



# Determining significance in social impact assessments (SIA) by applying both technical and participatory approaches: Methodology development and application in a case study of the concentrated solar power plant NOOR<sub>O</sub> I in Morocco



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## ARTICLE INFO

### Keywords:

Social impact assessment  
Impact significance  
Participatory approach  
Local stakeholders  
Renewable energy  
Morocco

## ABSTRACT

One of the main objectives of impact assessments is to identify potentially significant impacts. However, determining this significance has received very limited attention as a procedural step in social impact assessments. Consequently, only limited research and documentation exists on approaches, survey tools and evaluation methods, especially with regard to participatory approaches and combined participatory-technical approaches. This study aims to address this research gap by developing and applying a joined participatory and technical impact significance evaluation. The approach is applied in a case study which analysed the livelihood impacts of the large-scale concentrated solar power plant NOOR<sub>O</sub> I in Ouarzazate, Morocco.

The analysis shows that although different approaches and significance criteria must be applied when involving both local stakeholders and experts, the linked analysis offers more robust results and an improved basis for decision-making. Furthermore, it was observed in the case study that impacts affecting the social, cultural and political spheres were more often considered significant than impacts affecting the physical and material livelihood dimensions. Regarding sustainability assessments of large-scale renewable energy plants, these findings underline the importance (as for other large-scale infrastructure developments) of placing greater emphasis on the inclusion of social aspects in impact assessments.

## 1. Introduction

Social impact assessment (SIA) is an overarching term for concepts, processes, methods and tools to analyse, evaluate and manage the intended and unintended positive and negative social consequences of planned interventions (Vanclay, 2003, 2006). Focusing on the social aspects of sustainable development, the main application of SIA is within the regulatory approval process for infrastructure and resource extraction projects (Esteves et al., 2012). Accordingly, SIA is also appropriate as an analytical framework for assessing and understanding the social sustainability aspects of renewable energy projects. However, while some sustainability assessments of renewable energy installations and solar energy systems do exist (Phillips, 2013), the assessment of the social impacts of such infrastructure developments remains a complex and challenging task (Kirchherr and Charles, 2016). Consequently, the existing literature produced by academics and practitioners has tended to focus on the standard socio-economic indicators, such as number of

jobs created, economic effects on specific sectors or contribution to economic growth, but to date few publications have addressed the social implications of the deployment of large-scale renewable installations at local level.

Among the key reasons cited for the limited application of SIA in practice, not only for renewable energy projects but also in general is the lack of a normative framework (UNEP, 2007: II) and the limited availability of guidance on suitable methods, tools, models or data sources to evaluate social impacts (Arce-Gomez et al., 2015; TEP and CEPS, 2010). Accordingly, different authors have emphasized the need for procedural, theoretical, methodological and practical improvements (Suopajarvi, 2013; Mahmoudi et al., 2013), particularly regarding stakeholder engagement and the application of participatory processes within SIAs (Esteves et al., 2012).

One particular aspect that has received limited attention in SIA frameworks is the assessment of the significance of the predicted impacts (Ijäs et al., 2010). The term significance is not used consistently in

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impact assessments, but the understanding of significance differs depending on the assessment step. In the first step of an impact assessment, the screening and scoping phase, significance frequently describes a selection mechanism (Kjellerup, 1999). While in the prediction and evaluation stage the concept of significance typically refers to an evaluation of what is vital, appropriate or acceptable/unacceptable, interpreting the levels of importance (Lawrence, 2007a). In this paper, the term significance is applied in the latter sense.

In SIAs, the step of determining impact significance is often not discussed and in case it is mentioned, regularly no further information is provided on how significance levels were or could be determined. In contrast, several authors emphasized the importance of determining impact significance levels in environmental impact assessments (EIA) (e.g. Briggs and Hudson, 2013; Rowan, 2009; Lawrence, 2007a, 2007b, 2007c; Duinker and Beanlands, 1986; Sadler, 1996). However, the actual application of the concept of significance in EIAs is also limited and remains one of the most complex, difficult and least understood aspects of EIA (Ijäs et al., 2010; Wood, 2008). Little documentation on practical applications exists (Schindler et al., 2016), especially concerning the participatory approaches which are called for by various authors (Arce-Gomez et al., 2015; Esteves and Vanclay, 2009; Vanclay, 2003; Becker et al., 2003, 2004).

Based on these observations, the following research needs have been identified: (a) to advance the integration of significance evaluation in SIA; (b) to provide guidance on tools and methods for participatory assessments of impact significance (also in combination with technical approaches); and (c) to document practical applications of these approaches and tools. Addressing these research needs, the overall objective of this paper which is based on the findings from the project SocialCSP (Wuppertal Institute and Germanwatch, 2015) is to advance the understanding and practice of determining impact significance within SIAs. Particular attention is given to the combination of participatory and technical impact significance assessment methods, drawing on the findings from an applied research study on the impacts on the livelihoods of adjacent local communities of the large-scale concentrated solar power (CSP) plant NOOR<sub>1</sub> in Ouarzazate, Morocco.

Starting with a brief overview of the role and state of the art of determining impact significance in SIAs and EIAs in Section 2, followed by a short introduction to the empirical case study NOOR<sub>1</sub> in Section 3, the paper continues by describing the methods and survey tools applied in the case study to determine impact significance in Section 4. In Section 5 the application of these tools and the case study results are presented. Finally, following a discussion of the methodological aspects and the practical application in Section 6, conclusions are drawn in Section 7.

## 2. Significance determination in impact assessments - state of the art and method derived for a combined participatory and technical approach

Predicting and evaluating the significance of impacts is one of the major challenges in impact assessments. However, to the best of the authors' knowledge, to date only Rowan (2009) has addressed the topic explicitly within the setting of SIA. Therefore, the subsequent passage is largely based on findings and discussions from EIA literature.

Although various definitions of significance exist, most of comprise one of the following two characteristics: (a) significance is a value judgement, this means that significance essentially depends on the value society attributes to certain elements (level of importance); and (b) the resulting degree and type of the change in terms of measurable effects (level of consequences). While some authors, such as Thompson (1990) or Cloquell-Ballester et al. (2007), differentiate among these two components by defining the first aspect as impact significance in regards to the costs caused to society by an impact and the second element as a prediction of the impact's magnitude, many recent publications include the predicted magnitude of impacts as an element in

determining the overall impact significance (Lawrence, 2007a).

Apart from the different definitions, there are also many different approaches to operationalising the concept of significance. These can be divided into two main groups: technical approaches and participatory approaches (Lawrence, 2007b). On the one hand, technical approaches focus on technical properties - relying mainly on expert judgements, technical data and data analysis. Participatory approaches, instead, focus on the relative importance assigned by an individual or a group to an impact. Because social values are characterized by plurality (Wood, 2008; Vanclay, 2002), these types of judgements are based on the particular context and can be "subjective, normative and value-dependent" (Lawrence, 2007a).

To date, most impact assessment studies have applied technical approaches. However, technical approaches cannot account for the fact that stakeholder groups may have diverging sets of social values, relationships, histories and other elements distinctive to their own contexts (Becker et al., 2004). Consequently, determining significance without involving stakeholders cannot adequately reflect the range of realities of the affected individuals and groups. On the other hand, relying solely on stakeholder perceptions runs the risk of producing biased results and neglecting important impacts because local stakeholders cannot always anticipate the scope and effects of certain developments (Becker et al., 2003). Therefore, determining impact significance should combine technical knowledge with local stakeholder perspectives - but there are very few case studies that combine participatory and technical approaches to determine impact significance (Schindler et al., 2016; Arce-Gomez et al., 2015).

In addition to the choice of approach, it is important to define the criteria to measure impact significance. Common criteria applied in technical assessments comprise duration, spatial scale, intensity, reversibility, probability, frequency, residuals effects and mitigation potential. Furthermore, several authors advocate to integrate the degree of certainty in assessing the criteria into the evaluation (Soares et al., 2006; Noh and Lee, 2003; Rossouw, 2003). However, this type of criteria can usually not be evaluated without technical knowledge before the impact occurs. Hence, these criteria are normally not suitable to be applied in a participatory process, especially when working with local stakeholders in developing countries.

The literature contains very little guidance on criteria that can be applied to specify the values associated by local communities with features of their living environment (Stolp et al., 2002). The only exception in the SIA literature is the paper from Rowan (2009) which focuses on impact significance within the SIA process. Rowan (2009) suggests to determine the significance of an impact using the two criteria effect on wellbeing (magnitude) and vulnerability of the affected groups (sensitivity). Similar recommendation can also be found with regards to ecosystem service impact assessments, where it is suggested to use the magnitude of an impact on the ecosystem service and the vulnerability of the affected beneficiaries as criteria to determine significance (Landsberg et al., 2011). Whereas the effect on wellbeing appears to be a suitable criterion to apply in a participatory assessment to measure the *level of consequences*, vulnerability is a complex concept, which cannot be easily evaluated by local stakeholders. Following the citizens' value approach as described by (Stolp et al., 2002) instead, the *importance* ascribed to a particular livelihood asset could be applied as an alternative criterion to determine the level of significance. This can be justified because just when local stakeholders place value on a livelihood asset can an impact with an effect on the wellbeing be deemed significant. In this context the term value can be defined as the importance individuals or groups place on particular elements of their living environment (Stolp et al., 2002).

Accordingly, the two criteria considered suitable in this study to determine significance in a participatory setting are (a) the importance of the livelihood asset affected (*level of importance*) and (b) the level of effect on the wellbeing of different local stakeholders (*level of consequences*). Having selected the criteria, the assessment design for

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