



Managing social challenges in the nuclear decommissioning industry: A responsible approach towards better performance

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Abstract

At the end of their lifecycle, several large infrastructure will have to be dismantled, presenting unfamiliar challenges. Therefore, project management will need to focus extensively on the delivery of successful decommissioning projects to meet stakeholders' expectations and funding constraints. While there is an extensive literature that investigates the techno-economic aspects of decommissioning, social aspects remain remarkably under-investigated. Even if stakeholder communication, involvement and engagement are widely believed to be key enablers for the success of a project, often the needs and preferences of local communities are neglected and a participatory-based form of dialogue averted. Consequently, decommissioning projects fail to meet their intended objectives. Focusing on the nuclear decommissioning industry, this paper addresses the literature gap concerning social responsibility. A deductive method to formulate and validate theories regarding the social challenges for decommissioning is developed through a review and analysis of salient case studies.

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1. Introduction

Project management has, until now, mainly focused on new built. However, at the end of their lifecycle, most of infrastructures and industrial plants have to be dismantled. Therefore, in the future, project management will need to focus more and more extensively on the challenges imposed by decommissioning projects.

In particular, the decommissioning of mines (Nehring and Cheng, 2015; Franklin and Fernandes, 2013) and energy infrastructures such as large dams (Agoramoorthy, 2015; Oldham, 2009; Pacca, 2007), Oil&Gas platforms (Oil&Gas UK, 2015; Lakhali et al., 2009) and nuclear facilities (IAEA, 2016c; OECD/NEA, 2016; Laraia, 2012a), are likely to raise the biggest challenges not only from the economic perspective, but also from the socio-environmental one. Within these, the nuclear decommissioning industry is the most affected by

decommissioning costs and socio-environmental impact, because of the activities connected with decommissioning and the complex regulations that establish the correct disposal of radioactive material. Indeed, nuclear infrastructures are extremely complex and various encompassing numerous types of facilities, such as Nuclear Power Plants (NPPs), fuel fabrications facilities and research centres.

Depending on their function, nuclear facilities' life cycle widely varies, normally lasting several decades. Primarily, the end of nuclear infrastructure's operational phase is due to uneconomical operation, technical obsolescence, safety consideration, or to the conclusion of the research programme (Laraia, 2012b).

Globally, costs estimates for Nuclear Decommissioning Projects and Programmes (NDPs) lie in the range of hundreds of billions of pounds, reaching for instance £ 55 billion in France (WNA, 2015c) and almost £ 70 billion (discounted) in the UK (NDA, 2016a).¹ NDPs have huge uncertainties that hinder the reliability of their forecasts and their schedules can

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¹ £ 53.2 billion for the decommissioning of Sellafield site alone, that is expected to last 120 years (NDA, 2016b).

last decades, so several stakeholders are involved throughout the NDPs development. Consequently, it is important to evaluate the success of a project taking different stakeholders' point of view, according to a number of success criteria, in different timescales, as suggested by Turner and Zolin (2012), Müller and Turner (2007).

From the socio-economic perspective, some of the key enablers for the success of a project recognized in the literature are (Ruuska et al., 2011; Greiman, 2013; Zeng et al., 2015; NDA et al., 2015a):

- the local economy promotion, through allocation of benefits
- poverty alleviation through careful job repositioning, and
- effective stakeholder communication involvement and engagement.

However, as it happened in the construction of a waste repository in Scanzano Jonico (Bentivenga et al., 2004; Zinn, 2007), the needs and preferences of the local community are often still neglected and a participatory-based form of dialogue averted. NDPs fail to meet their scope and they are considerably delayed or even cancelled.

NDPs are morally troublesome also from an intergenerational perspective, as the benefits of nuclear power production are mainly for the present generation, while burdens (such as the remaining of long-living radiotoxic waste) could be transferred to the future generations (Taebi et al., 2012). In several countries the last generations (from the 50s to early 2000) enjoyed the creation of job positions and the availability of electricity, while the present and future generations will carry only the burden and costs of the compulsory nuclear sites clean-up and waste management.

This paper addresses the topic of social responsibility in decommissioning/dismantling projects. A deductive approach is adopted to formulate and validate theories regarding the social challenges that affect NDPs, and following the social constructionism approach, what people think and feel, both individually and collectively, is taken into account. This promotes a better understanding of the situation, incorporating the stakeholder perspective into theories. This analysis is based on a systematic collection of quantitative and qualitative data, so that theories can be critically framed into more formally defined constructs.

More specifically, this paper addresses two research questions:

- Which are the main social challenges that arise during the development of a NDP, and how do they affect NDPs?
- Which are the best practises to socially and ethically manage these challenges, and successfully meet the scope of the project?

NDPs are analysed because of their economical relevance, urgency to deal with radioactive material and the availability of public information. Nevertheless, lessons learned gained from NDPs are applicable to a number of decommissioning/dismantling projects in other industrial sectors, such as oil & gas, water infrastructures etc.

Since some NDPs are characterized by multi-billion budgets and have a high level of innovation and complexity, they can be addressed as megaprojects. Therefore, this paper is organized as follows: the literature review of section 2 starts with the analysis of social responsibility in major infrastructures, focusing on NDPs, and answers the first research question and identifies the main social challenges of NDPs and their consequences. Section 3 describes the research methodology for the collection and selection of the NDPs. Section 4 addresses the second research question and highlights the key factors to manage the risks for social responsibilities in order to successfully and ethically meet the scope of the project. Section 5 presents a deep reflection on the importance of stakeholder management and social responsibility in NDPs, highlighting best practises from international case studies.

2. Literature review

2.1. Social responsibility of major infrastructures

There is not a single accepted definition of major and mega projects in the literature: usually, megaprojects are characterized by budgets above \$1 billion with an high level of innovation and complexity (Flyvbjerg et al., 2003; Locatelli et al., 2014a; Merrow, 2011; Van Wee, 2007). However, already in 1985, Warrack (1985) argued that \$1 billion is not a constraint in defining megaprojects, as in some contexts, a much smaller project (such as one with a \$100 million budget), could constitute a megaproject. Indeed, Hu et al. (2013) claim that a deterministic cost threshold is not appropriate for all countries, and a relative threshold such as the GDP should be used instead.

Existing studies on social responsibility of major infrastructures are still scattered and fragmented (Zeng et al., 2015) and concerns about social responsibility have grown significantly only during the last two decades. Craddock (2013) defines "project social responsibility" as "the process to achieve the projects' objectives and balance the needs of all the stakeholders in an ethical manner to ensure that financial resources, human resources and environmental resources are utilized in a way that sustains all three" and focuses on the business excellence models that contribute to project sustainability and project success. Wang (2014) adopts the stakeholders' perspective and investigates the relationship between megaproject crisis management and social responsibility: the author's conclusion suggests that a dynamic megaproject network governance mode can promote stakeholder engagement in collaborative actions and improve the effectiveness and efficiency of the delivery of the megaproject. Shen et al. (2010) highlight the importance of incorporating sustainable development principles during the feasibility study of a project, considering not only the economical perspective, but also the social and environmental one, emphasizing the pivotal role that the Government, clients, architects & engineers, contractors and suppliers.

Focusing on nuclear sites in the UK, Whitton et al. (2015) highlights an increase in dialogue with stakeholders, concluding that fairness and justice are necessary to promote a community and institutional awareness regarding social sustainability. In

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