizon 2020' and 'Portugal 2020'.

The mission and objectives of CERIS and the policy guidelines address the needs of the sector in research and knowledge transfer. They are set under the guiding principle of basing research and innovation on PhD programs while exploiting the diversity of profiles of its members. This diversity is instrumental to promote the different forms of knowledge transfer practiced by CERIS, ranging from continuous training and skills development to direct support to public institutions and industrial and service

companies. The merging of the founding centres into CERIS is supported by new policies on membership, work organization and restructuring of their research lines into thematic strands that directly derive from national and EU directives. Their research is typically based on mathematical modelling, experimentation and fieldwork.

1.2 Organization

The organic structure of CERIS meets the recommendations set by IST and FCT. It consists of the President, the Executive Board, the Scientific Council, the External Advisory Committee and the research units, as presented in Figure 1.

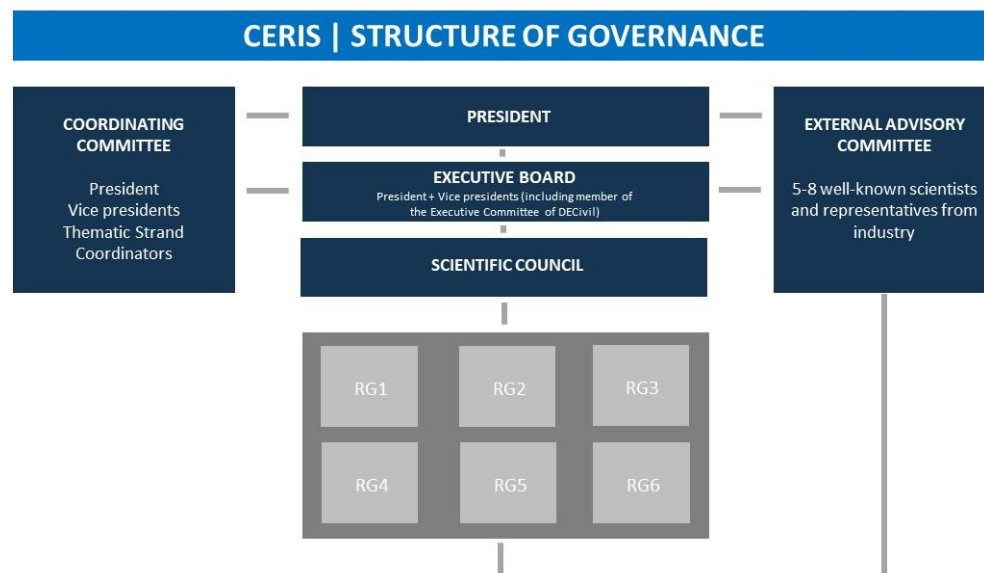


Figure 1| Structure of governance in 2019

The President of CERIS is responsible for the overall CERIS management. He/she is assisted by the Executive Board and, whenever necessary, by the Scientific Council Advisory Board. He/she chairs the Executive Board, as well as the meetings of the Scientific Council Plenary and Advisory Board.

The Executive Board assesses, assists and promotes the policies on cooperation through coordination and is composed of five members: the President of CERIS, Vice Presidents that guarantee the representativeness of all research groups and a member of the Executive Board of DECivil. In the current Executive Board (Table 2), Luís Picado Santos, RG4, (the president) is responsible for administrative, financial and project management matters, and for the definition of the strategic plan. Rui Ferreira, RG1, is in charge of scientific affairs, Filipe Moura, RG4, is responsible for the promotion of R&D initiatives and internationalization, Inês Flores-Colen, RG5, is responsible for PhD activities, image, communication and dissemination and José Oliveira Pedro, RG6, is in charge of the articulation with industry.

The Scientific Council is composed of researchers that comply with curricular selection criteria, mainly set on scientific production. Yearly, the Scientific Council approves scientific reports and plans, as well as financial reports and budgets. It may delegate competences on the Advisory and Executive Boards, but it ultimately rules all relevant matters of CERIS. The Scientific Council Advisory Board includes the members of the Executive Board and the Coordinators of Thematic Strands. Its main competence is to design and supervise the strategic program of CERIS. The thematic strands structure the scientific activity developed by the 6 research groups. Their coordinators in 2019 are identified in Tables 3 and 4.

Table 2| Executive Board

Position	Researcher
CERIS President	Luís Picado Santos
CERIS Vice Presidents	Filipe Moura
	Inês Flores-Colen
	José Oliveira Pedro
	Rui Ferreira

Table 3| Thematic Strands

Domain	Coordinator
Product Development in Civil Engineering Industries	Fernando Branco
Risk and Safety in Built and Natural Environments	João Abreu e Silva
Rehabilitation of Built and Natural Environments	João Azevedo
Response to Natural and Societal Changes	Francisco Nunes Correia

Table 4 | Research Groups

Group	Designation	Coordinator
RG1	Hydraulics	António Pinheiro
RG2	Environment and Water Resources	Maria Manuela Portela
RG3	Systems and Management	Rui Cunha Marques
RG4	Transportation Systems	Rosário Macário
RG5	Studies on Construction	António Moret Rodrigues
RG6	Structures and Geotechnics	Rita Bento

The External Advisory Committee of CERIS consists of well-known scientists and representatives from the industry with a recognized knowledge and experience of the challenges faced by institutions with similar missions and objectives. Besides advising on strategic planning and on long-term perspectives, its main competence is to periodically assess the quality and the relevance of the scientific activity of CERIS, the adequacy of its organization, the quality of the scientific environment, the level of internationalization of its activities and its performance in the transfer of knowledge and technology and dissemination. The current composition of the External Advisory Committee is defined in Table 5.

Table 5 | External Advisory Committee

Advisor	Institution
Alessandro Damiani	Former Director DG Research, European Commission Italy
Anton Schleiss	École Polytechnique Fédérale de Lausanne Switzerland
Kypros Pilakoutas	University of Sheffield UK
Michael Forde	University of Edinburgh UK
Rita Moura	Portuguese Construction Technology Platform Portugal
Werner Rothengatter	Karlsruhe Institute of Technology Germany

1.3 Research staff

According to CERIS rules and regulations, researchers are classified as *collaborators*, *members* and *integrated members*. Members are PhD researchers that meet the productivity criteria set by the Scientific Council of CERIS. Typically, collaborators are PhD students and specialists employed by firms and public services and agencies. This designation also includes PhD researchers that did not meet the productivity criteria set by the Scientific Council in each year. Integrated members are selected amongst PhD members to identify the core team of the unit, as requested by FCT in 2013.

The productivity criteria are based on the research component of the system of academic evaluation set by IST for each three-year period of evaluation, which basically values publication of papers (and the number of citations), supervision of PhD theses, coordination and participation in concluded competitive research projects and knowledge transfer. In 2015, the Scientific Council of CERIS decided to set the minimum requirement to be proportional to the grade of Excellent in the IST system of evaluation.

The current minimum requirements were increased by 30% in 2016 and again by 10% in 2017. Presently, and assuming that no other scientific activity is reported, a PhD researcher would reach the 2019 membership conditions publishing in a Quartile 1 (Q1) ISI journal an average of 1.1 single-author paper per year, or an average of 1.3 (1.6) two-(three-) author papers per year. The grading of the academic evaluation system strongly encourages publication in journals with high impact factors.

In this report, members of the Scientific Council are referred to as 'Members'. They all hold a PhD title. The terms 'PhD researchers' or the synonym 'Researchers with PhD' combines members and collaborators with PhD. PhD researchers may be permanent staff in their institutions, may be hired as researchers, for instance under DL57, or may hold post-doc scholarships.

The term 'non-PhD collaborator' includes all collaborators that do not hold a PhD. The term 'PhD students' combines PhD students registered in IST-UL (identified as CERIS-IST PhD students) with PhD students registered in other institutions (identified as External PhD Students). Note that 'PhD students' is not a subgroup of 'non-PhD collaborator'. There are PhD students that are not non-PhD collaborators; they may be collaborators in other research centres or state laboratories.

The 2019 distribution of researchers is summarized in Table 6. They include academic staff of UL and of twelve other universities and polytechnics¹, besides private companies and foundations.

Table 6 | Profile of research staff

Type	Permanent	Non-permanent		Total
		Contract	Scholarship	
Members	84	16	9	109
Collaborators with PhD	30	21	23	74
Collaborators without PhD	0	0	193	193

1.4 Administrative and technical staff

In 2019, CERIS, CERENA and CITUA shared with DECivil the support of administrative staff, namely accounting services and secretariat, and technical staff assigned to computational and experimental laboratories.

The accounting service is guaranteed by the central services of IST. CERIS has one administrative staff (Dra. Ana Soares Ramos, hired by IST) dedicated to the activities of the Directive Board and 9.5 administrative staff dedicated to RG affairs. These 10 employees (one part-time with CITUA) are hired by IST (8) and IST-ID (2). Informatics services, including assistance to the Laboratory of Computational Mechanics, are guaranteed by an external consultant (Filipe Aparício, which provides services to DECivil e CERIS). Technical staff assigned to CERIS laboratories is summarized in Table 7, amounting to 5 employees, of which 3 hired by IST, 1 by IST-ID and 1 by ADIST.

Table 7 | Laboratories and technical staff

Laboratory	Staff (no.)
Laboratory of Computational Mechanics (LMC)	1
Laboratory of Construction (LC) RG5	0,6+0,5
Laboratory of Geotechnics (LABGEO) RG6	0,4
Laboratory of Hydraulics and Environment (LHE) RG, RG2	0,5
Laboratory of Strength of Materials and Structures (LERM) RG6	2
Laboratory of Transport Infrastructures (LTI)	1

¹U. Algarve, U. Beira Interior, U. Évora, U. Nova de Lisboa, U. Madeira, U. Beira Interior, Instituto Superior de Engenharia de Lisboa, Instituto Superior de Engenharia de Coimbra, Instituto Politécnico de Setúbal, Instituto Politécnico de Leiria, U. Estadual Campinas (Brazil), University College London, University of Western Australia.

This resource pooling arrangement seems to satisfy all parties involved, DECivil, CERIS, CITUA and CERENA. However, there have been difficulties caused by the IST policy of centralizing the management of internationally funded research projects.

The major difficulty CERIS faces in the present context is the inexistence of administrative and technical staff adequately trained in management of science and technology activities. It is envisaged that this limitation may be overcome, given context of the positive evaluation CERIS in the 2017 evaluation exercise, by hiring a dedicated science manager.

Another difficulty CERIS faces, endured by its founding centres well before the merge and caused by a long-established freeze on hiring, is the inadequacy of the pool of technical staff assigned to the operation of its computational and experimental laboratories, as shown in Table 7. This staff is complemented by the DECivil Laboratories Coordinator, supported by a joint supervisor for the Structures, Construction and Geotechnics laboratories (LERM, LC and LABGEO). A good part of the day-to-day operation is supported by PhD researchers and students, well beyond training needs.

1.5 Facilities

The research methods adopted by CERIS include mathematical and numerical modelling, laboratory experimentation and *in situ* studies. CERIS is equipped with up-to-date hardware and software and the experimental facilities are adequately equipped. The main difficulties in this context are the heavy and limitative constraints on procurement, acquisition/renovation and maintenance/calibration of equipment caused by Government austerity measures.

Experimental research and PhD projects are supported by the laboratories identified in Table 7. In some cases of some researchers and for joint projects, CERIS take advantage of the experimental facilities of LNEC, Laboratório Nacional de Engenharia Civil (national laboratory of civil engineering), which is located within 3 km of IST and institutional collaboration is duly protocolled. Of course, the opposite also occurs.

1.6 Instruments for transfer of knowledge

Specialized consultancy and advanced training are the two main ways CERIS promotes knowledge transfer. CERIS members offer a large and diversified set of specialization courses through FUNDEC, the advanced training instrument of DECivil, a private partnership with the major companies operating in the Civil Engineering sector created in 1995. Consultancy is regulated in terms of conflicts of interest and unfair competition and can be directly contracted with CERIS or through FUNDEC or IST.

1.7 Analysis of the scientific activity

The analysis of the activity in 2019 presented in this report is set within the framework of the statutory objectives of CERIS and centred on the content of the research, the organization of the research and the evolution of scientific productivity indicators.

Content of the research is addressed in Section 2, where the thematic strands that structure the research activity are defined, as well as their main work areas. The areas of activity of the research groups in 2019 are also summarized to support the analysis of three key aspects in a new unit merging centres that used to operate independently: the 2019 profiles of the research groups, their organization and the existing and planned forms of internal cooperation. The identification of these aspects should sustain internal policies on membership and internal funding initiatives to promote cooperation and focusing of the research.

The information summarized in Section 3 covers a wide range of research activity indicators, namely on theses and publications, visibility and recognition of the research, and research and consultancy contracts. The analysis of the 2019 results is set on the evolution in time (since 2008 in most indicators) of the number of researchers, of the capacity to secure research and consultancy funds and of two main activity indicators, namely completed PhD theses and publication of papers in ISI/Scopus-indexed journals.

Performance of research units is usually assessed in terms of production rates per team member, which implies a clear definition of the population of the research team, namely Members and PhD researchers.

The production rates are presented in terms of Members and in some instances in terms of PhD researchers to stress the importance of the internal policies on membership. Those rates are presented in global terms and at unit level.

The same information at group level is available in Annex C. The diversity of the profiles of PhD collaborators can be high within a group and across groups, ranging from non-academic experts to young PhD researchers; therefore, the analysis at group level would imply an effort in detailing and justifications that could easily fall into individual assessment, well out of the scope of this report.

2. RESEARCH OBJECTIVES

This section defines the institutional objectives of CERIS and the thematic strands that anchor the research activity. It is also used to characterize the areas of activity of CERIS research groups in 2019, as it is essential to assess the relevance and viability of the strategic and operational objectives.

Thematic strands have been defined in sufficiently broad terms and cover priority work areas. Their relevance in content and the adequacy of internal expertise should guide the progressive realignment of the activities planned at group level through the periodic reassessment of strategic and operational objectives and of the supporting internal seeding programs.

2.1 Institutional objectives

The research objectives of CERIS are set to comply with its statutory mission: “To create and disseminate scientific knowledge and to promote innovation in the Built and Natural Environment sector through the active involvement in fundamental and applied research, at both national and international levels, and to enhance higher education and research training”. To accomplish its mission, CERIS operates under a set of objectives and organizes its activity in thematic strands selected according to national and European policy guidelines.

CERIS coordinates, under the same host institution, knowledge and skills in the Built and Natural Environment sector under the following objectives: (i) to promote quality research based on PhD programs; (ii) to transfer its expertise by providing specialized training, services and consulting; (iii) to ensure a wide dissemination of its results.

To attain its main objective, the policy of CERIS is to organize the PhD programs in the framework of national and international networks and consortia and to integrate doctoral theses in competitive research funding projects. CERIS also benefits from the direct participation of IST in international networks and programs set up to promote the mobility of students and researchers.

In what regards on-going specialized training, CERIS participates in international initiatives promoted by IST and cooperates with national professional associations. To develop mutually beneficial relationships with industrial and engineering firms, central and local administration and with governmental agencies, CERIS focuses on the formulations of public and private policies and on innovation programs that address specific needs of the sector, namely through the Portuguese Technological Platform for Construction, the Portuguese Water Partnership and the Sustainable Habitat Cluster.

CERIS values the dissemination of research results through the best-ranked journals and the best-established conferences. They have a decisive impact on recognition and visibility and, consequently, on the engagement in contracted research and the recruiting of young researchers. The partnerships mentioned above play an important role in knowledge transfer initiatives and are instrumental to enable a closer relationship with public and private institutions.

2.2 Research groups

The research groups in 2019 are numbered as shown in Table 8.

Table 8 | Research Groups

Before	Designation
RG1	Hydraulics
RG2	Environment and Water Resources
RG3	Systems and Management
RG4	Transportation Systems
RG5	Studies on Construction
RG6	Structures and Geotechnics

2.3 Thematic strands

The interdisciplinary knowledge in the field of the Built and Natural Environment addresses issues centred on the Construction Industry, namely structural rehabilitation, safety and security and innovation regarding eco-efficient materials, solutions and technologies, and encompasses subjects such as urban and regional planning and management, mobility of people and freight, environment and water resources planning, management and policy, and water services, including drinking water distribution, sewage treatment and hydraulic infrastructure. Moreover, they include dimensions that cut across several areas, such as strategic environment assessment, systems modelling and optimization, as well as decision processes, relevant public policies and governance issues.

In this context, and taking into consideration national and European policy guidelines, the following thematic strands (TS) have been established in 2013 to structure the activities of CERIS:

- TS1: Product Development in Civil Engineering Industries;
- TS2: Risk and Safety in Built and Natural Environments;
- TS3: Rehabilitation of Built and Natural Environments;
- TS4: Response to Natural and Societal Changes.

Product Development in Civil Engineering Industries embraces research activities whose main purpose is to improve the competitiveness of civil engineering industries, by developing innovative products and procedures, and by improving the efficiency of existing ones. The applied research to be conducted focuses on the development of projects with a strong emphasis on "idea to business", implying a robust involvement of industrial partners and making use of the interdisciplinary nature of CERIS. The deepening of existing collaborations with Industry is encouraged. The Portuguese

Technological Platform for Construction (PTPC), whose university-industry work groups are already developing proposals for a wealth of new projects, is an important partner in this context.

Risk and Safety in Built and Natural Environments focuses on the reduction of risk to people, the environment, and natural and built heritage that may be affected by the occurrence of extreme events, either natural, such as floods, droughts, earthquakes, wind storms, and tsunamis, or due to man's activities, such as accidental pollution, deficient structures and infrastructures, blasts and fires. Both environmental hazards and manmade hazards may have devastating effects on the built and on the natural environment, namely on natural resources. Hazard and risk assessment, as well as the development of structural and non-structural safety measures is a major societal challenge in a rapidly changing world, with people concentrating in large urban centers and with growing exploitation of limited natural resources.

Rehabilitation of Built and Natural Environments stands out as the new paradigm of the construction sector. New knowledge and skills, gathered through interdisciplinary activity, are needed to respond to current demands. The main goals include reducing risks and ensuring safety, as well as promoting more efficient life cycle management of energy and natural resources, as a means to foster both urban cohesion and the protection of natural and cultural heritage. This thematic strand seeks to mobilize activity within the CERIS research groups in the field of rehabilitation, and to promote synergies between them to carry out research at the forefront of existing knowledge.

Response to Natural and Societal Changes addresses issues related to the characterization, mitigation and adaptation to natural and societal changes, as they induce stress or even ruptures in the “business as usual” approach to the built and natural environment, especially in what concerns the relevant policies, procedures and design and operation of infrastructures for a sustainable interaction between man and nature. Climatic change is of great importance as a driver, forcing adaptation measures in virtually all areas of economic activity and social life, and aggravating all the pre-existing problems caused by social and economic changes.

2.4 Research areas

The main areas of work selected in each thematic strand are the following, as defined by their coordinators:

Product Development in Civil Engineering Industries

- (i) Development of eco-efficient, high-performance and durable cementitious materials and products, for both new construction and rehabilitation.
- (ii) Advanced composite materials and products for civil engineering applications.
- (iii) Development of components, devices and software to improve the seismic performance of civil infrastructure.
- (iv) Sensors, intelligent systems and knowledge-based management infrastructure systems, in what concerns improved safety, maintenance and management procedures.

- (v) Improvement of products and project efficiency, including procedures for life cycle analysis, procedures for conflict management and negotiation, analysis of private and public values and use of e-business and e-procurement platforms.
- (vi) Development of synergic management to sustainable tourism destination - Lidera destinations (to improve product efficiency and performance).
- (vii) Improvement of natural treatment systems, through pilot facilities, to define best procedures when facing seasonal interruptions and to determine maximum load capacity.

Risk and Safety in Built and Natural Environments

- (i) Risk assessment of natural and man-made hazards, mainly to support of decision making on the allocation of budgets for safety improvement works.
- (ii) Engineering expertise for improving safety of people and the environment, namely the development of solutions and techniques for improving construction robustness and resilience, as well as for the structural protection, strengthening and rehabilitation.
- (iii) Prevention, preparedness and management of risk considering natural hazards and climate change scenarios, in what concerns non-structural measures related with management, elaboration of risk prevention, preparedness plans and operational and management procedures.

Rehabilitation of Built and Natural Environments

- (i) Enhancement of the spatial functionality, energy efficiency and structural performance of civil infrastructures, including the improvement of seismic and fire resistance.
- (ii) Study of deterioration processes and development of advanced inspection and monitoring techniques aiming at enhancing both durability and safety of civil infrastructures.
- (iii) Development of urban management models to establish financing systems of urban rehabilitation and public investments, and flexibility and efficiency of the existing transport network infrastructure and management.
- (iv) Rehabilitation of natural and transformed water bodies, namely rivers, lakes, reservoirs and aquifers, and improvement of the flexibility and efficiency of the existing water infrastructure and management systems, mainly in what concerns water supply and wastewater services.

Response to Natural and Societal Changes

- (i) Understanding the complexity of natural and societal changes, mainly in what regards adaptation and resilience, competition and mitigation, path dependence, emergence, self-organization and metabolic mechanisms.
- (ii) Improving governance, seeking better integration of policies, new flexible planning and management tools, searching for new methods, tools and devices for efficiency, economy and equity, concerning energy, resources and the used materials.
- (iii) Enhancing the tools to respond adaptively to natural and societal changes, in what concerns information and communication technologies, computation and network systems, providing the platform for designing more intelligent and interconnected tools, and smarter buildings, infrastructures and services.

The main areas of work selected in each thematic strand reflect the number of research groups involved in core and complementary topics, as shown in Table 9. This information is complemented in the next section with data on existing and expected forms of cooperation at group level.

Table 9 | Groups participating in thematic strands

Thematic strand	RG1	RG2	RG3	RG4	RG5	RG6
Product Development	✓		✓	✓	✓	✓
Risk and Safety	✓	✓	✓	✓		✓
Rehabilitation	✓	✓	✓	✓	✓	✓
Response to Changes	✓	✓	✓	✓		

2.5 Activity of research groups

The following description describes, for each research group, its main areas of research and relative topics addressed in 2019, as defined by their coordinators. A description of the main achievements of each RG can be consulted in Annex C.

RG1| Hydraulics

7 Members | 11 PhD collaborators | 42 non-PhD collaborators

The activity of RG1 in 2019 was organized in the following major topics:

a) Pressurized water systems

Methodologies and software tools for the assessment and enhancement of water-use and energy efficiency in water supply systems (PD); Development of reliability analyses and risk management tools for different types of water and wastewater infrastructures (RS); Safety and risk analyses and establishment of design criteria in pressurized pipe systems based on the development of advanced 1D/2D transient solvers, CFD modelling of pressurized flows and data collection in experimental facilities and real-life systems, fluid structure interaction (RS).

b) Fluvial hydraulic structures

Development of mitigation strategies and pre-cast shelters for fish downstream of powerhouses with hydropeaking operation (RS); Numerical and experimental modelling of different flood release and related hydraulic structures (RS; RNBE); Study of the hydraulics of PKW weirs combined with spillways (RS, RNBE); Study of the pressure field and slab stability in a pollution lined with concrete slabs (RS).

c) River restoration and management

Monitoring tools, based on physically-based computational models, for water and sediment quality in rivers and estuaries (RNBE); Risk management in the valleys downstream of dams

(RS; RNSC); Environmental flows determination procedures and hydropower station operation rules to reduce ecological risk downstream of dams (RS, RNBE); River restoration and development of fish passes for low height river obstacles to improve ecological connection along regulated rivers (PD; RNBE; RNSC).

d) Environmental fluid mechanics

Laboratorial investigation of rough-wall open-channel turbulence (RNBE); CFD simulation of solid-fluid interactions in turbulent flows (RNBE); Laboratory investigation and mathematical simulation of transport of dissolved substances (RS, RNBE); Heat and mass transport in wetlands (RNBE).

e) Sediment transport and river morphodynamics

Hydrodynamics of river confluences in equilibrium (RS; RNBE); Hydrodynamics of river diversions in equilibrium (RS; RNBE); Sedimentation in shallow retention reservoirs: experimental study; Mathematical modelling of shallow-flows with mobile beds. Application to long term channel morphology evolution, dam-breaching, dam-break flows and overland tsunami propagation (RS); Mathematical simulation (Eulerian and Lagrangian) of transport processes (RS); Development of stabilization techniques for rivers meanders in equilibrium (RNBE).

f) Ocean waves, coastal morphodynamics and coastal and port structures

Studying extreme events like freak waves, near the coast, to improve navigation safety and support the offshore wind energy production industry (moored or floating) (RS; RNBE); Assessment of the vulnerability to flooding of the built environments on low-lying areas of estuaries, due to extreme ocean storm surges events and climate action (RNBE; RNSC); Life-cycle cost analysis of coastal and port structures (RNBE); Modular port facilities in rivers for bulk cargo; Morphological modelling of beach morphology in the presence of coastal structures. (RS). Turbulent transport processes in rivers and estuaries: experimental research on interaction between transported quantities (sediment, pollutants, nutrients, etc.) and turbulence (RS; RNBE). Air entrainment in wave breaking - laboratory experiments, infra-gravity waves – generation mechanisms and practical applications.

RG2 | Environment and Water Resources

11 PhD members | 2 PhD collaborators | 24 non-PhD collaborators

The activity of RG2 is focused on the following topics:

- Hydrology and water resources, including trend detection in hydrologic time series and modelling; drought analysis, and flood analysis, including joint probability cumulative distribution functions, empirical copulas and non-stationary models; development of rainfall-runoff models; artificial intelligence techniques applied to hydrologic modelling including artificial neuronal network; development of daily runoff modelling in very large watersheds based on satellite data;

development of regionalized impact scenarios for the water sector and climate change impact assessments; and risk assessment study on flash floods and debris

- Water services, covering water supply, sanitation and water pollution control, the following themes were included: dynamic simulation of the hydraulics and environmental performance of wastewater systems; wastewater transformations along sewer lines (in-sewer processes), with emphasis on improving the current knowledge on the influence of turbulence (drop falls) and ventilation on the release of hydrogen sulphide gas through laboratory and field experimentation; research on organic and microbiological processes in constructed wetlands WWTP.
- Water policy formulation and governance, including extensive work in the establishment of principles for good water governance and its application under different circumstances, namely in Portugal, Brazil, and Cabo Verde. The definition of indices for assessing water governance is pursuing with review and analysis of previous attempts reported in the literature
- Environmental issues, including the themes of assessment and analysis of climate change impacts on natural and man-made water resource systems, sustainable governance, and the environmental management applied to sustainable construction
- Hydrogeology and groundwater services, including: groundwater pollution and risk assessment; groundwater and ecosystems; aquifer recharge and discharge; water and climate change; decision support systems for water catchment management and development of effective methods for risk-based environmental decision-making.

RG3 | Systems and Management

11 PhD members | 10 PhD collaborators | 31 non-PhD collaborators

RG3 has relevant results in specific topics as:

- 1) Regulatory and contracting policies, pricing and performance assessment, including: Efficiency and productivity of public services and infrastructure; Regulatory governance and substance; Tariffs and pricing of public utilities and transportation; Economics of water and waste services; Governance models in local government
- 2) Decision-making and systems design, operations and management and project management, including: Decision aiding and MCDA methods; Logistics and supply chain management; Systems modelling and optimization; Procurement models of PPPs; Infrastructure contract management; Risk assessment and management.
- 3) Information modelling and technologies, including: Ground deformation measure with advanced SAR interferometric methods; 3D city information models and its application; Spatial analysis problems; Building information modelling and systems interoperability; Construction innovation and information management; E-business and e-procurement in construction.



RG4 | Transportation Systems

13 PhD members | 7 PhD collaborators | 39 non-PhD collaborators

RG4 research focused on the following three main topics:

- a. Road, Airport and Rail Infrastructure Systems, including methodologies and models to predict degradation and improve maintenance, renewal and investment decisions within the different transport infrastructure systems and across them (integrated asset management) and Retrofitting transport systems: changing and adapting “old to like-new” transport systems to meet new performance standards while extending the existing ones
- b. Transport Systems Planning and Operations, including transport systems and policies for an ageing society
- c. Strategy and Policy in Transport Systems, including new types of integration of public and private transportation modes and services (among each type and across the types) as vehicle-sharing systems including the modelling and testing of demand response transportation, multi-modal systems, shared-taxis, car-sharing, bike-sharing and freight services supported by new types of business models and by the development of appropriate ITS tools

RG5 | Studies on Construction

32 PhD members | 21 PhD collaborators | 41 non-PhD collaborators

RG5 developed research projects in the following domains:

- a) Innovative applications of materials such as GFRP, CFRP and GRC: breakthroughs in concrete and mortars technology were experimentally validated; mortars and concrete formulations with nanomaterials were performed; studies on energy efficiency of different materials, building components and construction systems such as active and glazing facades, shading devices and green roofs and walls were conducted; risk informed quality, safety and environmental management in construction related research was included in various national and international actions, including normative work;
- b) New theories on sustainability and construction: the use of traditional techniques and materials (earth, wood, stone, brick), implementation of selective demolition and recycling maximization (namely recycled aggregates in concrete and mortars production), and strategies of passive design and acclimatization;
- c) Life-cycle management systems (inspection, diagnosis, maintenance and rehabilitation); conservation of historical building heritage (within various European research projects); other projects included sensors in structures, technological innovation and assessment of complex structures; The summary of the main achievements are indicated in the above table;
- d) Seismic rehabilitation of masonry buildings; experimental and numerical analysis of timber-framed masonry walls subjected to monotonic and cyclic loading; reinforcement of timber-framed masonry walls with elastoplastic dampers, reinforced render or steel plates. Experimental and numerical analysis of ordinary masonry walls subjected to in-plane and out-of-

plane loading. Seismic reinforcement of ordinary masonry walls with carbon fibre reinforced render or with transverse hinge connectors.

RG6 | Structures and Geotechnics

34 PhD members | 23 PhD collaborators | 14 non-PhD collaborators

The research activity of RG6 for 2019 was planned to focus on six major research areas:

1) Mechanics, Modelling and Analysis of Structures;

Dynamic instabilities and algorithms for the numerical analysis of the mechanical behaviour of non-smooth structures with frictional or elastoplastic components; Modelling of moving loads on beams on nonlinear foundations.

2) Earthquake Engineering and Seismology;

History of construction and structural behaviour and construction techniques of traditional masonry tile vaults; Assessment of existing structures (e.g. dynamic characterization, seismic vulnerability and seismic risk assessment); Update and improve a model for quick evaluation of the potential seismic performance of masonry and reinforced concrete buildings based on its application to existing buildings; Structural rehabilitation (e.g. seismic strengthening techniques, passive protection); Development of tools to improve preparedness and community resilience, aiming to reduce the seismic risk through non-structural elements (Dissemination of a Practical Guide, a Short Guide for Students, a Portfolio of Solution and a Earthquake Awareness Campaign “Move, Protect and Secure” - the campaign is composed by a main short length film, accompanied by four teaser-spots); Seismic design of new masonry constructions.

3) Structural Concrete;

Advanced cementitious materials; (High-performance ordinary and prestress reinforcement; Enhanced durability; Sustainable and eco-efficient solutions; Modelling and design models (e.g. stress-fields models, FEM-based software with embedded strong discontinuities, concrete reinforced with embedded fibres); Assessment of existing structures (e.g. reliability, structural robustness, monitoring, seismic vulnerability); Structural rehabilitation (e.g. repairing and strengthening techniques, seismic strengthening, passive protection); Prefabrication and innovation.

4) Steel and Composite Structures;

GBT formulations to perform buckling, post-buckling and vibration analyses of isolated members and structural systems (e.g. continuous beams or simple frames) prone to local, distortional and global deformations; In-depth investigations on the non-linear behaviour, ultimate strength and design of cold-formed steel open-section and tubular members experiencing coupling phenomena involving local and/or distortional buckling; Novel rational approaches for the design of cold-formed and hot-rolled steel angle columns; Development and implementation of (iv₁)



a displacement-based finite element for the linear analysis of curved members (circular axis), (iv₂) a finite element formulation for the bifurcation analysis of composite steel-concrete beams; In-depth investigations on steel sub-assemblages with bolted and welded dissipative fuses; Proposal of design rules for composite structural members and parts; Applications to steel and composite bridges.

5) Bridge Design

Buckling resistance of steel plated girders considering M-V interaction with high compression forces (application to cable-stayed bridges); Curved steel plates on bridge deck beams: Post buckling behaviour and ultimate strength; The use of high strength steels in bridge deck; Fatigue assessment of composite steel-concrete cable-stayed bridge decks; Higher order beam theory (developments and applications to steel structures and bridges analysis); Analysis of the distortion effect on the dynamic behaviour of high-speed railway bridges; Analysis of substructures of offshore wind turbines.

6) Geotechnics.

Dynamic characterization of soils from small to large strains, including liquefaction; Studies on the elastic response measured in resonant column and using bender elements; Characterization of the chemo-hydro-mechanical behaviour of clayey and treated soils considering their structure and degree of saturation; Characterization of soils treated with jet grouting and bacteria; Numerical analysis of geotechnical structures involving strong soil structure interaction (e.g tunnels, retaining structures, piles and thermoactive structures); Studies on soils decontamination techniques (e.g. electro osmosis).

3. MAIN ACHIEVEMENTS

Because research in CERIS is statutorily based on doctoral training, this section opens with the identification of the doctoral programs staffed by members of CERIS in 2019. The second part of this section summarizes the 2019 activity indicators and the third part describes the time evolution of the main indicators. Section 3 closes with the summary of the 2019 research group results.

3.1 Doctoral programs

Besides five Master courses promoted by IST, CERIS researchers are presently engaged in PhD courses leading to eight Doctoral degrees. Students and their supervisors can either select structured, thematic PhD programs or select a combination of PhD-level subjects offered by IST or any other school of UL, or by other universities under protocolled agreements.

The doctoral degrees and the structured PhD programs CERIS is engaged with are listed in Table 10, which includes information on coordination and funding, mostly allocated to doctoral grants. Four PhD programs are offered under international protocols and three under national consortia. One PhD program is IST-interdepartmental and another is jointly promoted by schools of UL.

Table 10 | Participation in doctoral programs

Doctoral degree	Structured PhD programs	Observations
Civil Engineering(F. Branco) ⁽¹⁾	Eco-Construction and Rehabilitation (Coordinator: J. de Brito) ^(1,2)	Consortium of 5 universities and LNEC
	Analysis and Mitigation of Risks in Infrastructures (R. Bento) ^(1,2)	Consortium of 4 universities and LNEC
	Environmental Hydraulics and Hydrology (A.H. Cardoso) ^(1,2)	IST-EPFL initiative and LNEC
Climate Change and Sustainable Development Policies (J.S. Matos) ⁽¹⁾	Climate Change and Sustainable Development Policies ^(1,2)	Consortium of 3 universities (involving 7 schools)
Earth-Resources		
Environment Engineering		Involves 4 IST departments
River Restoration and Management (A. Pinheiro) ⁽¹⁾	River Restoration and Management ⁽³⁾	Involves 4 UL schools
Transportation Systems (L.P. Santos) ⁽¹⁾	Transportation Systems ^(1,2)	Portugal-MIT initiative

⁽¹⁾Coordinated by CERIS members; ⁽²⁾Funding until 2021; ⁽³⁾Funding until 2020.

CERIS also participates in a structured PhD program on Computational Engineering, originally funded through the Portugal-U. Texas (Austin) initiative. It is not listed in Table 10 because the participation of CERIS is marginal.

3.2 Activity indicators

The main scientific outputs of CERIS in 2019 are presented in Table 11. They include:

- (i) 33 concluded PhD theses (26, 2, and 1, respectively developed by CERIS-IST PhD students registered in IST, FCT-UNL and UBI) and 226 in progress beyond 2019;
- (ii) 173 concluded MSc theses;
- (iii) 8 authored books, 8 edited books and 27 book chapters;
- (iv) 302 papers published in journals included in ISI Web of Knowledge or Scopus databases, plus 28 papers in international and national peer-reviewed journals (non-ISI, non-SCOPUS);
- (v) 311 papers published in international conference proceedings;
- (vi) 70 papers published in national conference proceedings.

The list of PhD theses published in 2019 can be seen in Annex A. The list of papers published in 2019 can be seen in Annex B.

Table 11 | 2019 activity indicators: theses and publications

ACTIVITIES			RG1	RG2	RG3	RG4	RG5	RG6	CERIS
MSc Theses concluded in 2019									173*
PhD Theses		Concluded	7	5	3	3	8	10	33
		To be concluded after 2019	30	26	29	45	69	32	228
Publications	Papers in peer-reviewed journals	International peer-reviewed journals (WoS AND Scopus)	30	23	21	14	104	64	264
		Peer-reviewed journals (non ISI OR non Scopus)	3	2	3	7	17	4	38
		Peer-reviewed journals (non ISI AND non Scopus)	2	0	6	3	10	8	28
	Papers in proceedings	International	32	57	28	40	96	59	311
		National	7	4	1	21	6	31	70
	Books	Entire	0	0	1	1	5	1	8
		Chapters	0	2	7	8	7	9	27
		As editor	1	1	1	2	1	2	8
	Reports	Scientific	1	0	0	1	35	2	39
		Consultancy/others	5	9	3	4	53	6	80

* Not including theses concluded outside IST.

The number of papers published in international ISI or SCOPUS indexed journals (302) is now 97% of the number of papers published in proceedings of international conferences (311). Some years back, this relation was of the order of 1 (journal paper) -to-4 (conference papers). The change is due to the emphasis placed on the publication in international journals. The evolution of the number of papers is discussed below in section 3.5.

The indicators frequently used to assess national and international visibility are summarized in Table 12, namely:

- (i) Editor in Chief of ISI or SCOPUS indexed journals (2);
- (ii) Associate Editor of ISI or SCOPUS indexed journals (13);
- (iii) Membership of editorial boards of ISI or SCOPUS indexed journals, including Guest or Issue Editor (76);
- (iv) Participation in organizing committees of international conferences (132);
- (v) Participation in organizing committees of national conferences (41).

Other indicators that reflect the visibility and recognition of the scientific activity of CERIS members are:

- (i) 10 key-note lectures in international conferences;
- (ii) 12 recognition awards (national and international);
- (iii) Refereeing for 4 international and 4 national funding agencies.

These numbers show that CERIS members and collaborators have international projection. However, it should be pointed out that the number of Editor in Chief and Associate Editor in high impact journals (Q1 and Q2 ISI-indexed journals) is relatively low. Also, the number of the key-note lectures in international conferences is below CERIS potential. The number of competitive individual grants attributed to CERIS researchers with PhD is also relatively low.

Table 12| 2019 activity indicators: visibility and recognition of the research

ACTIVITIES			RG1	RG2	RG3	RG4	RG5	RG6	TOTAL
Collecti-ve guidan-ce scienti-fic work	Editor-in-Chief	WoS/Scopus-indexed Journals	0	0	0	1	1	0	2
		Other journals	0	0	1	0	0	1	2
	Associate Editor	WoS/Scopus-indexed Journals	3	0	2	1	4	3	13
		Other journals	1	1	0	0	0	1	3
	Issue Editor/Guest editor/Membership Editorial Boards	WoS/Scopus-indexed Journals	6	4	7	12	18	29	76
		Other journals	1	5	1	4	27	19	57
	Membership in Scientific Committees	International	15	16	17	16	52	16	132
		National	2	0	2	3	17	17	41
	Drafting of codes, Recommendations	International	0	1	0	0	8	12	21
		National	1	2	0	0	17	12	32
Organisation of scientific events		International	14	0	4	3	7	9	37
		National	1	1	1	3	1	11	18
Awards		International	0	0	0	0	4	1	5
		National	0	0	0	1	2	4	7
Refereeing for funding agencies		International	0	0	0	2	1	1	4
		National	0	1	0	2	13	4	20

Invited lectures	Key note lectures in international conferences	0	1	0	1	8	0	10
	Other	12	11	22	13	25	23	106

The information presented in Table 13 summarizes the 2019 initiatives to obtain funding through competitive research and consultancy. As shown below in Figure 8, in 2019 the budget secured through competitive research projects (close to 1.21 M€) was nearly 3.4times the budget secured through consultancy (approximately to 0.50 M€). While funding secured through specialized consultancy and industry-funded projects has slightly increased in 2017, it fell again in 2018 and in 2019, the latter being and all-time low. The large number of consultancy projects (80 finalized in 2019) is not indicative of a consolidated recovery in industry funding but rather of the small dimension of the average CERIS consultancy project. It may also be the case that the market has adapted to the crisis by lowering the net value of the consultancy work provided by CERIS.

Table 13| 2019 activity indicators: research and consultancy contracts

ACTIVITIES			RG1	RG2	RG3	RG4	RG5	RG6	TOTAL
Competitive research projects	International research grants	Started in 2019	0	3	3	0	4	1	10
		Active in 2019	1	9	8	1	10	5	32
	National research grants	Started in 2019	1	0	0	0	5	1	7
		Active in 2019	11	3	4	6	29	16	65
Competitive individual research grants (PhD, Post-doc, sabbatical, etc)		Started in 2019	2	0	0	1	1	3	7
		Active in 2019	2	0	0	1	1	3	7
Consultancy projects finalized in 2019			5	9	3	4	53	6	80

The indicators presented in Table 14 (Other initiatives) justify the following clarifications: a) Models typically are laboratory test-rigs; b) The software applications listed are limited to those accessible in the internet for public use; c) Registration as a national patent must be ensured before submission to international registration in the annual, internal calls promoted by IST.

Table 14 | 2019 activity indicators: other initiatives

ACTIVITIES		RG1	RG2	RG3	RG4	RG5	RG6	TOTAL
Models		1	1	0	0	0	0	2
Software applications		1	0	0	0	0	3	4
Pilot plants		0	0	0	0	0	0	0
Prototypes		0	0	0	1	0	0	1
Patents	International	0	0	0	0	0	0	0
	National	0	0	0	0	1	0	1

Carrying out dissemination and outreach is becoming an imperative to promote CERIS visibility and to expand the field of opportunities to apply CERIS members' expertise. These initiatives are expected to

impact positively on the capacity of CERIS researchers to form fruitful partnerships and to attract high quality PhD students. The number of outreach and dissemination initiatives is listed in Table 15.

Table 15 | 2019 Dissemination to a broad audience and Outreach

ACTIVITIES	RG1	RG2	RG3	RG4	RG5	RG6	TOTAL
Other actions (e.g. scientific dissemination to a broad audience, social media)	5	3	7	3	2	7	27

The databases from which the information in Tables 11 to 15 will be embedded in the CERIS website.

3.3 Evolution in the number of researchers

The evolution in the number of Members and PhD researchers is presented in Figure 2 and Figure 3, respectively. The increase in 2015 mainly reflects the integration in ICIST of academic staff of U. Nova de Lisboa, and the internal reclassification of PhD members and collaborators. The number of PhD researchers remained stable afterwards. However, an increase in the internal numerical criterion for selection of members in 2017 offset the increase of members that occurred in 2016. In 2018 there was a slight decrease of both, mostly because of the departure of the former RG to form a new Architecture and Urban Planning research Centre. The number of Members remained stable in 2019 while the number of PhD members and collaborators increased from 173 to 184.

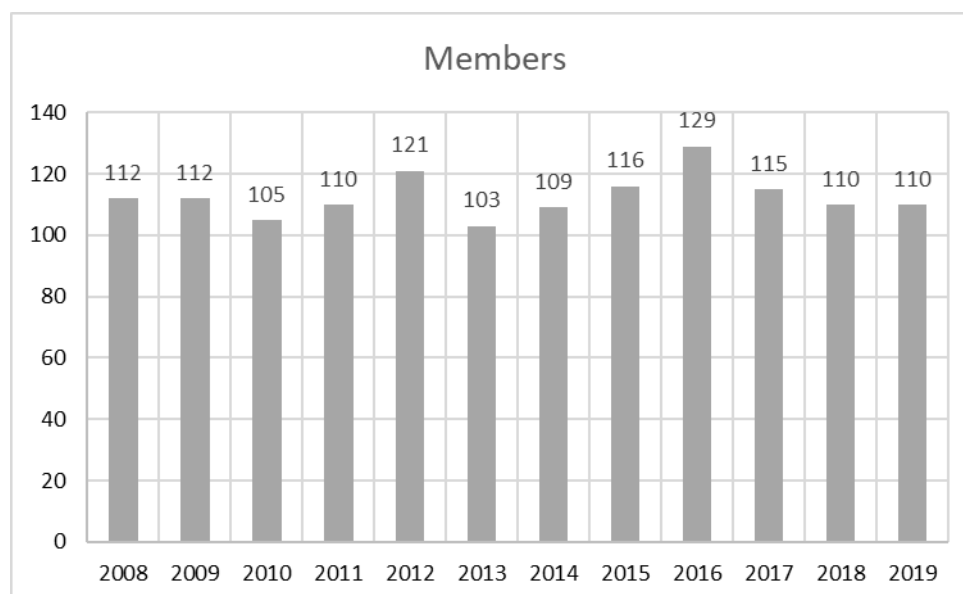


Figure 2 | Evolution of Members

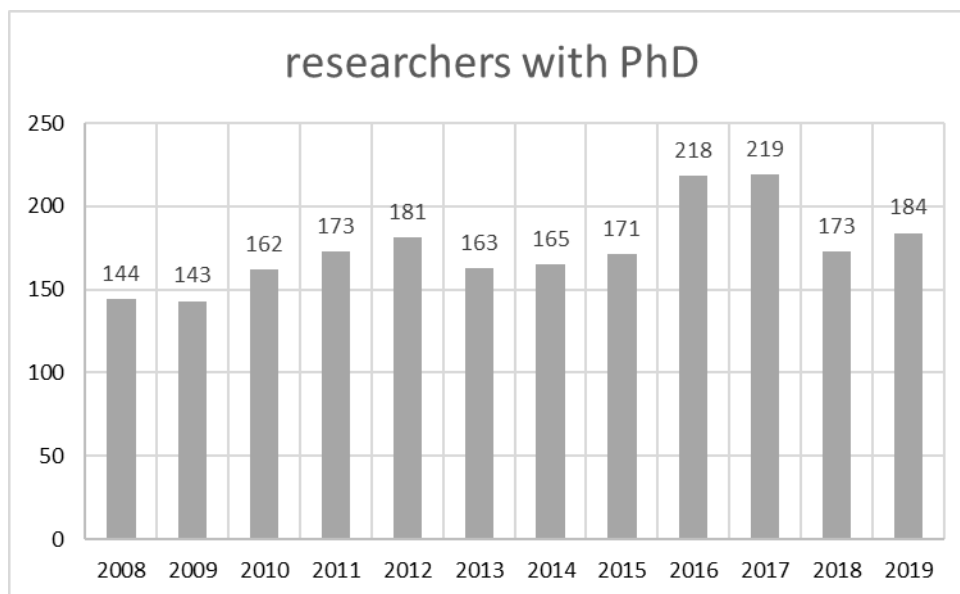


Figure 3 | Evolution of PhD researchers (Members and PhD collaborators)

The evolution of the number of researchers - combining Members, PhD collaborators and non-PhD researchers (PhD students and scholarships) - is presented in Figure 4. The overall increase in the 2008-2011 period is mainly due to the expansion of the national program for doctoral grants. The ensuing economic crisis justifies the subsequent stabilization. However, from 2015 to 2017 a quite significant increase occurred, which is explained by three main reasons: (i) the fulfilment of the last calls of the various FCT funded doctoral programmes, most of which led by CERIS; (ii) an increase of international PhD students, namely from Brazil; (iii) a more exact collection of the data concerning PhD supervision by CERIS researchers, namely of external students.

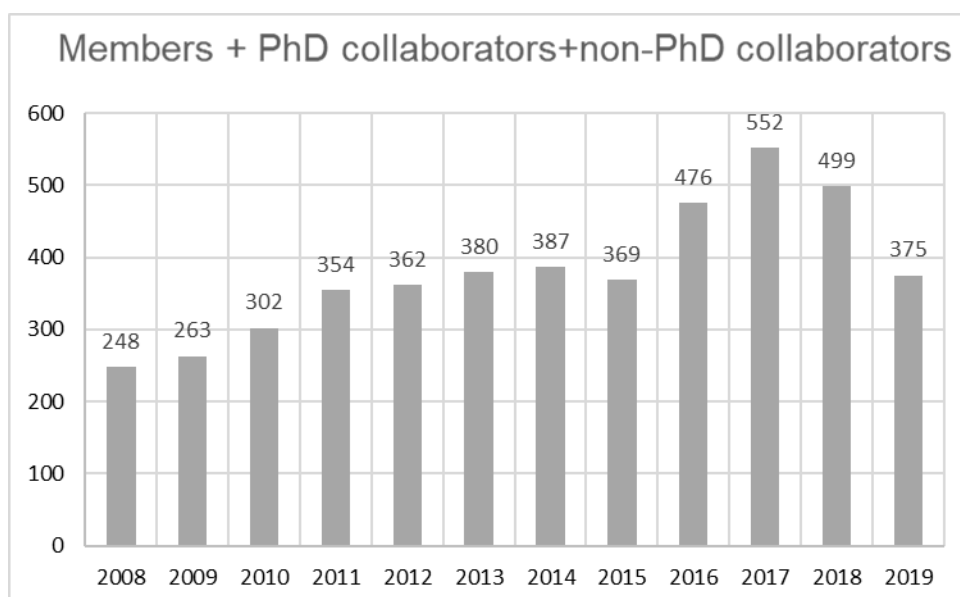


Figure 4 | Evolution of the Members and PhD collaborators and non-PhD collaborators

In 2018 the observed decrease of non-PhD collaborators is mostly explained by the departure of the RG group of Architecture and Urban Planning. In 2019 there was a sharper decrease of the number of non-PhD collaborators. This may be associated to the ending of some FCT funded PhD programs.

3.4 Evolution of research and consultancy funding

The aspects of the national economic scenario that are relevant in the present context are the following:

- (i) Austerity policies started to be implemented in 2010-2011 and induced an economic recession in 2013-2014 followed by a weak recovery after 2015;
- (ii) Public investment in RD&I, which had peaked in 2009, steadily decreased afterwards;
- (iii) Local and regional authorities and public agencies also suffered budget cuts in the same period;
- (iv) From 2007-2008 onwards, the largest contractors in the Civil Engineering sector invested in the internationalization of their activity, as the national infrastructure approached completion;
- (v) The economic crisis virtually paralyzed the Construction sector throughout this period, with a recent recovery based on the rehabilitation sector.

In the 2008-2012 evaluation period, the structure of the combined budget of the founding centres averaged 48% secured through research funding and 52% secured through consultancy funding. The latter form of funding combines all knowledge transfer activities, namely specialized consultancy and advanced on-going training. The decomposition of research funding was as follows: 21% allocated to the strategic program, the centre core funding yearly allocated by FCT; 52% secured through national competitions for research projects and research training programs (mostly promoted by FCT) and 27% through international competitions (mostly EU programs).

Figure 5 shows the evolution of total funding between 2013 and 2019. The local maxima of year 2014 was associated to strong results in the last FP7 calls for research projects in 2013 and 2014 but also by an increase in industry contracts in 2014. These results can be seen in Figure 6 and in Figure 7. Funding steadily decreased until 2017 mostly influenced by a reduction of the value of R&D projects.

In 2018 there was a recovery of the R&D funding, influenced by the success CERIS researcher in funding their research through FCT funded national projects. Consultancy, however, remained at low values, if compared with pre-2013 standards. Consultancy funding decreased again in 2019, falling to an all-time low of 500 k€ in 2019 (Figure 5 and Figure 7). Reduction of public investment in research may still be the root cause of these low values but the possibility that the market has adapted to the crisis by lowering the net value of the consultancy work provided by CERIS should be considered. If this is the case, it then is probable that the industry contracts will not return to the values prior to 2010 in the foreseeable future.

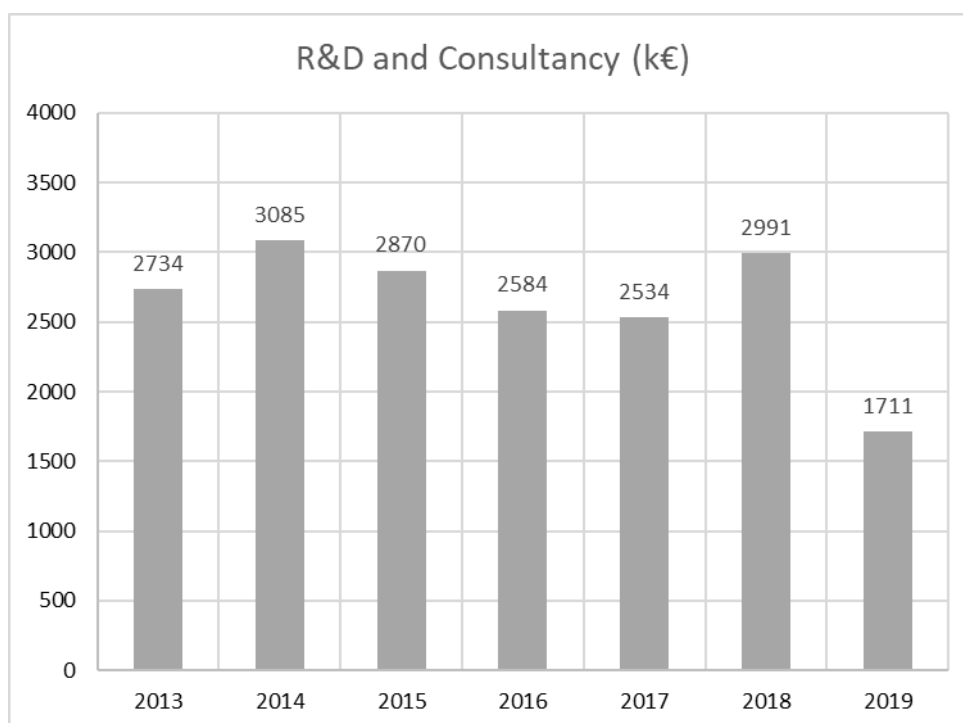


Figure 5 | Total annual CERIS funding (research and consultancy)

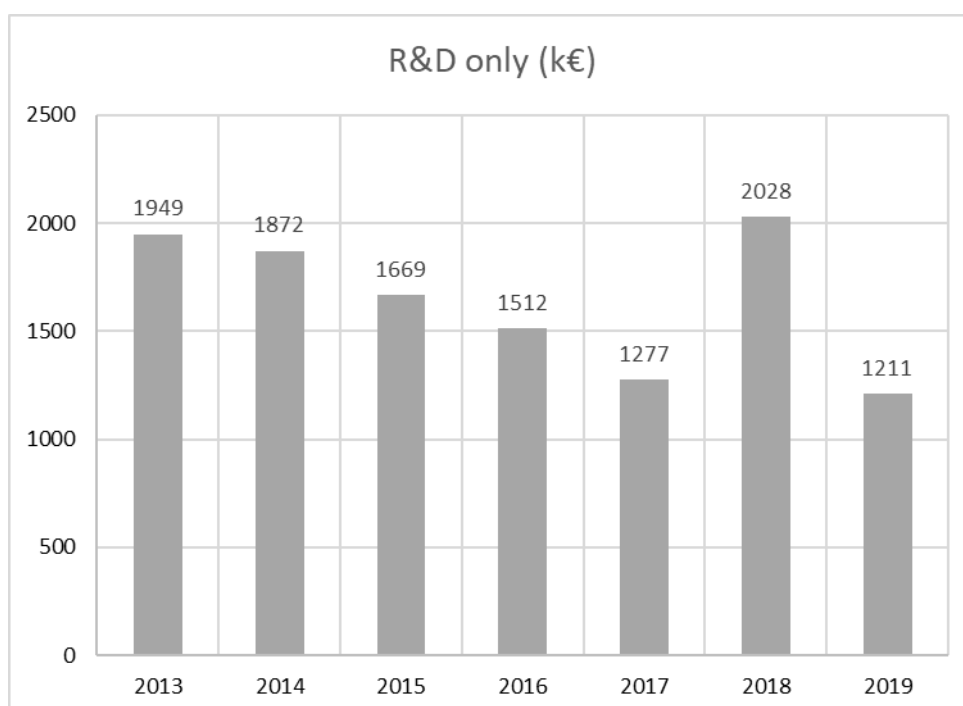


Figure 6 | R&D annual CERIS funding

While funding from R&D contracts steadily decreased between 2013 and 2017, it remained above 1.25 M€. In 2018, the research funding increased to 2.02 M€ (the best result since 2009), which was seen as

the outcome of the success of CERIS researchers in the 2017 FCT call for projects in all scientific domains. If that was the case, the increase was related to the initial transfer of funds from FCT to CERIS project managing institutions. However, in 2019, research funding hit an all-time low - 1.21 M€ (Figure 6). The cause for this strong reduction is not evident. It may simply express a lag in subsequent payments by FCT, which case a recovery is expected in the next years. However, this reduction may also be indicative of a less positive performance in securing other types of funding, namely EU-funded projects.

The imbalance between research and consultancy funding in 2018 was high: 69% of the budget was sourced through research funding and 31% through consultancy funding, that is the latter was about 45% of the former (see Figure 8 and Figure 9), as high as in 2013. Yet, the 2019 budget (ca. 1.71 M€) has deepened this trend, with R&D funding about 3.4 times the consultancy funding. It is worth mentioning that this ratio has been highly variable in the last few years – research and consultancy funding have converged from 2013 to 2017, as the latter increased and the former decreased. In 2017 parity was approximately achieved. In 2018, research funding increased to about twice consultancy funding, a result that was mostly attributed to the good performance of CERIS in securing research funding. In 2019, the unbalance is the largest recorded in spite of the reduction of research funding.

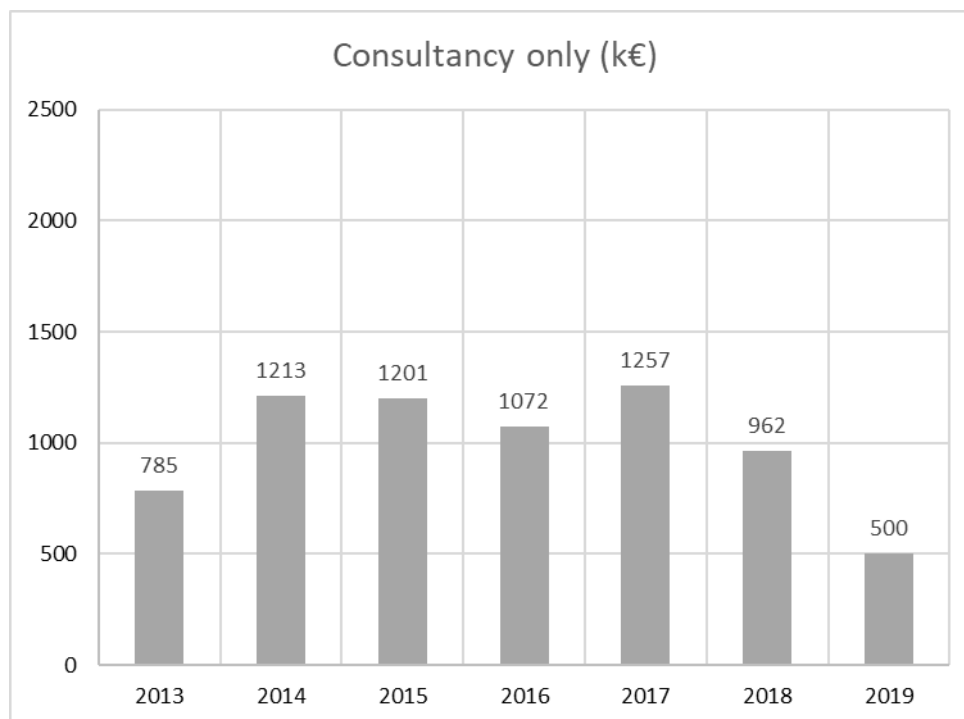


Figure 7 | Consultancy annual CERIS funding

The break out of funding in research and in consultancy shown in Figure 8 reflects the austerity measures taken throughout the 2010-2014 period. The results in 2014-2017 combine two effects: a

stagnation of the economy (with an oscillation in 2015), the research funding losses caused by the last evaluation of CERIS and by the P2020 calls limitations for entities from the Lisbon region, and also by the irregularity of the disclosure of the results of applications to FCT funded projects. It should be noticed that R&D funds due to EU-funded projects has not increased (not shown in graphics).

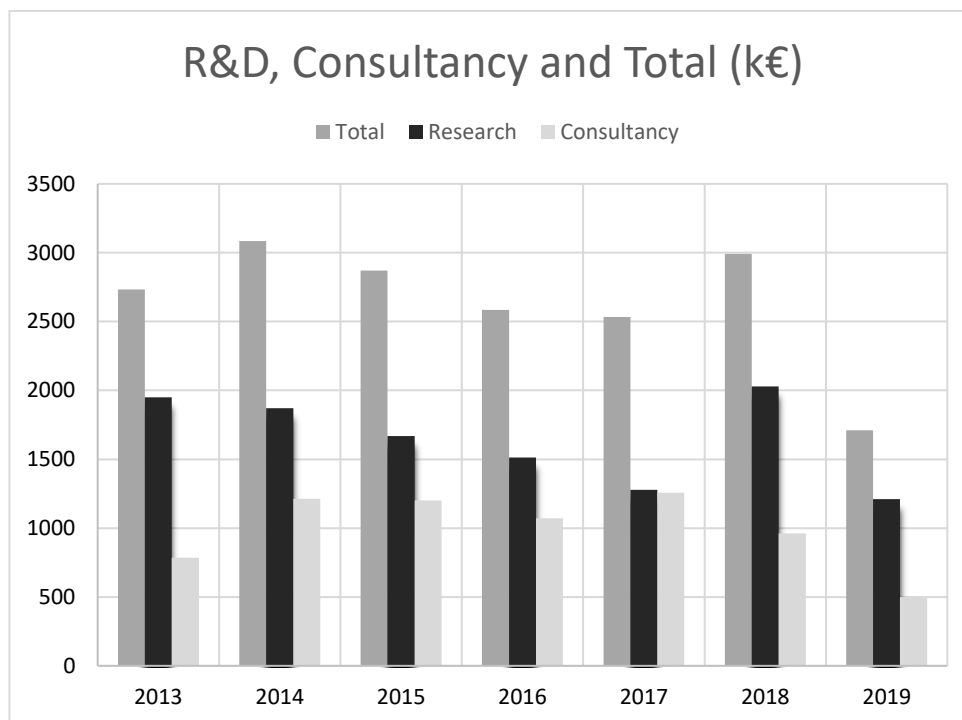


Figure 8 | Annual funding in research and in consultancy

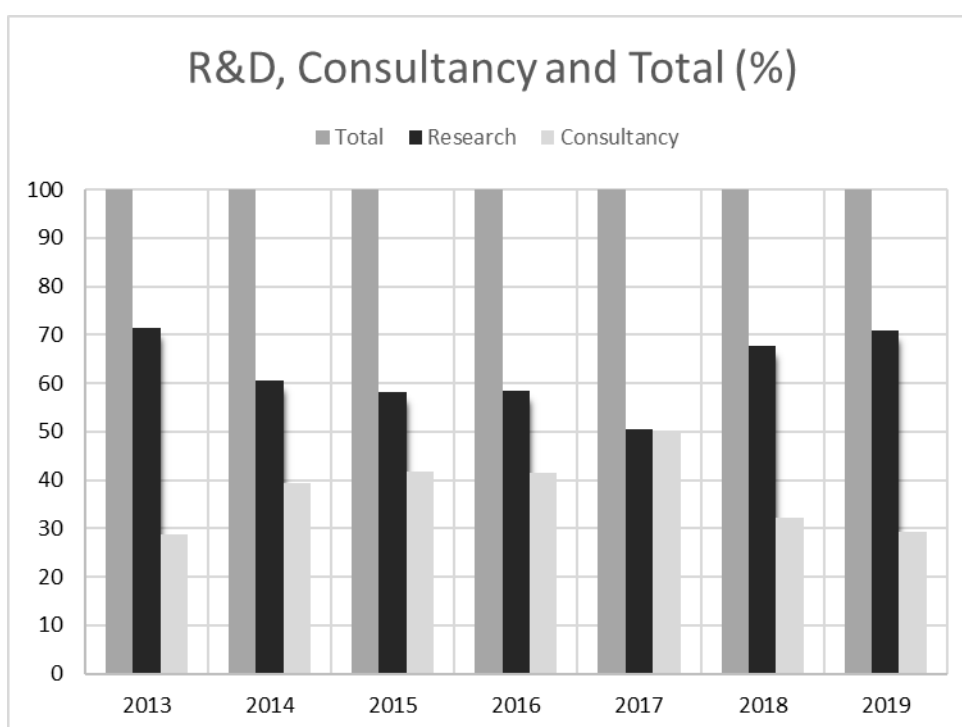


Figure 9 | Percentage of annual funding in research and in consultancy

As the number of PhD researchers (combining PhD members and PhD collaborators) did not substantially change in the period under analysis, a similar pattern is found in Figure 10, which illustrates the evolution of the capacity of PhD members to secure either forms of funding. In 2019, the average total funding was 16 k€ per CERIS member, an all-time low.

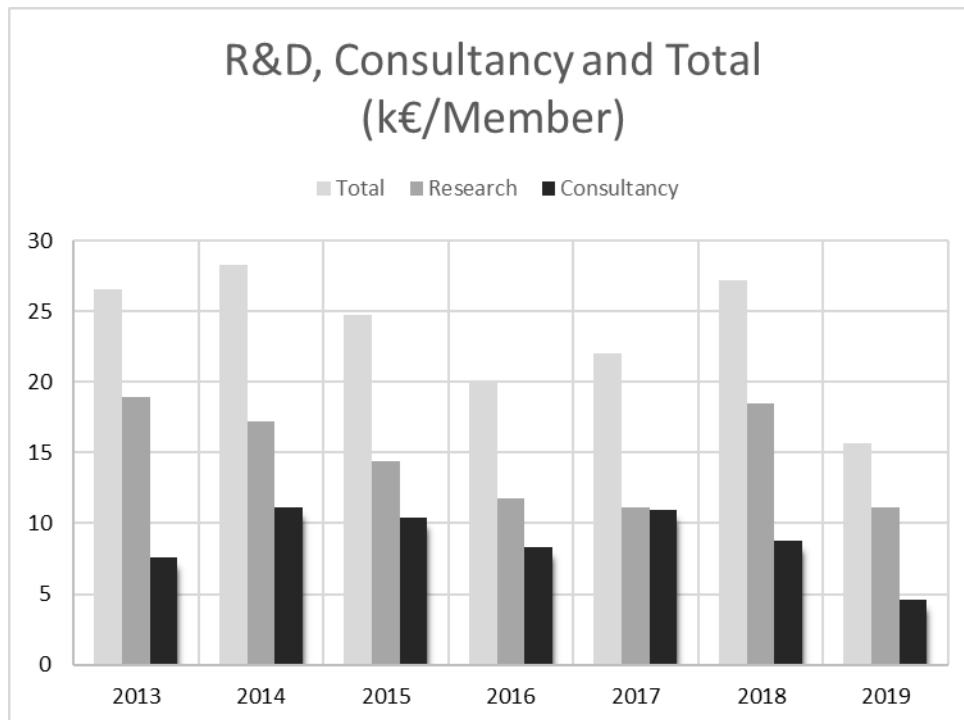


Figure 10 | Total annual funding per PhD researcher and per PhD member

3.5 Evolution of the main activity indicators

The evolution of the number of completed PhD theses is shown in Figure 11. The number of completed PhD theses in 2019 (33) is similar (but slightly smaller) to that of the previous 2 years and slightly higher than the average value in the period 2008-2014. This should reflect the relevance of the PhD programs headed by CERIS researchers. The oscillations are associated with differences in completion caused by PhD programs with dissimilar requirements in mandatory courses and, consequently, in breadth and depth of the research project. They are also affected by the cuts in the national program for PhD grants, which were attenuated by the engagement of CERIS in independently funded international bilateral consortia (namely through the Portugal-MIT and Portugal-U. Texas Programs) and FCT-funded PhD programs.

The ratios per PhD researcher (0.18 concluded theses, as seen in Figure 12, and 1.4 supervised or co-supervised active doctoral theses in 2019) are still close to target values.

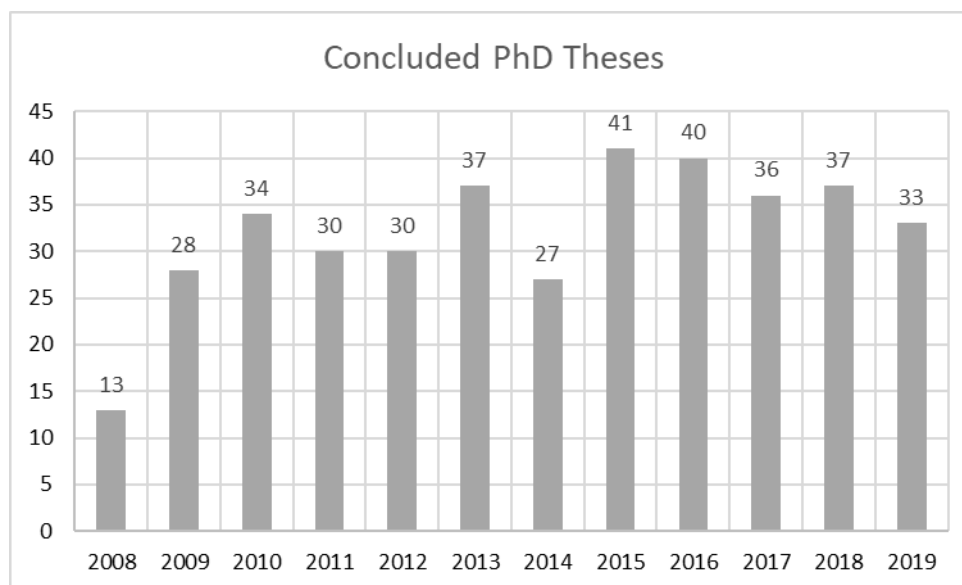


Figure 11 | Concluded PhD theses

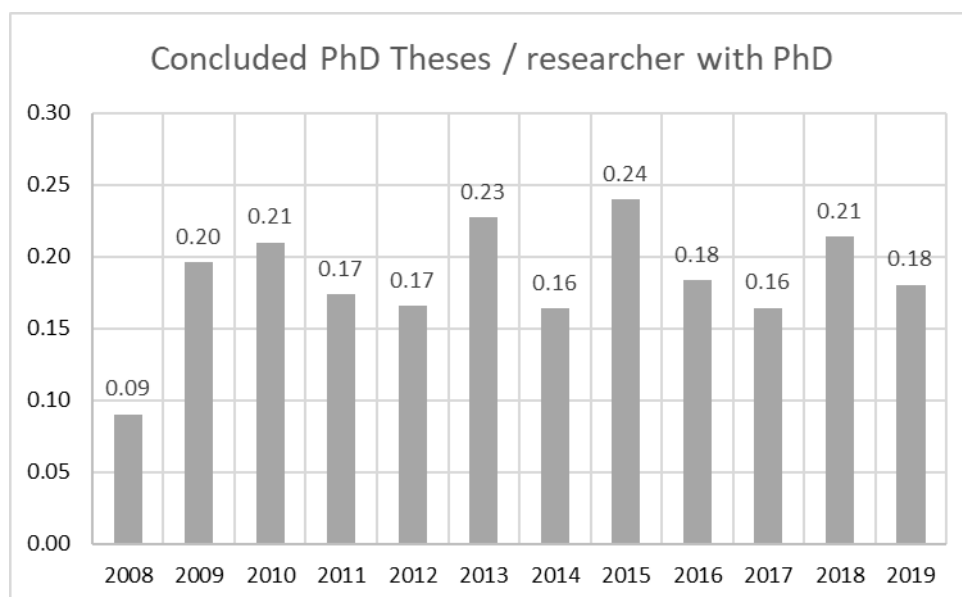


Figure 12 | Concluded PhD theses per researcher with PhD

The success in securing PhD contracts under FCT-funded doctoral programs is one of the key reasons why CERIS kept improving the main activity indicators under otherwise adverse conditions. CERIS succeeded in coordinating five and participating in another PhD program selected for funding in an internationally evaluated national competition held by FCT. No remotely similar rate of success was registered in the area of Engineering.

The evolution of the total number of papers published by CERIS researchers is presented in Figure 13. The plot shows a consistent increase in the scientific activity from 2008, with the exception of 2012 (possibly caused by a previous decrease in the number of concluded PhD theses), and a stabilization plateau in 2015. In 2018 there is an evident increase in all indicators – bulk number of papers, papers per PhD researcher and papers per member. This may be attributed to cumulative effect of the increase in completed PhD theses and the incorporation of highly productive young researchers at post-doc level. In 2019 there is a slight increase relatively to 2018 (from 299 to 302 papers). The number of papers in Q1 and Q2 ISI-indexed journals was substantially increased (from 206 to 229 papers, see Figure 14).

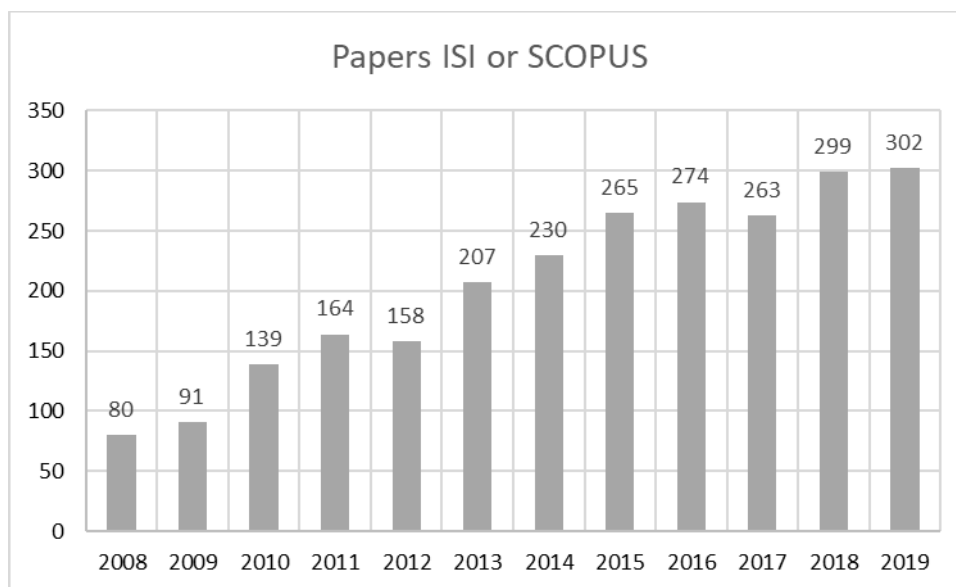


Figure 13 | Papers published in international journals (ISI and Scopus)

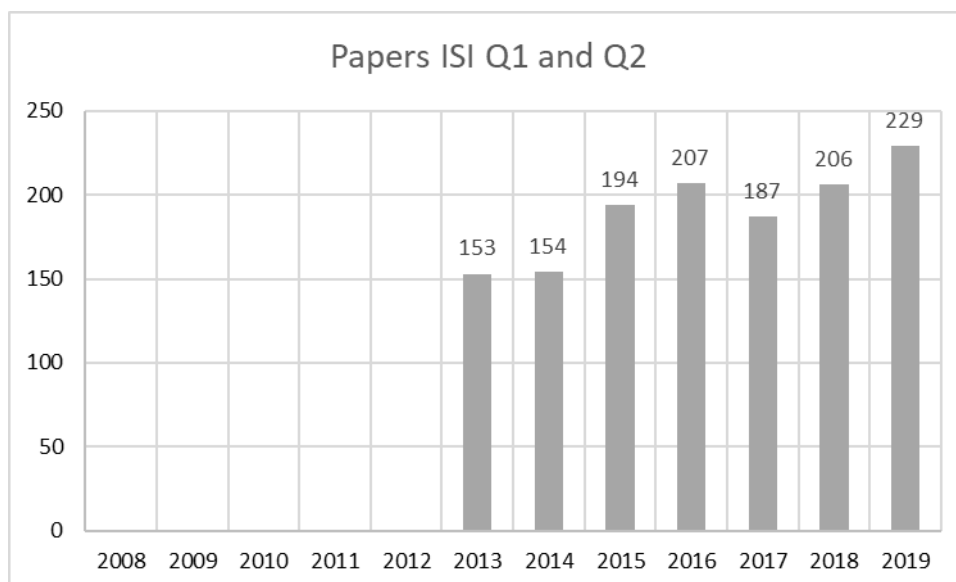


Figure 14 | Papers published in international Q1 or Q2 ISI journals

The publication ratios per member and per PhD researcher are presented in Figure 15 and in Figure 16, respectively. In 2019, 2.7 ISI or SCOPUS papers were published per CERIS member, the same value

as in 2018 (2.7 papers per member, see Figure 15). There is slight reduction when cast in papers per PhD researcher, due to the increase of the latter (Figure 16). These numbers show, nevertheless, a consolidated improvement relatively to 2013, when 2.0 ISI/SCOPUS papers were published per CERIS member.

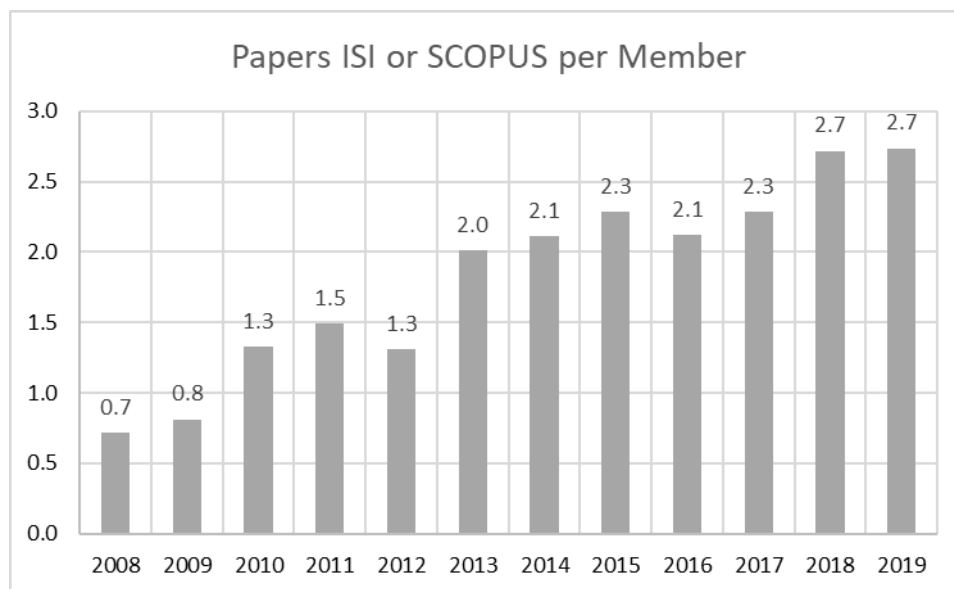


Figure 15 | Publication in ISI/Scopus journals per member

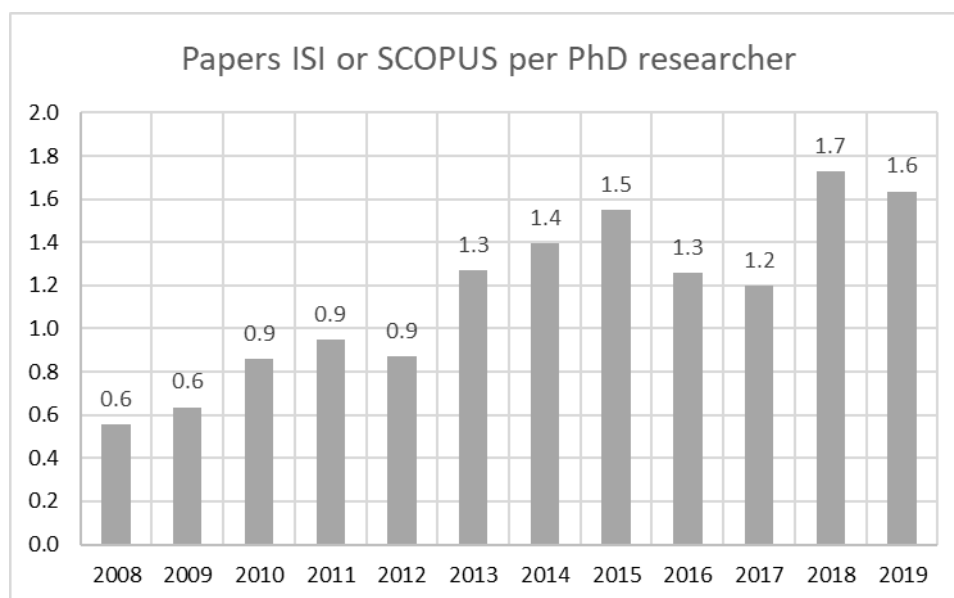


Figure 16 | Publication in ISI/Scopus journals per PhD researcher

The number of ISI-indexed Q1 and Q2 papers per researcher with PhD was increased from 1.19 to 1.24 (Figure 17). The number of other papers not indexed in ISI or SCOPUS per researcher with PhD was decreased from 0.54 to 0.39 (Figure 18) which may be considered as positive. The ratio for publication in international conference proceedings was 1.7 per researcher with PhD. Publications in international

conference proceedings increased in 2019 (312 papers or abstracts, not shown in the charts).

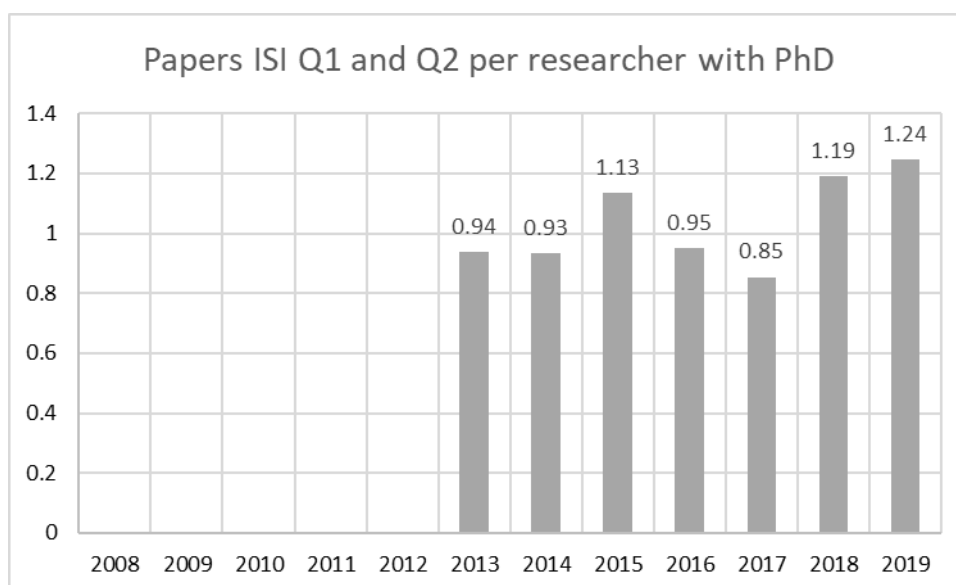


Figure 17 | Publication in Q1 or Q2 ISI journals per PhD researcher

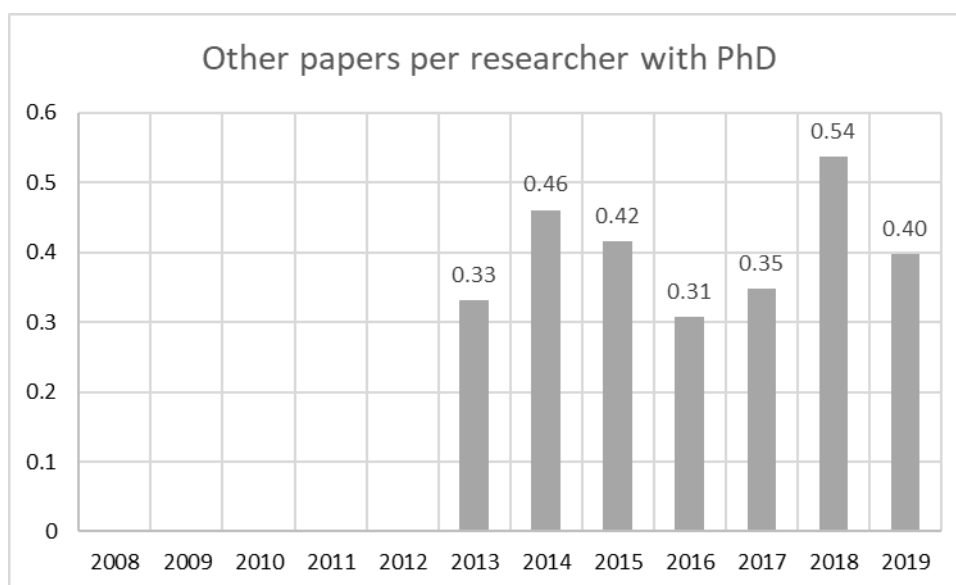


Figure 18 | Publication in other (Non Q1 and non Q2) ISI or SCOPUS journals per PhD researcher

Figure 19 depicts the distribution of the papers published in ISI journals per quartile of impact factor. In the 2013-2017 period about 50% of the papers were published in Q1 journals. This number was relatively stable during this period. In 2018 this figure was reduced to 46%. In 2019 this percentage was increased to 49%. Moreover, 76% of the papers were published in Q1 and Q2 journals, attesting the relatively high average quality of the journal publications of CERIS members.

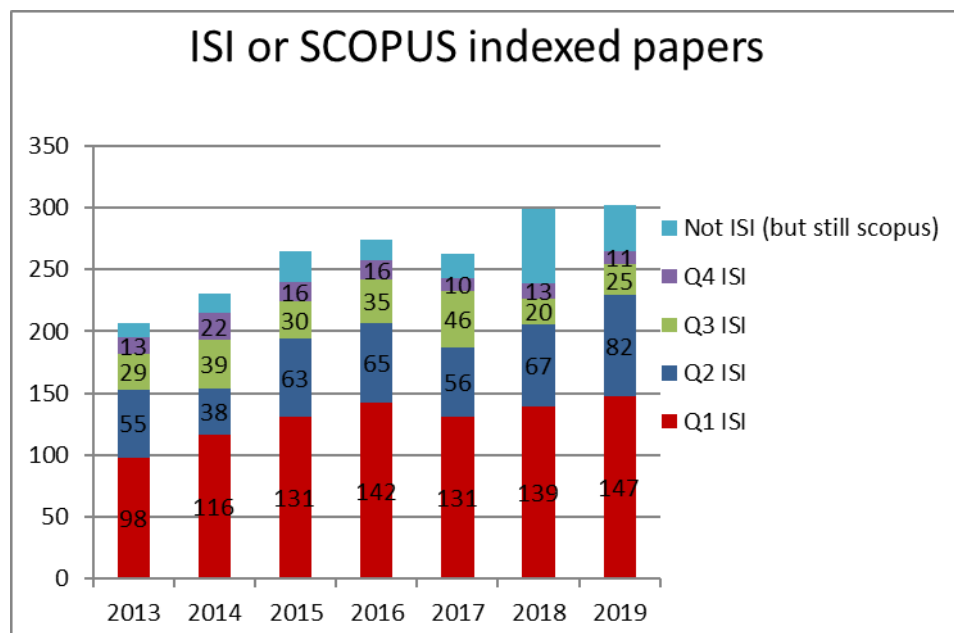


Figure 19 | Distribution of papers published in ISI journals per quartile (Q1 to Q4) of impact factor

Figure 20 shows the number of papers in ISI or SCOPUS journals per PhD researcher. In 2019, each researcher published more than 1 paper in Q1 or Q2 ISI-indexed journals.

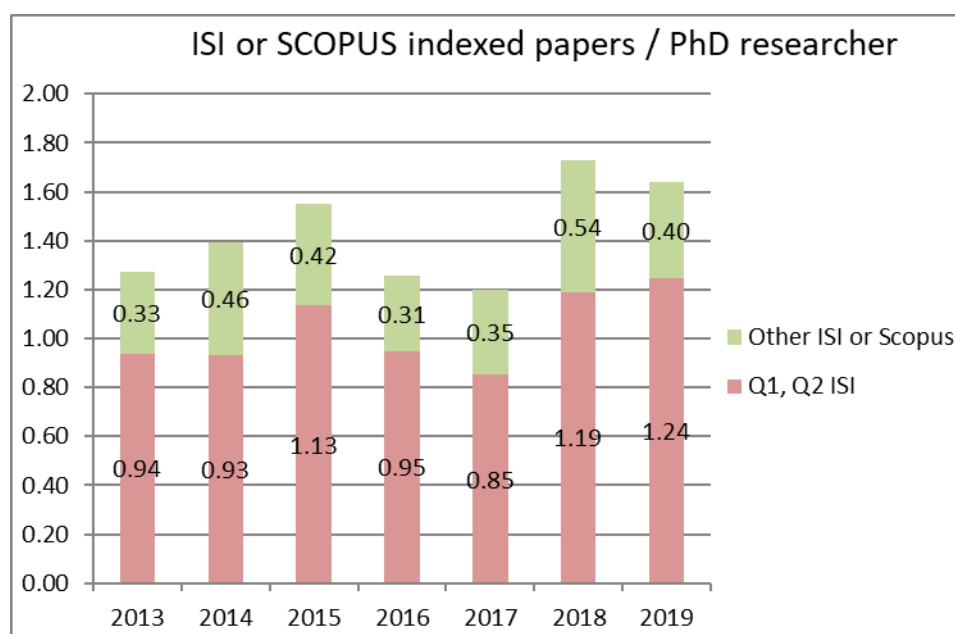


Figure 20| Distribution of papers per PhD researcher published in ISI or SCOPUS journals per quartile (Q1 to Q4) of impact factor

3.6 Research group results

The contribution of the research groups to the activity indicators presented above is presented in Annex C.



4. FUTURE RESEARCH

The CERIS activities planned for 2020 are a natural follow-up of the research carried out in 2019, as summarized in Section 2.4. The proposed activity, as submitted by the coordinators of the research groups, will benefit from the internal program to promote cooperation in research, as framed by the thematic strands and the work areas presented in Sections 2.2 and 2.3.

RG1 | Hydraulics

The RG activities in 2019 will be a natural follow-up of the research carried out in 2018. These activities will cover research objectives that include different cross-cutting issues with branches in the four thematic strands: Product development in Civil Engineering industries (PD); Risk and safety in natural and built environments (RS); Rehabilitation of natural and built environments (RNBE); Response to natural and societal changes (RNSC).

The RG activities for 2020 will be organized according to major research topics as follows:

a) Pressurized water systems

- Methodologies and software tools for the assessment and enhancement of water-use and energy efficiency in water supply systems (e.g., water and energy auditing, leak detection and location, optimization of pump scheduling, use of variable speed pumps, microturbines and pump-turbines) (PD).
- Development of reliability analyses and risk management tools for different types of water and wastewater infrastructures (RS).
- Safety and risk analyses and establishment of design criteria in pressurized pipe systems based on the development of advanced 1D/2D transient solvers, CFD modelling of pressurized flows and data collection in experimental facilities and real-life systems, fluid structure interaction (RS).

b) Fluvial hydraulic structures

- Development of mitigation strategies and pre-cast shelters for fish downstream of powerhouses with hydropeaking operation (RS).
- Numerical and experimental modelling of different flood release and related hydraulic structures (RS; RNBE).
- Study of the hydraulics of PKW weirs combined with spillways (RS, RNBE).
- Study of the pressure field and slab stability in a plunge pool lined with concrete slabs (RS).

c) River restoration and management

- Monitoring tools, based on physically-based computational models, for water and sediment quality in rivers and estuaries (RNBE).

- Risk management in the valleys downstream of dams (RS; RNSC).
- Environmental flows determination procedures and hydropower station operation rules to reduce ecological risk downstream of dams (RS, RNBE).
- River restoration and development of fish passes for low height river obstacles to improve ecological connection along regulated rivers (PD; RNBE; RNSC).

d) Environmental fluid mechanics

- Laboratorial investigation of rough-wall open-channel turbulence (RNBE).
- CFD simulation of solid-fluid interactions in turbulent flows (RNBE).
- Laboratory investigation and mathematical simulation of transport of dissolved substances (RS, RNBE).
- Heat and mass transport in wetlands (RNBE)

e) Sediment transport and river morphodynamics

- Hydrodynamics of river confluences in equilibrium (RS; RNBE).
- Hydrodynamics of river diversions in equilibrium (RS; RNBE).
- Sedimentation in shallow retention reservoirs: experimental study.
- Mathematical modelling of shallow-flows with mobile beds. Application to long term channel morphology evolution, dam-breaching, dam-break flows and overland tsunami propagation (RS).
- Mathematical simulation (Eulerian and Lagrangian) of transport processes (RS).
- Development of stabilization techniques for rivers meanders in equilibrium (RNBE).

f) Ocean waves, coastal morphodynamics and coastal and port structures

- Studying extreme events like freak waves, near the coast, to improve navigation safety and support the offshore wind energy production industry (moored or floating) (RS; RNBE).
- Assessment of the vulnerability to flooding of the built environments on low-lying areas of estuaries, due to extreme ocean storm surges events and climate action (RNBE; RNSC).
- Life-cycle cost analysis of coastal and port structures (RNBE).
- Modular port facilities in rivers for bulk cargo;
- Morphological modelling of beach morphology in the presence of coastal structures. (RS).
- Turbulent transport processes in rivers and estuaries: experimental research on interaction between transported quantities (sediment, pollutants, nutrients, etc.) and turbulence (RS; RNBE).

- Air entrainment in wave breaking - laboratory experiments, infra-gravity waves – generation mechanisms and practical applications

RG2 | Environment and Water Resources

The group RG2 will continue to focus on research activities in the areas of the environment and water resources, with the objective of developing approaches, methodologies and tools that cut across these areas, improving knowledge and capabilities to manage natural and built environments in a sustainable way.

The research objectives will cover different cross-cutting issues related with the thematic strands defined for CERIS, with the main activities focused on “Natural and Societal Changes”, and on “Risk and Safety in Natural and Built Environments”, with more limited contributions to the other two thematic strands.

In the near future, the E&WR will continue concentrating its activities in the following major topics:

- a) Hydrology and water resources: characterisation and modelling of hydrologic variables and processes, including extreme event analysis, planning and management of water resources, and water policy formulation;
- b) Assessment and analysis of climate change impacts on natural and man-made systems, with special emphasis on water resource systems, including the formulation of measures and policies for promoting adaptation and mitigation;
- c) Water governance indicators: the establishment of a sound set of indicators for water governance that reflect the i) existing framework conditions, ii) recent evolution, and iii) impact on society, for all principles and overarching goals of water governance;
- d) Sewer systems, including water quality along the lines and in in-sewer processes;
- e) Integrated sustainable wastewater solutions, including hydraulic and environmental performance of treatment systems such as constructed wetlands, and sanitation approaches and solutions for low income countries;
- f) Environmental management of natural and built environments and approaches to the transition of cities to greener economies, including, sustainable infrastructures and construction, energy efficiency, eco-efficiency, mobility, with special emphasis on life-cycle analysis, certification procedures and sustainability criteria;
- g) Monitoring and aquifer testing and assessment of groundwater pollution and Ecosystems in groundwater;
- h) Numerical and stochastic groundwater modelling and Geophysics and SSD applied to hydrogeology and groundwater management.

- i) Application of NBS in groundwater management.
- j) Drone images acquisition by using several bands, namely visible bands, near infrared and thermal images obtained at low altitude, for the delimitation of recharge zones and aquifer discharge by mapping the soil moisture and its relationship with land use (project DRONEWATER funded by FCT, PTDC/CTA-OHR/32360/2017).

RG3| Systems and Management

In line with the activity developed in the previous period, the planned research activities of the group can be placed under 3 major domains:

1. Regulatory and contracting policies, pricing and performance assessment;
2. Decision-making and systems design, operations and management and project management;
3. Information modelling and technology. Furthermore, closer coordination with CERIS strategy and the general orientations stemming from its thematic strands will be promoted. The horizontal character of the S&M group skills and competences creates opportunities for synergetic cooperation and interactions with other CERIS research groups and to make relevant contributions closely linked to the objectives of all the thematic strands.

Regarding Strand 1, the group will be focused on the improvement of the processes and infrastructure projects through the development of better models for project management and the procurement of goods, services and works. Particularly, the group has an extensive work developed in the scope of public-private partnerships arrangements with several models and contributions for the literature and the empirical world. Therefore, in the coming years new solutions will be proposed to achieve higher levels of efficiency and effectiveness of these two activities widely recognized as critical to achieving successful results in infrastructure and other civil engineering areas.

The team in particular has a remarkable tradition of open and comprehensive search for understanding new societal problems. Many of these challenges are directly related to the performance of complex organizations serving communities and cities. The S&M research group will promote the development of:

- a) models of complex organizations providing public goods or services, such as water supply, waste schooling, logistics and health networks;
- b) regulatory frameworks and adaptive approaches to propose better pricing and performance evaluation systems, allowing for benchmarking and rankings, particularly in infrastructure and other public services.

In Strand 2, the study of risk in any natural or built environment requires modelling complex systems, namely urban networks, designed to guarantee the fulfillment of societal needs expressed in terms of

information, energy, water, mobility and supplies of a wide spectrum of goods and services. The group will pursue the development of advanced tools to design and to optimize such complex systems, increasing safety and resilience. The group particularly will provide contributions in the development of models applied to Civil Engineering using as multicriteria decision analysis (MCDA), logistics and supply chain, systems modelling and optimization, contracts and project management in infrastructure.

Concerning the Strand 3, the main research scope are the areas of Geographical Information Science and Information and Communication Technologies applied to Geomatics, Building Information Modelling and Information Technology in Construction. The contribution of the members leads to a more effective sustainability, greater economy in the construction and energy efficiency and on streamlining the process of implementation of the project, based on innovative tools used in the field of Civil Engineering.

The activity of the group will be mostly focused on emergent areas of the H2020 program. The Geomatics research main subjects will be focused on: disaster-resilience; satellite imagery in the detection and mapping of vertical displacements and natural hazards; Interferometry via persistent scatters in the detection and measurement of ground subsidence; development of methodologies for volcanic hazard and risk mapping; Information for disaster mapping and management; geoid undulation at local and regional scales; ground deformation with advanced SAR methods; applications of spatial analysis, namely in location problems for meters in supply networks, measurement of walkability scores; and 3D virtual city models – GeoBIM environment.

The focus of the Information Technology in Construction will be mainly digital construction: e-business and e-procurement platforms to support construction project lifecycle; research on innovative approaches to e-business in construction, where social networks and collaborative work play a central role; intelligent buildings; building Information modelling (BIM); construction information management and optimization to improve buildings performance; BIM implementation in projects and organizations; and Asset Information Model (AIM).

RG4 | Transportation Systems

The RG4, in 2020, will pursue the objectives described in section II.1 using the means and the routes offered by EU (Horizon 2020) and national (Portugal 2020 and FCT) financed research projects, by the research involved in each going on PhD works integrated on the doctoral program in Transportation Systems, by the innovation, the technology and the development transfer to society and industry, by supporting the training professional programs set with several stakeholders on the transportation and infrastructure systems, and by the improvement of the results achieved within the international networks already established and the ones to enhance if the opportunity comes.

RG5| Studies on Construction

The general objectives of the group for 2020 are:

- To develop research projects in the general domains of Construction Materials, Technology and Management Innovation; Sustainable Construction; Monitoring, Rehabilitation and Conservation of the Built Heritage. An effort will be made to concentrate efforts in increasingly less wide and more specific fields to produce relevant results in national and international forums (measured in a significant increase in the number and impact factor of papers in peer reviewed international journals, the supervision of PhD Theses and the approval of national and international research grants): advanced materials and technologies also focusing on nanomaterials - establish international cooperation and be a national leader in the field of composites (GFRP and GRC); concrete and mortars technology - proceed with PhD and MSc studies under way (in strong collaboration with LNEC) and improve the Mortars Section of the Construction Laboratory; risk informed quality, safety and environmental management in construction - increase the already large international cooperation via technical committees and international conferences; sustainability and deconstruction strategies and technology - proceed with PhD and MSc studies under way and be a national and international reference in the field of recycled aggregates for concrete and mortars production; building physics and passive design - continue the very good results in the near past and expand its potential through studies on energy efficiency and acoustics of innovative materials, components and construction systems; building acclimatization and mechanical systems - continue collaboration with the Mechanics and Physics Departments of IST Department of IST, strategically important in terms of sustainable construction in terms of energy-saving; inspection, diagnosis, maintenance and rehabilitation systems - proceed with PhD and MSc studies under way and be a national and international reference in the field of inspection and diagnosis systems; conservation of historical building heritage - continue and strengthen national and international cooperation projects, namely within the Construction Technological Portuguese Platform (PTPC);
- To continue participating in national and international committees, participating / organizing national and international conferences, teaching in Graduation and Post-Graduation courses in the field of construction (namely in the recently awarded FCT Doctoral Program Eco Construction and Rehabilitation, launched in 2014 and participate in academic events and performing consultancy work.

RG6 | Structures and Geotechnics

As in previous years, in 2020, it is planned that the members of the RG6 continue working in the same major research topics of the area, taking into account most relevant issues according to reference international organizations and the current priorities of the country.

An effort will be made to promote a deeper and effective collaboration between RG members, as well as between these and internationally renowned researchers, to deliver relevant contributions to the sector and increase the participation in research projects funded by the European Union. The main general purpose is to improve the construction sector competitiveness, supporting the development of economical and eco-efficient materials and products, as well as new technologies to design, build and maintain high-quality and long-lasting structures. This embraces (i) the development of industrialized cementitious materials, geomaterials and products, (ii) the development and implementation of advanced computational tools for geotechnical and structural assessment, safety verifications (new and existing structures and their foundations) and design of strengthening solutions, (iii) the health monitoring and life-cycle management of structures and their foundations, and (iv) the develop of tools for the analysis and mitigation of risks in infrastructures.

Other more general objectives are the increase of the group internationalization and the links to industry, namely through:

- a) improvement of the competitive funding capacity in international and national research projects calls
- b) participation in national and international standardization committees,
- c) organization of academic national and international events,
- d) participation in national and international Graduation and Post-Graduation courses (namely FCT Doctoral Programs) in the field of Structures and Geotechnics,
- e) expert consultancy work to partially fund research and provide practical applications to the results of research,
- f) collaboration with design offices.

5. CLOSURE

CERIS merged in 2015 three research centres of DECivil, namely CEHIDRO (Centre of Hydraulics, Water Resources and Environment), CESUR (Centre for Urban and Regional Systems) and ICIST (Institute of Structural Engineering, Territory and Construction).

Their integration in CERIS was designed to exploit a comprehensive thematic coverage, in depth and scope, promoting synergies in the multidisciplinary sector of Built and Natural Environment. Indeed, CERIS was created to address the main issues identified in key documents on the prospects of the sector and to respond thus to recommendations to enhance strengths and to overcome weaknesses identified by the external advisory boards and the international evaluation panels of its founding centres when they operated independently.

In 2019, CERIS counted on the expertise of 184 PhD researchers and 191 non-PhD researchers, having the profile and the critical mass needed to sustain a leading national position and to attain a strong international presence in the sector. The feasibility of these central objectives was confirmed in the first four years of formal operation of CERIS, which also confirmed the need to face the challenges and solve the difficulties foreseen in the discussions that led to its creation.

CERIS is classified by FCT as the only 'large research unit' in the area of Civil Engineering. In terms of day-to-day operation, one set of difficulties relates to inherited weaknesses in technical staff in what regards the operation of laboratories and, especially, the creation of an administrative structure competent in the management of Science and Technology. As the merging of the centres must yield an improved use of human resources, CERIS should use its own resources to engage and train the necessary technical staff in preparation of the announced waiving of the current freeze on recruiting.

The discussion that led to the creation of CERIS was mainly focused on the dual challenge of respecting the identity of the founding centres while actively promoting internal cooperation in a new unit rich in synergies in the main areas of Built and Natural Environment. The first four years of operation have shown that loss of identity is not an issue and confirmed that the core challenge of the merge was the progressive realignment of the activity of the research groups in the framework of the main work areas of the common thematic strands. It was not expected, and it should not be expected that groups with long-established areas of operation would immediately readjust and start new forms of cooperation. Previous commitments must be met and new opportunities cannot be lightly discarded. Moreover, it takes time and sustained internal proactive policies to prove that individual- and group-level performances directly benefit from cooperation.

The number of CERIS Members has not changed, the number of PhD collaborators has slightly increased and the number of non-PhD collaborators has decreased in 2019. This is mostly because PhD programs centered at CERIS are in their last stages. The number of concluded PhD theses remained stable. However, it is necessary to be attentive, in the next years, to the impact of end of FCT-funded PhD programs.

In spite of the reduction of the number of non-PhD researchers, the number of Q1 and Q2 ISI-indexed journal papers increased while the number of papers per researcher was stabilized. This can be attributed to the success of PhD programs led by CERIS members and to the high productivity of early career researchers, most of them with no tenure contracts. The quality of the papers has increased, with about 49% published in ISI Q1 and Q2 journals. The percentage of papers with national partnerships has increased but not those stemming from international partnerships, an issue to be addressed with specific measures to increase internationalization.

International recognition remained high in 2019, with a fair number of Editor in Chief and Associate Editor roles, as well as key-note lectures in International Conferences. But this has not materialized in stable cooperation leading to international projects.

In what concerns funding, 2019 results show that the economic recovery has not yet resulted in apposite impact on the consultancy activity of CERIS members. Research funding through FCT projects has not increased in 2019, possibly because payments from FCT are very irregular. The more stable funding from EU has not increased in 2019, an issue that should be addressed.

Other difficulties in securing funding are related to the discouraging conditions the universities located in the Lisbon area have to face when applying to Portugal 2020 calls. In addition, and as a direct consequence of the downgrading suffered in the 2013 evaluation, core funding was substantially reduced and the funding necessary to launch the internal cooperation program was denied.

Based on the high-level of the activities of CERIS in the 2013-19 period and the positive mark (Excellent) in the 2017 FCT evaluation, CERIS expects to regain the leading position in the Civil Engineering area. Such a result would be coherent with all main international scientific rankings where the University of Lisbon (in which CERIS is the only research unit in Civil Engineering) ranks 1st in the country in that subject.

ANNEX A – PHD THESES COMPLETED IN 2019



PhD theses completed in 2019

Student name	Supervisor	Co-Supervisor #1	Co-Supervisor #2	Title	PhD programme
Santa Klavina Marques	Ana Ferreira	Manuel Duarte Pinheiro		Sustainable ID new paradigm of interior design and sustainable makeover scenarios for temporary accommodation establishment	Doutoramento em Arquitectura / Design
André Filipe de Oliveira Almeida	António Pinho Ramos	VálterLúcio		Punching in flat slabs subjected to cyclic horizontal loading	Engenharia Civil
Hugo Daniel Pereira Fernandes	VálterLúcio	António Pinho Ramos		Strengthening of flat slabs with concrete overlay - analysis and solution development	Engenharia Civil
Aisha Mamade	Dídiacovas	Dália Loureiro		Enhancement of water and energy efficiency in water supply systems	Civil Engineering
Ana Clara Pereira Barbosa Santos	Maria Manuela Portela	Andrea Rinaldo		On flow duration curve modelling in Alpine catchments	Engenharia Civil
Ana Rita Lopes dos Santos	Maria do RosárioVeiga	Jorge Manuel Calíço Lopes de Brito	António Santos Silva	The influence of natural aggregates on the performance of replacement mortars for ancient buildings: The effects of mineralogy, grading and shape	Engenharia Civil
Ana Rita Ventura de Matos	Filipa Ferreira	José Saldanha Matos		Effect of intermittent flows and ventilation in hydrogen sulfide dynamics in wastewater collection systems	Engenharia do Ambiente
Bahareh Tavallae	Luís Picado Santos	José Neves		A Framework for Sustainable Pavements Design Applied to Portuguese Conditions	Sistemas de Transportes
Claudia Caruso	Rita Bento	José Miguel Castro		Definition of mitigation strategies for the seismic risk reduction of old RC residential buildings	Civil Engineering, InfraRisk program
Diogo Rúben Castelo Branco das Neves	António Alberto Pires Silva	Conceição Juana Espinosa Morais Fortes	Jorge de Saldanha Gonçalves Matos	Air Entrainment in Wave Breaking: Experimental and Numerical Modelling	Civil Engineering

Emad Arbabzadeh	Rafaela Cardoso			Study of biocementation as crack sealing technique for rocks and concrete	Engenharia Civil
Federica Antico	Rui Ferreira			Laboratory investigation on the motion of sediment particles in cohesionless mobile beds under turbulent flows	Civil Engineering
Ingrid Graziele Nascimento	Jorge Manuel Gonçalves	Diogo Cunha Ferreira		Serviços de saneamento e abastecimento de água no Brasil: bases para a sustentação da universalização	Engenharia do Território
Ingrid Tonon Miranda	Filipa Ferreira	José Saldanha Matos		Metodologia para avaliação e melhoria da resiliência em inundações em meio urbano	Engenharia do Ambiente (PDACPDS)
Jelena Milosevic	Rita Bento	Serena Cattari		Seismic vulnerability assessment of mixed masonry-RC buildings in Lisbon	Civil Engineering
Larissa Varela	Francisco Nunes Correia	Amarílis Varennes Mendonça		A Governança dos Recursos Hídricos em Contexto de Escassez e Insularidade	Alterações Climáticas e Políticas de Desenvolvimento Sustentável
Luís Carlos Rodrigues de Sousa Miranda	Laura Caldeira	Rui Carrilho Gomes	João Bilé Serra	Liquefaction Mitigation Measures: Prospective Application to Immersed Tunnel Foundations	Engenharia Civil
Luís Pedro Monteiro Simões Mateus	Maria do RosárioVeiga	Jorge Manuel Calicho Lopes de Brito		Desenvolvimento de Formulações de Argamassas pré-doseadas para aplicação em suportes em terra compactada	Engenharia Civil
Marcos Correia	João de Abreu e Silva			The Influence of Transportation Infrastructures and Policies on Urban Sprawl Expansion. A Longitudinal Study of the Lisbon Metropolitan Area	Sistemas de Transportes
Olga BirjukovaCanelas	António Heleno Cardoso	Rui ML Ferreira	Lúcia Teixeira Couto	Experimental study of flow dynamics on movable bed open-channel confluences	PhD in Environmental Hydraulics and Hydrology (H2Doc)
Pedro Gonçalo Guerra Poseiro	Teresa Reis	Alexandre Bacelar Gonçalves	Juana Fortes	Forecast and Early Warning System for Wave Overtopping and Flooding in Coastal and Port Areas: Development of a Model and Risk Assessment	Engenharia Civil

Raul Fernando Rodrigues Cabral Gomes	Jorge Manuel Calção Lopes de Brito	José Dinis Silvestre		Avaliação do ciclo de vida "do berço ao berço" de soluções construtivas em edifícios - Aplicação às coberturas planas	Engenharia Civil
Rosa Félix	Filipe Moura	Kelly J. Clifton		Barriers and motivators to bicycle in low cycling maturity cities: Lisbon case study	Sistemas de Transportes
Sofia Alexandra de Carvalho Ferreira Real	José Alexandre Bogas	Maria da Glória Gomes		Durabilidade e desempenho térmico de betões estruturais de agregados leves produzidos com diferentes tipos de materiais cimentícios	Engenharia Civil
Ana Filipa das Neves Rodrigues Marques Couto Salvado	Nuno GCM Almeida	Alvaro Vale e Azevedo		LIFE CYCLE COST IN BUILDING MANAGEMENT: Economic assessment model applied to public school buildings portfolio	Engenharia Civil
Daniel Augusto de Miranda	Márcia Lara Coelho	António H. Cardoso	Elsa Alves	Análise experimental e numérica de padrões de escoamento e de deposição de sedimentos em reservatórios retangulares rasos: influência do posicionamento dos canais de entrada e de saída.	Civil Engineering + Sanitation, Environment and Water Resources
Rúben Emanuel Cirilo dos Santos	António Aguiar Costa	LincyPyl	José Dinis Silvestre	Integration of LCA and LCC with BIM for the environmental and economic assessment of buildings	Engenharia Civil
Ivan Stojnic	Jorge de Saldanha Gonçalves Matos; Eugen Brühwiler			Stilling basin performance downstream of stepped spillways	Civil Engineering (IST); Génie Civil et Environnement (EPFL)
Adina-Ana Mureşan	Mihai Nedelcu	Rodrigo Gonçalves		GBT analysis of the linear and buckling behavior of thin-walled conical shells	InginerieCiviliainstalatii
Maria de Castro Fonseca Morão Manso	João Paulo de Castro Gomes	Cristina Matos Silva	-	Modular system design for vegetated surfaces with alkaline activated materials	Engenharia Civil
Maria João Costa	António Pinheiro	Isabel Boavida	Maria Teresa Ferreira	Effects of hydropeaking and refuge configurations on the behaviour of cyprinids in experimental flume conditions	FCT- FLUVIO River Restoration and Management
Cristina Maria Vieira Frazão	Joaquim António Oliveira de Barros	José Alexandre Bogas		Recycled Steel Fiber Reinforced Concrete for structural elements subjected to chloride attack: Mechanical and Durability performance	EcoCore/ Engenharia Civil

Fernanda Cristina Moreira da Silva	Alexandre Landesmann	Dinar Reis ZamithCamotim		DSM-Based Prediction of Distortional Failure Loads of Cold- Formed Steel Columns at Elevated Temperatures	Programa de Engenharia Civil da COPPE
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ANNEX B – PAPERS PUBLISHED IN 2019

Authors	Year	Title of paper	Journal	Vol, (Number), pages, month	DOI	Type of journal	Impact factor Clar. Analytics (2019)	Quartil SCOPUS	Quartil WoS
Ribeiro, F.; Sena-Cruz, J.; Branco, F.G.; Júlio, E.	2019	3D finite element model for hybrid FRP-confined concrete in compression using modified CDPM	Engineering Structures	V. 190, 459-479, July.	10.1016/j.engstruct.2019.04.027	WoS and SCOPUS	3.084	Q1	Q1
Melo, P.; Vieira, R.F.; Virtuoso, F.	2019	A beam-column model for evaluating the effects of residual stresses and geometrical imperfections	Computers & Structures	V. 223, art. 106090, October.	10.1016/j.compstruc.2019.06.007	WoS and SCOPUS	3.354	Q1	Q1
Neves, J.; Sampaio, Z.; Vilela, M.	2019	A Case Study of BIM Implementation in Rail Track Rehabilitation	Infrastructures	4(1), 8	https://doi.org/10.3390/infrastructures4010008	Non (WoS, SCOPUS) International			-
Cunha, H.; Lourenço, D.; Sousa, G.; Covas, D.; Alegre, H.	2019	A comprehensive water balance methodology for collective irrigation systems	Agricultural Water Management	V. 223, art. 105660, August.	10.1016/j.agwat.2019.05.044	WoS and SCOPUS	3.542	Q1	Q1
Filho, J.D.P.; Portela, M.M.; Studart, T.M.C.; Filho, F.A.S.	2019	A continuous drought probability monitoring system, CDPMS, based on copulas	Water	V. 11, n.º 9, art. 1925, September.	10.3390/w11091925	WoS and SCOPUS	2.524	Q1	Q2
Areias, P.; Rabczuk, T.; Carapau, F.; Carrilho Lopes, J.	2019	A continuous-stress tetrahedron for finite strain problems	Finite Elements in Analysis and Design	V. 165, 52-64, November.	10.1016/j.finel.2019.07.003	WoS and SCOPUS	2.456	Q1	Q1
Caruso, C.; Bento, R.; Castro, J.M.	2019	A contribution to the seismic performance and loss assessment of old RC wall-frame buildings	Engineering Structures	V. 197, art. 109369, October.	10.1016/j.engstruct.2019.109369	WoS and SCOPUS	3.084	Q1	Q1
Reis, V.	2019	A disaggregated freight transport market model based on agents and fuzzy logic	Transportmetrica B: Transport Dynamics	V. 7, n.º 1, 363-385, December.	10.1080/21680566.2019.1642118	WoS and SCOPUS	2.229	Q1	Q2
Moitinho de Almeida, J.P.; Maunder, E.A.W.; Tiago, C.	2019	A general degree semi-hybrid triangular compatible finite element formulation for Kirchhoff plates	International Journal for Numerical Methods in Engineering	V. 120, 56-85	10.1002/nme.6124	WoS and SCOPUS	2.746	Q1	Q1
Amado, M.; Rodrigues, E.	2019	A Heritage-Based Method to Urban Regeneration in Developing Countries: The Case Study of Luanda	Sustainability	Nº11, Vol15, art 4105	10.3390/su11154105	WoS and SCOPUS	2.592	Q2	Q2
Ueda, T.; Roberts, E.S.; Norton, A.; Styles, D.; Williams, A.P.; Ramos, H.M.; Gallagher, J.	2019	A life cycle assessment of the construction phase of eleven micro-hydropower installations in the UK	Journal of Cleaner Production	V. 218, 1-9, May.	10.1016/j.jclepro.2019.01.267	WoS and SCOPUS	6.395	Q1	Q1
Cavaco, E.; Pimenta, R.; Valença, J.	2019	A new method for corrosion assessment of reinforcing bars based on close-range photogrammetry: Experimental validation	Structural Concrete	V. 20, n.º 3, 996-1009, June.	10.1002/suco.20180196	WoS and SCOPUS	1.885	Q1	Q2
Miranda, H.M.B.; Batista, F.A.; Antunes, M.L.; Neves, J.	2019	A new SMA mix design approach for optimisation of stone-on-stone effect	Road Materials and Pavement Design	V. 20, n.º 1, S462-S469, -.	10.1080/14680629.2019.1588779	WoS and SCOPUS	1.98	Q1	Q2
Reis, V.	2019	A new theoretical framework for integration in freight transport chains	Transport Reviews	V. 39, n.º 5, 589-610, September.	10.1080/01441647.2019.1573860	WoS and SCOPUS	6.648	Q1	Q1
Vu-Bac, N.; Duong, T.X.; Lahmer, T.; Areias, P.; Sauer, R.A.; Park, H.S.; Rabczuk, T.	2019	A NURBS-based inverse analysis of thermal expansion induced morphing of thin shells	Computer Methods in Applied Mechanics and Engineering	V. 350, 480-510, June.	10.1016/j.cma.2019.03.011	WoS and SCOPUS	4.821	Q1	Q1
Cruchio, J.; Picado-Santos, L.; Neves, J.; Capitão, S.	2019	A review of nanomaterials' effect on mechanical performance and aging of asphalt mixtures	Applied Sciences	V. 9, n.º 18, art. 3657, -.	10.3390/app9183657	Non WoS; SCOPUS		Q1	
Bourne-Webb, P.; Bodas Freitas, T.; Assunção, R.M.F.	2019	A review of pile-soil interactions in isolated, thermally-activated piles	Computers and Geotechnics	V. 108, 61-74, April.	10.1016/j.compgeo.2018.12.008	WoS and SCOPUS	3.345	Q1	Q1

Bogas, J.A.; Real, S.	2019	A review on the carbonation and chloride penetration resistance of structural lightweight aggregate concrete	Materials	V. 12, n.º 20, art. 3456, -.	10.3390/ma12203456	WoS and SCOPUS	2.972	Q2	Q2
Antunes, V.; Freire, A.C.; Neves, J.	2019	A review on the effect of RAP recycling on bituminous mixtures properties and the viability of multi-recycling	Construction and Building Materials	V. 211, 453-469, June.	10.1016/j.conbuildmat.2019.03.258	WoS and SCOPUS	4.046	Q1	Q1
Parracha, J.L.; Pereira, M.F.C.; Maurício, A.; Machado, J.S.; Faria, P.; Nunes, L.	2019	A semi-destructive assessment method to estimate the residual strength of maritime pine structural elements degraded by anobiids	Materials and Structures	V. 52, 54, July.	10.1617/s11527-019-1354-9	WoS and SCOPUS	2.548	Q1	Q2
Vanelslander, T.; Sys, C.; Lam, J.; Ferrari, C.; Roumboutsos, A.; Acciaro, M.; Macário, R.; Giuliano, G.	2019	A serving innovation typology: mapping port-related innovations	Transport Reviews	V. 39, n.º 5, 611-629, -.	10.1080/01441647.2019.1587794	WoS and SCOPUS	6.648	Q1	Q1
Areias, P.; Pinto da Costa, A.; Rabczuk, T.; César de Sá, J.	2019	A simple and robust Coulomb frictional algorithm based on 3 additional degrees-of-freedom and smoothing	Finite Elements in Analysis and Design	V. 167, art. 103321, December.	10.1016/j.finel.2019.103321	WoS and SCOPUS	2.456	Q1	Q1
Biscaia, H.C.; Chastre, C.; Silva, M.A.G.	2019	A simple method for the determination of the bond-slip model of artificially aged joints	Journal of Composites for Construction	V. 23, n.º 4, art. 107468, August.	10.1016/j.compositesb.2019.107468	WoS and SCOPUS	2.606	Q1	Q2
Henriques, D.; Gonçalves, R.; Camotim, D.	2019	A visco-elastic GBT-based finite element for steel-concrete composite beams	Thin-Walled Structures	V. 145, art. 106440, December.	10.1016/j.tws.2019.106440	WoS and SCOPUS	3.488	Q1	Q1
Sanchez, A.; G.-Gaya, C.; Zulueta, P.; Sampaio, A.Z.; Torre, B.	2019	Academic proposal for heritage intervention in a BIM environment for a XIX century flour factory	Journal Applied Sciences	Vol. 9 (19), 19pgs, Oct.	https://doi.org/10.3390/app9194134	Non WoS; SCOPUS			Q2
Rahmani, A.Y.; Bourahla, N.; Bento, R.; Badaoui, M.	2019	Adaptive upper-bound pushover analysis for high-rise moment steel frames	Structures	V. 20, 912-923, August.	10.1016/j.istruc.2019.07.006	WoS and SCOPUS	1.646	Q1	Q2
Malandri, C.; Mantecchini, L.; Reis, V.	2019	Aircraft turnaround and industrial actions: How ground handlers' strikes affect airport airside operational efficiency	Journal of Air Transport Management	V. 78, 23-32, July.	10.1016/j.jairtraman.2019.04.007	WoS and SCOPUS	2.412	Q1	Q2
Fonseca, B.S.; Ferreira, M.J.; Taryba, M.G.; Piçarra, S.; Ferreira Pinto, A.P.; Montemor, M.F.	2019	Alkoxysilane-based sols for consolidation of carbonate stones: Impact of the carbonate medium in the sol-gel processes	Journal of Cultural Heritage	V. 37, 63-72, May-June.	10.1016/j.culher.2018.11.007	WoS and SCOPUS	1.955	Q1	Q3
Neto, S.	2019	Alqueva dam in the Guadiana River Basin—Past and future of illusive water abundance	World Water Policy	V.5, 71 - 84	10.1002/wwp2.12001	Non (WoS, SCOPUS) International			
Cetrulo, T.B.; Marques, R.C.; Malheiros, T.F.	2019	An analytical review of the efficiency of water and sanitation utilities in developing countries	Water Research	V. 161, 372-380, September.	10.1016/j.watres.2019.05.044	WoS and SCOPUS	7.913	Q1	Q1
da Cruz, N.F.; Marques, R.C.	2019	An application of a multicriteria model to assess the quality of local governance	Urban Affairs Review	V. 55, n.º 4, 1218-1239, July.	10.1177/1078087417733049	WoS and SCOPUS	2.081	Q1	Q2
Almeida, A.; Crucho, J.; Abreu, C.; Picado-Santos, L.	2019	An assessment of moisture susceptibility and ageing effect on nanoclay-modified AC mixtures containing flakes of plastic film collected as urban waste	Applied Sciences	V. 9, n.º 18, art. 3738, -.	10.3390/app9183738	Non WoS; SCOPUS		Q1	
Gonçalves, R.	2019	An assessment of the lateral-torsional buckling and post-buckling behaviour of steel I-section beams using a geometrically exact beam finite element	Thin-Walled Structures	V. 143, art. 106222, October.	10.1016/j.tws.2019.106222	WoS and SCOPUS	3.488	Q1	Q1
Frazão, C.; Díaz, B.; Barros, J.; Bogas, J.A.; Toptan, F.	2019	An experimental study on the corrosion susceptibility of Recycled Steel Fiber Reinforced Concrete	Cement and Concrete Composites	V. 96, 138-153, February.	10.1016/j.cemconcomp.2018.11.011	Non WoS; SCOPUS		Q1	

Almeida, C.; Ramos, T.B.; Sobrinho, J.; Neves, R.; Proença de Oliveira, R.	2019	An integrated modelling approach to study future wated demand vulnerability in the Montargil Reservoir basin, Portugal	Sustainability	V. 11, n.º 1, art. 206, January.	10.3390/su11010206	WoS and SCOPUS	2.592	Q2	Q2
Areias, P.; Pires, M.; Vu Bac, N.; Rabczuk, T.	2019	An objective and path-independent 3D finite-strain beam with least-squares assumed-strain formulation	Computational Mechanics	V. 64, n.º 4, 1115-1131, October.	10.1007/s00466-019-01696-1	WoS and SCOPUS	3.159	Q1	Q1
Simonetti, H.L.; Almeida, V.S.; Leitão, V.M.A.; das Neves, F.A.	2019	Application of evolutionary structural optimization based on the boundary element method using initial stress fields	Structures	V. 20, 550-559, August.	10.1016/j.i struc.2019.06.006	WoS and SCOPUS	1.646	Q1	Q2
Taji, I.; Ghorbani, S.; de Brito, J.; Tam, V.W.Y.; Sharifi, S.; Davoodi, A.; Tavakkolizadeh, M.	2019	Application of statistical analysis to evaluate the corrosion resistance of steel rebars embedded in concrete with marble and granite waste dust	Journal of Cleaner Production	V. 210, 837-846, February.	10.1016/j.j clepro.2018.11.091	WoS and SCOPUS	6.395	Q1	Q1
Jardim, A.; Silva, A.C.F.; de Brito, J.	2019	Application of the factor method to the service life prediction of architectural concrete	Canadian Journal of Civil Engineering	V. 46, n.º 11, 1054-1062, November.	10.1139/cj ce-2018-0452	WoS and SCOPUS	0.748	Q2	Q4
Fernández-Braña, A.; Sousa, V.; Dias-Ferreira, C.	2019	Are municipal waste utilities becoming sustainable? A framework to assess and communicate progresses	Environmental Science and Pollution Research	V. 26, n.º 35, December	10.1007/s11356-019-05102-4	WoS and SCOPUS	2.914	Q1	Q2
Caldas, P.; Ferreira, D.; Dollery, B.; Marques, R.C.	2019	Are there scale economies in urban waste and wastewater municipal services? A non-radial input-oriented model applied to the Portuguese local government	Journal of Cleaner Production	V. 219, 531-539, May.	10.1016/j.j clepro.2019.02.076	WoS and SCOPUS	6.395	Q1	Q1
Oliveira, V.; Sousa, V.; Dias-Ferreira, C.	2019	Artificial neural network modelling of the amount of separately-collected household packaging waste	Journal of Cleaner Production	V. 210, 401-409, February.	10.1016/j.j clepro.2018.11.063	WoS and SCOPUS	6.395	Q1	Q1
Tenreiro, T.; Branco, F.; Arruda, M.R.T.	2019	As habitações e os fogos florestais	RevistaConstruir	Ano XV Número 388		Non (WoS, SCOPUS) National			
Lamba, J. R.; Silvestre, H. C.; Correia, A. M.	2019	As teorias do processo político na avaliação das políticas públicas brasileiras: aplicações e agenda de pesquisa' (Theories of the policy process for public policy analysis in Brazil: studies and research agenda)	Revista Brasileira de Informação Bibliográfica em Ciências Sociais – BIB	n.º 1, 1-31, February	10.17666/bib8804/2019	Non (WoS, SCOPUS) National			
Zhou, D.; Liu, Y.; Hu, S.; Hu, D.; Neto, S.; Zhang, Y.	2019	Assessing the hydrological behaviour of large-scale potential green roofs retrofitting scenarios in Beijing	Urban Forestry & Urban Greening	V. 40, 105-113, April.	10.1016/j. ufug.2017.12.010	WoS and SCOPUS	3.043	Q1	Q1
Barreiras, N.; Correia, F.N.; Matos, R.S.	2019	Assessment of a Web-Based Water Information System Performance in the Context of Groundwater Governance	Water Resources Management	V.33, nº 14, 4939-4953, November	10.1007/s11269-019-02429-y	WoS and SCOPUS	2.987	Q1	Q1
Farinha, C.B.; de Brito, J.; Veiga, R.	2019	Assessment of glass fibre reinforced polymer waste reuse as filler in mortars	Journal of Cleaner Production	V. 210, 1579-1594, February.	10.1016/j.j clepro.2018.11.080	WoS and SCOPUS	6.395	Q1	Q1
Carmo, R.N.F.; Valença, J.; Bencardino, F.; Cristofaro, S.; Chiera, D.	2019	Assessment of plastic rotation and applied load in reinforced concrete, steel and timber beams using image-based analysis	Engineering Structures	V. 198, art. 109519, November.	10.1016/j. engstruct.2019.109519	WoS and SCOPUS	3.084	Q1	Q1
Amaral, S.D.; Quaresma, A.L.; Branco, P.; Romão, F.; Katopodis, C.; Ferreira, M.T.; Pinheiro, A.N.; Santos, J.M.	2019	Assessment of retrofitted ramped weirs to improve passage of potamodromous fish	Water	V. 11, nº 12, art. 2441, November.	10.3390/w11122441	WoS and SCOPUS	2.524	Q1	Q2
Gouveia, N.D.; Faria, D.V.M.; Ramos, A.P.	2019	Assessment of SFRC flat slab punching behaviour – part I: monotonic vertical loading	Magazine of Concrete Research	V. 71, n.º 11, 587-598, June.	10.1680/j macr.17.00343	WoS and SCOPUS	2.026	Q1	Q2
Gouveia, N.D.; Faria, D.V.M.; Ramos, A.P.	2019	Assessment of SFRC flat slab punching behaviour – part II: reversed horizontal cyclic loading	Magazine of Concrete Research	V. 71, n.º 1, 26-42, January.	10.1680/j macr.17.00344	WoS and SCOPUS	2.026	Q1	Q2

Santos, B.O.; Valença, J.; Júlio, E.	2019	Automatic mapping of cracking patterns on concrete surfaces with biological stains using hyper-spectral images processing	Structural Control Health Monitoring	V. 26, n.º 3, e2320, March.	10.1002/stc.2320	WoS and SCOPUS	3.74	Q1	Q1
Kurda, R.; Silvestre, J.; de Brito, J.	2019	Avaliação do Ciclo de Vida de Betão com Volume Elevado de Agregados de Betão Triturado e Cinzas Volantes	Construção Magazine	n.º 90, 16-19, Março / Abril.		Non (WoS, SCOPUS) National			
Bento, R.	2019	Avaliação sísmica do património cultural construído: uma abordagem interdisciplinar	Construção Magazine, Revista Técnico-científica de Engenharia Civil	V. 91, 26-11		Non (WoS, SCOPUS) National			
Torabian, A.; Isufi, B.; Mostofinejad, D.; Ramos, A.M.P.	2019	Behavior of thin lightly reinforced flat slabs under concentric loading	Engineering Structures	V. 196, art. 109327, October.	10.1016/j.engstruct.2019.109327	WoS and SCOPUS	3.084	Q1	Q1
Sousa, V.; Dias-Ferreira, C.; Fernández-Braña, A.; Meireles, I.	2019	Benchmarking operational efficiency in waste collection: Discussion of current approaches and possible alternatives	Waste Management & Research	V. 37, n.º 8, 803-814, -.	10.1177/0734242X19854119	WoS and SCOPUS	2.015	Q2	Q3
Rosa, I.C.; Firmo, J.P.; Correia, J.R.; Barros, J.A.O.	2019	Bond behaviour of sand coated GFRP bars to concrete at elevated temperature – Definition of bond vs. slip relations	Composites Part B: Engineering	V. 160, 329-340, March.	10.1016/j.compositesb.2018.10.020	WoS and SCOPUS	6.864	Q1	Q1
Yang, Y.; Silva, M.A.G.; Biscaia, H.; Chastre, C.	2019	Bond durability of CFRP laminates-to-steel joints subjected to freeze-thaw	Composite Structures	V. 212, 243-258, March.	10.1016/j.compstruct.2019.01.016	WoS and SCOPUS	4.829	Q1	Q1
Santos, P.; Correia, J.R.; Godinho, L.; Dias, A.M.P.G.; Dias, A.	2019	Bonding quality assessment of cross-layered Maritime pine elements glued with one-component polyurethane adhesive	Construction and Building Materials	V. 211, 571-582, June.	10.1016/j.conbuildmat.2019.03.064	WoS and SCOPUS	4.046	Q1	Q1
Alves, R.; Faria, P.; Brás, A.	2019	Brita Lavada – An eco-efficient decorative mortar from Madeira Island	Journal of Building Engineering	V. 24, art. 100756, July.	10.1016/j.jobe.2019.100756	WoS and SCOPUS	2.378	Q1	Q2
Ardıçoğlu, M.; Kuriqi, A.	2019	Calibration of channel roughness in intermittent rivers using HEC-RAS model: case of Sarımsaklı creek, Turkey	SN Applied Sciences	V.1, Nº 9, art.UNSP 1080, September	10.1007/s42452-019-1141-9	Non (WoS, SCOPUS) International			
Santos, T.; Faria, P.; Silva, V.	2019	Can an earth plaster be efficient when applied on different masonries?	Journal of Building Engineering	V. 23, 314-323, May.	10.1016/j.jobe.2019.02.011	WoS and SCOPUS	2.378	Q1	Q2
Reis, V.; Almeida, A.	2019	Capacity evaluation of a railway terminal using microsimulation: Case study of a freight village in Turin	Frontiers in Built Environment	V. 5, art. 75, May.	10.3389/fbuil.2019.00075	Non (WoS, SCOPUS) International			
Hawreen, A.; Bogas, J.A.	2019	Capillary absorption and oxygen permeability of concrete reinforced with carbon nanotubes	Advances in Civil Engineering Materials	V. 8, n.º 3, 307-326, -.	10.1520/ACEM20180156	Non WoS; SCOPUS		Q2	
Pedroso, M.; de Brito, J.; Silvestre, J.	2019	Caracterização do Comportamento de Paredes com Materiais de Absorção Sonora Eco-Eficientes (Tradicionais e Inovadores)	Engenharia Civil	n.º 56, 44-56, Maio.		Non (WoS, SCOPUS) National		-	-
Kurda, R.; de Brito, J.; Silvestre, J.D.	2019	Carbonation of concrete made with high amount of fly ash and recycled concrete aggregates for utilization of CO2	Journal of CO2 Utilization	V. 29, 12-19, January.	10.1016/j.jcou.2018.11.004	WoS and SCOPUS	5.189	Q1	Q1
Gonçalves, A.M.; Candeias, P.; Guerreiro, L.; Ferreira, J.G.; Campos Costa, A.	2019	Characterization of timber masonry walls with dynamic tests	International Journal of Architectural Heritage	V. 13, n.º 2, 298-313, February.	10.1080/15583058.2018.1436727	WoS and SCOPUS	1.44	Q1	Q3
Almeida-Fernandes, L.; Silvestre, N.; Correia, J.R.	2019	Characterization of transverse fracture properties of pultruded GFRP material in tension	Composites Part B: Engineering	V. 175, art. 107095, October.	10.1016/j.compositesb.2019.107095	WoS and SCOPUS	6.864	Q1	Q1
Pedroso, M.; de Brito, J.; Silvestre, J.D.	2019	Characterization of walls with eco-efficient acoustic insulation materials (traditional and	Construction and Building Materials	V. 222, 892-902, October.	10.1016/j.conbuildmat.2019.07	WoS and SCOPUS	4.046	Q1	Q1

		innovative)			.259				
Azevedo, A.R.G.; Alexandre, J.; Pessanha, L.; Manhães, R.; de Brito, J.; Marvila, M.T.	2019	Characterizing the paper industry sludge for environmentally-safe disposal	Waste Management	V. 95, 43-52, July.	10.1016/j.wasman.2019.06.001	WoS and SCOPUS	5.431	Q1	Q1
Galan, A.; Simarro, G.; Fael, C.; Cardoso, A.H.	2019	Clear-water scour at submerged pile groups	International Journal of River Basin Management	V. 17, n.º 1, 101-108, -.	10.1080/15715124.2018.1446964	Non WoS; SCOPUS		Q2	
Mendes, M.P.; Cherubini, P.; Plieninger, T.; Ribeiro, L.; Costa, A.	2019	Climate effects on stem radial growth of <i>Quercus suber</i> L.: Does tree size matter?	Forestry	V. 92, n.º 1, 73-84, January.	10.1093/forestry/cpy034	WoS and SCOPUS	2.876	Q1	Q1
Lima, G.M.; Luvizotto Jr, E.; Brentan, B.M.; Ramos, H.M.	2019	Closure to "Leakage Control and Energy Recovery Using Variable Speed Pumps as Turbines" by Gustavo Meirelles Lima, EdevarLuvizotto Jr., Bruno Melo Brentan, and Helena M. Ramos	Journal of Water Resources Planning and Management	V. 45, n.º 6, art. 07019002, June.	10.1061/(ASCE)WR.1943-5452.0001113	WoS and SCOPUS	3.404	Q1	Q1
Miranda, J.; Valença, J.; Júlio, E.	2019	Colored concrete restoration method: For chromatic design and application of restoration mortars on smooth surfaces of colored concrete	Structural Concrete	V. 20, n.º 4, 1391-1401, August.	10.1002/suco.201900006	WoS and SCOPUS	1.885	Q1	Q2
Carl, C.; Lopes, P.; Sá da Costa, M.; Canon Falla, G.; Leischner, S.; Micaelo, R.	2019	Comparative study of the effect of long-term ageing on the behaviour of bitumen and mastics with mineral fillers	Construction and Building Materials	V. 225, 76-89, November.	10.1016/j.conbuildmat.2019.07.150	WoS and SCOPUS	4.046	Q1	Q1
Kazemi, M.; Madandoust, R.; de Brito, J.	2019	Compressive strength assessment of recycled aggregate concrete using Schmidt rebound hammer and core testing	Construction and Building Materials	V. 224, 630-638, November.	10.1016/j.conbuildmat.2019.07.110	WoS and SCOPUS	4.046	Q1	Q1
Kurda, R.; de Brito, J.; Silvestre, J.D.	2019	Concrete with high volume of recycled concrete aggregates and fly ash: Shrinkage behavior modeling	ACI Materials Journal	V. 116, n.º 1, 83-94, January.	10.14359/51710964	WoS and SCOPUS	1.453	Q1	Q3
Kurda, R.; de Brito, J.; Silvestre, J.D.	2019	CONCRETOP - A multi-criteria decision method for concrete optimization	Environmental Impact Assessment Review	V. 74, 73-85, January.	10.1016/j.eiar.2018.10.006	WoS and SCOPUS	3.749	Q1	Q1
Kurda, R.; de Brito, J.; Silvestre, J.D.	2019	CONCRETOP method: Optimization of concrete with various incorporation ratios of fly ash and recycled aggregates in terms of quality performance and life-cycle cost and environmental impacts	Journal of Cleaner Production	V. 226, 642-657, July.	10.1016/j.jclepro.2019.04.070	WoS and SCOPUS	6.395	Q1	Q1
Novara, D.; Carravetta, A.; McNabola, A.; Ramos, H.M.	2019	Cost model for pumps as turbines in run-of-river and in-pipe microhydropower applications	Journal of Water Resources Planning and Management	V. 145, n.º 5, -, May.	10.1061/(ASCE)WR.1943-5452.0001063	WoS and SCOPUS	3.404	Q1	Q1
Hawreen, A.; Bogas, J.A.	2019	Creep, shrinkage and mechanical properties of concrete reinforced with different types of carbon nanotubes	Construction and Building Materials	V. 198, 70-81, February.	10.1016/j.conbuildmat.2018.11.253	WoS and SCOPUS	4.046	Q1	Q1
Picado-Santos, L.; Capitão, S.; Feiteira Dias, J.L.	2019	Crumb rubber asphalt mixtures by dry process: Assessment after eight years of use on a low/medium trafficked pavement	Construction and Building Materials	V. 215, 9-21, August.	10.1016/j.conbuildmat.2019.04.129	WoS and SCOPUS	4.046	Q1	Q1
Biscaia, H.C.; Micaelo, R.; Chastre, C.	2019	Cyclic performance of adhesively bonded joints using the Distinct Element Method: Damage and parametric analysis	Composites Part B: Engineering	V. 178, art. 107468, December.	10.1016/j.compositesb.2019.107468	WoS and SCOPUS	6.864	Q1	Q1
Romão, F.; Quaresma A.L.; Santos, J.M.; Branco, P.; Pinheiro, A.N.	2019	Cyprinid passage performance in an experimental multislot fishway across distinct seasons	Marine and Freshwater research	V. 70, n.º6 881-890329-340, February	10.1071/MF18232	WoS and SCOPUS	1.859	Q2	Q2
Conceição, J.; Poça, B.; de Brito, J.; Flores-Colen, I.	2019	Data analysis of inspection, diagnosis, and rehabilitation of flat roofs	Journal of Performance of Constructed	V. 33, n.º 1, -, February.	10.1061/(ASCE)CF.1943-	WoS and SCOPUS	1.542	Q1	Q3

Castelo, A.			Facilities		5509.0001 252				
Oliveira, V.; Sousa, V.; Dias- Ferreira, C.	2019	Dataset of socio-economic and waste collection indicators for Portugal at municipal level	Data in Brief	V. 22, 658- 661, February.	10.1016/j. dib.2018.1 2.069	Non WoS; SCOPUS		Q1	
Ferreira, A., Pinheiro, M.D.; de Brito, J.; Mateus, R.	2019	Decarbonizing strategies of the retail sector following the Paris Agreement	Energy Policy	V. 135, art. 110999, December.	10.1016/j. enpol.201 9.110999	WoS and SCOPUS	4.880	Q1	Q1
Ribeiro, A.M.G.; Capitão, S.D.; Correia, R.G.	2019	Deciding on maintenance of small municipal roads based on GIS simplified procedures	Case Studies on Transport Policy	V. 7, n.º 2, 330-337, June.	10.1016/j. cstp.2019. 03.011	Non WoS; SCOPUS		Q2	
Tošić, N.; Marinković, S.; de Brito, J.	2019	Deflection control for reinforced recycled aggregate concrete beams: Experimental database and extension of the fib Model Code 2010 model	Structural Concrete	V. 20, n.º 6, 2015-2029, December.	10.1002/s uco.20190 0035	WoS and SCOPUS	1.885	Q1	Q2
Cabral, M.; Loureiro, D.; Amado, C.; Mamade, A.; Covas, D.	2019	Demand scenario planning approach using regression techniques and application to network sectors in Portugal	Water Policy	V. 21, n.º 2, 394-411, April.	10.2166/w p.2019.02 9	WoS and SCOPUS	1.011	Q2	Q4
Macedo, M.; de Brito, J.; Silva, A.; Cruz, C.O.	2019	Design of an insurance policy model applied to natural stone facade claddings	Buildings	V. 9, n.º 5, art. 111, May.	10.3390/b uildings90 50111	Non WoS; SCOPUS		Q1	
Dinis, P.B.; Camotim, D.; Landesmann, A.	2019	Design of simply supported hot-rolled steel short-to-intermediate angle columns	Steel Construction	V. 12, n.º 4, 278-290, November.	10.1002/st co.201900 029	Non WoS; SCOPUS		Q2	
Gavali, H.R.; Brás, A.; Faria, P.; Ralegaonkar, R.V.	2019	Development of sustainable alkali-activated bricks using industrial wastes	Construction and Building Materials	V. 215, 180- 191, August.	10.1016/j. conbuildm at.2019.04 .152	WoS and SCOPUS	4.046	Q1	Q1
Ahmed, H.; Bogas, J.A.; Guedes, M.; Pereira, M.F.C.	2019	Dispersion and reinforcement efficiency of carbon nanotubes in cementitious composites	Magazine of Concrete Research	V. 71, n.º 8, 408-423, April.	10.1680/j macr.17.0 0562	WoS and SCOPUS	2.016	Q1	Q2
Ferreira, D.C. Marques, R.C.	2019	Do quality and access to hospital services impact on their technical efficiency?	Omega	V. 86, 218- 236, July.	10.1016/j. omega.201 8.07.010	WoS and SCOPUS	5.341	Q1	Q1
Silva, A.; de Brito, J.	2019	Do we need a buildings' inspection, diagnosis and service life prediction software?	Journal of Building Engineering	V. 22, 335- 348, March.	10.1016/j.j obe.2018. 12.019	WoS and SCOPUS	2.378	Q1	Q2
Nunes, D.M.; Pinheiro, M.D.; Tomé, A.	2019	Does a review of urban resilience allow for the support of an evolutionary concept?	Journal of Environmental Management	V. 244, 422- 430, August.	10.1016/j.j envman.20 19.05.027	WoS and SCOPUS	4.865	Q1	Q1
Marques, R. C.; Silvestre, H. C.	2019	Does Regulation really work? A Principal-agent approach to the Portuguese water sector	Economia Pubblica	n.º 1, 49-67, May	10.3280/E P2019- 001003.	Non (WoS, SCOPUS) National			
Landesmann, A.; Camotim, D.; Silva, F.C.M.	2019	DSM design of cold-formed steel columns failing in distortional modes at elevated temperatures	International Journal of Steel Structures	V. 19, n.º 3, 1023-1041, June.	10.1007/s 13296- 018-0184- x	WoS and SCOPUS	0.873	Q2	Q4
Santos, S.A.; Silva, P.R.; de Brito, J.	2019	Durability evaluation of self- compacting concrete with recycled aggregates from the precast industry	Magazine of Concrete Research	V. 71, n.º 24, 1265-1282, December.	10.1680/j macr.18.0 0225	WoS and SCOPUS	2.026	Q1	Q2
Sousa, J.M.; Correia, J.R.; Gonilha, J.; Cabral-Fonseca, S.; Firmo, J.P.; Keller, T.	2019	Durability of adhesively bonded joints between pultruded GFRP adherends under hygrothermal and natural ageing	Composites Part B: Engineering	V. 158, 475- 488, February.	10.1016/j. composite sb.2018.09 .060	WoS and SCOPUS	6.864	Q1	Q1
Evangelista, L.; de Brito, J.	2019	Durability of crushed fine recycled aggregate concrete assessed by permeability-related properties	Magazine of Concrete Research	V. 71, n.º 21, 1142-1150, November.	10.1680/j macr.18.0 0093	WoS and SCOPUS	2.026	Q1	Q2
Göswein, V.; Silvestre, J.D.; Habert, G.; Freire, F.	2019	Dynamic assessment of construction materials in urban building stocks: A critical review	Environmental Science and Technology	V. 53, n.º 17, 9992-10006, April.	10.1021/a cs.est.9b0 1952	Non (WoS, SCOPUS) Internat ional			
Moreira, M.; Hayes, D.S.; Boavida, I.; Schletterer, M.;	2019	Ecologically-based criteria for hydropeaking mitigation: A review	Science of The Total Environment	V. 657, 1508- 1522, March.	10.1016/j.s citotenv.2 018.12.107	WoS and SCOPUS	5.589	Q1	Q1

Schmutz, S.; Pinheiro, A.									
Garrido, R.; Silvestre, J.D.; Flores-Colen, I.; Júlio, M.F.; Pedroso, M.	2019	Economic assessment of the production of subcritically dried silica-based aerogels	Journal of Non-Crystalline Solids	V.516, 26-34, July	10.1016/j.noncrysol.2019.04.016	WoS and SCOPUS	2.600	Q1	Q1
Caldas, P.; Ferreira, D.; Dollery, B.; Marques, R.C.	2019	Economies of scope in Portuguese local government using an augmented Hicks-Moorsteen approach	Regional Studies	V. 53, n.º 7, 963-976, -.	10.1080/0343404.2018.1508872	WoS and SCOPUS	3.074	Q1	Q1
Coronado-Hernández, O.E.; Besharat, M.; Fuentes-Miquel, V.S.; Ramos, H.M.	2019	Effect of a commercial air valve on the rapid filling of a single pipeline: a numerical and experimental analysis	Water	V. 11, n.º 9, art. 1184, September.	10.3390/w11091814	WoS and SCOPUS	2.524	Q1	Q2
Ghorbani, S.; Sharifi, S.; Ghorbani, S.; Tam, V.W.Y.; de Brito, J.; Kurda, R.	2019	Effect of crushed concrete waste's maximum size as partial replacement of natural coarse aggregate on the mechanical and durability properties of concrete	Resources, Conservation and Recycling	V. 149, 644-673, October.	10.1016/j.resconrec.2019.06.030	WoS and SCOPUS	7.044	Q1	Q1
Ghorbani, S.; Ghorbani, S.; Tao, Z.; de Brito, J.; Tavakkolizadeh, M.	2019	Effect of magnetized water on foam stability and compressive strength of foam concrete	Construction and Building Materials	V. 197, 280-290, February.	10.1016/j.conbuildmat.2018.11.160	WoS and SCOPUS	4.046	Q1	Q1
Barros, M.; Cavaco, E.; Neves, E.; Júlio, E.	2019	Effect of non-structural masonry brick infill walls on the robustness of a RC framed building severely damaged due to a landslide	Engineering Structures	V. 180, 274-283, February.	10.1016/j.engstruct.2018.11.027	WoS and SCOPUS	3.084	Q1	Q1
Ghalehnovi, M.; Roshan, N.; Hakak, E.; Shamsabadi, E.A.; de Brito, J.	2019	Effect of red mud (bauxite residue) as cement replacement on the properties of self-compacting concrete incorporating various fillers	Journal of Cleaner Production	V. 240, art. 118213, December.	10.1016/j.jclepro.2019.118213	WoS and SCOPUS	6.395	Q1	Q1
Madandoust, R.; Kazemi, M.; Talebi, P.K.; de Brito, J.	2019	Effect of the curing type on the mechanical properties of lightweight concrete with polypropylene and steel fibres	Construction and Building Materials	V. 223, 1038-1052, October.	10.1016/j.conbuildmat.2019.08.006	WoS and SCOPUS	4.046	Q1	Q1
Parracha, J.L.; Pereira, A.S.; da Silva, R.V.; Almeida, N.; Faria, P.	2019	Efficacy of iron-based bioproducts as surface biotreatment for earth-based plastering mortars	Journal of Cleaner Production	V. 237, art. 117803, November.	10.1016/j.jclepro.2019.117803	WoS and SCOPUS	6.395	Q1	Q1
Marchão, C.; Lúcio, V.; Ganz, H.R.	2019	Efficiency of the confinement reinforcement in anchorage zones of posttensioning tendons	Structural Concrete	V. 20, n.º 3, 1182-1198, June.	10.1002/suco.201800238	WoS and SCOPUS	1.885	Q1	Q2
Arruda, M.R.T.; Arruda, P.F.T.; Lopes, B.J.F.	2019	Energetic convergence of a new hybrid mixed finite element	Engineering Solid Mechanics	V. 7, n.º 4, 291-312, -.	10.5267/j.esm.2019.7.002	Non WoS; SCOPUS		Q1	
Silvestre, J.D.; Castelo, A.M.P.; Silva, J.J.B.C.; De Brito, J.M.C.L.; Pinheiro, M.D.	2019	Energy retrofitting of a buildings' envelope: Assessment of the environmental, economic and energy (3E) performance of a cork-based thermal insulating rendering mortar	Energies	V.13, n.º1, art. 143, December	10.3390/en13010143	WoS and SCOPUS	2.707	Q1	Q3
Chastre, C.; Ludovico-Marques, M.; Biscaia, H.	2019	Ensaaios não destrutivos usados na inspeção e diagnóstico de edifícios históricos de alvenaria de pedra	Construindo	V.11, n.º 3, 44-62, -.		Non (WoS, SCOPUS) National			
Gonçalves, M.; Silvestre, J.D.; de Brito, J.; Gomes, R.	2019	Environmental and economic comparison of the life cycle of waterproofing solutions for flat roofs	Journal of Building Engineering	V. 24, art. 100710, July.	10.1016/j.jobe.2019.02.002	WoS and SCOPUS	2.378	Q1	Q2
Silva, R.V.; de Brito, J.; Lynn, C.J.; Dhir, R.K.	2019	Environmental impacts of the use of bottom ashes from municipal solid waste incineration: A review	Resources, Conservation and Recycling	V. 140, 23-35, January.	10.1016/j.resconrec.2018.09.011	WoS and SCOPUS	7.044	Q1	Q1
Gomes, R.; Silvestre, J.D.; de Brito, J.	2019	Environmental life cycle assessment of thermal insulation tiles for flat roofs	Materials	V. 12, n.º 16, art. 2595, -.	10.3390/ma12162595	WoS and SCOPUS	2.972	Q2	Q2
Barreiras, N.; Ribeiro, L.	2019	Estimating groundwater recharge uncertainty for a carbonate aquifer in a semi-arid region using the Kessler's method	Journal of Arid Environments	V. 165, 64-72, June.	10.1016/j.aridenv.2019.04.005	WoS and SCOPUS	1.825	Q2	Q3
Cabral, M.; Loureiro, D.; do	2019	Estimation of costs for monitoring urban water and	Journal of Water Supply: Research	V. 68, n.º 2, 87-97, March.	10.2166/aqua.2019.	WoS and	1.051	Q3	Q3

Céu Almeida, M.; Covas, D.		wastewater networks	and Technology - AQUA		043	SCOPUS			
Santos, A.C.; Portela, M.M.; Rinaldo, A.; Schaeffli, B.	2019	Estimation of streamflow recession parameters: New insights from an analytic streamflow distribution model	Hydrological Processes	V. 33, n.º 11, 1595-1609, May.	10.1002/hyp.13425	WoS and SCOPUS	3.189	Q1	Q1
Biscaia, H.C.; Chastre, C.; Silva, M.A.G.	2019	Estimations of the debonding process of aged joints through a new analytical method	Composite Structures	V. 211, 577-595, March.	10.1016/j.compstruct.2018.12.053	WoS and SCOPUS	4.829	Q1	Q1
Crucho, J.; Neves, J.; Capitão, S.; Picado-Santos, L.	2019	Evaluation of the durability of asphalt concrete modified with nanomaterials using the TEAGE aging method	Construction and Building Materials	V. 214, 178-186, July.	10.1016/j.conbuildmat.2019.04.121	WoS and SCOPUS	4.046	Q1	Q1
Santos, J.N.D.C.M.; Carvalheira, C.; Picado-Santos, L.; Magušić, R.	2019	Evaluation of the Speed Control Cameras in the City of Lisbon	Safety	V. 5, n.º 1, art. 4, -.	10.3390/safety5010004	Non (WoS, SCOPUS) International			
Fernandes, C.; Cruz, C.O.; Moura, F.	2019	Ex post evaluation of PPP government-led renegotiations: Impacts on the financing of road infrastructure	The Engineering Economist	V. 64, n.º 2, 116-141, -.	10.1080/013791X.2018.1559384	WoS and SCOPUS	1.114	Q1	Q4
Catalão, F.P.; Cruz, C.O.; Sarmento, J.M.	2019	Exogenous determinants of cost deviations and overruns in local infrastructure projects	Construction Management and Economics	V. 37, n.º 12, 697-711, December.	10.1080/01446193.2019.1576915	Non WoS; SCOPUS		Q1	
Martins, D.; Proença, M.; Gonilha, J.; Sá, M.; Correia, J.R.; Silvestre, N.	2019	Experimental and numerical analysis of GFRP frame structures. Part 1: Cyclic behaviour at the connection level	Composite Structures	V. 220, 304-317, July.	10.1016/j.compstruct.2019.03.097	WoS and SCOPUS	4.829	Q1	Q1
Martins, D.; Sá, M.; Gonilha, J.; Correia, J.R.; Silvestre, N.; Ferreira, J.G.	2019	Experimental and numerical analysis of GFRP frame structures. Part 2: Monotonic and cyclic sway behaviour of plane frames	Composite Structures	V. 220, 194-208, July.	10.1016/j.compstruct.2019.03.098	WoS and SCOPUS	4.829	Q1	Q1
Ljubinković, F.; Martins, J.P.; Gervásio, H.; Simões da Silva, L.; Pedro, J.O.	2019	Experimental behavior of curved bottom flanges in steel box-girder bridge decks	Journal of Constructional Steel Research	V. 160, 169-188, September.	10.1016/j.jcsr.2019.05.031	WoS and SCOPUS	2.65	Q1	Q2
Muhaj, H.; Marchão, C.; Lúcio, V.; Gião, R.	2019	Experimental evaluation of cyclic loading test procedure including gravity load on RC beams	Structural Concrete	V. 20, n.º 4, 1292-1306, August.	10.1002/suco.201800255	WoS and SCOPUS	1.885	Q1	Q2
Pacheco, J.; de Brito, J.; Chastre, C.; Evangelista, L.	2019	Experimental investigation on the variability of the main mechanical properties of concrete produced with coarse recycled concrete aggregates	Construction and Building Materials	V. 201, 110-120, March.	10.1016/j.conbuildmat.2018.12.200	WoS and SCOPUS	4.046	Q1	Q1
Amaral, S.; Viseu, T.; Ferreira, R.M.L.	2019	Experimental methods for local-scale characterization of hydro-morphodynamic dam breach processes. Breach detection, 3D reconstruction, flow kinematics and spacial surface velocimetry	Flow Measurement and Instrumentation	V. 70, art. 101658, December.	10.1016/j.flowmeasinst.2019.10.1658	WoS and SCOPUS	1.977	Q1	Q2
Furlan, P.; Pfister, M.; Matos, J.S.G.; Amado, C.; Schleiss, A.J.	2019	Experimental repetitions and blockage of large stems at ogee crested spillways with piers	Journal of Hydraulic Research	V. 57, n.º 2, 250-262, March.	10.1080/00221686.2018.1478897	WoS and SCOPUS	2.974	Q1	Q1
Rebello, H.B.; Santos, F.A.; Cismaşiu, C.; Santos, D.	2019	Exploratory study on geodesic domes under blast loads	International Journal of Protective Structures	V. 10, n.º 4, 439-456, December.	10.1177/2041419618820540	Non WoS; SCOPUS		Q1	
Cunha, J.; Reis, V.	2019	Exploring the added-value of synchro-modality with micro-simulation	European Transport - Trasporti Europei	V. 72, , -.	-	Non WoS; SCOPUS		Q4	
CARUSO, C.; BENTO, R.; CASTRO M.	2019	Feasibility of retrofitting solutions for an old RC wall-frame building in Lisbon	Revista Portuguesa de Engenharia de Estruturas	Série III n.º 11 novembro de 2019		Non (WoS, SCOPUS) National			
Nunes, A.M.; Ferreira, D.C.; Fernandes, A.C.	2019	Financial crisis in Portugal: Effects in the health care sector	International Journal of Health Services	V. 49, n.º 2, -, 237-259.	10.1177/0020731418822227	WoS and SCOPUS	1.75	Q2	Q3
Simões, F.M.F.; Pinto da Costa, A.	2019	Finite element steady state solution of a beam on a frictionally damped foundation	International Journal of Non-Linear Mechanics	V. 117, art. 103247, December.	10.1016/j.jnonlinmec.2019.1032	WoS and SCOPUS	2.225	Q1	Q2

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Figueiredo, E.; Moldovan, I.; Santos, A.; Campos, P.; Costa, J.C.W.A.	2019	Finite element-based machine-learning approach to detect damage in bridges under operational and environmental variations	Journal of Bridge Engineering	V. 24, n.º 7, -, July.	10.1061/(ASCE)BE.1943-5592.0001432	WoS and SCOPUS	1.84	Q1	Q2
Areias, P.; Carrilho Lopes, J.; Santos, M.P.; Rabczuk, T.; Reinoso, J.	2019	Finite strain analysis of limestone / basaltic magma interaction and fracture: Low order mixed tetrahedron and remeshing	European Journal of Mechanics - A/Solids	V. 73, 235-247, January/February.	10.1016/j.euromechsol.2018.09.003	WoS and SCOPUS	2.931	Q1	Q1
Costa, M.J.; Fuentes-Pérez, J.F.; Boavida, I.; Tuhtan, J.A.; Pinheiro, A.N.	2019	Fish under pressure: Examining behavioural responses of Iberian barbel under simulated hydropeaking with instream structures	PLoS ONE	V. 14, n.º 1, art. e0211115, January.	10.1371/journal.pone.0211115	WoS and SCOPUS	2.776	Q1	Q2
Lapi, M.; Pinho Ramos, A.; Orlando, M.	2019	Flat slab strenghtening techniques against punching-shear	Engineering Structures	V. 180, 160-180, February.	10.1016/j.engstruct.2018.11.033	WoS and SCOPUS	3.084	Q1	Q1
Simão, M.; Pérez-Sánchez, M.; Carravetta, A.; Ramos, H.M.	2019	Flow conditions for PATs operating in parallel: Experimental and numerical analyses	Energies	V. 12, nº 5, art. 901, March.	10.3390/en12050901	WoS and SCOPUS	2.707	Q1	Q3
Kuriqi, A.; Pinheiro, A.N.; Sordo-Ward, A.; Garrote, L.	2019	Flow regime aspects in determining environmental flows and maximising energy production at run-of-river hydropower plants	Applied Energy	V. 256, art. 113980, December.	10.1016/j.apenergy.2019.113980	WoS and SCOPUS	8.426	Q1	Q1
Marques, T.S.; Silva, V.D.; Júlio, E.	2019	Form finding of continua shells with lattice spring models	Engineering Structures	V. 200, art. 109683, December.	10.1016/j.engstruct.2019.109683	WoS and SCOPUS	3.084	Q1	Q1
Silva, B.; Ferreira Pinto, A.P.; Gomes, A.; Candeias, A.	2019	Fresh and hardened state behaviour of aerial lime mortars with superplasticizer	Construction and Building Materials	V. 225, 1127-1139, November.	10.1016/j.conbuildmat.2019.07.275	WoS and SCOPUS	4.046	Q1	Q1
Barroqueiro, T.; da Silva, P.R.; de Brito, J.	2019	Fresh-state and mechanical properties of high-performance self-compacting concrete with recycled aggregates from the precast industry	Materials	V. 12, n.º 21, art. 3565, -.	10.3390/ma12213565	WoS and SCOPUS	2.972	Q2	Q2
Prieto A., Macías-Bernal, J.M., Silva A., Ortiz P.	2019	Fuzzy decision-support system for safeguarding tangible and intangible cultural heritage	Sustainability	V. 11, n.º 14, 1 July 2019, Article number 3953	10.3390/su11143953	WoS and SCOPUS	2.592	Q2	Q2
Ruggerini, A.W.; Madeo, A.; Gonçalves, R.; Camotim, D.; Ubertini, F.; de Miranda, S.	2019	GBT post-buckling analysis based on the Implicit Corotational Method	International Journal of Solids and Structures	V. 163, 40-60, May.	10.1016/j.ijsolstr.2018.12.011	WoS and SCOPUS	2.787	Q1	Q2
Basaglia, C.; Camotim, D.; Silvestre, N.	2019	GBT-based buckling analysis of steel cylindrical shells under combinations of compression and external pressure	Thin-Walled Structures	V. 144, art. 106274, November.	10.1016/j.tws.2019.106274	WoS and SCOPUS	3.488	Q1	Q1
Muresan, A.-A.; Nedelcu, M.; Gonçalves, R.	2019	GBT-based FE formulation to analyse the buckling behaviour of isotropic conical shells with circular cross-section	Thin-Walled Structures	V. 134, 84-101, January.	10.1016/j.tws.2018.07.032	WoS and SCOPUS	3.488	Q1	Q1
Gião, R.; Lúcio, V.; Chastre, C.	2019	Gravity load effects on the behaviour of reinforced concrete beam critical zones subjected to cyclic loads	Engineering Structures	V. 181, 503-518, February.	10.1016/j.engstruct.2018.12.045	WoS and SCOPUS	3.084	Q1	Q1
Costa, MJ; Pinheiro, A; Boavida, I.	2019	Habitat Enhancement Solutions for Iberian Cyprinids Affected by Hydropeaking: Insights from Flume Research	Sustainability	V. 11, nº 24, 6998, December	10.3390/su11246998	WoS and SCOPUS	2.592	Q2	Q2
Li, M.; Greenfield, B.K.; Nunes, L.M.; Dang, F.; Liu, H.-L.; Zhou, D.-M.; Yin, B.	2019	High retention of silver sulfide nanoparticles in natural soils	Journal of Hazardous Materials	V. 378, art. 120735, October.	10.1016/j.jhazmat.2019.06.012	WoS and SCOPUS	7.650	Q1	Q1
Delgado, J.; Andolfatto, L.; Covas, D.I.C.; Avellan, F.	2019	Hill chart modelling using the Hermite polynomial chaos expansion for the performance prediction of pumps running as turbines	Energy Conversion and Management	V. 187, 578-592, May.	10.1016/j.enconman.2019.02.051	WoS and SCOPUS	7.181	Q1	Q1

Salvado, F.; Almeida, N.M.; Azevedo, A.V.	2019	Historical analysis of the economic life-cycle performance of public school buildings	Building Research & Information	V. 47, n.º 7, 813-832, -.	10.1080/09613218.2019.1612730	WoS and SCOPUS	3.744	Q1	Q1
Moldovan, I.; Coutinho, A.; Cismaşiu, I.	2019	Hybrid-Trefftz finite elements for non-homogeneous parabolic problems using a novel dual reciprocity variant	Engineering Analysis with Boundary Elements	V. 106, 228-242, September.	10.1016/j.enganabou.2019.05.012	WoS and SCOPUS	2.243	Q1	Q1
Gonçalves, T.; Silva, R.V.; de Brito, J.; Fernández, J.; Esquinas, A.R.	2019	Hydration of reactive MgO as partial cement replacement and its influence on the macroperformance of cementitious mortars	Advances in Materials Science and Engineering	V. 2019, art. 9271507, -.	10.1155/2019/9271507	WoS and SCOPUS	1.399	Q2	Q4
Fuentes-Pérez, J.F.; Tuhtan, J.A.; Eckert, M.; Romão, F.; Ferreira, M.T.; Kruusmaa, M.; Branco, P.	2019	Hydraulics of vertical-slot fishways: Nonuniform profiles	Journal of Hydraulic Engineering	V. 145, n.º 2, art. 06018020, February.	10.1061/(ASCE)HY.1943-7900.0001565	WoS and SCOPUS	2.206	Q1	Q1
Ali, R.; Kuriqi, A.; Abubaker, S.; Kisi, O.	2019	Hydrologic alteration at the upper and middle part of the Yangtze River, China: Towards sustainable water resource management under increasing water exploitation	Sustainability	V. 11, n.º 19, art. 5176, October.	10.3390/su11195176	WoS and SCOPUS	2.592	Q2	Q2
Prieto A., Macías-Bernal J. M., Chávez M.-J., Alejandro F. J., Silva A.	2019	Impact of maintenance activities in the functionality of heritage buildings	Journal of Performance of Constructed Facilities	V. 33, n.º 2, June	10.1061/(ASCE)CF.1943-5509.0001271	WoS and SCOPUS	1.542	Q1	Q3
Moret Rodrigues, A.; Santos, M.; Gomes, M.G.; Duarte, R.	2019	Impact of Natural Ventilation on the Thermal and Energy Performance of Buildings in a Mediterranean Climate	Buildings	Volume 9, n.º 5, art.123, May.	10.3390/buildings9050123	Non WoS; SCOPUS		Q1	
Gomes, M.G.; Silva, C.M.; Valadas, A.S.; Silva, M.	2019	Impact of vegetation, substrate, and irrigation on the energy performance of green roofs in a Mediterranean climate	Water	V. 11, n.º 10, art. 2016, October.	10.3390/w11102016	WoS and SCOPUS	2.524	Q1	Q2
Gonçalves, M.; Silvestre, J.D.; de Brito, J.; Gomes, R.	2019	Impacte Ambiental Comparado do Ciclo de Vida de Soluções de Impermeabilização de Coberturas Planas	Proelium	Série VIII, n.º 3, 87-114, June.	comum.rc.aap.pt/handle/10400.26/13533	Non (WoS, SCOPUS) National			
Reis, V.; Escameia, A.; Macário, R.	2019	Improving distribution of freight in Lisbon downtown - Perspectives on the implementation of an urban consolidation centre to serve the HORECA segment	Revista Portuguesa de Estudos Regionais	V. 50, 85-101, -.	-	Non WoS; SCOPUS		Q3	
Andrea Mortesen Laura Tupenaite; Jurga Naimaviciene; Loret a Kanapeckiene; Miguel Amado; Pille Hamburg; Roger Howard	2019	Improving Transnational Education in Timber Construction by the Use of Project-Based Learning Approach: As Evaluated by Teachers and Students	Baltic Journal of Real Estate Economics and Construction Management	7 (1), 228-244	10.3846/mbmst.2019.029	Non (WoS, SCOPUS) International			
Bogas, J.A.; Carriço, A.; Pontes, J.	2019	Influence of cracking on the capillary absorption and carbonation of structural lightweight aggregate concrete	Cement and Concrete Composites	V. 104, art. 103382, November.	10.1016/j.cemconcomp.2019.103382	Non WoS; SCOPUS		Q1	
Mousavi, S.H.; Silva, A.; de Brito, J.; Ekhlas, A.	2019	Influence of design on the service life of indirectly fastened natural stone cladding	Journal of Performance of Constructed Facilities	V. 33, n.º 3, -, June.	10.1061/(ASCE)CF.1943-5509.0001277	WoS and SCOPUS	1.542	Q1	Q3
Firmino, J.P.; Roquette, M.G.; Correia, J.R.; Azevedo, A.S.	2019	Influence of elevated temperatures on epoxy adhesive used in CFRP strengthening systems for civil engineering applications	International Journal of Adhesion and Adhesives	V. 93, art. 102333, September.	10.1016/j.jadhadh.2019.01.027	WoS and SCOPUS	2.501	Q1	Q2
Farinha, C.B.; de Brito, J.; Veiga, R.	2019	Influence of forest biomass bottom ashes on the fresh, water and mechanical behaviour of cement-based mortars	Resources, Conservation and Recycling	V. 149, 750-759, October.	10.1016/j.resconrec.2019.06.020	WoS and SCOPUS	7.044	Q1	Q1
Kuriqi, A.; Pinheiro, A.N.;	2019	Influence of hydrologically based environmental flow methods on	Journal of Cleaner Production	V. 232, 1028-1042,	10.1016/j.jclepro.201	WoS and	6.395	Q1	Q1

Sordo-Ward, A.; Garrote, L.		flow alteration and energy production in a run-of-river hydropower plant		September.	9.05.358	SCOPUS			
Matos, R.V.; Ferreira, F.; Saldanha Matos, J.	2019	Influence of intermittence and pressure differentials in hydrogen sulfide concentration in a gravity sewer	Water	V. 2019, n.º 11, art. 1780, September.	10.3390/w11091780	WoS and SCOPUS	2.524	Q1	Q2
Ghalehnovi, M.; Karimpour, A.; de Brito, J.	2019	Influence of steel fibres on the flexural performance of reinforced concrete beams with lap-spliced bars	Construction and Building Materials	V. 229, art. 116853, December.	10.1016/j.conbuildm.2019.11.6853	WoS and SCOPUS	4.046	Q1	Q1
Pedreño-Rojas, M.A.; Flores-Colen, I.; de Brito, J.; Rodríguez-Liñán, C.	2019	Influence of the heating process on the use of gypsum wastes in plasters: Mechanical, thermal and environmental analysis	Journal of Cleaner Production	V. 215, 444-457, April.	10.1016/j.jclepro.2019.01.053	WoS and SCOPUS	6.395	Q1	Q1
Santos, R.; Costa, A.A.; Silvestre, J.D.; Pyl, L.	2019	Informetric analysis and review of literature on the role of BIM in sustainable construction	Automation in Construction	V. 103, 221-234, July.	10.1016/j.autcon.2019.02.022	WoS and SCOPUS	4.313	Q1	Q1
Cruz, C.O.; Sarmento, J.M.	2019	Institutional “tetrís” in infrastructure regulation: Harmonizing governance, regulation and policy-making in the transport sector	Case Studies on Transport Policy	V. 7, n.º 1, 22-27, March.	10.1016/j.cstp.2018.11.003	Non WoS; SCOPUS		Q2	
Pedro, J.; Silva, C.; Pinheiro, M.D.	2019	Integrating GIS spatial dimension into BREEAM communities sustainability assessment to support urban planning policies, Lisbon case study	Land Use Policy	V. 83, 424-434, April.	10.1016/j.landusepol.2019.02.003	WoS and SCOPUS	3.573	Q1	Q1
Santos, R.; Costa, A.A.; Silvestre, J.D.; Pyl, L.	2019	Integration of LCA and LCC analysis within a BIM-based environment	Automation in Construction	V. 103, 127-149, July.	10.1016/j.autcon.2019.02.011	WoS and SCOPUS	4.313	Q1	Q1
Sanchez, A.; G.-Gaya, C.; Zulueta, P.; Sampaio, A.Z.	2019	Introduction of Building Information Modelling in Industrial Engineering education: Students perception	Journal Applied Sciences	Vol. 9 (16), 16pgs, Aug.	https://doi.org/10.3390/app9163287	Non WoS; SCOPUS			Q2
Silvestre, H. C.; Marques, R. C.; Dollery, B. E.; Correia, A. M.	2019	Is cooperation cost reducing? An analysis of public-public partnerships and inter-municipal cooperation in Brazilian local government	Local Government Studies	1-23, May	10.1080/03003930.2019.1615462	WoS and SCOPUS	1.825		Q1
Espinosa, L.A.; Portela, M.M.; Pontes Filho, J.D.; Studart, T.M.C.; Santos, J.F.; Rodrigues, R.	2019	Jointly modeling drought characteristics with smoothed regionalized SPI series for a small island	Water	V. 11, n.º12, art. 2489, December	10.3390/w11122489	WoS and SCOPUS	2.524	Q1	Q2
Alyarbi, Y.; Camkin, J.; Neto, S.; Wegener, P.	2019	Knowledge, attitudes, skills, and aspirations of farmers in Abu Dhabi and Western Australia on groundwater management: A comparison study	World Water Policy	V.5, 161 - 178	10.1002/wwp2.12012	Non (WoS, SCOPUS) International			
Talento, K.; Amado, M.; Kullberg, J.C.	2019	Landscape: A Review with a European Perspective	Land	8 (6), 85.	10.3390/land8060085	Non WoS; SCOPUS		Q2	
Farinha, C.B.; Silvestre, J.D.; de Brito, J.; Veiga, R.	2019	Life cycle assessment of mortars with incorporation of industrial wastes	Fibers	V. 7, n.º 7, art. 59, -.	10.3390/fib7070059	Non WoS; SCOPUS		Q2	
Hayes, D.S.; Moreira, M.; Boavida, I.; Haslauer, M.; Unfer, G.; Zeiringer, B.; Greimel, F.; Auer, S.; Ferreira, T.; Schmutz, S.	2019	Life stage-specific hydropeaking flow rules	Sustainability	V. 2019, n.º 11, 1547, March.	10.3390/su11061547	WoS and SCOPUS	2.592	Q2	Q2
Lourenço, P.; Pinheiro, M.D.; Heitor, T.	2019	Light use patterns in Portuguese school buildings: User comfort perception, behaviour and impacts on energy consumption	Journal of Cleaner Production	V. 228, 990-1010, August.	10.1016/j.jclepro.2019.04.144	WoS and SCOPUS	6.395	Q1	Q1
Ali, R.; Kuriqi, A.; Abubaker, S.; Kisi, O.	2019	Long-term trends and seasonality detection of the observed flow in Yangtze River using Mann-Kendall and Sen's innovative trend method	Water	V. 11, 1855, September.	10.3390/w11091855	WoS and SCOPUS	2.524	Q1	Q2
Carvalho, A.F.; Picado Santos, L.	2019	Maintenance of airport pavements: the use of visual	International Journal of	V. 20, n.º 4, 425-431,	10.1080/10298436.2	WoS and	2.298	Q1	Q1

		inspection and IRI in the definition of degradation trends	Pavement Engineering	February.	017.1309189	SCOPUS			
Marques, I.G.; Nascimento, J.; Cardoso, R.M.; Miguéns, F.; Condesso de Melo, M.T.; Soares, P.M.M.; Gouveia, C.M.; Besson, C.B.	2019	Mapping the suitability of groundwater-dependent vegetation in a semi-arid Mediterranean area	Hydrology and Earth System Sciences	V. 23, 3525-3552, September.	10.5194/hess-23-3525-2019	WoS and SCOPUS	4.936	Q1	Q1
Félix, R.; Moura, F.; Clifton, K.J.	2019	Maturing urban cycling: Comparing barriers and motivators to bicycle of cyclists and non-cyclists in Lisbon, Portugal	Journal of Transport & Health	V. 15, art. 100628, December.	10.1016/j.jth.2019.10.0628	Non WoS; SCOPUS		Q1	
Ghorbani, S.; Taji, I.; de Brito, J.; Negahban, M.; Ghorbani, S.; Tavakkolizadeh, M.; Davoodi, A.;	2019	Mechanical and durability behaviour of concrete with granite waste dust as partial cement replacement under adverse exposure conditions	Construction and Building Materials	V. 194, 143-152, January.	10.1016/j.conbuildmat.2018.11.023	WoS and SCOPUS	4.046	Q1	Q1
Hawreen, A.; Bogas, J.A.; Kurda, R.	2019	Mechanical characterization of concrete reinforced with different types of carbon nanotubes	Arabian Journal for Science and Engineering	V. 44, n.º 10, 8361-8376, October.	10.1007/s13369-019-04096-y	WoS and SCOPUS	1.518	Q2	Q3
Bogas, J.A.; Carriço, A.; Pereira, M.F.C.	2019	Mechanical characterization of thermal activated low-carbon recycled cement mortars	Journal of Cleaner Production	V. 218, 377-389, May.	10.1016/j.jclepro.2019.01.325	WoS and SCOPUS	6.395	Q1	Q1
Fraternali, F.; Santos, F.A.	2019	Mechanical modeling of superelastic tensegrity braces for earthquake-proof structures	Extreme Mechanics Letters	V. 33, art. 100578, November.	10.1016/j.eml.2019.100578	WoS and SCOPUS	4.075	Q1	Q1
Duarte, G.; Bravo, M.; de Brito, J.; Nobre, J.	2019	Mechanical performance of shotcrete produced with recycled coarse aggregates from concrete	Construction and Building Materials	V. 210, 696-708, June.	10.1016/j.conbuildmat.2019.03.156	WoS and SCOPUS	4.046	Q1	Q1
Lei, P.; Nunes, L.M.; Liu, Y.-R.; Zhong, H.; Pan, K.	2019	Mechanisms of algal biomass input enhanced microbial Hg methylation in lake sediments	Environment International	V. 126, 279-288, May.	10.1016/j.envint.2019.02.043	WoS and SCOPUS	7.943	Q1	Q1
Fernandes, D.; de Brito, J.; Silva, A.C.F.	2019	Methodology for service life prediction of window frames	Canadian Journal of Civil Engineering	V. 46, n.º 11, 1010-1020, November.	10.1139/cjce-2018-0453	WoS and SCOPUS	0.748	Q2	Q4
Thomas, C.; Setián, J.; Polanco, J.A.; de Brito, J.; Fiol, F.	2019	Micro- and macro-porosity of dry- and saturated-state recycled aggregate concrete	Journal of Cleaner Production	V. 211, 932-940, February.	10.1016/j.jclepro.2018.11.243	WoS and SCOPUS	6.395	Q1	Q1
Simão, M.; Ramos, H.M.	2019	Micro Axial Turbine Hill Charts: Affinity Laws, Experiments and CFD Simulations for Different Diameters	Energies	V.12, nº15, 2908, 28 July 2019	10.3390/en12152908	WoS and SCOPUS	2.707	Q1	Q3
Pedro, D.; Guedes, M.; de Brito, J.; Evangelista, L.	2019	Microstructural features of recycled aggregate concrete: From non-structural to high-performance concrete	Microscopy and Microanalysis	V. 25, n.º 3, 601-616, June.	10.1017/S1431927619000096	WoS and SCOPUS	2.673	Q2	Q1
Oliveira, L.; Teves-Costa, P.; Pinto, C.; Gomes, R.C.; Almeida, I.M.; Ferreira, C.; Pereira, T.; Sotto-Mayor, M.,	2019	Microzonagem sísmica de Lisboa baseada na análise de sondagens geotécnicas	Revista Portuguesa de Engenharia de Estruturas	Série III, nº 11, pp.7-16.	http://rpee.lnec.pt/Ficheiros/rpee_serieIII_n11/rpee_sIII_n11_pg07_16.pdf		Non (WoS, SCOPUS) National		
Mateus, L.; Veiga, R.; de Brito, J.; Santos Silva, A.	2019	Mineralogical and mechanical characterization of rammed earth external renderings of the south of Portugal	Construction and Building Materials	V. 225, 1160-1169, November.	10.1016/j.conbuildmat.2019.08.030	WoS and SCOPUS	4.046	Q1	Q1
Caruso, C.; Bento, R.; Sousa, R.; Correia, A.A.	2019	Modelling strain penetration effects in RC walls with smooth steel bars	Magazine of Concrete Research	V. 71, n.º 17, 894-906, November.	10.1680/jmacr.18.00052	WoS and SCOPUS	2.026	Q1	Q2
VALENÇA, J., SANTOS, B., JÚLIO, E.,	2019	Monitorização de Fendas em Superfícies de Betão Através de Análise de Imagens Multitemporais	Revista Portuguesa de Engenharia de Estruturas	Série III. N.º 9: 109-116, Março		Non (WoS, SCOPUS) National			
Yang, Y.; Biscaia, H.; Silva, M.A.G.; Chastre, C.	2019	Monotonic and quasi-static cyclic bond response of CFRP-to-steel joints after salt fog exposure	Composites Part B: Engineering	V. 168, 532-549, July.	10.1016/j.compositesb.2019.03.066	WoS and SCOPUS	6.864	Q1	Q1
Pereira, H.; Figueira, J.R.;	2019	Multiobjective irrigation model: Alqueva River basin application	Journal of Irrigation and	V. 145, n.º 7, art.	10.1061/(ASCE)IR.194	WoS and	1.34	Q2	Q3

Marques, R.C.			Drainage Engineering	05019006, July.	3-4774.0001396	SCOPUS			
Garrido, M.; Madeira, J.F.A.; Proença, M.; Correia, J.R.	2019	Multi-objective optimization of pultruded composite sandwich panels for building floor rehabilitation	Construction and Building Materials	V. 198, 465-478, February.	10.1016/j.conbuildmat.2018.11.259	WoS and SCOPUS	4.046	Q1	Q1
Manchao, H.; Ribeiro e Sousa, L.; Müller A., Vargas Jr, E., Sousa R.L., Oliveira C. S., Gong, W	2019	Numerical and safety considerations about the Daguanbao landslide induced by the 2008 Wenchuan earthquake	Journal of Rock Mechanics and Geotechnical Engineering	V.11, 1019-1035	https://doi.org/10.1016/j.jrmge.2019.05.004		Non WoS; SCOPUS		Q1
de Brito, J.; Correia, J.	2019	O CERIS: Investigação e Desenvolvimento	Construção Magazine	n.º 89, 12-17, Janeiro / Fevereiro.		Non (WoS, SCOPUS) National			
de Brito, J.; Correia, J.	2019	O CERIS: Transferência de Conhecimento	Construção Magazine	n.º 89, 18-21, Janeiro / Fevereiro.		Non (WoS, SCOPUS) National			
Borkowski, M.; Moldovan, I.D.	2019	On rank-deficiency in direct Trefftz method for 2D Laplace problems	Engineering Analysis with Boundary Elements	V. 106, 102-115, September.	10.1016/j.enganabou.2019.05.003	WoS and SCOPUS	2.243	Q1	Q1
Cruz, C.O.; Gaspar, P.; de Brito, J.	2019	On the concept of sustainable sustainability: An application to the Portuguese construction sector	Journal of Building Engineering	V. 25, art. 100836, September.	10.1016/j.jobe.2019.100836	WoS and SCOPUS	2.378	Q1	Q2
Dinis, P.B.; Camotim, D.; Landesmann, A.; Martins, A.D.	2019	On the direct strength method design of columns against global failures	Thin-Walled Structures	V. 139, 242-270, June.	10.1016/j.tws.2019.02.027	WoS and SCOPUS	3.488	Q1	Q1
Vieira, L.; Gonçalves, R.; Camotim, D.	2019	On the influence of the rounded corners on the local stability of RHS members under axial force and biaxial bending	Thin-Walled Structures	V. 144, art. 106327, November.	10.1016/j.tws.2019.106327	WoS and SCOPUS	3.488	Q1	Q1
Martins, A.D.; Gonçalves, R.; Camotim, D.	2019	On the local and distortional post-buckling behaviour of thin-walled regular polygonal tubular columns	Thin-Walled Structures	V. 138, 46-63, May.	10.1016/j.tws.2019.01.033	WoS and SCOPUS	3.488	Q1	Q1
Fernandes, J.F.P.; Pérez-Sánchez, M.; Ferreira da Silva, F.; López-Jiménez, P.A.; Ramos, H.M.; Costa Branco, P.J.	2019	Optimal energy efficiency of isolated PAT systems by SEIG excitation tuning	Energy Conversion and Management	V. 183, 391-405, March.	10.1016/j.enconman.2019.01.016	WoS and SCOPUS	7.181	Q1	Q1
Brás, A.; Antunes, A.; Laborel-Préneron, A.; Ralegaonkar, R.; Shaw, A.; Riley, M.; Faria, P.	2019	Optimisation of bio-based building materials using image analysis method	Construction and Building Materials	V. 223, 544-553, October.	10.1016/j.conbuildmat.2019.06.148	WoS and SCOPUS	4.046	Q1	Q1
Ponte, M.; Milosevic, J.; Bento, R.	2019	Parametrical study of rubble stone masonry panels through numerical modelling of the in-plane behaviour	Bulletin of Earthquake Engineering	V. 17, n.º 3, 1553-1574, March.	10.1007/s10518-018-0511-9	WoS and SCOPUS	2.406	Q1	Q2
Dias-da-Costa, D.; Neves, L.A.C.; Gomes, S.; Graça-e-Costa, R.; Hadigheh, S.A.; Fernandes, P.	2019	Partial safety factors for prestressed concrete girders strengthened with CFRP laminates	Journal of Composites for Construction		10.1061/(ASCE)CC.1943-5614.00009		WoS and SCOPUS	2.606	Q1
Dastjerdi, A.M.; Kaplan, S.; Abreu e Silva, J.; Nielsen, O.A.; Pereira, F.C.	2019	Participating in environmental loyalty program with a real-time multimodal travel app: User needs, environmental and privacy motivators	Transportation Research Part D: Transport and Environment	V. 67, 223-243, February.	10.1016/j.trd.2018.11.013	WoS and SCOPUS	4.051	Q1	Q1
Amaral, S.D.; Branco, P.; Katopodis, C.; Ferreira, M.T.; Pinheiro, A.N.; Santos, J.M.	2019	Passage performance of potamodromous cyprinids over an experimental low-head ramped weir: The effect of ramp length and slope	Sustainability	V. 11, n.º 5, art. 1456, March.	10.3390/su11051456	WoS and SCOPUS	2.592	Q2	Q2
Carvalho, C.; de Brito, J.; Flores-Colen, I.; Pereira, C.	2019	Pathology and rehabilitation of vinyl and linoleum floorings in health infrastructures: Statistical survey	Buildings	V. 9, n.º 5, art. 116, -.	10.3390/buildings9050116	Non WoS; SCOPUS		Q1	

Lozano-Lunar, A.; Silva, P.R.; de Brito, J.; Álvarez, J.I.; Fernández, J.M.; Jiménez, J.R.	2019	Performance and durability properties of self-compacting mortars with electric arc furnace dust as filler	Journal of Cleaner Production	V. 219, 818-832, May.	10.1016/j.jclepro.2019.02.145	WoS and SCOPUS	6.395	Q1	Q1
Santos, L.F.; Galvão, A.F.; Cardoso, M.A.	2019	Performance indicators for urban storm water systems: a review	Water Policy	V. 21, n.º 1, 221-244, February.	10.2166/wp.2018.042	WoS and SCOPUS	1.011	Q2	Q4
Sousa, V.; Silva, C.M.; Meireles, I.	2019	Performance of water efficiency measures in commercial buildings	Resources, Conservation and Recycling	V. 143, 251-259, April.	10.1016/j.resconrec.2019.01.013	WoS and SCOPUS	7.044	Q1	Q1
Gomes, M.G.; Flores-Colen, I.; Melo, H.; Soares, A.	2019	Physical performance of industrial and EPS and cork experimental thermal insulation renders	Construction and Building Materials	V.198, 786-795, February	10.1016/j.conbuildmat.2018.11.151	WoS and SCOPUS	4.046	Q1	Q1
Martins, A.D.; Gonçalves, R.; Camotim, D.	2019	Post-buckling behaviour of thin-walled regular polygonal tubular columns undergoing local-distortional interaction	Thin-Walled Structures	V. 138, 373-391, May.	10.1016/j.tws.2019.02.020	WoS and SCOPUS	3.488	Q1	Q1
Ludovico-Marques, M.; Chastre, C.	2019	Prediction of stress-strain curves based on hydric non-destructive tests on sandstones	Materials	V. 12, n.º 20, art. 3366, -.	10.3390/ma12203366	WoS and SCOPUS	2.972	Q2	Q2
Sousa, V.; Meireles, I.; Oliveira, V.; Dias-Ferreira, C.	2019	Prediction performance of separate collection of packaging waste yields using genetic algorithm optimized support vector machines	Waste and Biomass Valorization	V. 10, n.º 12, 3603-3612, December.	10.1007/s12649-019-00656-3	WoS and SCOPUS	2.358	Q2	Q2
Marujo, N.; Trigo-Teixeira, A.; do Valle, A.S.; Araujo, M.A.	2019	Prioritizing Rubble-Mound Breakwater's Repairs Using a Multicriteria Approach	Journal of Performance of Constructed Facilities	V.33, n.º 6, December	10.1061/(ASCE)CF.1943-5509.0001340	Non WoS; SCOPUS	1.542	Q1	Q1
Pacheco, J.; de Brito, J.; Chastre, C.; Evangelista, L.	2019	Probabilistic conversion of the compressive strength of cubes to cylinders of natural and recycled aggregate concrete specimens	Construction and Building Materials	V. 12, n.º 2, art. 280, January.	10.3390/ma12020280	WoS and SCOPUS	4.046	Q1	Q1
Silva, C.M.; Cruz, C.O.; Teotónio, I.	2019	Project GENESIS: An all-inclusive model to perform cost-benefit analysis of green roofs and walls	European Journal of Sustainable Development	Vol 8 No 3: 85	https://doi.org/10.14207/eisd.2019.v8n3p85	Non (WoS, SCOPUS) International			
Dinis, P.B.; Camotim, D.	2019	Proposal to improve the DSM design of cold-formed steel angle columns: Need, background, quality assessment, and illustration	Journal of Structural Engineering	V. 145, n.º 8, -, August.	10.1061/(ASCE)ST.1943-541X.0002342	WoS and SCOPUS	2.528	Q1	Q2
Sena da Fonseca, B.; Ferreira Pinto, A.P.; Vaz Silva, D.	2019	Provenance and characterization of stones used in the rubble stone masonry of the National Palace of Sintra (Portugal)	Journal of Archaeological Science: Reports	V. 27, art. 101984, October.	10.1016/j.jasrep.2019.101984	Non WoS; SCOPUS		Q1	
Gomes, M.I.; Faria, P.; Gonçalves, T.D.	2019	Rammed earth walls repair by earth-based mortars: The adequacy to assess effectiveness	Construction and Building Materials	V. 205, 213-231, April.	10.1016/j.conbuildmat.2019.01.222	WoS and SCOPUS	4.046	Q1	Q1
Flores-Colen, I.; Soares, A.; Pedroso, M.	2019	Reabilitação de fachadas. A inovação das argamassas na reabilitação de fachadas	Construção Magazine	n.º 93, 24-27, Setembro/Outubro		Non (WoS, SCOPUS) National			
Amaral, S.; Alvarez, T.; Caldeira, L.; Viseu, T. and Ferreira, R.M.L.	2019	Recent advances on experimental dam breach studies	Revista da Associação Portuguesa de Análise Experimental de Tensões	Vol. 31: 11-25.		Non (WoS, SCOPUS) National			
Nunes, A.M.; Ferreira, D.C.	2019	Reforms in the Portuguese health care sector: Challenges and proposals	International Journal of Health Planning and Management	V. 34, n.º 1, January/March, e21-e33.	10.1002/hpm.2695	WoS and SCOPUS	1.45	Q2	Q3
Pederneiras, C.M.; Veiga, R.; de Brito, J.	2019	Rendering mortars reinforced with natural sheep's wool fibers	Materials	V. 12, n.º 22, art. 3648, -.	10.3390/ma12223648	WoS and SCOPUS	2.972	Q2	Q2
Jesus, S.; Maia, C.; Farinha, C.B.; de Brito, J.; Veiga, R.	2019	Rendering mortars with incorporation of very fine aggregates from construction and demolition waste	Construction and Building Materials	V. 229, art. 116844, December.	10.1016/j.conbuildmat.2019.11.6844	WoS and SCOPUS	4.046	Q1	Q1

Neto, D.; Cruz, C.O.; Sarmiento, J.	2019	Renegotiation of Transport Public Private Partnerships: Policy implications of the Brazilian experience in the Latin American context	Case Studies on Transport Policy	V. 7, n.º 3, 554-561, September.	10.1016/j.cstp.2019.07.003	Non WoS; SCOPUS		Q2	
Carvalho, B.E.; Marques, R.C.; Netto, O.C.	2019	Rethinking Brasília's water services: 'new targets' using the regulatory impact assessment (RIA) tool	Journal of Water Sanitation and Hygiene for Development	V. 9, n.º 1, 7-18, March.	10.2166/washdev.2019.088	WoS and SCOPUS	0.977	Q2	Q4
Silvestre, J.D.; Castelo, A.M.P.; Silva, J.B.C.; de Brito, J.; Pinheiro, M.D.	2019	Retrofitting a building's envelope: Sustainability performance of ETICS with ICB or EPS	Applied Sciences	V. 9, n.º 7, art. 1285, March.	10.3390/app9071285	Non WoS; SCOPUS		Q1	
Silvestre, J.D.; Castelo, A.M.P.; Silva, J.B.C.; de Brito, J.; Pinheiro, M.D.	2019	Retrofitting a building's envelope: Sustainability performance of ETICS with ICB or EPS	Applied Sciences	V. 9, n.º 7, art. 1285, March.	10.3390/app9071285	Non WoS; SCOPUS		Q1	
Isufi, B.; Pinho Ramos, A.; Lúcio, V.	2019	Reversed horizontal cyclic loading tests of flat slab specimens with studs as shear reinforcement	Structural Concrete	V. 20, n.º 1, 330-347, February.	10.1002/suco.20180128	WoS and SCOPUS	1.885	Q1	Q2
Antunes, A.; Faria, P.; Silva, V.; Brás, A.	2019	Rice husk-earth based composites: A novel bio-based panel for buildings refurbishment	Construction and Building Materials	V. 221, 99-108, October.	10.1016/j.conbuildmat.2019.06.074	WoS and SCOPUS	4.046	Q1	Q1
Penacho, P.; de Brito, J.; Santos Silva, A.; Veiga, M.R.	2019	Risk of ASR in coating mortars incorporating glass aggregates and a Portland-limestone cement	European Journal of Environmental and Civil Engineering	V. 23, n.º 2, 226-244, February.	10.1080/19648189.2016.1275986	WoS and SCOPUS	1.873	Q2	Q2
Lozano-Lunar, A.; Silva, P.R.; de Brito, J.; Fernández, J.M.; Jiménez, J.R.	2019	Safe use of electric arc furnace dust as secondary raw material in self-compacting mortars production	Journal of Cleaner Production	V. 211, 1375-1388, February.	10.1016/j.jclepro.2018.12.002	WoS and SCOPUS	6.395	Q1	Q1
Pacheco, J.; de Brito, J.; Chastre, C.; Evangelista, L.	2019	Scatter of constitutive models of the mechanical properties of concrete: Comparison of major international codes	Journal of Advanced Concrete Technology	V. 17, n.º 3, 102-125, March.	10.3151/jact.17.3.102	WoS and SCOPUS	1.336	Q2	Q3
Santos, F.; Benzoni, G.; Fraternali, F.	2019	Seismic performance of superelastic tensegrity braces	Ingegneria Sismica	V. 36, n.º 3, 20-37, -.		WoS and SCOPUS	2.561	Q2	Q2
Bogas, J.A.; Hawreen, A.; Olhero, S.; Ferro, A.C.; Guedes, M.	2019	Selection of dispersants for stabilization of unfunctionalized carbon nanotubes in high pH aqueous suspensions: application to cementitious matrices	Applied Surface Science	V. 463, 169-181, January.	10.1016/j.apsusc.2018.08.196	WoS and SCOPUS	5.155	Q1	Q1
Farinha, F.; Oliveira, M.J.; Silva, E.M.J.; Lança, R.; Pinheiro, M.D.; Miguel, C.	2019	Selection process of sustainable indicators for the Algarve Region—OBSERVE project	Sustainability	V. 11, n.º 2, art. 444, January.	10.3390/su11020444	WoS and SCOPUS	2.592	Q2	Q2
Ghalehnovi, M.; Shamsabadi, E.A.; Khodabakhshian, A.; Sourmeh, F.; de Brito, J.	2019	Self-compacting architectural concrete production using red mud	Construction and Building Materials	V. 226, 418-427, November.	10.1016/j.conbuildmat.2019.07.248	WoS and SCOPUS	4.046	Q1	Q1
Santos, S.; Silva, P.R.; de Brito, J.	2019	Self-compacting concrete with recycled aggregates - A literature review	Journal of Building Engineering	V. 22, 349-371, March.	10.1016/j.jobe.2019.01.001	WoS and SCOPUS	2.378	Q1	Q2
Gouveia, F.; Gomes, R.C.; Lopes, I.	2019	Shallow and in depth seismic testing in urban environment: A case study in Lisbon Miocene stiff soils using joint inversion of active and passive Rayleigh wave measurements	Journal of Applied Geophysics	V. 169, 199-213, October.	10.1016/j.jappgeo.2019.06.022	WoS and SCOPUS	1.646	Q2	Q2
Silvestre, H. C.; Marques, R. C.; Dollery, B. E.; Correia, A. M.	2019	Shared Services in Brazilian Local Government: Urban development in small counties	Public Administration	V. 97, n.º 3, 686-702, September	10.1111/padm.12593	WoS and SCOPUS	2.6	Q1	Q1
Chaboki, H.R.; Ghalehnovi, M.; Karimipour, A.; de Brito, J.; Khatibinia, M.	2019	Shear behaviour of concrete beams with recycled aggregate and steel fibres	Construction and Building Materials	V. 204, 809-827, April.	10.1016/j.conbuildmat.2019.01.130	WoS and SCOPUS	4.046	Q1	Q1
Morgado, T.; Silvestre, N.	2019	Simulation of fire resistance behaviour of pultruded GFRP	Thin-Walled Structures	V. 135, 521-536,	10.1016/j.tws.2018.1	WoS and	3.488	Q1	Q1

Correia, J.R.		columns		February.	1.022	SCOPUS			
Pisco, G.; Santos, J.A.	2019	Soil-pile-structure seismic interaction considering the non-linear behaviour of soil and reinforced concrete	Revista Portuguesa de Engenharia de Estruturas	Série III, nº 11		Non (WoS, SCOPUS) National			
Espinosa, L.A.; Portela, M.M.; Rodrigues, R.	2019	Spatio-temporal variability of droughts over past 80 years in Madeira Island	Journal of Hydrology: Regional Studies	V. 25, art. 100623, October.	10.1016/j.ejrh.2019.100623	Non WoS; SCOPUS		Q1	
Pacheco, J.; de Brito, J.; Chastre, C.; Evangelista, L.	2019	Statistical analysis of Portuguese ready-mixed concrete production	Construction and Building Materials	V. 209, 283-294, June.	10.1016/j.conbuildmat.2019.03.089	WoS and SCOPUS	4.046	Q1	Q1
Sousa, V.; Matos, J.P.; Matias, N.; Meireles, I.	2019	Statistical comparison of the performance of data-based models for sewer condition modeling	Structure and Infrastructure Engineering	V. 15, n.º 12, 1680-1693, December.	10.1080/15732479.2019.1648525	WoS and SCOPUS	2.43	Q1	Q2
Ferreira, C.; Canhoto Neves, L.; Silva, A.F.; de Brito, J.	2019	Stochastic Petri-net models to predict the degradation of ceramic claddings	Building Research and Information	V. 47, n.º 6, 697-715, -.	10.1080/09613218.2018.1501873	WoS and SCOPUS	3.744	Q1	Q1
Rodrigues, J.D.; Ferreira Pinto, A.P.	2019	Stone consolidation by biomineralisation. Contribution for a new conceptual and practical approach to consolidate soft decayed limestones	Journal of Cultural Heritage	V. 39, 82-92, September-October.	10.1016/j.culher.2019.04.022	WoS and SCOPUS	1.955	Q1	Q3
Galvão, A.; Pisco, J.; Pinheiro, H.	2019	Storage mechanisms in constructed wetlands: Should we modify heterotrophic bacteria modelling?	Science of The Total Environment	V. 658, 830-835, March.	10.1016/j.scitotenv.2018.12.120	WoS and SCOPUS	5.589	Q1	Q1
Dadfar, A.; Besharat, M.; Ramos, H.M.	2019	Storage ponds application for flood control, hydropower generation and water supply	International Review of Civil Engineering	V.10, nº 4, Pages 219-226	doi.org/10.15866/irece.v10i4.17133	Non WoS; SCOPUS			Q3
Bedon, C.; Honfi, D.; Machalická, K.V.; Eliášová, M.; Vokáč, M.; Kozłowski, M.; Wüest, T.; Santos, F.A.; Portal, N.W.	2019	Structural characterisation of adaptive facades in Europe – Part I: insight on classification rules, performance metrics and design methods	Journal of Building Engineering	V. 25, art. 100721, September.	10.1016/j.jobe.2019.02.013	WoS and SCOPUS	2.378	Q1	Q2
Bedon, C.; Honfi, D.; Machalická, K.V.; Eliášová, M.; Vokáč, M.; Kozłowski, M.; Wüest, T.; Santos, F.A.; Portal, N.W.	2019	Structural characterisation of adaptive facades in Europe – Part II: Validity of conventional experimental testing methods and key issues	Journal of Building Engineering	V. 25, art. 100797, September.	10.1016/j.jobe.2019.100797	WoS and SCOPUS	2.378	Q1	Q2
Pronça, J. Gago, A.S.; Vilas Boas, A.	2019	Structural window frame for in-plane seismic strengthening of masonry wall buildings	International Journal of Architectural Heritage	V. 13, n.º 1, 98-113, -.	10.1080/15583058.2018.1497234	WoS and SCOPUS	1.44	Q1	Q3
Freire, M.T.; Silva, A.S.; Veiga, M.R.; de Brito, J.	2019	Studies in ancient gypsum based plasters towards their repair: Mineralogy and microstructure	Construction and Building Materials	V. 196, 512-529, January.	10.1016/j.conbuildmat.2018.11.037	WoS and SCOPUS	4.046	Q1	Q1
Freire, M.T.; Veiga, M.R.; Silva, A.S.; de Brito, J.	2019	Studies in ancient gypsum based plasters towards their repair: Physical and mechanical properties	Construction and Building Materials	V. 202, 319-331, March.	10.1016/j.conbuildmat.2018.12.214	WoS and SCOPUS	4.046	Q1	Q1
Reinoso, J.; Paggi, M.; Areias, P.; Blázquez, A.	2019	Surface-based and solid shell formulations of the 7-parameter shell model for layered CFRP and functionally graded power-based composite structures	Mechanics of Advanced Materials and Structures	V. 26, n.º 15, 1271-1289, -.	10.1080/15376494.2018.1432802	WoS and SCOPUS	2.872	Q1	Q1
Ramos, H.M.; Zilhão, M.; López-Jiménez, P.A.; Pérez-Sánchez, M.	2019	Sustainable water-energy nexus in the optimization of the BBC golf-course using renewable energies	Urban Water Journal	V. 16, n.º 3, 215-224, March.	10.1080/1573062X.2019.1648529	WoS and SCOPUS	2.083	Q1	Q2
Ferreira, D.C.; Nunes, A.M.	2019	Technical efficiency of Portuguese public hospitals: A comparative analysis across the five regions of Portugal	International Journal of Health Planning and Management	V. 34, n.º 1, e411-e422, January/March.	10.1002/hpm.2658	WoS and SCOPUS	1.45	Q2	Q3
Catalão, F.P.; Cruz, C.O.; Sarmento, J.M.	2019	The determinants of cost deviations and overruns in transport projects, an endogenous models approach	Transport Policy	V. 74, 224-238, February.	10.1016/j.tranpol.2018.12.008	WoS and SCOPUS	3.19	Q1	Q1
Cambra, P.J.; Gonçalves, A.B.	2019	The digital pedestrian network in complex urban contexts: a	Finisterra	V. 54, n.º 110, 155-	10.18055/Finis16414	WoS and		Q4	

Moura, F.		primer discussion on typological specifications		170, May.		SCOPUS			
Bravo, M.; de Brito, J.; Evangelista, L.	2019	The Effect of the Quality of Construction and Demolition Waste on Recycled Aggregates Concrete Properties	Indian Concrete Journal	V. 93, n.º 9, 17-29, September.	icjonline.com/editionabstract_detail/092019	Non WoS; SCOPUS		Q3	
Nunes, A.M.; Ferreira, D.C.	2019	The health care reform in Portugal: Outcomes from both the New Public Management and the economic crisis	International Journal of Health Planning and Management	V. 34, n.º 1, January/March, 196-215.	10.1002/hpm.2613	WoS and SCOPUS	1.45	Q2	Q3
Neves, M.C.; Costa, L.; Hugman, R.; Monteiro, J.P.	2019	The impact of atmospheric teleconnections on the coastal aquifers of Ria Formosa (Algarve, Portugal)	Hydrogeology Journal	V.27, n.º 8, 2775-2787, December	10.1007/s10040-019-02052-6	WoS and SCOPUS	2.401	Q1	Q2
Carvalho, B.E.; Costa, S.A.B.; Marques, R.C.; Netto, O.C.	2019	The impact of household connection to public network wastewater systems: Regulatory impact assessment	Water Science and Technology	V. 79, n.º 6, 1060-1070, March.	10.2166/wst.2019.102	WoS and SCOPUS	1.624	Q2	Q3
Boadella, I.; Gayarre, F.; González, J.; Gómez-Soberón, J.; Pérez, C.; López, M.; de Brito, J.	2019	The influence of granite cutting waste on the properties of ultra-high performance concrete	Materials	V. 12, n.º 4, art. 634, -.	10.3390/ma12040634	WoS and SCOPUS	2.972	Q2	Q2
Esteves, C.; Ahmed, H.; Flores-Colen, I.; Veiga, R.	2019	The influence of hydrophobic protection on building exterior claddings	Journal of Coatings Technology and Research	V.16, n.º5, 1379-1388, September	10.1007/s11998-019-00220-7	Non SCOPUS ; WoS	1.584		Q3
Antico, F.; Ricardo, A.M.; Ferreira, R.M.L.	2019	The logarithmic law of the wall in flows over mobile lattice-arranged granular beds	Water	V. 11, n.º 6, 1166, June.	10.3390/w11061166	WoS and SCOPUS	2.524	Q1	Q2
Costa, M.J.; Ferreira, M.T.; Pinheiro, A.N.; Boavida, I.	2019	The potential of lateral refuges for Iberian barbel under simulated hydropeaking conditions	Ecological Engineering	V. 127, 567-578, February.	10.1016/j.ecoleng.2018.07.029	WoS and SCOPUS	3.406	Q1	Q1
Carvalho, B.E.; Costa, A.S.; Marques, R.C.; Netto, O.C.	2019	The presence of governance: A system assessment based on innovative core regulatory principles for Brazilian regulators	Expert Systems	V. 36, n.º 4, art. e12406, August.	10.1111/esyx.12406	WoS and SCOPUS	1.505	Q2	Q2
Ildefonso, S.; Machete, R.; Falcão, A.P.; Heitor, T.	2019	The proto-social housing in the city of Lisbon: A holistic perspective about work force housing in the current urban context	Urbe	V. 11, art. e20170201, -.	10.1590/2175-3369.011.001.AO05	Non WoS; SCOPUS		Q2	
Serro, J.; Silva, C.M.; Ferreira, P.D.; Teotónio, I.	2019	The socio-economic feasibility of greening rail stations: A case study in Lisbon	The Engineering Economist	V. 64, n.º 2, 167-190, -.	10.1080/013791X.2018.1470272	WoS and SCOPUS	1.114	Q1	Q4
Marques, R.C.; Geddes, R.R.	2019	The use of PPP arrangements in street lighting: a win-win option?	Annals of Public and Cooperative Economics	V. 90, n.º 2, 311-327, June.	10.1111/apce.12229	WoS and SCOPUS	1.15	Q2	
Pereira, J.; Gomes, M.G.; Moret Rodrigues, A.; Almeida, M.	2019	Thermal, luminous and energy performance of solar control films in single-glazed windows: use of energy performance criteria to support decision making	Energy and Buildings	V. 198, 431-443, September.	10.1016/j.enbuild.2019.06.003	WoS and SCOPUS	4.495	Q1	Q1
Ibrahim, M.; Ferreira, D.C.; Daneshvar, S.; Marques, R.C.	2019	Transnational resource generativity: Efficiency analysis and target setting of water, energy, land, and food nexus for OECD countries	Science of the Total Environment	V. 697, art. 134017, December.	10.1016/j.scitotenv.2019.134017	WoS and SCOPUS	5.589	Q1	Q1
Pacheco, J.; de Brito, J.; Chastre, C.; Evangelista, L.	2019	Uncertainty models of reinforced concrete beams in bending: Code comparison and recycled aggregate incorporation	Journal of Structural Engineering	V. 145, n.º 4, -, April.	10.1061/(ASCE)ST.1943-541X.0002296	WoS and SCOPUS	2.528	Q1	Q2
Matos, R.V.; Ferreira, F.; Gil, C.; Saldanha Matos, J.	2019	Understanding the effect of ventilation, intermittent pumping and seasonality in hydrogen sulfide and methane concentrations in a coastal sewerage system	Environmental Science and Pollution Research	V. 26, n.º 4, 3404-3414, February.	10.1007/s11356-018-3856-3	WoS and SCOPUS	2.914	Q1	Q2
Bogas, J.A.; Silva, M.; Gomes, M.D.G.	2019	Unstabilized and stabilized compressed earth blocks with partial incorporation of recycled aggregates	International Journal of Architectural Heritage	V. 13, n.º 4, 569-584, -.	10.1080/15583058.2018.1442891	WoS and SCOPUS	1.44	Q1	Q3

de Brito, J.; Silva, R.	2019	Upscaling the Use of Recycled Aggregate Concrete	New Building Materials and Construction World (NBM&CW)	V. 24, n.º 11, 94-106, May.	nbmwc.com/tech-articles/concrete/39996-upscaling-the-use-of-recycled-aggregate-concrete.html	Non (WoS, SCOPUS) International			
Nunes, D.M.; Tomé, A.; Pinheiro, M.D.	2019	Urban-centric resilience in search of theoretical stabilisation? A phased thematic and conceptual review	Journal of Environmental Management	V. 230, 282-292, January.	10.1016/j.envman.2018.09.078	WoS and SCOPUS	4.865	Q1	Q1
Nunes, D.M.; Tomé, A.; Pinheiro, M.D.	2019	Urban-centric resilience in search of theoretical stabilisation? A phased thematic and conceptual review	Journal of Environmental Management	V. 230, 282-292, January.	10.1016/j.envman.2018.09.078	WoS and SCOPUS	4.865	Q1	Q1
Dastjerdi, A.M.; Kaplan, S.; Abreu e Silva, J.; Nielsen, O.A.; Pereira, F.C.	2019	Use intention of mobility-management travel apps: The role of users goals, technophile attitude and community trust	Transportation Research Part A: Policy and Practice	V. 126, 114-135, August.	10.1016/j.trra.2019.06.001	WoS and SCOPUS	3.693	Q1	Q1
Silva, R.V.; de Brito, J.; Dhir, R.K.	2019	Use of recycled aggregates arising from construction and demolition waste in new construction applications	Journal of Cleaner Production	V. 236, art. 117629, November.	10.1016/j.jclepro.2019.117629	WoS and SCOPUS	6.395	Q1	Q1
Santos, C.A.S.; Rocha, F.A.; Ramos, T.B.; Alves, L.M.; Mateus, M.; Oliveira, R.P.; Neves, R.	2019	Using a hydrologic model to assess the performance of regional climate models in a semi-arid watershed in Brazil	Water	V. 11, n.º 1, art. 170, January.	10.3390/w11010170	WoS and SCOPUS	2.524	Q1	Q2
Cabral, M.; Loureiro, D.; Covas, D.	2019	Using economic asset valuation to meet rehabilitation priority needs in the water sector	Urban Water Journal	V. 16, n.º 3, 205-214, April.	10.1080/1573062X.2019.1648528	WoS and SCOPUS	2.083	Q1	Q2
MILOSEVIC, J., BENTO, R., CATTARI, S.	2019	Using sensitivity analyses to evaluate behaviour factor for mixed masonry-RC buildings in Lisbon	Revista Portuguesa de Engenharia de Estruturas	Série III, nº 11, 83-96		Non (WoS, SCOPUS) National			
Ghorbani, S.; Sharifi, S.; de Brito, J.; Ghorbani, S.; Jalayer, M.A.; Tavakkolizadeh, M.	2019	Using statistical analysis and laboratory testing to evaluate the effect of magnetized water on the stability of foaming agents and foam concrete	Construction and Building Materials	V. 207, 28-40, May.	10.1016/j.conbuildmat.2019.02.098	WoS and SCOPUS	4.046	Q1	Q1
Delgado, J.; Ferreira, J.P.; Covas, D.I.C.; Avellan, F.	2019	Variable speed operation of centrifugal pumps running as turbines. Experimental investigation	Renewable Energy	V. 142, 437-450, November.	10.1016/j.renene.2019.04.067	WoS and SCOPUS	5.439	Q1	Q1
Vilela, M.; Neves, J.; Sampaio, A.Z.	2019	Viabilidade da Implementação da Metodologia BIM no Sector Ferroviário – Caso de Renovação e Inspeção da Via Férrea	CONSTRUINDO	Vol. 11 (03), 13pgs, Jun	http://www.fumec.br/revistas/construindo/article/view/7085	Non (WoS, SCOPUS) International			
Kurda, R.; de Brito, J.; Silvestre, J.D.	2019	Water absorption and electrical resistivity of concrete with recycled concrete aggregates and fly ash	Cement and Concrete Composites	V. 95, 169-182, January.	10.1016/j.cemconcomp.2018.10.004	Non WoS; SCOPUS		Q1	
Cortês, A.; Almeida, J.; de Brito, J.; Tadeu, A.	2019	Water retention and drainage capability of expanded cork agglomerate boards intended for application in green vertical systems	Construction and Building Materials	V. 224, 439-446, November.	10.1016/j.conbuildmat.2019.07.030	WoS and SCOPUS	4.046	Q1	Q1
Alfaite, J.; Sluijs, L.J.	2019	Damage and Fracture Mechanics approaches to mixed-mode discrete fracture with dilatancy	Theoretical and Applied Fracture Mechanics	V. 104, art. 103382, December.	10.1016/j.tafmec.2019.102350	WoS and SCOPUS	4.868	Q1	Q1

Areias, P.; Vidinha- Alves, A.; Pereira dos Santos, M.; Carrilho Lopes, P.	2019	A dimensional reduction algorithm and software for acyclically dependent constraints	International Journal for Computational Methods in Engineering Science and Mechanics	V. 20, n.º 6, 494-513	10.1080/15502287.2019.15662 84	Non (WoS, SCOPUS) National			
Berbellini, A.; Schimmel, M.; Ferreira, A.M.G.; Morelli, A.	2019	Constraining S-wave velocity using Rayleigh wave ellipticity from polarization analysis of seismic noise	Geophysical Journal International	V. 216, n.º 3, 1817-1830, March.	10.1093/gji/ggy512	WoS and SCOPUS	2.777	Q2	Q2
Bertin, X.; Mendes, D.; Martins, K.; Fortunato, A.B.; Lavaud, L.	2019	The closure of a shallow tidal inlet promoted by infragravity waves	Geophysical Research Letters	V. 46, n.º 12,6804- 6810, June.	10.1029/2019GL083527	WoS and SCOPUS	4.578	Q1	Q1

<p>Brose, U.; Archambault, P.; Barnes, A.D.; Bersier, L.F.; Boy, T.; Canning-Clode, J.; Conti, E.; Dias, M.; Digel, C.; Dissanayake, A.; Flores, A.A.; Fussmann, K.; Gauzens, B.; Gray, C.; Häussler, J.; Hirt, M.R.; Jacob, U.; Jochum, M.; Kéfi, S.; McLaughlin, O.; MacPherson, M.M.; Latz, E.; Layer-Dobra, K.; Legagneux, P.; Li, Y.; Madeira, C.; Martinez, N.D.; Mendonça, V.; Mulder, C.; Navarrete, S.A.; O'Gorman, E.J.; Ott, D.; Paula, J.; Perkins, D.; Piechnik, D.; Pokrovsky, I.; Raffaelli, D.; Rall, B.C.; Rosenbaum, B.; Ryser, R.; Silva, A.; Sohlström, E.H.; Sokolova, N.; Thompson, M.S.A.; Thompson, R.M.; Vermandele, F.; Vinagre, C.; Wang, S.; Wefer, J.M.; Williams, R.J.; Wieters, E.; Woodward, G.; Iles, A.C.</p>	2019	Predator determine traits architecture food-web across ecosystems	Nature Ecology & Evolution	V. 3, 919 - 927	10.1038/s41559-019-0899-x	WoS and SCOPUS	10.965	Q1	Q1
<p>Celentano, G.; Escamilla, E.Z.; Gösswein, V.; Habert, G.</p>	2019	A matter of speed: The impact of material choice in post-disaster reconstruction	International Journal of Disaster Risk Reduction	V. 34, 34-44, March.	10.1016/j.ijdr.2018.10.026	WoS and SCOPUS	2.568	Q1	Q2
<p>Chang, S.-J.; Ferreira, A.M.G.</p>	2019	Inference on water content in the mantle transition zone near subducted slabs from anisotropy tomography	Geochemistry, Geophysics, Geosystems	V. 20, n.º 2, 1189-1201, February.	10.1029/2018GC008090	WoS and SCOPUS	2.946	Q2	Q2

Faccenda, M.; Ferreira, A.M.G.; Tisato, N.; Lithgow-Bertelloni, C.; Stixrude, L.; Pennacchioni, G.	2019	Extrinsic elastic anisotropy in a compositionally heterogeneous Earth's mantle	Journal of Geophysical Research - Solid Earth	V. 124, n.º 2, 1671-1687, February.	10.1029/2018JB016482	WoS and SCOPUS	3.585	Q1	Q1
Feria, M.; Amado, M.	2019	Architectural Design: Sustainability in the Decision-Making Process	Buildings	V. 9, n.º 5, 135.	10.3390/buildings9050135	Non WoS; SCOPUS		Q4	
Ferreira, A.M.G.; Faccenda, M.; Sturgeon, W.; Chang, S.J.; Schardong, L.	2019	Ubiquitous lower-mantle anisotropy beneath subduction zones	Nature Geoscience	V. 12, 301-306 April.	10.1038/s41561-019-0325-7	WoS and SCOPUS	14.48	Q1	Q1
Ferreira, P.; Maciel, R.; Estaire, J.; Rodríguez-Plaza, M.	2019	Railway track design optimisation for enhanced performance at very high speeds: experimental measurements and computational estimations	Structure and Infrastructure Engineering	V. 15, n.º 1, 13.	10.1080/15732479.2018.1490325	WoS and SCOPUS	2.43	Q2	Q2
Frietsch, M.; Ferreira, A.M.G.; Funning, G.J.; Weston, J.	2019	Multiple fault modelling combining seismic and geodetic data: the importance of simultaneous sub-event inversions	Geophysical Journal International	V. 218, n.º 2, 958-976, August.	10.1093/gji/ggz205	WoS and SCOPUS	2.777	Q2	Q2
Ghazi, A.; Berke, P.; Kamel, K.E.M.; Sonon, B.; Tiago, C.; Massart, C.J.	2019	Multiscale computational modelling of closed cell metallic foams with detailed microstructural morphological control	International Journal of Engineering Science	V. 143, 92-114, October.	10.1016/j.ijengsci.2019.06.012	WoS and SCOPUS	9.052	Q1	Q1
Hafez, H.; Kurda, R.; Cheung, W.M.; Nagarathnam, B.	2019	A systematic review of the discrepancies in life cycle assessments of green concrete	Applied Sciences	V. 9, n.º 22, art. 4803.	10.3390/app9224803	WoS and SCOPUS	2.217	Q1	Q2
Henriques, J.; Calado, L.; Castiglioni, C.A.; Degée, H.	2019	Dissipative connections with U-shaped steel plate for braces of concentrically braced frames	Bulletin of Earthquake Engineering	V. 17, 6203-6237, November.	10.1007/s10518-019-00689-y	WoS and SCOPUS	2.406	Q2	Q2
Heorton, H.; Tsamados, M.; Cole, S.; Ferreira, A.M.G.; Berbellini, A.; Fox, M.; Armitage, T.	2019	Retrieving sea ice drag coefficients and turning angles from in situ and satellite observations using an inverse modeling framework	Journal of Geophysical Research - Oceans	V. 124, n.º 8, 6388-6413, August.	10.1029/2018JC014881	WoS and SCOPUS	3.235	Q1	Q1
Marcelino, P.; Antunes, M.D.L.; Fortunato, E.; Gomes, M.C.	2019	Development of a multi criteria decision analysis model for pavement maintenance at the network level: Application of the MACBETH approach	Frontiers in Built Environment	V. 5, artigo 6, January	10.3389/fbuil.2019.00006	Non WoS; SCOPUS		Q4	
Marques, B.; Tadeu, A.; Almeida, J.; António, J.	2019	Experimental characterisation of cement-based composites with rice husk	International Journal of Design & Nature and Ecodynamics	V. 14, n.º 2, 147-153	10.2495/DNE-V14-N2-147-153	Non WoS; SCOPUS		Q4	
Mendonça, V.; Flores, A.A.V.; Silva, A.C.F.; Vinagre, C.	2019	Do marine fish juveniles use intertidal tide pools as feeding grounds?	Estuarine, Coastal and Shelf Science	V. 225, art. 106255.	10.1016/j.ecss.2019.106255	WoS and SCOPUS	2.611	Q1	Q1

Paipuri, M.; Tiago, C.; Fernández- Méndez, S.	2019	Coupling of continuous and hybridizable discontinuous Galerkin methods: Application to conjugate heat transfer problem	Journal of Scientific Computing	V. 78, n.º 1, 321-350, January.	10.1007/s10915-018-0769-8	WoS and SCOPUS	2.37	Q1	Q1
Prieto, A.J.; Vásquez, V.; Silva, A.F.; Horn, A.; Alejandre, F.J.; Macías- Bernal, J.M.	2019	Protection value and functional service life of heritage timber buildings	Building Research and Information	V. 47, n.º 5, 567-584	10.1080/09613218.2017.14048 27	WoS and SCOPUS	3.744	Q1	Q1
Rebelo, H.B.; Lecompte, D.; Cismaşiu, C.; Jonet, A.; Belkassam, B.; Maazoun, A.	2019	Experimental and numerical investigation on 3D printed PLA sacrificial honeycomb cladding	International Journal of Impact Engineering	V. 131, 162- 173, September.	10.1016/j.ijimpeng.2019.05.013	WoS and SCOPUS	3.173	Q1	Q1
Reis, C.; Figueiredo, J.; Clain, S.; Omira, R.; Baptista, M.A.; Miranda, J.M.	2019	Comparison between MUSCL and MOOD techniques in a finite volume well-balanced code to solve SWE. The Tohoku-Oki, 2011 example	Geophysical Journal International	V. 216, n.º 2, 958-983, February.	10.1093/gji/ggy472	WoS and SCOPUS	2.777	Q2	Q2
Reis, V.; Macedo, P.	2019	Mapping and evaluating the complexity of information flows in freight transport chains	Transportation Planning and Technology	V. 42, n.º 8, 757-776	10.1080/03081060.2019.16753 12	WoS and SCOPUS	0.893	Q4	Q4
Ribeiro, F.L.A.; Barbosa, A.R.; Neves, L.C.	2019	Fragility assessment of pre-northridge steel moment frames using finite-length plastic hinge elements and concentrated plasticity fracture elements	CMES- Computer Modeling in Engineering & Sciences	V. 120, n.º 3, 657-676	10.32604/cmes.2019.06296	WoS and SCOPUS	0.796	Q4	Q4
Schardong, L.; Ferreira, A.M.G.; Berbellini, A.; Sturgeon, W.	2019	The anatomy of uppermost mantle shear- wave speed anomalies in the western U.S. from surface-wave amplification	Earth and Planetary Science Letters	V. 528, art. 115822, December.	10.1016/j.epsl.2019.115822	WoS and SCOPUS	4.637	Q1	Q1
Sturgeon, W.; Ferreira, A.M.G.; Faccenda, M.; Chang, S.-J.; Schardong, L.	2019	On the origin of radial anisotropy near subducted slabs in the midmantle	Geochemistry , Geophysics, Geosystems	V. 20, n.º 11, 5105-5125, November	10.1029/2019GC008462	WoS and SCOPUS	2.946	Q2	Q2





ANNEX C—RESEARCH GROUP ACTIVITIES IN 2019

