

# RI-PATHS Report on Socio - Economic Pilot Activity at CERN (July 2019 to June 2020)

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## Introduction

CERN is a large - scale research infrastructure that operates numerous particle accelerators with a plethora of scientific experiments and associated technology R&D projects. A quantitative socio-economic impact analysis of the research programme that is associated to its flagship particle collider, the Large Hadron Collider (LHC) and its high-luminosity upgrade (HL-LHC) has been carried out in 2016<sup>2</sup> and 2018<sup>3</sup> respectively.

The piloting activity in this project builds on one side on the quantitative socio-economic impact analysis method that has been adopted by CERN as a basis and on the developments concerning homogeneous framework for RI socio-economic impact identification in RI-Paths on the other side. The piloting activity was planned based on the outcome of various workshops in this project to identify relevant impact pathways, effects and the key drivers of those impacts. Since CERN has a well-established visit programme and CERN's occupation is primarily concerned with fundamental physics research without guaranteed effects for commodity applications, we selected to understand the impacts that are generated at CERN due to on-site visit activities and to understand better what the motivations for the visitors to come to CERN are. Another question concerned the possibility of true economic value would be generated by this impact pathway so that this investigation could be used as a blueprint for the planning and analysis of socio-economic impacts through on-site visits also for other Research Infrastructures.

Earlier studies<sup>4</sup> on this topic was based on the so called "Travel Cost Method"<sup>5</sup>. This approach was a first attempt to quantify the economic effects at CERN. However, this study was based on a method that relies on secondary data estimates, such as a quantification of the time value and the travel expenses based on high-level estimates of the distance of visitors from the visit location. This approach delivers inaccurate estimates,

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<sup>2</sup> M. Florio, S. Forte, E. Sirtori, Forecasting the Socio-Economic Impact of the Large Hadron Collider: a Cost-Benefit Analysis to 2025 and Beyond, in Techn. For. And Soc. Change 112(38), 2016, online available at <https://cds.cern.ch/record/2136658?ln=en>

<sup>3</sup> A. Bastianin, Social Cost Benefit Analysis of HL-LHC, CERN-ACC-2018-0014, online at <https://cds.cern.ch/record/2319300?ln=en>

<sup>4</sup> M. Florio et al., Exploring Cost-Benefit Analysis of Research, Development and Innovation Infrastructures: An Evaluation Framework, online at [https://www.csilmilano.com/docs/WP2016\\_01.pdf](https://www.csilmilano.com/docs/WP2016_01.pdf)

<sup>5</sup> Ward, F.A., Beal, D., Valuing nature with travel cost models. A manual. Edward Elgar, Cheltenham, 2000.

since the origin of the visitors is not exactly known. The study therefore significantly underestimated the actual economic value and does not permit forecasting socio-economic impact potentials for future projects reliably.

## Pilot Overview

In this pilot, we aimed at obtaining more reliable, firsthand data through face-to-face interviews and questionnaires with a significant number of actual on-site visitors. This pilot to analyse the socio-economic value of onsite visitors at CERN was carried out between June 2018 and May 2019 over an entire year.

To carry out the study, a questionnaire was given to a representative sample of visitors of the CERN. The data were collected in an anonymous way, although face-to-face interviews with persons and guides took place to elucidate better the motivation to come to CERN, even from far away locations.

The study revealed the real expenses of the visitors and permitted to identify the causal relationship with their visit. The variables used in this study were:

- Duration of travel as time value.
- Cost of the travel.
- Cost of the accommodation.
- Cost of the transport in the region.
- Expenses for food and regional purchases.
- Expenses for further visits, such as entrance fees.

In order to properly model the impact, the motivation for the expenses were asked: is the primary reason for the expenses the travel to CERN or is the primary reason another one and CERN has been discovered during the visit as an additional visit location.

We therefore split the visitors during the study into two groups for the analysis:

- Visit motivated by CERN's research, where the original motivation for the travel is the fundamental scientific research carried out at CERN. In this case, 100% of the indicated spendings are considered for the economic value generation, since the travel would not be performed without the existence of CERN and its research activities. People of this visit category predominantly travel as part of a group.
- Visit to CERN in addition to travel to the region, where 50% of the people travelling to the region know that CERN exists and plan an additional visit to CERN. In this case, only 50% of the individuals' spendings are considered to be in causal relation with CERN. The entire time value of regional travel and the expenses that are directly related to the CERN visit (e.g. regional transport tickets, purchases in CERN store, purchase of food and drinks during the visit day) are fully considered for all individual visitors, since a CERN visit usually requires an entire day.

## Results

900 valid responses were obtained from the questionnaire-based investigation. The results were extrapolated to 120'000 yearly visitors recorded by CERN in that year (83'000 as part of groups and 37'000 individual visitors). The survey revealed that the majority of visitors come from nearby countries (Italy, Switzerland, United Kingdom and France). Only a small number of visitors come from far away countries like China, Japan,

Australia or Canada. It can be deduced that there is a greater influx of visitors from those countries closest to the organization.

The work carried out in this project has resulted in the publication of the MSc. thesis<sup>6</sup> of I. Crespo Garrido.

The results obtained and extrapolated to the total number of visitors recorded per year are shown in the Tables 1 and 2. It is worth mentioning that significantly more visitors travel to CERN in the period from autumn to spring than in the period from spring to autumn.

*Table 1: Number of visitors that come to CERN as part of a group by season.*

Group visitors	
Summer	21'400
Winter	61'600
Total per year	83'000

*Table 2: Total estimated spending of all CERN visitor per year.*

	Spending	Time Value
Groups	53.2 MChf	11.8 MChf
Individuals	17.6 MChf	1.5 MChf
Total per year	70.8 MChf	13.3 MChf
Total per year	ca. 84 MChf	

These results were used to create the spending distribution shown in Figure 1. The function will be used in Monte Carlo simulations to assess the socio-economic impact of the Future Circular Collider (FCC) project.

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<sup>6</sup> I. Crespo Garrido, Socio - economic impact at CERN: Social networks and onsite CERN visitors, CERN-THESIS-2020-008, 5 February 2020, online at <https://cds.cern.ch/record/2711506?ln=en>

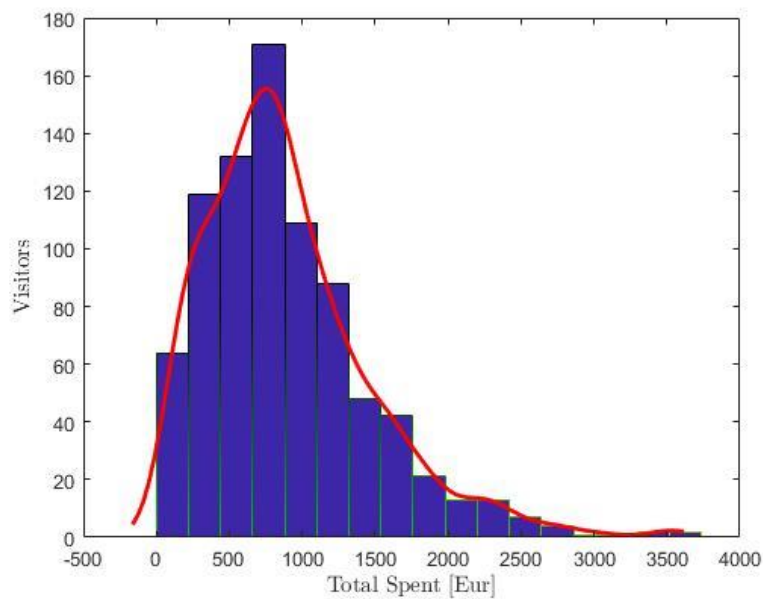


Figure 1: Spending distribution function for all visitors.

## Conclusions

The conclusions derived from the results of this pilot study are as follows:

- The survey confirms that curiosity about the fundamental scientific research performed at CERN, motivates people to make a trip. The majority of people visits CERN, because they are interested in the fundamental science and they plan multi-day trips to CERN to learn about the research being conducted at CERN. As a consequence, these people make significant additional purchases in the region and visit additional touristic attractions.
- People visit CERN, even if the distance is long and if the stay needs to be extended to multiple days.
- People voluntarily invest time and money for being close to the scientists exploring the origins of the universe. Their primary motivation is to see the scientists at work in their natural environment.
- The main visit period is from autumn to spring.
- CERN offers an activity that is highly complementary to traditional leisure and travel activities in spring and summer.
- The estimated cumulative socio-economic benefits created by on-site visitors at CERN is about 84 million CHF (ca 78 million euros) per year expressed in 2019 money value.
- The survey-based analysis led to the establishment of a spending distribution function that will be used to forecast the socio-economic impact generated by onsite visits for future projects.
- The results of this pilot will be used for analysing the expected economic benefits for a Future Circular Collider at CERN in the frame of the FCCIS H2020 EU project.
- The work revealed that long-term systematic sampling of visitors at CERN would be required to maintain the robustness of the spending distribution function.
- The results can be used by other Research Infrastructures as a blueprint and to develop contents that matches well the visitors expectations, and thus, to ensure an attractive continuity of the research infrastructure.

## Related Communication Activities:

Date and event	Title	Audience	Rationale	Links
14 – 15 September 2019 CERN open days.	The Economic benefits of the LHC research programme.	Visitors of the CERN open days.	Show the economic benefits of the LHC research programme.	<a href="https://opendays.cern">https://opendays.cern</a>
30 sept – 4 oct 2019 HSSIP: Spanish High - School Students Internship Programme 2019	<p>This programme was a unique opportunity for high-school students from CERN Member States to be introduced to CERN, to learn through workshops and by shadowing, observing, and working with a member of personnel.</p> <p>Our student studied about the socio economic impact pathways, and developed a brief study of the impact produced by HSSIP Spain during its two weeks stay.</p>	Student from Spain.	Instructed in socio economic impact pathways.	<a href="https://indico.cern.ch/event/730487/timetable/">https://indico.cern.ch/event/730487/timetable/</a>
11 December 2019 (conference) NewSpace Economy in Rome. Global Space Economic Forum.	Economic of Science	Participants of the NewSpace Economy event.	Share experience of activities carried out on socio economic studies in the RI-Paths project.	<a href="https://spacegeneration.org/event/ns-e-expoforum">https://spacegeneration.org/event/ns-e-expoforum</a>



29 June 2020 (virtual)  RI-Paths final event of the project.	CERN pilot: from experiments to innovation approach. Session: "Spotlight on impact pathway insights: What RIs have learned about their impact and impact study requirements?"	Participants of the final webinar series of the RI-PATHS project.	Share experience of the piloting phase with other research infrastructures.	<a href="#">Pilot project presentations "Spotlight on impact pathway insights: what RIs have learned about their impact and impact study requirements?"</a>
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