KM3NeT INFRADEV-2

TOWARD FULL IMPLEMENTATION OF THE KM3NeT RESEARCH INFRASTRUCTURE

KM3NeT-INFRADEV2 – HORIZON – 101079679

KM3NeT Socio-economic impact study for France and Greece

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ABSTRACT

Following the similar study done previously for Italy, this report describes the results obtained from a study on the socio-economic impact of the KM3NeT construction and operation in France and Greece.

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IV. APPLICATION AREA

This document is a formal deliverable of the Grant Agreement of the project, applicable to all members of the KM3NeT-INFRADEV2 project, beneficiaries and third parties, as well as its collaborating projects.

V. TERMINOLOGY

APC	*Laboratoire AstroParticules et Cosmologie*
APPEC	AstroParticles Physics European Consortium
ARCA	Astroparticle Research with Cosmics in the Abyss
ASPERA	Astro Particle ERAnet
ASTRONET	Astronomy ERAnet
CPER	*Contrat de Plan État-Région*
CPPM	*Centre de Physique des Particules de Marseille*
CSA	Coordination and Support Action
DOM	Digital Optical Module
DU	Detection Unit
EMSO	European Multidisciplinary Seafloor and water column Observatory
ERA	European Research Agency
ESIF	European Structural and Investment Funds
ESFRI	European Strategy Forum on Research Infrastructures
FDI	Foreign Direct Investment
FNPV	Financial Net Present Value
GP	Galactic Plane
IB	KM3NeT Institute Board
IPHC	*Institut Pluridisciplinaire Hubert Curien*
KM3NeT	Cubic Kilometer (km3) Neutrino Telescope
LPC	*Laboratoire de Physique Corpusculaire de Caen*
LUPM	*Laboratoire Univers et Particules de Montpellier*
NEMO	NEutrino Mediterranean Observatory
ORCA	Oscillation Research with Cosmics in the Abyss
O&M	Operation and Maintenance

PI	Principal Investigator
PMT	Photomultiplier tube
RDI	Research, technological Development and Innovation
RI	Research Infrastructure
WP	Work Package

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VIII. PROJECT SUMMARY

The Kilometre Cube Neutrino Telescope (KM3NeT) is a large Research Infrastructure (RI) comprising a network of deep-sea neutrino telescopes in the Mediterranean Sea with user ports for earth and sea sciences instrumentation. During the EU-funded Design Study (2006-2020) and Preparatory Phase (2008-2012), a cost-effective technology was developed, deep-sea sites were selected and the Collaboration was formed. This proposal constitutes a second INFRADEV CSA dedicated to KM3NeT in order to implement an efficient framework for mass production of KM3NeT components, accelerate completion of its construction and provide a sustainable solution for the operation of the RI during ten or more years. Following the appearance of KM3NeT on the ESFRI roadmap 2016 and in line with the recommendations of the Assessment Expert Group, this proposal addresses the Coordination and Support Actions (CSA) to prepare a legal entity for KM3NeT, accelerate its implementation, establish open access to the RI and ensure its sustainability by transforming activities with a negative impact on the environment and the evaluation of the socio-economic impact of KM3NeT.

IX. EXECUTIVE SUMMARY

This report presents the socio-economic impact study of the KM3NeT construction and operation for France and Greece. For each country, several aspects are analysed in order to better evaluate the positive impact of KM3NeT: financial, staff, impact, economic and social analysis. Theses aspects have been evaluated from 2016 (when KM3NeT appeared on the ESFRI roadmap) to 2025. The 2026-2030 period is also considered in order to estimate the future impact of the KM3NeT RI over the long term.

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XI. INTRODUCTION

The ability to generate, transmit, and apply new knowledge has become a fundamental driver of economic growth and social well-being.

Europe, through strategies such as Europe 2020 and Horizon Europe, has placed research, technological development and innovation (RDI) at the core of its political agenda to ensure smart, sustainable, and inclusive growth. (European Commission, 2020) Research Infrastructures (RIs) are a key element of the European strategy. They consist of facilities, resources, and services used by the scientific community to conduct high-level research in their respective fields. RIs are no longer regarded as mere support tools for academic activity, but as true engines of the knowledge economy. They facilitate the advancement of knowledge, accelerate technological development, and strengthen cooperation among research, education, and industry, thereby creating jobs and enhancing economic competitiveness. The RDI projects carried out within RIs generate benefits ranging from the creation of start-ups and spin-offs to the development of human capital, and the production of knowledge spill overs that benefit companies directly involved or not in the infrastructure. (European Commission, 2025; Technopolis, 2011)

KM3NeT is a research infrastructure fully aligned with European strategic priorities, being identified as a priority project in the roadmap of the ESFRI (European Strategy Forum on Research Infrastructures). The project addresses the objectives of strengthening the European Research Area (ERA), fostering scientific excellence and transnational collaboration. The implementation of KM3NeT contributes to the European strategy by aiming to transform territorial competitive advantages into innovations, scientific advancements, and tangible social impacts.

RIs are designed to meet research needs but their impact goes beyond the production of scientific results and knowledge. Their planning, construction, and management can require and stimulate unique technological developments, advanced data management systems and the presence of highly skilled personnel. RIs offer opportunities for innovation and market development, can attract investments and significantly contribute to socioeconomic progress. In some cases, they become the focal point for the growth of an innovation ecosystem (OECD, 2025). The growth and benefits that research infrastructures can bring are direct or indirect for the range of stakeholders who may be interested in the project.

Policy makers and local communities present increasingly growing expectations on research infrastructures as essential components not only of scientific and technological progress but in general of the socio-economic growth of the regional and national territory in which they are created (European Commission, 2010; ESFRI, 2008, 2010; FSE, 2013). Therefore, it is relevant to measure the socio-economic impact the KM3NeT infrastructure has created and continues to generate.

XII. THE KM3NeT RESEARCH INFRASTRUCTURE

KM3NeT (Cubic Kilometre Neutrino Telescope) is configured as a large-scale distributed Research Infrastructure (RI), consisting of a network of deep-sea neutrino telescopes in the Mediterranean Sea. The type of research conducted is predominantly fundamental research, but with strong components of applied and technological research. The main research lines are particle physics and astrophysics, but thanks to its location and permanent cabled connection, KM3NeT also functions as a multidisciplinary deep-sea observatory for real-time monitoring of oceanographic, geophysical, and biological parameters (e.g., bioluminescence, cetacean acoustics, seismology), contributing to environmental and climate research. (Adrian-Martinez, S., et al, 2016)

This RI has been selected for the ESFRI Roadmap as it is considered a pan-European infrastructure of strategic importance, essential to maintain Europe's leadership in astroparticle physics and to address long-term scientific needs that no single country could tackle alone; its implementation is considered necessary to guarantee Europe maximum research competitiveness over the next 25 years. ESFRI (European Strategy Forum on Research Infrastructures) is the EU's strategic instrument to develop Europe's scientific integration and strengthen its international competitiveness (ESFRI, 2025). The infrastructure also responds to the strategies of the European Research Area (ERA) and aligns with the priorities of Horizon Europe (Scientific Excellence). KM3NeT is also included in the main European research roadmaps with high priority, such as that developed by the Astro Particle ERAnet (ASPERA) for astroparticle physics and the "Strategic Plan for European Astronomy" of the Astronomy ERAnet (ASTRONET). It is also present in the programmatic development plans of the main European institutes and agencies participating in the consortium (e.g., INFN, Italy; CNRS, France; FOM, Netherlands).

KM3NeT adopts a mixed funding model that combines European, national, and regional funds. Significant resources come from the European Structural and Investment Funds (ESIF), which aim at regional development and cohesion, but also from the governments of the host countries and competitive grants from the European Union (such as Horizon 2020 and Horizon Europe) (KM3NeT Collaboration, 2025)

The project is managed by an international Collaboration involving more than 60 research institutes and universities from over 15 countries. Among the main actors are INFN (*Istituto Nazionale di Fisica Nucleare*) in Italy and CNRS (*Centre National de la Recherche Scientifique*) in France. The whole project is organised in a single Collaboration with central management and common data analysis and repository centres.

The infrastructure is distributed across three strategically selected sites in the Mediterranean, chosen for their excellent optical properties of water and proximity to the coast, connected to land via high-bandwidth electro-optical cables. The three deep-sea sites are offshore Toulon (France), Capo Passero (Sicily, Italy), and Pylos (Peloponnese, Greece). The distributed implementation maximises access to regional funds, the availability of human resources, and synergistic opportunities for the Earth and sea sciences community.

The main objectives of the KM3NeT Collaboration are (i) the discovery and subsequent observation of high-energy neutrino sources in the Universe and (ii) the determination of the mass hierarchy of neutrinos.

The KM3NeT is -*to date*- composed of two operating sites:

- ARCA (Astroparticle Research with Cosmics in the Abyss): Through a sparse configuration of sensors (with strings placed at wider distances), ARCA is optimized to detect cosmic neutrinos in the TeV–PeV energy range. This setup enables the identification of the most violent astrophysical sources in the Universe, such as supernovae and black holes, and provides a view of the Milky Way that is complementary to that of the IceCube telescope at the South Pole. The primary scientific objective of KM3NeT/ARCA is the detection of high-energy neutrinos of cosmic origin. Because neutrinos travel directly from their sources to Earth without being deflected, even a modest number of detections can be of profound scientific importance. They can reveal the astrophysical objects where cosmic rays (CRs) are accelerated or point to regions where dark matter particles annihilate or decay. An indisputable goal of KM3NeT/ARCA is to identify neutrinos originating from cosmic-ray accelerators within our Galaxy, thereby opening a new observational window on the high-energy Universe.

- ORCA (Oscillation Research with Cosmic in the Abyss): ORCA is focused on fundamental particle physics. With a dense configuration of sensors (placed closer together), it studies atmospheric neutrinos at lower energies (GeV) in order to determine the Neutrino Mass Hierarchy. The ORCA detector, located off the coast of Toulon, France, is specifically optimized to detect neutrinos in the GeV energy range.

Moreover, KM3NeT provides continuous, cabled access to the deep sea, enabling the real-time collection of oceanographic, geophysical, and biological data. This infrastructure supports research on climate change, biodiversity, and natural hazards, offering valuable insights into the dynamics of the marine environment.

KM3NeT is configured as a Distributed Research Infrastructure (Distributed RDI Infrastructure). Although the project is physically located across three distinct geographical sites, there is a strong functional relationship that connects the different parts of the infrastructure. The distributed components do not operate as independent entities, but rather as integral parts of a single global "scientific instrument". Both configurations (ARCA and ORCA) employ the same core technology, developed by the KM3NeT Collaboration. The fundamental elements, that are the multi-PMT Digital Optical Module (DOM) and the detection strings (Detection Units), are identical at both sites.

The two configurations pursue different but closely complementary scientific objectives. The combination of data collected by ARCA (high energy) and ORCA (low energy) enables a comprehensive study of neutrino physics that would not achieve the same scientific effectiveness if carried out separately. In addition, the system for data management, processing, and storage is centralized and shared.

The whole infrastructure consists of three so-called building blocks. A building block comprises 115 strings, each string comprises 18 optical modules and each optical module comprises 31 photo-multiplier tubes. Each building block thus constitutes a three-dimensional array of photo sensors that can be used to detect the Cherenkov light produced by relativistic particles emerging from neutrino interactions. Two building blocks are sparsely configured to fully explore the IceCube signal with comparable instrumented volume, different methodology, improved resolution and complementary field of view, including the galactic plane (GP). Collectively, these building blocks constitute the ARCA configuration. One building block is densely configured to precisely measure atmospheric neutrino oscillations. This building block represents the ORCA configuration.

ARCA is realised at the Porto Palo di Capo Passero site, located at ° 36 16' N ° 16 06' E at a depth of 3500m, about 100km offshore. This site is the former NEutrino Mediterranean Observatory (NEMO) site and is shared with the European Multidisciplinary Seafloor and water column Observatory (EMSO) facility for Earth and Sea science research. In 2005, with the NEMO project, the National Institute of Nuclear Physics (INFN) started an intense research and development activity for the construction of a neutrinos' detector of the required scale at high depth (> 3000 m) in the Mediterranean Sea. For these activities, the INFN has equipped, at the "Laboratori Nazionali del Sud" two underwater stations: a Test Site off Catania at 2000 m depth and one off Capo Passero at 3500 m depth on a site candidate for the installation of the telescope. In 2011, NEMO's activities merged into the KM3NeT- France project.

The KM3NeT-France ORCA configuration is located at ° 42 48'N06° 02'E at a depth of 2450m, about 40 km offshore from Toulon, France. The site is outside of the French territorial waters and about 10 km west of the site of the existing ANTARES telescope.

KM3NeT-Greece is located off the coast of Pylos in the western Peloponnese and several locations at different depths between 3000 m and 4550 m are under investigation. The deepest site (4550 m) is located at 36° 33' N 21°30' E. At present, this site has been used primarily for experimental and qualification activities, including the deployment and recovery of detector prototypes, such as the one tested in 2017 at a depth of 3,000 meters. The presence of an operational shore station in Pylos, although requiring infrastructural upgrades, provides a logistical base for potential future expansion. In this context, KM3NeT-Gr emerges as a hub for scientific and technological development in the eastern Mediterranean, with its growth prospects closely tied to the availability of future funding.

Due to KM3NeT's flexible design, the technical implementation of ARCA and ORCA is almost identical. The deep-sea sites are linked to shore with a network of cables for electrical power and high-bandwidth data communication. On site, shore stations are equipped to provide power, computing and a high-bandwidth internet connection to the data repositories. The readout of the detectors is based on the 'All data-to-shore' concept, pioneered in ANTARES. The overall design allows for a flexible and cost-effective implementation of the Research Infrastructure and its low-cost operation (Adrian-Martinez, S., et al, 2016)

XIII. REPORT ON THE SOCIO-ECONOMIC IMPACT OF KM3NeT FRANCE

Figure 1: Deployment of DU81 on the ORCA site (France)

1. Financial analysis

The objective of the financial sustainability analysis is to demonstrate that the project possesses sufficient financial resources to cover all foreseen expenditures in each year of the analysed time horizon. Technically, this assessment verifies that the cumulative net cash flow is never negative. A negative balance in any single year would indicate a liquidity crisis, a situation that could compromise the project's implementation.

To assess sustainability, the analysis matches financial inflows against financial outflows year by year:

- Financial Inflows: these include not only operating revenues (e.g., service fees) but also capital contributions (such as grants from the European Union or national government), equity injections, loans, and potential annual operating subsidies.
- Financial Outflows: These comprise investment costs, Operation and Maintenance (O&M) expenses, debt service (repayment of principal plus interest), and taxes.

For research infrastructures like KM3NeT, which typically do not generate commercial profits to repay the initial investment (resulting in a negative Financial Net Present Value, FNPV), the financial sustainability analysis is crucial. Its primary function is to confirm that there are enough committed public funds and other resources to guarantee the continuity of operational activities throughout the project's life cycle.

For the KM3NeT French site, the most significant expenditures are attributed to equipment costs, which correspond to the expenses for the construction of the detector and represent the main financial commitment. The second most relevant expenditure category is general expenditure, which includes maintenance and operating costs such as missions, energy, and other essential services.

The funding sources provided in France reflect a balanced mix of national and European resources, ensuring the project's financial solidity. In particular, the funding originates from the Centre National de la Recherche Scientifique (CNRS/IN2P3), the main French public research institution; the Contrat de Plan État-Région (CPER NEUMED), which is the principal instrument of territorial development policy in France; and European Commission framework programmes or structural funds. KM3NeT-France has a very stable financial balance, demonstrated by the positive cumulated cash flow well above the break-even threshold, highlighting the project’s capacity to maintain long-term viability.

In addition to its strong financial sustainability, the project also benefits from solid financial planning for the coming years. KM3NeT France is expected to receive €5.5 million from the French Ministry in 2026 and will continue to benefit from State–Regional funding through the CPER NEUMED 2021–2027 programme. Moreover, the project team has already applied to a French Ministry call for Research Infrastructures, requesting €18 million over a three-year period (2026–2029).

France	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
2.1 Investment costs	**245.000 €**	**996.000 €**	**725.000 €**	**1.007.000 €**	**1.139.000 €**	**1.423.000 €**	**1.260.000 €**	**1.134.000 €**	**1.618.800 €**	**3.113.000 €**	**12.660.800 €**
I.1 Start-up and technical costs	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.1.2 Land	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.1.3 Buildings	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.1.4 Equipment	245.000 €	996.000 €	725.000 €	1.007.000 €	1.139.000 €	1.423.000 €	1.260.000 €	1.134.000 €	1.618.800 €	3.113.000 €	12.660.800 €
2.2 Operating costs	**171.000 €**	**139.000 €**	**116.000 €**	**132.000 €**	**89.000 €**	**126.000 €**	**177.000 €**	**179.200 €**	**197.000 €**	**223.000 €**	**1.549.200 €**
2.2.1 Personnel	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.2.2 Energy	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.2.3 General expenditure	171.000 €	139.000 €	116.000 €	132.000 €	89.000 €	126.000 €	177.000 €	179.200 €	197.000 €	223.000 €	1.549.200 €
2.2.4 Intermediate services	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.2.6 Buildings	0 €	0 €	0 €	0 €	0 €		0 €	0 €	0 €	0 €	0 €
2.3 Other outflows	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**
2.3.1 Loan repayments	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.3.2 Interests	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.3.3 Taxes	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.3.3.1 National taxes	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.3.3.2 Regional taxes	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.3.3.3 Local taxes	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.4 Inflows	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**
2.4.1 Revenues	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.4.2 Operating subsidies	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.5 Sources of financing	**798.000 €**	**1.128.150 €**	**1.481.500 €**	**1.552.500 €**	**1.454.750 €**	**1.665.000 €**	**3.308.000 €**	**3.761.540 €**	**4.095.540 €**	**3.416.540 €**	**22.661.520 €**
2.5.1 Union assistance	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €			0 €
2.5.2 Public contribution	798.000 €	1.128.150 €	1.481.500 €	1.552.500 €	1.454.750 €	1.665.000 €	3.308.000 €	3.761.540 €	4.095.540 €	3.416.540 €	22.661.520 €
2.5.3 Private equity	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.5.4 Private loan	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
Cash Flow	**382.000 €**	**-6.850 €**	**640.500 €**	**413.500 €**	**226.750 €**	**116.000 €**	**1.871.000 €**	**2.448.340 €**	**2.279.740 €**	**80.540 €**	
Cumulated Cash Flow		**375.150 €**	**1.015.650 €**	**1.429.150 €**	**1.655.900 €**	**1.771.900 €**	**3.642.900 €**	**6.091.240 €**	**8.370.980 €**	**8.451.520 €**	

Figure 2: KM3NeT-France Cash-Flow Statement

2. Staff analysis

This analysis is based on the dataset provided by French partners, which contains information on the personnel involved in the KM3NeT project between 2016 and 2025. The variables considered include:

- Professional role
- Gender
- Age
- Educational background
- Person-months declared per year
- Annual staff spending
- Country and site of affiliation

The French sites participating in the project are:

- AstroParticles and Cosmology laboratory, Paris (APC)
- Centre de Physique des Particules de Marseille (CPPM)
- Laboratoire de Physique Corpusculaire de Caen (LPC)
- Institut Pluridisciplinaire Hubert Curien, Strasbourg (IPHC)
- Laboratoire Univers et Particules de Montpellier (LUPM)
- Subatech research laboratory, Nantes

Site	Staff	Person/months
CENTRE DE PHYSIQUE DES PARTICULES DE MARSEILLE	275	818
ASTROPARTICLES AND COSMOLOGY LABORATORY	202	78
SUBATECH RESEARCH LABORATORY	90	471
INSTITUT PLURIDISCIPLINAIRE HUBERT CURIEN	67	240
LABORATOIRE DE PHYSIQUE CORPUSCULAIRE DE CAEN	50	168
LABORATOIRE UNIVERS ET PARTICULES DE MONTPELLIER	14	76
Total	**698**	**1851**

Table 1 : KM3NeT-France Site and Staff 2016-2025

At the beginning of the period under review, the project employed a workforce of 38 units, whereas by the final year this number had risen to 95 staff members involved in operations, highlighting a phase of strong expansion and consolidation. The size of the workforce increased steadily over the years. Technical staff represent the largest category, and their numbers doubled over the decade, rising from 20 to 40 units. The scientific component (PIs, Researchers, Professors and PhD students) also experienced significant growth, particularly among employed researchers, whose numbers increased from around 4 in 2016 to more than 20 in the 2022–2025 period. From 2022 onwards, the number of PhD students also grew substantially. This trend is an excellent indicator of academic vitality: the project is attracting young talent and has secured the necessary funding to support scholarships, thereby contributing to the future of research.

Overall, the data portray a research infrastructure in excellent health and undergoing a clear scaling phase. Between 2016 and 2025, the staff more than doubled, and the range of competencies expanded. The project began with a strong technical foundation and subsequently broadened its base of researchers and students needed to exploit the scientific data produced, eventually strengthening the administrative component as well.

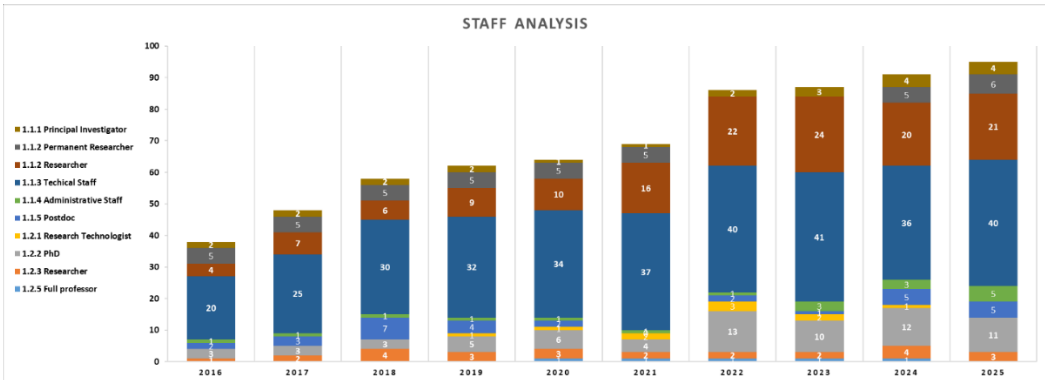

Figure 3: KM3NeT-France Staff Distribution 2016-2025

The operational effort of the project has been assessed through two key indicators: salaries and related staff costs, and the number of person months dedicated to the project. Both measures display a clear upward trajectory over the years. In 2016, the project began with 59 person-months, whereas by 2024 this figure had risen to 418 person-months, corresponding to an approximate increase of 30 full time equivalents.

The ratio between staff spending and person months is not constant throughout the period, reflecting the qualitative evolution of the workforce. As the project expanded, the composition of the staff changed, resulting in variations in average personnel costs. This dynamic indicates not only a quantitative growth in human resources but also an evolution on the project’s scientific and technical capacity.

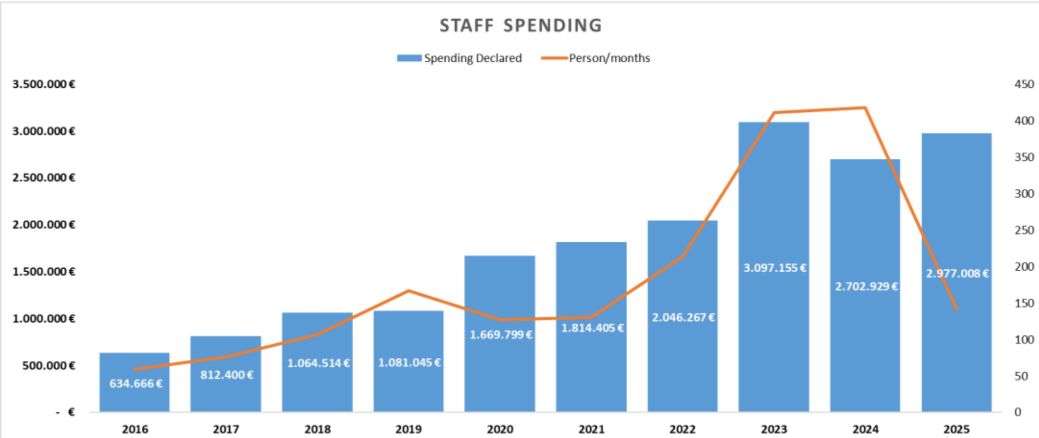

Figure 4: KM3NeT-France Staff Spending and Person/month 2016-2025

Role	Person/months
1.1.3 Techical Staff	792
1.1.2 Researcher	435
1.2.2 PhD	350
1.1.5 Postdoc	163
1.1.4 Administrative Staff	67
1.2.1 Research Technologist	36
1.1.1 Principal Investigator	8
Total	**1851**

Table 2: KM3NeT-France person-month by role 2016-2025

The data regarding staff gender distribution show a significant gender imbalance throughout the project's decade-long timeline, which is a common challenge in large-scale physics and engineering infrastructures. However, there is a trend toward improvement in the last years. Indeed, starting from the 2022 the women staff percentage increased. The project successfully moved from a workforce that was made by 11,11% of women to one that reached the 20,65%. While parity is still far off, the trend in the last three years indicates that recruitment efforts are beginning to improve the demographic balance.

It is important to note that the presence of women is highly concentrated in a limited number of roles. In fact, most women are employed in administrative positions, while senior scientific roles, such as Principal Investigators, employed researchers and full professors, remain almost exclusively occupied by men.

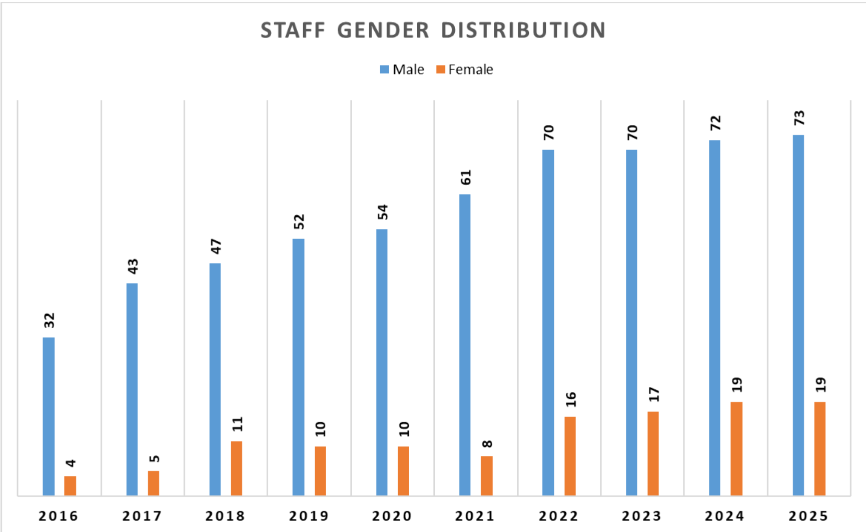

Figure 5: KM3NeT-France Gender Distribution 2016-2025

Year	Total	% Male	% Female
2016	36	88,89%	11,11%
2017	48	89,58%	10,42%
2018	58	81,03%	18,97%
2019	62	83,87%	16,13%
2020	64	84,38%	15,63%
2021	69	88,41%	11,59%
2022	86	81,40%	18,60%
2023	87	80,46%	19,54%
2024	91	79,12%	20,88%
2025	92	79,35%	20,65%

Table 3: KM3NeT-France Gender Distribution % 2016-2025

Role	Total	% Male	% Female
1.1.1 Principal Investigator	23	74%	26%
1.1.2 Permanent Researcher	41	100%	0%
1.1.2 Researcher	136	81%	19%
1.1.3 Techical Staff	335	89%	11%
1.1.4 Administrative Staff	18	11%	89%
1.1.5 Postdoc	31	65%	35%
1.2.1 Research Technologist	10	100%	0%
1.2.2 PhD	69	86%	14%
1.2.3 Researcher	25	48%	52%
1.2.5 Full professor	5	100%	0%
Total	**693**	**83%**	**17%**

Table 4: KM3NeT-France Gender Distribution by role 2016-2025

3. Impact analysis

Policy makers and civil society increasingly hold growing expectations for research infrastructures, viewing them as essential components not only for scientific and technological progress but also for the overall socio-economic development of the regional and national territories where they are implemented (European Commission, 2010; ESFRI, 2008, 2010; Technopolis, 2011; FSE, 2013).

It is therefore crucial to measure the socio-economic impact that the KM3NeT-France infrastructure has generated and continues to generate for the national territory. Defining socio-economic impact means assessing the incremental wealth created by the implementation of the infrastructure within the territory.

Specifically, this study identifies the following types of impact: Direct economic impact, Indirect economic impact, Induced economic impact, Social impact, deriving, among other things, from the value of patents generated, spin-offs created, scientific publications, human capital development, and knowledge spill overs; Environmental impact, mainly associated with benefits from CO_2 reduction.

The sum of these individual valuations provides the total estimated impact generated by the infrastructure.

The overall set of economic and social effects of KM3NeT-France analysed and estimated through the adopted model is referred to as the "general impact of KM3NeT-France" encompassing all economic and social implications the project may generate. The impact of KM3NeT-France therefore represents the complete estimate of socio-economic effects provided through the ad hoc methodology employed in this study.

Impact is assessed for the period from 2016 to 2030. The analysis is based on actual data for the period 2016–2025, while data for 2026–2030 are projections.

As noted above, the infrastructure develops its scientific and social potential over the long term, and adopting an extended time horizon is necessary for a comprehensive evaluation of its performance. However, measuring impact over a period longer than that considered in this study would raise concerns about the reliability of the estimates.

Therefore, while acknowledging the enormous potential for impact in the distant future, the estimates in this study are limited to 2030.

Impact analysis is a tool designed to inform stakeholders about the economic and social benefits that society derives from the infrastructure. These benefits—including social and environmental ones—are expressed here through monetary quantification at accounting prices.

The interpretation and representation of value creation processes and the generation of territorial impact for all stakeholders of a research infrastructure are central elements of a comprehensive and dynamic networked system. Such a system aims to communicate transparently the information related to the creation and measurement of shared value (Porter & Kramer, 2011; Nicotra, 2014).

Beneficiaries of the Infrastructure:

- Firms Spin-offs and start-ups, SMEs and large companies that directly benefit from the services provided by the infrastructure and/or enjoy indirect effects arising from contracts or knowledge spill overs.
- Workers and the scientific community Scientists and researchers who generate knowledge and are direct users of the infrastructure. Early-career researchers, students and professionals undertaking a study or training period at KM3NeT-France. The broader scientific community that benefits from knowledge spill overs.
- Users Consumers of goods and services produced by the infrastructure (or indirectly generated by it), accessed either free of charge or against payment. Visitors accessing the infrastructure, including virtual access through websites and social networks.

- Taxpayers Indirect "funders" of the infrastructure who, although not direct beneficiaries, value the scientific discoveries and technological progress generated by KM3NeT-France.
- Promoting research centre in terms of reputational returns that enhance its ability to attract investments.

It is essential to represent the value of a project with the awareness that its impact extends beyond the financial dimension.

It is equally important to distinguish between the concept of impact evaluation—which this study aims to measure—and the concept of outcome evaluation.

Outcome evaluation seeks to qualify and quantify the added value of the project in relation to its predefined objectives, taking into account how the implementation process unfolded and any changes that may have occurred in the reference context.

Impact evaluation, on the other hand, focuses on the persistence over time and the magnitude of the immediate results. Both evaluations are ultimately concerned with external effectiveness, that is, the degree to which the project addresses or satisfies the needs that originally motivated its creation.

4. Economic analysis

The objective of section is to estimate the overall economic impact generated by the KM3NeT-France research infrastructure over the period 2016–2030, with specific reference to:

- direct effects, related to the expenditures directly incurred by the infrastructure;
- indirect effects, generated along the upstream supply chains;
- induced effects, resulting from the expenditure of the incomes activated (households and workers).

The analysis aims to provide a monetary quantification of the economic effects, distinguishing three main expenditure components:

1. Capital investments (Equipment)
2. Operating and management costs (General Expenditure)
3. Staff expenditure (Personnel costs)

6.1 Capital investments (Equipment)

Investment data for KM3NeT-France (2016–2025 actual, 2026–2030 projected). French symmetric input-output tables (INSEE) and Eurostat FIGARO for multipliers.

Due to lack of detailed sectoral breakdown, we apply average national multipliers for research and advanced services:

Type I multiplier = 1.50 (direct + indirect).
Type II multiplier = 1.80 (direct + indirect + induced).

For each year, we calculate:

Direct impact = investment.
Indirect impact = investment × (Type I − 1.00).
Induced impact = investment × (Type II − Type I).
Total impact = direct + indirect + induced.

Capital investments include expenditures devoted to the construction, upgrade and technological enhancement of the KM3NeT-France infrastructure.

- Observed period: 2016–2025 (actual data)
- Total investments 2016–2025: €12,660,800

Year	Investment (€)
2016	€245.000,00
2017	€996.000,00
2018	€725.000,00
2019	€1.007.000,00
2020	€1.139.000,00
2021	€1.423.000,00
2022	€1.260.000,00
2023	€1.134.000,00
2024	€1.618.800,00
2025	€3.113.000,00
Total	**€12.660.800,00**

Table 5: Capital Investments 2016-2025

Over the period 2016–2025, capital investments increased from €245,000 to €3,113,000, showing a progressive growth pattern, particularly in the most recent years. This trend reflects the construction and upgrade phase of the infrastructure. After 2025, KM3NeT-France enters the final completion and enhancement phase. Investments are expected to remain significant but more stable, as most of the core infrastructure components will already have been installed.

A moderate increase in investment levels is assumed until 2028, in order to cover final installations and advanced equipment. From 2029 to 2030, investment levels are assumed to stabilise, reflecting the testing, commissioning and final completion phase of the infrastructure. Based on historical expenditure patterns, average annual investments between €1.2 and €1.4 million are assumed, consistent with the final investment phases of comparable large-scale scientific research infrastructures.

Year	Projected Investment (€)
2026	€1.200.000,00
2027	€1.300.000,00
2028	€1.350.000,00
2029	€1.350.000,00
2030	€1.350.000,00
Total	**€6.550.000,00**

Table 6: Projected investment 2026-2030

Adopting the methodology previously explained, we reach the following results.

Year	Investment (€)	Direct (€)	Indirect (€)	Induced (€)	Total Impact (€)
2016	245.000,00	245.000,00	122.500,00	73.500,00	441.000,00
2017	996.000,00	996.000,00	498.000,00	298.800,00	1.792.800,00
2018	725.000,00	725.000,00	362.500,00	217.500,00	1.305.000,00
2019	1.007.000,00	1.007.000,00	503.500,00	302.100,00	1.812.600,00
2020	1.139.000,00	1.139.000,00	569.500,00	341.700,00	2.050.200,00
2021	1.423.000,00	1.423.000,00	711.500,00	426.900,00	2.561.400,00
2022	1.260.000,00	1.260.000,00	630.000,00	378.000,00	2.268.000,00
2023	1.134.000,00	1.134.000,00	567.000,00	340.200,00	2.041.200,00
2024	1.618.800,00	1.618.800,00	809.400,00	485.640,00	2.913.840,00
2025	3.113.000,00	3.113.000,00	1.556.500,00	933.900,00	5.603.400,00
2026	1.200.000,00	1.200.000,00	600.000,00	360.000,00	2.160.000,00
2027	1.300.000,00	1.300.000,00	650.000,00	390.000,00	2.340.000,00
2028	1.350.000,00	1.350.000,00	675.000,00	405.000,00	2.430.000,00
2029	1.350.000,00	1.350.000,00	675.000,00	405.000,00	2.430.000,00
2030	1.350.000,00	1.350.000,00	675.000,00	405.000,00	2.430.000,00
Total	**19.210.800,00**	**19.210.800,00**	**9.605.400,00**	**5.763.240,00**	**34.579.440,00**

6.2 Operating and management costs

Operating costs include current expenditures necessary for the day-to-day functioning of the infrastructure (services, maintenance, utilities and operational support).

- Observed period: 2016–2025
- Total operating costs 2016–2025: €1,549,200

Year	Operating Costs (€)
2016	€171.000,00
2017	€139.000,00
2018	€116.000,00
2019	€132.000,00
2020	€89.000,00
2021	€126.000,00
2022	€177.000,00

2023	€179.200,00
2024	€197.000,00
2025	€223.000,00
Total	**€1.549.200,00**

Table 7: Operating costs 2016-2025

Operating and management costs are expected to stabilize or grow slightly in the coming years, as the infrastructure will be fully completed and maintained in operational conditions. An annual increase of 2–3% compared to the last observed year (2025: €223,000) is assumed, in order to cover maintenance activities, operational needs and routine consumption.

Year	Operating Costs (€)
2026	€228.000,00
2027	€233.000,00
2028	€238.000,00
2029	€244.000,00
2030	€250.000,00
Total	**€1.193.000,00**

Table 8: Operating costs 2026-2030

We apply standard input output (I O) analysis using the Leontief model and French symmetric input output tables (SIOT). Impacts are computed at basic prices in euros of gross output:

Direct impact: the management expenditure itself, treated as final demand in the relevant service activities.

Indirect impact (Type I): supply chain effects arising as service providers and vendors purchase intermediate inputs across the economy; captured via the Leontief inverse $(I-A)^{-1}$.

Induced impact (Type II): household consumption generated by wages and salaries paid through direct and indirect activity, obtained by endogenizing the household sector in the I O system (Type II multipliers).

Data sources are derived from INSEE TES/SIOT for France and Eurostat FIGARO tables to ensure consistency of multipliers and technical coefficients. In the absence of a fully disaggregated breakdown of operating items, management costs are assumed to primarily fall in advanced market services (administration, scientific support, ICT, logistics), consistent with NACE Rev.2 M72 and related service aggregates used in French SIOT. This is a common practice when only top-level totals are available.

We use average national multipliers suited to services:

Type I (direct + indirect) = 1.50
Type II (direct + indirect + induced) = 1.80

This keeps a conservative stance and aligns with documented ranges for France's market services; Type II adds household effects on top of Type I.

Computation. For each year t:

$$\text{Direct} = \text{Management Cost}_t$$
$$\text{Indirect} = \text{Management Cost}_t \times (1.50 - 1.00)$$
$$\text{Induced} = \text{Management Cost}_t \times (1.80 - 1.50)$$
$$\text{Total (Type II)} = \text{Direct} + \text{Indirect} + \text{Induced}$$

Results measure gross output. Without item level sectoral shares, average multipliers approximate the effect; sector specific multipliers would refine estimates.

Year	Management Costs (€)	Direct (€)	Indirect (€)	Induced (€)	Total Impact (€)
2016	171.000,00	171.000,00	85.500,00	51.300,00	307.800,00
2017	139.000,00	139.000,00	69.500,00	41.700,00	250.200,00
2018	116.000,00	16.000,00	58.000,00	34.800,00	208.800,00
2019	132.000,00	32.000,00	66.000,00	39.600,00	237.600,00
2020	89.000,00	9.000,00	44.500,00	26.700,00	160.200,00
2021	126.000,00	126.000,00	63.000,00	37.800,00	226.800,00
2022	177.000,00	177.000,00	8.500,00	53.100,00	318.600,00
2023	179.200,00	179.200,00	89.600,00	53.760,00	322.560,00
2024	197.000,00	197.000,00	98.500,00	59.100,00	354.600,00
2025	223.000,00	223.000,00	111.500,00	66.900,00	401.400,00
2026	228.000,00	228.000,00	114.000,00	68.400,00	410.400,00
2027	233.000,00	233.000,00	116.500,00	69.900,00	419.400,00
2028	238.000,00	238.000,00	119.000,00	71.400,00	428.400,00
2029	244.000,00	244.000,00	122.000,00	73.200,00	439.200,00
2030	250.000,00	250.000,00	125.000,00	75.000,00	450.000,00
total	**2.742.200,00**	**2.742.200,00**	**1.371.100,00**	**822.660,00**	**4.935.960,00**

6.3 General expenditure

Staff expenditure represents the most structurally significant component of the economic impact, as it is directly linked to high-skilled employment and sustained income generation.

- Observed period: 2016–2025
- Total staff expenditure 2016–2025: approximately €17.9 million

Data show a marked increase starting from 2020, with a peak in the 2023–2025 period, consistent with the expansion of scientific and operational activities at KM3NeT-France.

Year	Staff Spending (€)
2016	€634.666,00
2017	€812.400,00
2018	€1.064.514,00
2019	€1.081.045,00

2020	€1.669.799,00
2021	€1.814.405,00
2022	€2.046.267,00
2023	€3.097.155,00
2024	€2.702.929,00
2025	€2.977.008,00
Total	**€17.900.188,00**

Table 9: Staff Spending 2016-2025

For the period 2026–2030, staff costs are assumed to stabilise, with annual expenditure between €2.7 and €2.8 million.

Year	Staff Spending (€)
2026	€2.800.000,00
2027	€2.700.000,00
2028	€2.700.000,00
2029	€2.700.000,00
2030	€2.700.000,00
Total	**€13.600.000,00**

Table 10: Staff Spending 2026-2030

Direct impact: salaries and wages paid to staff (final demand in labour services).

Indirect impact: supply-chain effects from goods and services purchased by the organization to support staff activities (e.g., office supplies, IT services).

Induced impact: household consumption financed by staff wages, which is particularly significant for labour costs.

Data are based on French symmetric input-output tables (SIOT) and Eurostat FIGARO for multipliers. Household consumption coefficients for induced effects.

Staff costs are mapped to professional, scientific, and technical services (NACE M72 and related aggregates) and administrative services. These sectors are labour-intensive, so induced effects are relatively strong compared to indirect effects.

We apply conservative multipliers for service sectors:

Type I multiplier = 1.40 (direct + indirect)
Type II multiplier = 1.80 (direct + indirect + induced)

Type I is lower because staff costs themselves do not trigger large supply-chain purchases, but induced effects remain significant.

For each year:

Direct impact = staff cost.
Indirect impact = staff cost × (Type I − 1.00).

Induced impact = staff cost × (Type II − Type I).
Total impact = direct + indirect + induced.

Year	Direct (€)	Indirect (€)	Induced (€)	Total
2016	634.666,00	253.866,40	253.866,40	1.142.398,80
2017	812.400,00	324.960,00	324.960,00	1.462.320,00
2018	1.064.514,00	425.805,60	425.805,60	1.916.125,20
2019	1.081.045,00	432.418,00	432.418,00	1.945.881,00
2020	1.669.799,00	667.919,60	667.919,60	3.005.638,20
2021	1.814.405,00	725.762,00	725.762,00	3.265.929,00
2022	2.046.267,00	818.506,80	818.506,80	3.683.280,60
2023	3.097.155,00	1.238.862,00	1.238.862,00	5.574.879,00
2024	2.702.929,00	1.081.171,60	1.081.171,60	4.865.272,20
2025	2.977.008,00	1.190.803,20	1.190.803,20	5.358.614,40
2026	2.800.000,00	1.120.000,00	1.120.000,00	5.040.000,00
2027	2.700.000,00	1.080.000,00	1.080.000,00	4.860.000,00
2028	2.700.000,00	1.080.000,00	1.080.000,00	4.860.000,00
2029	2.700.000,00	1.080.000,00	1.080.000,00	4.860.000,00
2030	2.700.000,00	1.080.000,00	1.080.000,00	4.860.000,00
Total	**31.500.188,00**	**12.600.075,20**	**12.600.075,20**	**56.700.338,40**

The adopted methodology allows for:

- a transparent and consistent assessment of the economic impact of KM3NeT-France;
- comparability across investment, management and personnel expenditure categories;
- a robust and defensible estimate of economic effects at national level.

The analysis highlights that KM3NeT-France generates not only scientific value but also significant and persistent economic benefits, particularly through high-skilled employment and sustained demand along production supply chains.

Category	Direct Impact (€)	Indirect Impact (€)	Induced Impact (€)	Total Impact (€)
Investments	19.210.800,00	9.605.400,00	5.763.240,00	34.579.440,00
Operating costs (net of personnel)	2.742.200,00	1.371.100,00	822.660,00	4.935.960,00
Personnel costs	31.500.188,00	12.600.075,20	12.600.075,20	56.700.338,40
All categories	**53.453.188,00**	**23.576.575,20**	**19.185.975,20**	**96.215.738,40**

According to the input-output methodology adopted, each euro of direct expenditure by KM3NeT-France generates approximately €1.8 of total economic impact, including direct, indirect and induced effects.

5. Social impact

Beyond economic impacts, the project generates social impact, monetized in this study. In detail:

δ1 – New enterprises created by the infrastructure

New businesses will emerge locally and nationally to seize opportunities generated by KM3NeT-FRANCE and its induced effects. Entrepreneurship stimulated by KM3NeT-FRANCE and its medium- to long-term impact forms part of the infrastructure's legacy.

δ2 – Patent value

Technological innovation and R&D play a strategic role in the economy, driving competitiveness and enabling continuous improvement of traditional production and the creation of new goods and services. Highlighting the economic value of patent activity is essential, as it enables knowledge spill overs benefiting firms and the entire regional and national territory.

δ3 – Value of scientific publications

Among KM3NeT-France's benefits is the opportunity for scientists and researchers to access new data, process it, and contribute to knowledge creation through outputs such as journal articles or monographs. As with patents, this study captures the social and economic value of publications.

δ4 – Human capital development

KM3NeT-France employs scientific, technical (technicians and engineers), administrative, and support staff and hosts PhD students, postdoctoral researchers, young academics, and short-term users who gain knowledge and experience that enrich their cultural and professional background.

δ5 – Services to the territory

The infrastructure provides services that the territory enjoys free of charge. KM3NeT supplies third parties with data from marine technological structures for social purposes.

δ6 – Knowledge spill over within the supply chain

Technology suppliers involved in the design, construction, and operation of KM3NeT-FRANCE benefit from working with a research infrastructure. These firms face the challenge of delivering non-commercial industrial solutions to complex technological problems, fostering collaboration with KM3NET-FRANCE's scientific and technical staff and enabling the acquisition of new knowledge and skills. This learning-by-doing process can lead to improvements in existing equipment and the development of new tools applicable in other scientific and industrial sectors.

δ7 – Knowledge spill over within the scientific community

The infrastructure generates knowledge and significant benefits for the broader scientific community, particularly through free access to data collected by the underwater telescope.

δ8 – Scientific attractiveness of the area

Thanks to the presence of KM3NeT-France, the area hosting the infrastructure attracts a steady flow of researchers interested in the submarine site, school groups visiting the area, students enrolled in training programs, and conferences that stimulate spending on accommodation, catering, transportation, ancillary services, and publishing.

δ9 – Increase in Foreign Direct Investment (FDI)

Due to the growing attractiveness of the area where KM3NeT-France is located—especially in relation to the supplies required for its enhancement and operation—an increase in greenfield FDI flows (new investments, independent of acquisitions of existing companies) is expected.

δ10 – Strengthening the image of the promoting entity and its international relations

The image of KM3NeT-FRANCE's promoting institution is reinforced by the project itself, both nationally and internationally, with positive effects on its ability to attract European and other funding.

δ11 – Existence value

An additional impact on social well-being is linked to the infrastructure's potential for discovery. Beyond the value of publications and patents, the discovery itself has intrinsic social value and can lead to improvements in human well-being, defined as "non-use benefits."

ε1 – Benefits from CO_2 reduction

The project also generates an environmental impact, expressed here in economic terms. Specifically, this refers to the reduction of CO_2 emissions achieved because the use of the infrastructure and its underwater sensors reduces the need for marine campaigns by certain entities, resulting in significant savings in fuel consumption and related emissions.

XIV. REPORT ON THE SOCIO-ECONOMIC OF KM3NeT GREECE

Figure 6 : KM3NeT DOM

6. Financial analysis

The objective of the financial sustainability analysis is to demonstrate that the project possesses sufficient financial resources to cover all foreseen expenditures in each year of the analysed time horizon. Technically, this assessment verifies that the cumulative net cash-flow is never negative. A negative balance in any single year would indicate a liquidity crisis, a situation that could compromise the project's implementation.

To assess sustainability, the analysis matches financial inflows against financial outflows year by year:

- Financial Inflows: these include not only operating revenues (e.g., service fees) but also capital contributions (such as grants from the European Union or national government), equity injections, loans, and potential annual operating subsidies.
- Financial Outflows: These comprise investment costs, Operation and Maintenance (O&M) expenses, debt service (repayment of principal plus interest), and taxes.

For research infrastructures like KM3NeT, which typically do not generate commercial profits to repay the initial investment (resulting in a negative Financial Net Present Value, FNPV), the financial sustainability analysis is crucial. Its primary function is to confirm that there are enough committed public funds and other resources to guarantee the continuity of operational activities throughout the project's lifecycle.

For the KM3NeT Greek site, the largest inflows originate from public contributions, amounting to 1.1 million euros over the period 2016–2025.

On the expenditure side, personnel costs represent the main outflow, exceeding 800 thousand euros during the same period. In contrast, spending on equipment is substantially low, especially when compared to the resources allocated to personnel.

Regarding the financial sustainability balance, the Greek site shows a slight strain that does not appear alarming. The cumulative cash-flow turns negative only in the last year, but the deficit remains relatively small, indicating that financial sustainability can be restored without major difficulty.

Greece	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
2.1 Investment costs	**20.000 €**	**15.000 €**	**15.000 €**	**30.000 €**	**20.000 €**	**40.000 €**	**70.000 €**	**86.000 €**			**296.000 €**
2.1.1 Start-up and technical costs	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.1.2 Land	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.1.3 Buildings	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.1.4 Equipment	20.000 €	15.000 €	15.000 €	30.000 €	20.000 €	40.000 €	70.000 €	86.000 €			296.000 €
2.2 Operating costs	**68.800 €**	**69.800 €**	**68.800 €**	**69.800 €**	**71.000 €**	**80.200 €**	**103.200 €**	**104.200 €**	**94.200 €**	**94.200 €**	**824.200 €**
2.2.1 Personnel	61.800 €	62.800 €	61.800 €	61.800 €	63.000 €	67.200 €	85.200 €	85.200 €	85.200 €	85.200 €	719.200 €
2.2.2 Energy	2.000 €	2.000 €	2.000 €	3.000 €	3.000 €	3.000 €	3.000 €	4.000 €	4.000 €	4.000 €	30.000 €
2.2.3 General expenditure	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	
2.2.4 Intermediate services						5.000 €	10.000 €	10.000 €			25.000 €
2.2.5 Raw materials	5.000 €	5.000 €	5.000 €	5.000 €	5.000 €	5.000 €	5.000 €	5.000 €	5.000 €	5.000 €	50.000 €
2.3 Other outflows	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**
2.3.1 Loan repayments	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.3.2 Interests	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.3.3 Taxes	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.3.3.1 National taxes	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.3.3.2 Regional taxes	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.3.3.3 Local taxes	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.4 Inflows	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**	**0 €**
2.4.1 Revenues	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.4.2 Operating subsidies	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.5 Sources of financing	**200.000 €**	**150.000 €**	**60.000 €**	**60.000 €**	**70.000 €**	**400.000 €**	**70.000 €**	**30.000 €**	**30.000 €**	**30.000 €**	**1.100.000 €**
2.5.1 Union assistance	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €			0 €
2.5.2 Public contribution	200.000 €	150.000 €	60.000 €	60.000 €	70.000 €	400.000 €	70.000 €	30.000 €	30.000 €	30.000 €	1.100.000 €
2.5.3 Private equity	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
2.5.4 Private loan	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
Cash Flow	**111.200 €**	**65.200 €**	**-23.800 €**	**-39.800 €**	**-21.000 €**	**279.800 €**	**-103.200 €**	**-160.200 €**	**-64.200 €**	**-64.200 €**	
Cumulated Cash Flow		**176.400 €**	**152.600 €**	**112.800 €**	**91.800 €**	**371.600 €**	**268.400 €**	**108.200 €**	**44.000 €**	**-20.200 €**	

Figure 7: KM3NeT-Greece Cash-Flow Statement

7. Staff analysis

The staff analysis is based on the dataset provided by Greek partners, which contains information on the personnel involved in the KM3NeT project between 2016 and 2025. The variables considered include:

- Professional role
- Gender
- Age
- Educational background
- Person-months declared per year
- Annual staff spending
- Country and site of affiliation

The Greek site participating in the project is the National Centre for Scientific Research “Demokritos”, one of the largest interdisciplinary research institutions in Greece. The centre runs high-impact research and innovation projects funded by the European Union, private corporations, and the Greek state.

Over the decade observed, the staff involved in operations at Demokritos ranges from 9 to 15 individuals, with peaks in 2018 and 2023. The distribution by role reveals a stable and well-balanced structure, with the constant presence of two Principal Investigators, confirming a consolidated scientific leadership. Technical Staff show a clear increase from 2020 onwards, rising from 2 to 5 units, which suggests a strengthening of operational and engineering activities. PhD students fluctuate between 1 and 4, with a particularly strong presence between 2018 and 2020; this variability reflects typical cycles of training, turnover, and progression in long-term research projects. Non-employed Researchers represent the most variable category, peaking at 4 units in 2019 and decreasing in the following years.

The consistent presence of PhD candidates and early-career researchers highlights a positive impact on local human capital, with potential spill overs in terms of qualified employment, technological transfer, and the site’s attractiveness to young scientists.

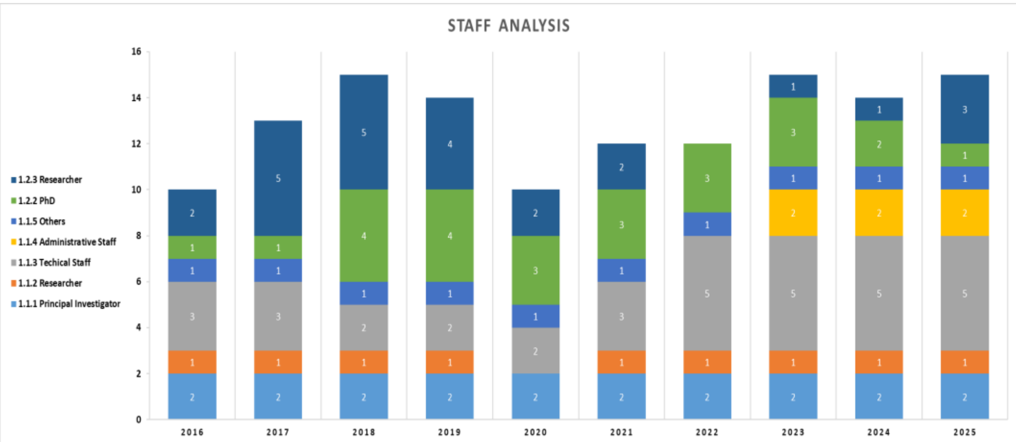

Figure 8: KM3NeT-Greece Staff Distribution 2016-2025

The financial resources allocated to staff and the person months dedicated to the KM3NeT project at the Greek site illustrate the operational effort of the project over the decade. The years 2018–2019 represent the peak of activity, marked by the highest deployment of both human and financial resources, indicating a phase of technical and scientific expansion and consolidation. In 2020, a sharp slowdown is observed, most likely attributable to the effects of the COVID 19 pandemic, which led to a reduction in both spending and person months devoted to the project.

From 2021 onwards, a gradual recovery becomes evident, with a steady increase in activity and a progressive realignment of operational levels. However, despite this positive trend, neither staff expenditure nor human effort has yet returned to pre-pandemic levels.

It is also noteworthy that PhD students are among the most consistently involved categories. This highlights the project's positive social impact on local human capital, fostering advanced training, skill development, and opportunities for young researchers.

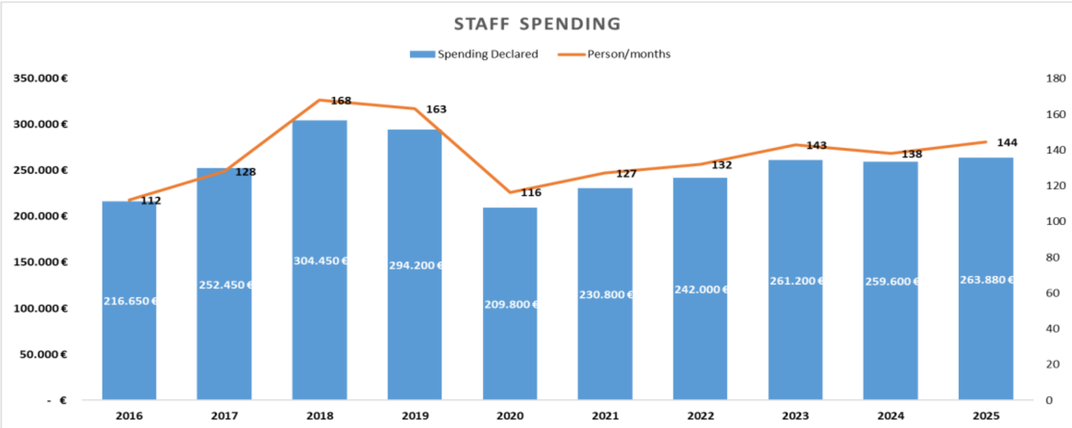

Figure 9: KM3NeT-Greece Staff Spending and Person-month 2016-2025

Role	Person/months
1.1.3 Techical Staff	387
1.2.2 PhD	300
1.2.3 Researcher	248
1.1.1 Principal Investigator	202
1.1.5 Others	120
1.1.2 Researcher	97
1.1.4 Administrative Staff	18
Total	**1372**

Table 11: KM3NeT-Greece Person-month by role 2016-2025

An analysis of staff gender distribution reveals a demographic structure marked by a predominance of men, a pattern commonly observed in STEM fields and particularly in physics and engineering. However, a closer examination highlights noteworthy trends and role-specific dynamics. Looking at the aggregated data for the entire period, the workforce is composed of 62.29% men and 37.31% women. Although the gender gap remains significant, the temporal trend shows a slow but steady improvement: the share of women increased by 7.31% over the period considered.

Despite the overall imbalance, gender distribution in senior scientific positions is more equitable. The role of Principal Investigator is perfectly balanced between men and women, and employed researchers include more women than men. Conversely, male presence is higher among PhD students and non-employed researchers, reflecting patterns often associated with early-career stages and transitional research positions.

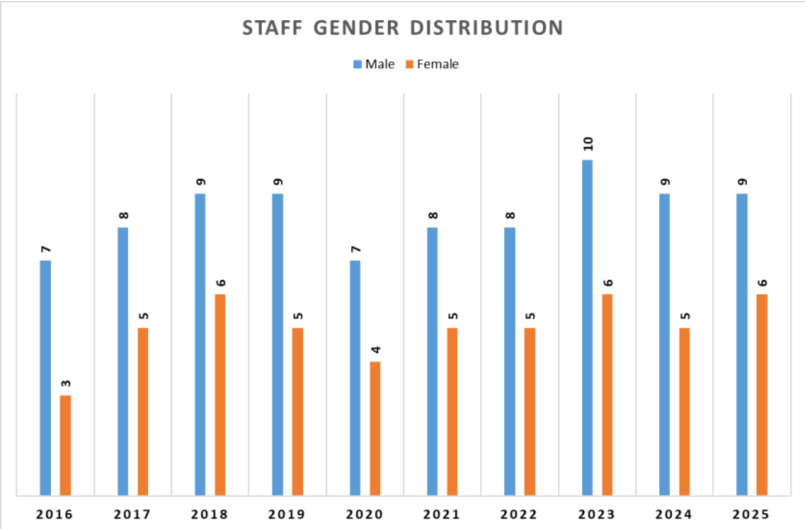

Figure 10: KM3NeT-Greece Gender Distribution 2016-2025

Year	% Male	% Female
2016	70,00%	30,00%
2017	61,54%	38,46%
2018	60,00%	40,00%
2019	64,29%	35,71%
2020	63,64%	36,36%
2021	61,54%	38,46%
2022	61,54%	38,46%
2023	62,50%	37,50%
2024	64,29%	35,71%
2025	60,00%	40,00%

Table 12: KM3NeT-Greece Gender Distribution % 2016-2025

Role	Total	% Male	% Female
1.1.1 Principal Investigator	20	50%	50%
1.1.2 Researcher	9	44%	56%
1.1.3 Techical Staff	35	71%	29%
1.1.4 Administrative Staff	6	50%	50%
1.1.5 Others	10	0%	100%
1.2.2 PhD	29	79%	21%
1.2.3 Researcher	25	76%	24%
Total	**134**	**63%**	**37%**

Table 13: KM3NeT-Greece Gender Distribution by role 2016-2025

8. Impact analysis

Policy makers and civil society increasingly hold growing expectations for research infrastructures, viewing them as essential components not only for scientific and technological progress but also for the overall socio-economic development of the regional and national territories where they are implemented (European Commission, 2010; ESFRI, 2008, 2010; Technopolis, 2011; FSE, 2013).

It is therefore crucial to measure the socio-economic impact that the KM3NET-GREECE infrastructure has generated and continues to generate for the national territory. Defining socio-economic impact means assessing the incremental wealth created by the implementation of the infrastructure within the territory.

Specifically, this study identifies the following types of impact: Direct economic impact, Indirect economic impact, Induced economic impact, Social impact, deriving, among other things, from the value of patents generated, spin-offs created, scientific publications, human capital development, and knowledge spill overs; Environmental impact, mainly associated with benefits from CO_2 reduction.

The sum of these individual valuations provides the total estimated impact generated by the infrastructure.

The overall set of economic and social effects of KM3NeT-Greece analysed and estimated through the adopted model is referred to as the "general impact of KM3NeT-Greece," encompassing all economic and social implications the project may generate. The impact of KM3NeT-Greece therefore represents the complete estimate of socio-economic effects provided through the ad hoc methodology employed in this study.

Impact is assessed for the period from 2016 to 2030. The analysis is based on actual data for the period 2016–2025, while data for 2026–2030 are projections.

As noted above, the infrastructure develops its scientific and social potential over the long term, and adopting an extended time horizon is necessary for a comprehensive evaluation of its performance. However, measuring impact over a period longer than that considered in this study would raise concerns about the reliability of the estimates.

Therefore, while acknowledging the enormous potential for impact in the distant future, the estimates in this study are limited to 2030.

Impact analysis is a tool designed to inform stakeholders about the economic and social benefits that society derives from the infrastructure.

The interpretation and representation of value creation processes and the generation of territorial impact for all stakeholders of a research infrastructure are central elements of a comprehensive and dynamic networked system. Such a system aims to communicate transparently the information related to the creation and measurement of shared value (Porter & Kramer, 2011; Nicotra, 2014).

Beneficiaries of the Infrastructure:

- Firms Spin-offs and start-ups, SMEs and large companies that directly benefit from the services provided by the infrastructure and/or enjoy indirect effects arising from contracts or knowledge spill overs.
- Workers and the scientific community Scientists and researchers who generate knowledge and are direct users of the infrastructure. Early-career researchers, students and professionals undertaking a study or training period at KM3NET. The broader scientific community that benefits from knowledge spill overs.
- Users Consumers of goods and services produced by the infrastructure (or indirectly generated by it), accessed either free of charge or against payment. Visitors accessing the infrastructure, including virtual access through websites and social networks.
- Taxpayers Indirect "funders" of the infrastructure who, although not direct beneficiaries, value the scientific discoveries and technological progress generated by KM3NeT-Greece.
- Promoting research centre in terms of reputational returns that enhance its ability to attract investments.

It is essential to represent the value of a project with the awareness that its impact extends beyond the financial dimension.

It is equally important to distinguish between the concept of impact evaluation—which this study aims to measure—and the concept of outcome evaluation.

Outcome evaluation seeks to qualify and quantify the added value of the project in relation to its predefined objectives, taking into account how the implementation process unfolded and any changes that may have occurred in the reference context.

Impact evaluation, on the other hand, focuses on the persistence over time and the magnitude of the immediate results. Both evaluations are ultimately concerned with external effectiveness, that is, the degree to which the project addresses or satisfies the needs that originally motivated its creation.

9. Economic analysis

The objective of this section is to estimate the overall economic impact generated by the KM3NeT-Greece research infrastructure over the period 2016–2030, with specific reference to:

- direct effects, related to the expenditures directly incurred by the infrastructure;
- indirect effects, generated along the upstream supply chains;
- induced effects, resulting from the expenditure of the incomes activated (households and workers).

The analysis aims to provide a monetary quantification of the economic effects, distinguishing three main expenditure components:

1. Capital investments
2. Operating and management costs
3. Staff expenditure

The economic impact assessment is conducted using an Input-Output (I-O) methodology, which is widely adopted in the economic literature for the evaluation of the effects of large infrastructure and research projects.

This approach is based on the Greek national input-output tables which describe the flows of goods and services between economic sectors. These tables allow the estimation of how an exogenous increase in final demand in a given sector propagates throughout the economy via inter-sectoral linkages.

Types of impact considered:

- Direct impact: Corresponds to the expenditures directly sustained by KM3NET-Greece, including capital investments, operating costs and staff remuneration.
- Indirect impact: Measures the effects on the upstream supply chain, i.e. the additional production generated in sectors supplying goods and services to the infrastructure and its direct suppliers.
- Induced impact: Captures the effects generated by the expenditure of the incomes (wages and compensations) earned by workers and economic agents involved in both direct and indirect activities, which translate into additional household consumption across the economy.

6.1 Capital investments (Equipment)

Capital investments include expenditures devoted to the construction, upgrade and technological enhancement of the KM3NET-Greece infrastructure.

- Observed period: 2016–2025 (actual data)
- Total investments 2016–2025: € 296.000,00

Year	Investment costs (€)
2016	20.000,00
2017	15.000,00
2018	15.000,00
2019	30.000,00
2020	20.000,00
2021	40.000,00
2022	70.000,00
2023	86.000,00
Total	**296.000,00**

Table 14: Investment costs

For investments, the forecast assumes zero expenditure throughout 2026–2030 because the KM3NeT-GR site at Pylos is currently used for validation and qualification, and its expansion, including upgrades to the shore station for power and computing, is explicitly stated to depend on future funding; therefore, introducing capex without confirmed grants would be speculative. Inflation assumptions are derived from official sources: the European Commission's Autumn 2025 forecast, the Bank of Greece's Inflation Monitor, and Eurosystem projections, which indicate a gradual return toward 2% with a temporary uptick in 2028 due to ETS2. The trajectory applied is 2.4% for 2026, 2.4% for 2027, 2.5% for 2028, 2.2% for 2029, and 2.0% for 2030.

To develop the direct, indirect and induced impacts of KM3NeT GR investments over 2016–2030, average national input–output multipliers that are consistent with Greece's IO/SIOT framework for research activities (R&D), advanced services (professional, scientific & technical/ICT) and manufacturing are used. Each year's investment is allocated across these three macro sectors and applied sector typical Type I (simple) and Type II (total, household closed) output multipliers.

The direct impact equals the initial outlay.

The indirect impact captures supply chain effects and is computed as ("Type-I"-1)×"direct."

The induced impact captures household consumption feedbacks and is computed as ("Type-II"-"Type-I”) × "direct" .

This approach mirrors the Leontief open/closed model treatment used by the Bank of Greece when deriving sectoral output, GVA and employment multipliers from the 2015 symmetric input–output tables compiled under ESA 2010, and it is consistent with the ELSTAT supply–use/input–output infrastructure and with recent Greek multiplier work by KEPE (Centre of Planning and Economic Research).

Key modelling choices and assumptions:

- Investment time series (2016–2030): KM3NeT GR capital outlays 2016–2025 (total €296,000), with €0 in 2026–2030 under the Base Scenario. Direct impact equals these nominal euros by year.
- Allocation across macro sectors (constant across years, used only to select multipliers): 50% manufacturing, 35% advanced services, 15% R&D services—a conservative split typical of research infrastructures with equipment/installation, engineering/ICT, and design/prototyping components.
- Average national output multipliers (central values within the ranges reported for Greece), used to apportion indirect and induced effects:

  - Manufacturing: Type I 1.70, Type II 2.20
  - Advanced services (professional, scientific & technical; ICT): Type I 1.30, Type II 1.70
  - R&D services (NACE M72): Type I 1.25, Type II 1.60

These values reflect sector typical magnitudes found for Greece (output multipliers tend to be larger in manufacturing due to deeper upstream linkages and smaller in market services/R&D due to higher import leakages and primary input shares), in line with the Bank of Greece sectoral multiplier rankings from the 2015 SIOT and corroborated by KEPE's recent national/regional multiplier evidence; exact subclass multipliers vary by CPA/NACE.

The direct–indirect–induced decomposition follows the standard Leontief framework. The Bank of Greece explicitly derives simple (Type I) and total (Type II) multipliers for output, GVA and employment and discusses their interpretation and bounds, using ELSTAT's domestic SIOT. KEPE provides updated multiplier analysis for Greece, confirming sectoral heterogeneity and the appropriateness of national multipliers when itemised sectoral detail is unavailable.

Year	Direct Impact (€)	Indirect Impact (€)	Induced Impact (€)	Total Impact (€)
2016	20.000,00	9.850,00	8.850,00	38.700,00
2017	15.000,00	7.387,50	6.637,50	29.025,00
2018	15.000,00	7.387,50	6.637,50	29.025,00
2019	30.000,00	14.77,50	13.275,00	58.050,00
2020	20.000,00	9.850,00	8.850,00	38.700,00
2021	40.000,00	19.700,00	17.700,00	77.400,00
2022	70.000,00	34.475,00	30.975,00	135.450,00
2023	86.000,00	42.355,00	38.055,00	166.410,00
2024	0	0	0	0
2025	0	0	0	0
2026	0	0	0	0
2027	0	0	0	0
2028	0	0	0	0
2029	0	0	0	0
2030	0	0	0	0
Total	**296.000,00**	**145.780,00**	**130.980,00**	**572.760,00**

6.2 Operating and management costs (General Expenditure)

Operating costs include current expenditures necessary for the day-to-day functioning of the infrastructure (services, maintenance, utilities and operational support).

- Observed period: 2016–2025
- Total operating costs 2016–2025: €105.000,00

Year	Operating costs net of personnel (€)
2016	7.000,00
2017	7.000,00
2018	7.000,00
2019	8.000,00
2020	8.000,00
2021	13.000,00

2022	18.000,00
2023	19.000,00
2024	9.000,00
2025	9.000,00
Total	**105.000,00**

Table 15: Operating costs of personnel 2016-2025

For operating costs net of personnel, the projection uses pure inflation indexing, multiplying the previous year's value by (1 + expected inflation), since these expenses typically follow general price levels and there is no evidence of structural changes in scale.

Year	Operating costs net of personnel (€)
2026	9.216,00
2027	9.437,18
2028	9.673,11
2029	9.885,92
2030	10.083,64
Total	**48.295,85**

Table 16: Operating costs of personnel 2026-2030

Below the direct, indirect and induced impacts of operating costs net of personnel for 2016–2030 using national average multipliers consistent with Greece's input–output framework. In line with standard IO practice, direct equals the operating outlay; indirect captures supply-chain effects using Type-I (simple) multipliers; induced captures household consumption feedbacks using the increment from Type-II (total, household-closed) multipliers. Methodology and the Type-I/Type-II distinction follow the Bank of Greece's sectoral multiplier analysis based on ELSTAT's symmetric input–output tables (ESA 2010), which is the benchmark reference used here; recent KEPE evidence corroborates sectoral heterogeneity and the appropriateness of national multipliers when itemised sectoral detail is not available.

Operating costs for a large research infrastructure like KM3NeT-GR typically consist of services (O&M, ICT, logistics, professional/technical services), some consumables/spare parts, and a smaller share of outsourced R&D/analysis. We can assign 65% to advanced services, 20% to manufacturing (consumables/spares), and 15% to R&D services. Consistent with Greek sectoral magnitudes reported in the literature, we have applied central output multipliers: Manufacturing Type-I 1.70, Type-II 2.20; Advanced services (professional, scientific & technical; ICT) Type-I 1.30, Type-II 1.70; R&D services (NACE M72) Type-I 1.25, Type-II 1.60. These values lie within the ranges presented by the Bank of Greece for output multipliers based on ELSTAT's domestic SIOT (imports treated as leakages) and are consistent with KEPE's recent study of national/regional multipliers.

Let W_y be the operating costs, and let s be the sectors with shares α_s(0.65/0.20/0.15):

- Direct impact: $\text{Direct}_y = W_y$
- Indirect impact: $\text{Indirect}_y = \sum_s (\text{Type-I}_s - 1) \cdot \alpha_s W_y$
- Induced impact: $\text{Induced}_y = \sum_s (\text{Type-II}_s - \text{Type-I}_s) \cdot \alpha_s W_y$
- Total impact: $\text{Total}_y = \text{Direct}_y + \text{Indirect}_y + \text{Induced}_y$

Year	Direct Impact (€)	Indirect Impact (€)	Induced Impact (€)	Total Impact (€)
2016	7.000,00	2.609,00	2.887,50	12.496,50
2017	7.000,00	2.609,00	2.887,50	12.496,50
2018	7.000,00	2.609,00	2.887,50	12.496,50
2019	8.000,00	2.982,86	3.301,79	14.284,65
2020	8.000,00	2.982,86	3.301,79	14.284,65
2021	13.000,00	4.848,21	5.370,54	23.218,75
2022	18.000,00	6.711,64	7.438,58	32.150,22
2023	19.000,00	7.080,82	7.853,39	33.934,21
2024	9.000,00	3.355,93	3.720,83	16.076,76
2025	9.000,00	3.355,93	3.720,83	16.076,76
2026	9.216,00	3.437,54	3.807,38	16.460,92
2027	9.437,18	3.519,16	3.894,10	16.850,44
2028	9.673,11	3.607,19	3.989,95	17.270,25
2029	9.885,92	3.685,51	4.073,90	17.645,33
2030	10.083,64	3.749,89	4.145,35	17.978,88
Total	**15.3295,85**	**57.144,54**	**63.280,93**	**273.721,32**

6.3 Staff expenditure (Personnel costs)

Staff expenditure represents the most structurally significant component of the economic impact, as it is directly linked to high-skilled employment and sustained income generation.

- Observed period: 2016–2025
- Total staff expenditure 2016–2025: approximately €719.200 thousand

Data show a marked increase starting from 2020, with a peak in the 2023–2025 period, consistent with the expansion of scientific and operational activities at KM3NeT-Greece.

Year	Personnel costs (€)
2016	61.800,00
2017	62.800,00
2018	61.800,00
2019	61.800,00
2020	63.000,00
2021	67.200,00
2022	85.200,00
2023	85.200,00
2024	85.200,00
2025	85.200,00
Total	**719.200,00**

For personnel costs, the formula applies annual compounding using the previous year's value multiplied by (1 + expected inflation + a salary drift of 0.5 percentage points). This drift reflects moderate wage pressures in Greece, as noted by the European Commission and the Bank of Greece, without assuming aggressive increases.

Year	Personnel (€)
2026	87.670,80
2027	90.213,25
2028	92.919,65
2029	95.428,48
2030	97.814,19
Total	**464.046,37**

We use the standard Leontief demand-driven IO model under two configurations: (1) Open model (households exogenous) → Type-I (simple) multipliers capture direct + indirect production effects.

(2) Household-closed model (households endogenous) → Type-II (total) multipliers capture direct + indirect + induced effects from household consumption generated by wages (compensation of employees). The difference Type-II − Type-I isolates induced impacts tied to the propensity to consume locally. This is exactly the distinction used by the Bank of Greece when deriving sectoral multipliers from Greece's ELSTAT symmetric IO tables (ESA 2010).

"Personnel costs" are predominantly wages (compensation of employees), i.e., primary inputs. A wage outlay does not purchase intermediate inputs, so the direct impact we report equals the wage bill itself (a demand injection), while the indirect and induced components are obtained by mapping that wage bill to the relevant sectoral structure (R&D and advanced services) and applying sector-specific Type-I and Type-II output multipliers that embed the households' consumption feedbacks recorded in Greece's IO system. This approach mirrors the practice in Greek IO multipliers: the Type-I portion reflects the economy's inter-industry linkages, and the Type-II − Type-I increment captures the local consumption propensity of households out of wage income (the induced channel).

Sector mapping for KM3NeT-GR staff. In the absence of a fully disaggregated payroll by CPA/NACE, we allocate the annual personnel costs across two relevant macro-sectors: R&D services (NACE M72) and advanced services (professional, scientific & technical; ICT). For KM3NeT-GR we use a conservative split of 60% R&D services and 40% advanced services, reflecting the scientific/technical nature of the staff.

Consistent with Bank of Greece sectoral practice on Greece's domestic SIOT, and corroborated by recent national/regional multiplier evidence from KEPE, we apply sector-typical central values:

- R&D services: Type-I 1.25, Type-II 1.60
- Advanced services: Type-I 1.30, Type-II 1.70
- The Type-II − Type-I increments implicitly reflect the local consumption propensity of wages (household closure), while Type-I captures inter-industry production linkages.

Let W_y be the personnel cost and let sectors $s \in \{\text{R\&D,Advanced services}\}$ with shares α_s(0.60/0.40).

- Direct impact: $\text{Direct}_y = W_y$
- Indirect impact: $\text{Indirect}_y = \sum_s (\text{Type-I}_s - 1) \cdot \alpha_s W_y$
- Induced impact: $\text{Induced}_y = \sum_s (\text{Type-II}_s - \text{Type-I}_s) \cdot \alpha_s W_y$
- Total impact: $\text{Total}_y = \text{Direct}_y + \text{Indirect}_y + \text{Induced}_y$

IO multipliers assume fixed technical coefficients, constant returns to scale, and no capacity constraints—they typically provide lower/upper bounds (Type I / Type II) of the effects; imports are treated as leakages in the domestic SIOT, consistent with the Bank of Greece approach. Results are output (gross production) impacts.

Year	Direct Impact (€)	Indirect Impact (€)	Induced Impact (€)	Total Impact (€)
2016	61.800,00	16.686,00	22.866,00	10.1352,00
2017	62.800,00	16.956,00	23.236,00	10.2992,00
2018	61.800,00	16.686,00	22.866,00	10.1352,00
2019	61.800,00	16.686,00	22.866,00	10.1352,00
2020	63.000,00	17.010,00	23.310,00	10.3320,00
2021	67.200,00	18.144,00	24.864,00	11.0208,00
2022	85.200,00	23.004,00	31.524,00	13.9728,00
2023	85.200,00	23.004,00	31.524,00	13.9728,00
2024	85.200,00	23.004,00	31.524,00	13.9728,00
2025	85.200,00	23.004,00	31.524,00	13.9728,00
2026	87.670,8	23.671,12	32.438,2	143.780,11
2027	90.213,25	24.357,58	33.378,9	147.949,73
2028	92.919,65	25.088,31	34.380,27	152.388,23
2029	95.428,48	25.765,69	35.308,54	156.502,71
2030	97.814,19	26.409,83	36.191,25	160.415,27
Total	**1.183.246,37**	**319.476,53**	**437.801,16**	**1.940.524,05**

The adopted methodology allows for:

- a transparent and consistent assessment of the economic impact of KM3NET-Greece;
- comparability across investment, management and personnel expenditure categories;
- a robust and defensible estimate of economic effects at national level.

The analysis highlights that KM3NET-Greece generates not only scientific value but also significant and persistent economic benefits, particularly through high-skilled employment and sustained demand along production supply chains.

Category	Direct Impact (€)	Indirect Impact (€)	Induced Impact (€)	Total Impact (€)
Investments	296.000,00	145.780,00	130.980,00	572.760,00
Operating costs (net of personnel)	153.295,85	57.102,71	63.234,54	273.633,10
Personnel costs	1.299.946,62	351.544,67	480.038,63	2.131.529,92
All categories	**1.749.242,47**	**554.427,38**	**674.253,17**	**2.977.923,02**

According to the input-output methodology adopted, each euro of direct expenditure by KM3NET-Greece generates approximately €1.7 of total economic impact, including direct, indirect and induced effect.

10. Social Impact

Beyond economic impacts, the project generates social impact, monetized in this study. In detail:

δ1 – New enterprises created by the infrastructure

New businesses will emerge locally and nationally to seize opportunities generated by KM3NeT-Greece and its induced effects. Entrepreneurship stimulated by KM3NeT-Greece and its medium- to long-term impact forms part of the infrastructure's legacy.

δ2 – Patent value

Technological innovation and R&D play a strategic role in the economy, driving competitiveness and enabling continuous improvement of traditional production and the creation of new goods and services. Highlighting the economic value of patent activity is essential, as it enables knowledge spill overs benefiting firms and the entire regional and national territory.

δ3 – Value of scientific publications

Among KM3NeT-Greece's benefits is the opportunity for scientists and researchers to access new data, process it, and contribute to knowledge creation through outputs such as journal articles or monographs. As with patents, this study captures the social and economic value of publications.

δ4 – Human capital development

KM3NeT-Greece employs scientific, technical (technicians and engineers), administrative, and support staff and hosts PhD students, postdoctoral researchers, young academics, and short-term users who gain knowledge and experience that enrich their cultural and professional background.

δ5 – Services to the territory

The infrastructure provides services that the territory enjoys free of charge. KM3NeT supplies third parties with data from marine technological structures for social purposes.

δ6 – Knowledge spill over within the supply chain

Technology suppliers involved in the design, construction, and operation of KM3NeT-Greece benefit from working with a research infrastructure. These firms face the challenge of delivering non-commercial industrial solutions to complex technological problems, fostering collaboration with KM3NeT-Greece's scientific and technical staff and enabling the acquisition of new knowledge and skills. This learning-by-doing process can lead to improvements in existing equipment and the development of new tools applicable in other scientific and industrial sectors.

δ7 – Knowledge spill over within the scientific community

The infrastructure generates knowledge and significant benefits for the broader scientific community, particularly through free access to data collected by the underwater telescope.

δ8 – Scientific attractiveness of the area

Thanks to the presence of KM3NeT-Greece, the area hosting the infrastructure attracts a steady flow of researchers interested in the submarine site, school groups visiting the area, students enrolled in training programs, and conferences that stimulate spending on accommodation, catering, transportation, ancillary services, and publishing.

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