SOCIETAL IMPACT OF THE COMPACT LINEAR COLLIDER STUDY

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Over the past decade, an interest on the Societal Impact Assessment topic has increased. However, there is still a well-known problem in measuring the impact. Different developed methodological approaches such as econometric studies, surveys, case studies, do not create the full picture of the impact. Assessing the basic research outcomes is even more challenging, since it is usually required large government public funds, while the societal benefits are often implicit comparing to an applied science project. Therefore, the societal impact assessment of research infrastructure becomes essential for scientists in demonstrating and highlighting the source of economic value generated for society and economy, besides its absolute technological or scientific aspects.

Moreover, the European particle physics community repeatedly raises the question on the societal impact during discussions. The community meets to define a strategy for the future developments in fundamental research on physics by evaluating ongoing studies. Thereby in an open symposium in Granada in May 2019 [1], the committee highlighted a pure academic significance of an international collider study and its unclear technical and economic ripple effects for general public. Likewise, the European Strategy update in June 2020 again recommended to emphasize the scientific impact of particle physics, as well as its technological, societal and human capital outcomes [2]. Additionally, the committee underlined an importance of partnership with industry and other research institutes, as these collaborations are key for sustaining scientific and technological progress, helping to drive innovation, and bringing societal benefits. Furthermore, the particle physics attracts young minds and provide their education and training, so vital for the functionality of research infrastructure (RI) and of society at large.

Together with the elevated interest on the stated topic, the community of assessing societal impact of RI is expanding. Big scientific centres, institutes and laboratories around the World reunite their experience and knowledge to build a comprehensive assessment model. RI-PATHS [3] as a European project funded by EU with consortium of EFIS, CSIL, ESF, ALBA, DESY, CERN, ELIXIR and Fraunhofer ISI is one of the latest examples. A conceptual model for evaluation of social benefits has been proposed even earlier for the Large Hadron Collider [4]. The authors are introducing the Cost-Benefit Analysis (CBA) supported by a guide to CBA of investment projects issued by European commission [7]. Also the model has been employed in the appraisals of the HL-LHC [5] and a health care proton therapy centre [6].

The present paper is relevant to a big scientific study, Compact Linear Collider (CLIC) and scientific contexts within which a research organization, CERN, operates. CLIC is an international study for a future high-gradient machine (50.1 km long) to collide electrons and positrons head-on at energies up to several Teraelectronvolts (TeV). Building and operating such a large machine with its corresponding

infrastructure is extremely costly. To prove required investment needs and importance of possible scientific discoveries we study potential effects on different concerned groups such as society, industry, and science world. Since CLIC is still at a study phase at this point, a societal impact can reinforce the decision-making process on the project implementation.

The research aims to identify the scale, nature, and sustainability of the impacts for main actors. The applied methodology is established based on the previous studies and describes concerned evaluating fields and proposed methods of appraisal (see Fig. 1).

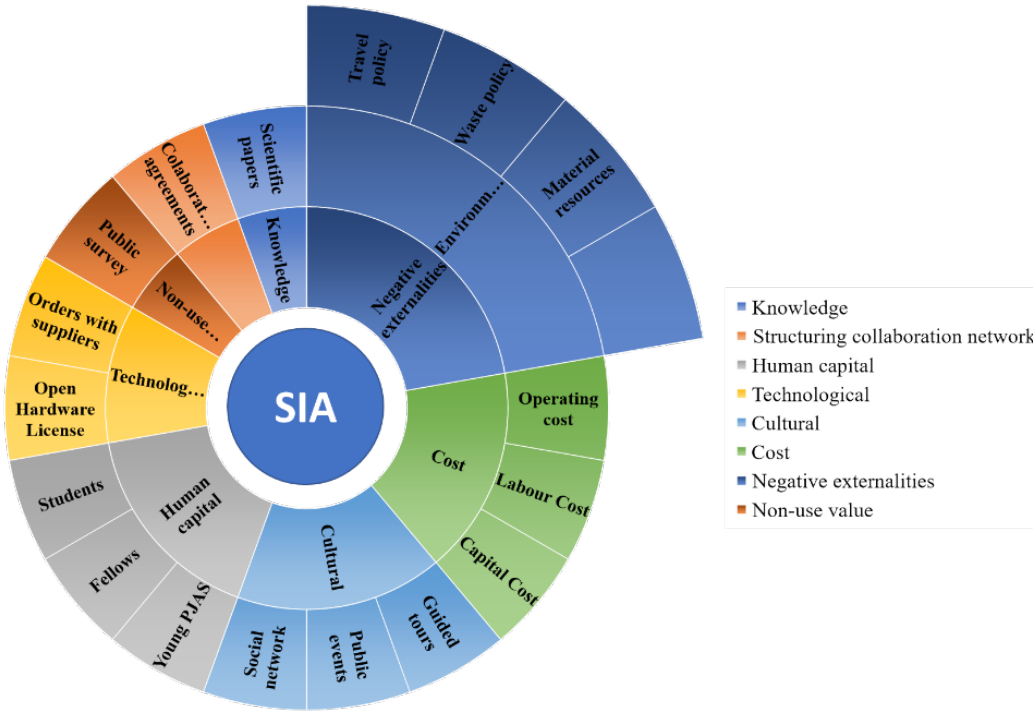

FIG. 1. Societal impact assessment frame for CLIC study.

The paper will introduce the methodology and the valuation of human capital formation, technological impact, and knowledge formation. The document will also discuss the future study to be done to complete the societal impact assessment of CLIC.

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