Project Leadership and Society 3 (2022) 100056

Contents lists available at ScienceDirect

Project Leadership and Society

journal homepage: www.sciencedirect.com/journal/project-leadership-and-society

Empirical Research Paper

Challenges and advocated solutions for environmental protection legislation for building infrastructure projects in developing countries: Evidence from Zambia

Ephraim Zulu [a], Sambo Zulu [b,*], Mwansa Chabala [a], Innocent Musonda [c], Neema Kavishe [d], Nicholas Chileshe [e]

[a] School of Built Environment, Construction Economics and Management, Copperbelt University, Kitwe, Zambia
[b] School of Built Environment, Engineering and Computing, Leeds Beckett University, Leeds, United Kingdom
[c] Faculty of Engineering and the Built Environment, University of Johannesburg, Johannesburg, South Africa
[d] School of Architecture, Construction Economics and Management, Ardhi University, Dar es Salaam, Tanzania
[e] UniSA STEM, Sustainable Infrastructure and Resource Management (SIRM), University of South Australia, Adelaide, South Australia, SA 5001, Australia

ARTICLE INFO

Keywords:
Environmental legislation
Environmental sustainability
Legislation enforcement
Sustainable infrastructure

ABSTRACT

Environment protection legislation is often inadequate and poorly implemented in Africa even though literature shows that it is important for environmental protection. Furthermore, there is a paucity of studies which examine the catalytic role of legislation in the building infrastructure sustainability agenda. Therefore, to bridge that knowledge gap, this study examined the adequacy of environment protection legislation for building infrastructure projects in Zambia and their associated challenges and solutions. The study used an exploratory qualitative approach using semi-structured interviews with key stakeholders on environment protection. The study theorises that environment protection legislation in Zambia is fairly adequate but with inadequacies in its implementation, some with omitted content, and poor understanding of the importance of environment protection. Solutions include increasing the level of implementation of the legislation and championing awareness of the importance of protecting the environment. The findings have implications for sustainability transitioning in Africa.

1. Introduction

The average global temperature has been increasing by a steady margin since industrialisation and if left unabated, could lead to severe climate change and extreme weather events (Hansen et al., 2006). It is therefore important to limit the overall temperature increase to within 1.5 °C of pre-industrial levels if severe climate change and extreme whether events are to be avoided (Cronin et al., 2021). Thousands of studies have shown that green-house gas (GHG) emissions are the dominant cause of the rise in the average global temperature (Cronin et al., 2021; Marcott et al., 2013) with the construction industry accounting for about 39% of the world's carbon emissions (Müller et al., 2013; Onat and Kucukvar, 2020).

With construction projects accounting for a large percentage of GHG emissions, project leadership needs to address ecological concerns in order to contribute to a sustainable future (Magano et al., 2021; Whyte et al., 2022). Some infrastructure development projects in Africa have been noted to have negative environmental impacts. For example, Ika (2012) noted that the Medupi coal plant project in South Africa largely benefited major industries rather than the poor who suffer the negative environmental impacts of the project. Similarly, it was noted that there is still a general lack of environmental sustainability in project management (Marnewick, 2017). Project managers have been noted to be having challenges in implementing sustainability in their practices (Aghaegbuna et al., 2020). It is therefore important that the management of projects shifts from managing only time, budget and quality to also managing the social, environmental and economic impact of the projects (Silvius and Schipper, 2014).

National legislation may be used to foster good project management practices which will also focus on the environmental sustainability of

* Corresponding author.
E-mail addresses: ephraim.zulu@cbu.ac.zm (E. Zulu), s.zulu@leedsbeckett.ac.uk (S. Zulu), mwansachabala@gmail.com (M. Chabala), imusonda@uj.ac.za (I. Musonda), neema.kavishe@aru.ac.tz (N. Kavishe), nicholas.chileshe@unisa.edu.au (N. Chileshe).

https://doi.org/10.1016/j.plas.2022.100056
Received 31 December 2021; Received in revised form 25 July 2022; Accepted 26 August 2022
Available online 1 September 2022

projects. For example, in a landmark decision in June 2021, the European Union (EU) agreed to use legislation to reduce the GHG emissions by 55% from the 1990 levels by the year 2030. Pauna et al. (2021) concluded that the extent of collaboration on projects may be affected by legislation. In Sweden, there are mandatory provisions for near-zero energy buildings by lowering the acceptable minimum levels for energy use continuously (Lundgren, 2016).

However, studies have found that the incorporation of environmental sustainability in infrastructure projects is mostly lacking but have a strong focus on economic sustainability (Marnewick, 2017). Zulu et al. (2022) equally found that infrastructure design teams in Zambia do not actively pursue environmental sustainability at the design stage of projects but adhere to environmental protection legislation because they are mandated to do so.

Notwithstanding the importance of legislation in ensuring environmental sustainability of infrastructure, African countries lag quite far behind when it comes to environmental protection legislation often with a poor record of implementation (Gebreyesus et al., 2017; Mayda, 1984; Mubanga and Kwarteng, 2020; Oke et al., 2019; Richardson, 2000; Sishekanu and Katati, 2021). For example, in a study assessing factors necessary for sustainable construction projects in Zambia, it was found that issues of legislation and regulation ranked highly and it was recommended that the government should introduce legislation and regulations to promote sustainable construction (Oke et al., 2019). Studies have also shown that inadequate building regulations and policies hinder the adoption of sustainable construction in developing countries (Darko et al., 2017; Tokbolat et al., 2019). For example, Gebreyesus et al. (2017) found inadequacies in the legislation pertaining to environmental impact assessments (EIAs) and their impact on environmental protection. In South Africa, it was argued that there was no synergy between environmental law and the sustainable delivery of projects (Murombo, 2015). Generally, environmental protection law and it enforcement in Africa is low as evidenced by the small number of court cases recognised as climate change conflicts compared to other regions of the world (Kotzé and du Plessis, 2020). Legislation and African courts have been underutilised in the protection of environmental rights (Addaney et al., 2018). Therefore, environmental protection legislation for infrastructure projects in Africa generally is far behind the standards of developed countries (Gebreyesus et al., 2017).

While studies have highlighted the importance of legislation in fostering environmental sustainability in construction projects (Akinade et al., 2017; Clarke et al., 2008; Gan et al., 2015; Kesidou and Sovacool, 2019), and that legislation and its implementation are often poor in Africa (Mayda, 1984; Oke et al., 2019; Richardson, 2000), there is a paucity of studies which have assessed the adequacy of environment legislation and their implementation on building infrastructure projects in Africa. Therefore, using Zambia as a case, this study queried the extent to which legislation promotes environmentally sustainable building infrastructure project delivery. An assessment of the environmental protection legislation is required because a critique of the legislation could reveal the exact inadequacies in the legislative framework and offer recommendations on what exactly needs to change in order to make legislation more responsive to the environmental sustainability of infrastructure projects.

In view of the stated research gap, the aim of this paper is to discuss findings of a study which investigated the adequacy of the Zambian legislative environment in promoting environmentally sustainable building infrastructure delivery, associated challenges, and possible solutions. The focus of the study was on building infrastructure projects because they emit significant amounts of GHGs throughout the socio-metabolic system of construction, use and end-of-life phases (Mü;ller et al., 2013). The paper first reviews literature on environment legislation at the global level followed by a discussion of the context of the local environment protection legislation in Zambia. The next sections provide a description of the research methods followed by a presentation and discussion of the findings. The paper ends with some conclusions. The findings have the potential to inform legislators, policy makers and civic environment protection advocacy groups on possible legislative amendments required to promote sustainable infrastructure development in Zambia in particular and possibly other African countries with a similar contextual background.

2. Legislation and the environment

The following literature review shows that legislation is important in fostering environmental sustainability on infrastructure projects (Akinade et al., 2017; Clarke et al., 2008; Gan et al., 2015; Ghaffar et al., 2020; Kesidou and Sovacool, 2019) and highlights instances where it has been used to promote environmental sustainability. The review also shows that environmental sustainability legislation for infrastructure projects is either missing, inadequate or not sufficiently enforced in African countries (da Rocha and Sattler, 2009; García et al., 2007; Ghaffar et al., 2020; Gibbs and O'Neill, 2015; Oke et al., 2019). In Zambia particularly, and other African countries generally, the review shows that there is no legislation regulating emissions from buildings or guiding sustainable energy use on building infrastructure projects as the case is in some developed countries.

Legislation is important in fostering environmental sustainability of infrastructure projects because several measures which can improve environmental sustainability and help achieve net zero carbon emissions can be enhanced by legislation (Onat and Kucukvar, 2020). Measures which can improve sustainability on infrastructure projects and advance the agenda of achieving net zero carbon emissions include the adoption of low carbon buildings, de-constructible buildings, 'greening' of the existing building stock, construction waste demolition, and circularity in construction among many other initiatives (Akinade et al., 2017; Clarke et al., 2008; Gaffar et al., 2005; Kesidou and Sovacool, 2019). These measures can be enhanced by promoting them through legislative frameworks so that they are formally included in the management of projects. Legislation has been used in other aspects of projects management in order to enforce requirements. For example, the legislation pertaining to personal data protection in European Union which resulted in the General Data Protection Regulation (GDPR) had implications for Information and Communication Technology (ICT) project management (Todorović et al., 2018).

Several studies have shown that legislation is effective in promoting environment protection on infrastructure projects. For example, in a review of literature Kesidou and Sovacool (2019) established that legislation and industry standards were important for driving the demand for low carbon buildings. A study in the United Kingdom (UK) concluded that stringent legislation and regulations, among others, were key for designing de-constructible buildings (Akinade et al. (2017). Regarding the existing building stock in the UK, Clarke et al. (2008) concluded that the future drivers for sustainability improvements were legislation and enforcement. This is because initiatives such as Energy Performance Certificates, regular inspection of boilers and air conditioning equipment and check on air-tightness of buildings have been effectively used as a minimum mandatory standard for existing buildings. Ghaffar et al. (2020) also found that legislation can substantially improve circularity within building projects. This is because legislation mandating companies to meet specific re-use/recycle targets on infrastructure projects would create reasons for the companies to invest in waste management solutions in view of the current lack of environmental sustainability in project management practice (Marnewick, 2017).

Advantage has been taken of the fact that legislation can foster environmental sustainability of infrastructure projects by using it to advance specific environmental agenda. For instance, in the UK, legislation has been enacted to reduce the amount of waste generated on infrastructure projects and ensure that different categories of waste are managed properly to reduce the environmental impact (Lou et al., 2021). Legislation specifically designed for the construction industry in

the UK includes the Aggregates Levy and Site Waste Management Plan Regulation (SWMP) of 2008. Each of these aims to make individual construction companies responsible for the waste they generate and how it is managed (Lou et al., 2021). It was noted that the UK building legislation had changed dramatically by introducing higher standards for infrastructure sustainability issues; especially those related to thermal insulation and conservation (Wang et al., 2014). In a review of European and Spanish legislation, it was found that legislation covers minimum requirements of energy performance of building infrastructure regarding illumination, soundproofing, insulation, heating, air condition, sanitary hot water in buildings, energy certification for buildings, and use of solar photovoltaic and thermal renewable energy (García et al., 2007). In the United States (US), the Federal Government has developed policy and legislation to reduce GHG emissions, reduce power and water consumption in all new buildings projects as well as in existing buildings (Hardy and Valdes-Vasquez, 2015). For example, all new buildings in the US should achieve net-zero emissions by 2030, reduce water use by 26% by 2020, and divert 50% of non-hazardous solid waste and construction debris from landfills (Hardy and Valdes-Vasquez, 2015). It is evident that legislation can be used to foster environmental sustainability of infrastructure projects considering that project managers have been found to be have challenges in implementing sustainability in their practices (Marnewick, 2017).

Notwithstanding, several inadequacies have been highlighted in some of the environmental legislation in different countries. The inadequacies mostly stem from lack of specific legislation on aspects of environmental protection and also inadequate enforcement on any existing legislation and regulations. For example, in a study on UK policy on green buildings as exemplified in the legislation for the Code for Sustainable Homes and in Building Regulations, Gibbs and O'Neill (2015, p. 133) found that "respondents from within the green building niche are critical of current UK legislation, and argue that its narrow conceptualisation fails to adequately encourage, or recognise, what they would consider to be green building forms that will contribute to substantial reductions in carbon emissions nor does it respect locally appropriate building methods." A study in South Africa found that there was a gap between green building legislation and practices on site (Windapo and Goulding, 2015). This was attributed to lack of awareness about the legislation and its selective implementation. Also, in Brazil, it was found that municipal legislation had no procedures or guidelines for construction and demolition waste (da Rocha and Sattler, 2009). In Zambia, Oke et al. (2019) noted the need for the government to introduce legislation and regulations to promote sustainable construction. Even when it is acknowledged that legislation is important for environmental sustainability of infrastructure projects, it is either lacking, missing or not sufficiently enforced (Howes et al., 2017). In the east African countries of Ethiopia and Kenya, it was noted that national capacity to implement EIAs was lacking and therefore the EIAs were not contributing to environmental protection (Gebreyesus et al., 2017).

Generally, there is a lack of environmental sustainability in project management because project managers have challenges in implementing it in their practices (Marnewick, 2017). Challenges include lack of information and knowledge which lead to delayed projects and abandonment of sustainability principles on projects (Aghaegbuna et al., 2020). Subsequently, the integration of sustainability principles with project management practice has become a growing niche in project management knowledge. Literature shows that legislation is important in fostering environmental sustainability on infrastructure projects (Akinade et al., 2017; Clarke et al., 2008; Gan et al., 2015; Ghaffar et al., 2020; Kesidou and Sovacool, 2019) and that it can and has been used to promote environmental sustainability of infrastructure projects especially in developed countries (García et al., 2007; Ghaffar et al., 2020; Hardy and Valdes-Vasquez, 2015; Lou et al., 2021; Wang et al., 2014). The review also shows that often, environmental sustainability legislation for infrastructure projects is either missing, inadequate or not sufficiently enforced especially in Africa (da Rocha and Sattler, 2009; García et al., 2007; Ghaffar et al., 2020; Gibbs and O'Neill, 2015; Howes et al., 2017; Oke et al., 2019).

3. Zambia country profile: an African developing country

Zambia is a landlocked country in central southern Africa bordered by eight countries (Angola, Botswana, Democratic Republic of Congo, Malawi, Mozambique, Namibia, Tanzania, and Zimbabwe). It is a young country by median age with a rapidly growing population at 2.8%. The country is dependent on the export of primary commodities including copper (over 70% of foreign exchange earnings), sugar, tobacco, gemstones, cotton and electricity with the majority of the population directly dependant on agriculture. Based on its per capita gross domestic product (GDP), Zambia is classified by the World Bank as a low income country (Kapotwe and Tembo, 2021). Developing countries are mainly characterised by low per capita real income, high population growth rate, high rates of unemployment, dependency on the primary sector, and primary commodity export dependence (Kapotwe and Tembo, 2021; Pretorius et al., 2021). In terms of environmental protection legislation, the country adopted most of its legislation from Britain and therefore has very similar legislative frameworks to most African countries with a history of British rule. For example, the EIA process for infrastructure project approval in Ethiopia and Kenya described by Gebreyesus et al. (2017) are the same as those for Zambia.

4. Zambian environmental legislation

In contrast to developed countries, Zambia, like most African countries, does not have environment legislation dedicated to the construction industry (cf. Gebreyesus et al., 2017). All matters pertaining to the environmental impact of the built environment are subject to the general environment protection legislation. There are several legislations with associated statutory instruments (regulations) which deal with environmental sustainability and these are the Environmental Management Act of 2011 (EMA Act) administered by the Zambia Environmental Management Authority (ZEMA), the Energy Regulation Act of 2019 (ER Act) administered by the Energy Regulation Board (ERB) and the Water Resources Act of 2011 (WR Act) administered by the Water Resources Management Authority (WARMA). The Acts were assessed for their relevance to environmental protection by searching for the words 'environment', 'environmental' and 'environmentally' in the Acts. The results and a summary of the focus of each Act are shown in Table 1.

The 92 page EMA Act used the words 497 times, the 36 page Energy Regulation Act used the words 7 times, and the 28 page Water Resources Act used the words 5 times. This shows that the EMA Act is the primary legislation for environmental protection in Zambia (Mubanga and Kwarteng, 2020; Mulenga, 2019; Sishekanu and Katati, 2021). By contrast the National Council for Construction Act, which is the primary

Table 1
Environment protection legislation in Zambia.

Act	Body	Pages	Environment Mentions	Summary of Act
EMA Act	ZEMA	92	497	Provide for integrated environmental management and the protection and conservation of the environment and the sustainable management and use of natural resources
ER Act	ERB	36	7	Provide for the regulation and licensing of enterprises in the energy sector
WR Act	WARMA	28	5	Provide for the management, development, conservation, protection and preservation of the water resource and its ecosystems

Table 2
Sample demography.

Category	Frequency	Percent	Regulatory	Civic	Consultant
Gender					
Male	10	71	6	4	1
Female	4	29	4	0	0
	14	100			
Education					
Undergraduate degree	10	71	10	0	0
Master's degree	3	22	1	1	1
PhD	1	7	0	1	0
	14	100			
Experience					
3–5 years	2	14	2	0	0
5–10 years	4	29	3	1	0
Over 10 years	8	57	2	5	1
	14	100			
Organisation					
Regulatory	9	64	9	0	0
Civic	4	29	0	4	0
Consultancy	1	7	0	0	1
	14	100			
Position in organisation					
Senior Manager	6	43	2	4	0
Middle Manager	2	14	2	0	0
Professional	6	43	5	0	1
	14	100			

legislation for the regulation of the construction industry, does not allude to environmental protection.

In executing its mandate, ZEMA requires that developers submit an environmental impact assessment (EIA). ZEMA has the authority to approve or disapprove the application for the development of infrastructure based one environmental concerns. In the event that an application is declined, the developer may appeal to the government Minister in charge ("Environmental Management Act," 2011). The Act gives the Minister power to decide as he deems fit but with due regard to the environmental policies, guidelines and standards published by the agency (Mulenga, 2019). In fact, the Minister has significant authority under the EMA Act with the Act making reference to the Minister a total of 82 times.

A sentiment analysis was performed on the sentences in which the Minister was mentioned in the EMA Act in order to contextualise the polarity in which he is mentioned. Sentiment analysis is primary used to identify and classify the polarity of opinions about a product or service and is used in various settings including product reviews, opinion polls, and health care applications such as to detect stress and depression (Chandrasekaran et al., 2021). The analysis is hardly ever used in most other fields such as projects management, legislation and policy studies, or in sustainability related research. The sentiment analysis was conducted using the Azure machine learning add-in in Microsoft Excel. While 82 mentions of the Minister were found in the ACT, the sentiment analysis used 74 text snippets containing the word Minister because some of the text used had multiple mentions of the word. Out of the 74 text snippets analysed, 74% (55/74) were positive, 16% (12/74) were negative while 9% (7/74) were neutral. This means that the Minister was predominantly mentioned in a positive sentiment. The absence of studies on sentiment analysis outside classifying and identifying opinions means that the results here are difficult to relate with other studies. Nonetheless, the results suggest that the role and authority of the Minister in the Act is predominantly stated in a positive manner. This is expected because it is unlikely for the Act to do otherwise. The results also suggest that the authority given to the Minister under the Act is given positively.

The environmental protection legislation in Zambia is designed to cover all aspects of environmental sustainability across all sectors. There are no environmental legislation which are specific to the type of proposed infrastructure projects as the case is in most developed countries. For example, in Spain and Europe generally, there is legislation on minimum requirements of energy performance regarding illumination, soundproofing, insulation, heating, air condition, sanitary hot water in buildings, energy certification for buildings, and use of solar photovoltaic and thermal renewable energy (García et al., 2007). In contrast, environmental legislation in Zambia pertaining to infrastructure projects only covers the impact the proposed infrastructure would have on the flora and fauna of the environment but does not seem to consider issues of GHG emissions and the carbon-footprint of the final development. Subsequently, the study queried the extent to which the current legislative environment in Zambia promotes environmentally sustainable building infrastructure delivery. Therefore, the study examined the adequacy of environment protection legislation for building infrastructure projects in Zambia and their associated challenges and solutions.

5. Research method and approach

The study used semi-structured interviews to obtain the perceptions and beliefs of experts on the adequacy and implementation of environmental sustainability legislation applicable to infrastructure projects, and the associated challenges and solutions in Zambia. Semi-structured interviews were favoured over structured and unstructured interviews because they permit a more thorough understanding of the respondents opinions while being reasonably objective (Carruthers, 1990; Horton et al., 2004). This is in contrast to the limitation of the rigidity associated with structured interview and the difficult of analysing varying questions from unstructured interviews (Horton et al., 2004). A qualitative approach was favoured because the study was exploratory in nature (cf. Madter et al., 2012) as studies on environmental legislation and their implementation on building infrastructure project are few in Africa. The next sections discuss the research approach used in the study beginning with the sampling method followed by data collection and analysis.

5.1. Participants and sampling

The selection criteria for the interview participants was that they should be working in the environment protection industry with experience of the environment protection legislative framework. Table 1 summarises the profile of the participants in the study. Participants were drawn from the Government agencies responsible for regulation and enforcement of the environment protection legislation (64%), civic organisations which advocate for environmental protection (29%), and an environment consultant (7%). The organisations included in the sample were ZEMA, WARMA, ERB, NCC, the local authority, Zambia Network for Environmental Educators and Practitioners (ZANEEP), the Impact Assessment Association of Zambia (IAAZ), the Zambia Climate Change Network (ZCCN), and the Zambia Institute of Environmental Management (ZIEM). Subsequently, a sample of 14 interviewees was obtained comprising of mostly senior members of the target organisations which deal with environmental protection in Zambia and environmental planners at the local authorities. Large sample sizes are not considered important determinants of quality in qualitative studies (Braun et al., 2017) because data from a relatively small sample can still result in a broad range of core issues when the interviewees have experienced the phenomenon in question (Starks and Brown-Trinidad, 2007). Several qualitative studies have reported findings from samples ranging from one to ten interviewees (e.g. d'Young, 2008). Further, Smith (2018) asserted that the rich knowledge of purposefully chosen small samples present unique strengths of qualitative research, even though they are highlighted as limitations in some studies. Therefore, a sample size of 14 (coded as P1 to P14) was considered adequate considering that the participants were mostly senior members of the organisations and with vast experience in the field of environment protection in Zambia and therefore possessed rich knowledge on the subject. Since the interviews produced recurring comments, information redundancy was reached indicative of data saturation (Saunders et al., 2018). The sample

comprised of ten male (71%) and four female (29%) interviewees each with a minimum of a university bachelor's degree in an environment related field and industry experience ranging between five and 23 years. The participants were of a suitable profile to participate in the survey because they met the inclusion criteria stated earlier of being conversant with environment protection issues. Because a specific demographic profile of respondents was sought, the sampling technique was therefore purposive in nature but quite well suited to the nature of the research notwithstanding that the approach can introduce sampling bias (Creswell and Poth, 2016; Etikan et al., 2016; Whitehead and Whitehead, 2016)

5.1.1. Data collection and analysis

Semi-structured interviews were conducted via online virtual meeting applications with only two interviews conducted face-to-face. Virtual platforms were preferred due to their convenience of being conducted in the comfort of both the interviewer and interviewees' premises and the hazard of the Covid-19 pandemic. The face-to-face interviews were conducted at the option of the interviewees who preferred this approach with appropriate Covid-19 protocols observed at all times. The duration of the interviews ranged between 19 min and 59 min with an average of 30 min. All interviews were recorded, transcribed using the online software Amberscript, checked and corrected manually and qualitatively analysed using *NVivo* v12 Pro.

The interview schedule was framed around a set of core questions focusing on the adequacy of environmental protection legislation and their implementation on building infrastructure projects, procedures and processes followed by institutions implementing the environmental protection legislation and also on challenges and possible solutions to the challenges in implementing the legislation. Interviewees from academia and civic organisations who do not participate in implementing the environmental protection legislation were asked core questions relating to the adequacy of the legislation and their implementation and perceived challenges and possible solutions required to overcome the challenges. The questions focused on evaluating the perceptions and experiences of the participants as recommended by Braun et al. (2017). The interview protocol had a total of twelve questions divided into four main groups evaluating 1) how and to what extent the legislation fosters sustainability in infrastructure designs; 2) the extent to which regulatory authorities critique sustainability in infrastructure projects; 3) some of the challenges encountered while evaluating projects?; and 4) possible solutions for some of the challenges encountered while evaluating projects? Questions under the first and second groups assessed the adequacy of environmental protection legislation applicable to building infrastructure projects while those under the third and fourth group assessed challenges associated with implementation of the legislation and any possible solutions to the challenges.

The data analysis followed the linear process of qualitative data analysis recommended by Williams and Moser (2019), and others, of open coding, axial coding, selective coding and then theory development and construction of meaning. Results of these processes are shown in Fig. 1. Subsequently, six, ten and six open codes were identified for the questions pertaining to legislation, its challenges, and possible solutions respectively which were consequently broken down into axial codes and then developed into theory. Open coding was used to identify distinct themes and concepts for categorisation (Costa et al., 2016; Williams and Moser, 2019). This involved reading the interview transcripts and comparing the initial codes for regularly occurring concepts and then organising similar words and phrases. Repeating themes were sort in successive transcript and interesting comments were selected and put in nodes. This process started with a search for frequently occurring words. Axial coding was used to refine, align and categorise the emerging themes in order to identify distinct thematic categories so that core codes can be identified (Costa et al., 2016; Williams and Moser, 2019). This was achieved by cross referencing the themes and categorising related open codes. Selective coding integrated the axial codes in to cohesive and meaningful expressions. Subsequently, theory was proposed pertaining to the environmental protection legislation, and the challenges and some solutions to the identified challenges.

6. Results and discussion

The themes extracted from the data are summarised in Fig. 1. The themes relate to the adequacy of environmental protection laws for building infrastructure projects, challenges and possible solutions for the implementation of the laws in Zambia. Based on the findings, the study theorises that environmental protection legislation for building infrastructure projects is relatively adequate but with some inadequacies to do with its implementation and the absence of legislation pertaining to GHG emissions and the carbon footprint of building infrastructure. Environmental protection is also fraught with challenges of funding, and issues of poor understanding of the importance of environmental protection. Solutions to the challenges of environmental protection for building infrastructure projects lie in increasing the level of implementation of the existing legislation and increasing the levels of awareness of the importance of protecting the environment.

6.1. Adequacy of the law

The interviewees almost unanimously agreed that the legal provisions are adequate for environmental protection with some minor flaws. There were comments such as, "*It's adequate but it's not completely 100 percent*" (P4). It was clear that the respondents felt that the law was fairly adequate on environmental protection.

However, there is no legislation which guides either aspects of environmental sustainability such as the carbon footprint or carbon emissions from infrastructure projects nor the energy efficiency of the buildings as the case is with legislation in most countries in Africa. This is in contrast to legislation in developed countries which includes these aspects (cf. García et al., 2007; Hardy and Valdes-Vasquez, 2015). The interviewees felt that the legislation was sufficient because the majority of them are from the field of environmental management and focus on the ecology of the environment and not the carbon footprint of infrastructure projects. Therefore, even though the interviewees felt that the legislation is adequate, there is need to enact legislation for monitoring the carbon footprint of infrastructure projects, energy efficiency, and waste generation of the projects among others (cf. García et al., 2007; Hardy and Valdes-Vasquez, 2015; Lou et al., 2021; Lundgren, 2016; Mubanga and Kwarteng, 2020; Sishekanu and Katati, 2021; Wang et al., 2014). Enacting more sustainability legislation is important because it has been found that project managers are having challenges implementing sustainability in their practices (Marnewick, 2017). Therefore, legislation would ensure that the project managers address their challenges and adhere to the regulation. This is tandem with findings that project management teams in Zambia adhere to mandatory environmental protection legislation without regard to cost but weigh other sustainability options based on cost (Zulu et al., 2022).

6.2. Inadequacies in the law

Notwithstanding that the interviewees felt that the legal framework was fairly adequate, some inadequacies in the legislation were also pointed out as discussed in the following sections.

6.2.1. Minister can override technical team

Four interviewees highlighted that the EMA Act gives authority to the Minister in charge to hear and decide on appeals against decisions made by the ZEMA board. "*The law says that if the client is not satisfied with ZEMA decision, the client shall appeal to the Minister who shall make a decision. … Now, when you as professionals have rejected the project, the Act again takes it to the Minister; but is the minister a professional?*" (P7). The interviewees argued against such a provision arguing that the ZEMA

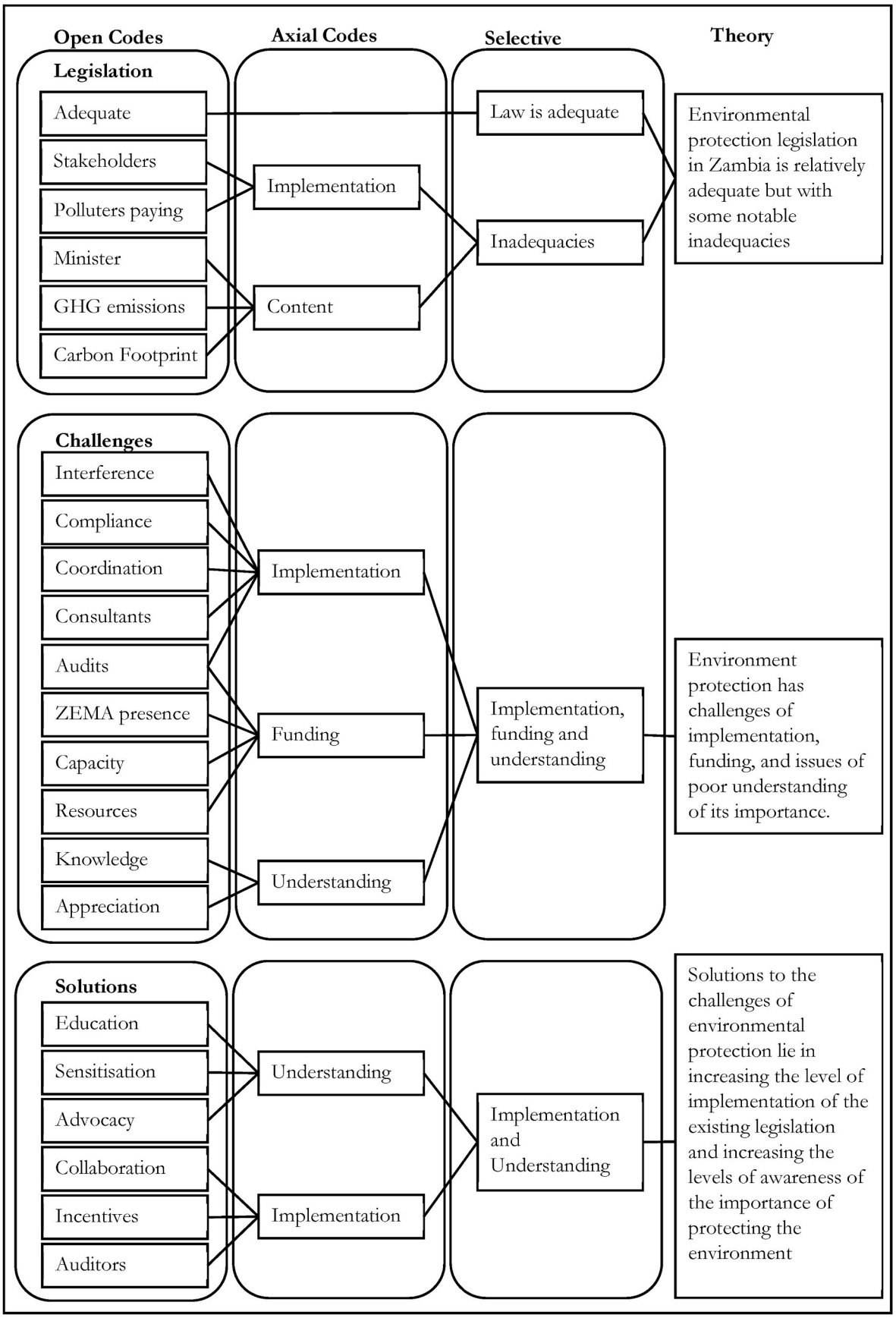

Fig. 1. Open codes, axial codes, selective themes and theory.

board sits as a team of experts to review the environmental impact of proposed development projects while the Minister is not an expert and is not mandated to constitute a team of experts to hear appeals against decisions by the team of experts. Therefore, it has been argued that the extent of the powers of the Minister under the Act are inappropriate because they allow the Minister to overrule the decision of a technical team of experts with several occasions where it has been done (Mulenga, 2019; Sishekanu and Katati, 2021). One of the most controversial cases was when the team of technocrats was overruled to approve a large scale open pit mining project in a designated game park which caused a national outcry and also made international news headlines (Sishekanu and Katati, 2021). From this finding, it can be theorised that over-empowering political officers with decisions of environment protection is likely to produce adverse unintended consequences. However, it is unclear whether this problem is similar to environmental protection legislation in other African countries.

6.2.2. Polluter pay principle

Ideally, the polluter pay principle is designed to shift the cost of pollution to the polluting agency (Zahar, 2018). This means that the cost of rectifying the effects of pollution should be borne by whoever creates the pollution. The principle is intended to discourage erring parties from continuing to cause pollution. In contrast, some interviewees argued that some enforcement agencies in Zambia use the principle to generate revenue by focusing on charging fines for pollution rather than the prevention of pollution. P5 noted that, "*If the law is strict and if people cannot just be paying and just have polluters pay principle, it may then change* …" This can be seen in a number of situations were enforcing agencies seem to be more concerned with the collection of penalty fees rather than abating pollution. For example, P12 said, "… *management approved the highest* fee *for an industry that is polluting … I think it is 50,000 Kwacha for a heavy industry* …" The sentiments expressed about the application of the polluter pay principle do not show any focus on collecting money to rectify the negative impacts of the pollution and discouraging the erring parties. It seems the application of the polluter pay principle in Zambia is underdeveloped. This is similar to other developing countries like Indonesia where it was noted that the principle had not reached its full effectiveness (Darma and Redi, 2018).

6.2.3. Low stakeholder input

Two interviewees pointed out that there is also inadequacy in the development of the legal provisions because the level of consultation with stakeholders is low. For example, P2 explained that, "*Even when you give input, they basically don't take you. In fact, I have sat on committees at parliament. They will tell you [that] when the executive bring in something, even if we do input, it is usually very difficult to change.*" The interviewees felt that stakeholder engagement was a mere formality. This resonates with findings from East Africa that stakeholder engagement is often inadequate or not considered in the final output (Gebreyesus et al., 2017). However, one interviewee argued that stakeholders are in fact consulted. P4 highlighted that, "… *during the formulation of legislation, all stakeholders are consulted* …"

The interviewees argue that the stakeholder consultation in legislation and policy formulation is often a cosmetic exercise to 'tick the box' that stakeholders were consulted. Mubanga and Kwarteng (2020) agree with this preposition and recommended for the EIA legislation should be amended by incorporating stakeholder's concerns and other emerging environmental issues. While studies on stakeholder involvement in legislative processes are rare (Wamsler, 2017), Wamsler (2017) found that stakeholder involvement in strategic decisions is conditional on the power domain in which stakeholders operate. Howes et al. (2017) found that inadequacy or absence of consultation with appropriate stakeholders led to opposition of environment protection legislation. This is in tandem with findings from East Africa were it was recommended that the community needed to be empowered to ensure a more collective and meaningful participation in the EIA process (Gebreyesus et al., 2017).

6.2.4. Does not cover all aspects of environmental protection

One interviewee commented that even though the legislation is largely adequate, it did not cover all aspects of environmental protection which is similar to other developing countries (cf. da Rocha and Sattler, 2009). P10 cited the absence of legislation on emissions and on energy efficiency. P10 mentioned that, "… *there are loopholes … despite that we have the Energy Act, to what level does it go to look at energy efficiency in buildings?*" The environmental legislation is focused on preserving the natural ecology of the environment with issues of environmental pollution mostly dealt with by penalties. Issues of energy efficiency and emissions are largely ignored in the legislation. Mubanga and Kwarteng (2020) also found that the legislation in Zambia does not incorporate strategic environmental assessment (SEA), ecosystem services, and issues of climate change. This is similar to Brazil where it was found that municipal legislation had no procedures or guidelines for construction and demolition waste (da Rocha and Sattler, 2009). This is in stark contrast to legislation in developed countries which covers these and other aspects of GHG emissions (García et al., 2007; Hardy and Valdes-Vasquez, 2015). Therefore, specific legislation can be used to promote the integration of the missing sustainability principles with project management practice as highlighted by Aghaegbuna et al. (2020).

6.3. Challenges associated with environmental protection legislation

A number of challenges associated with environmental protection legislation on infrastructure projects were identified and these included issues of implementation, funding, and poor understanding of the importance of the legislation. These are briefly discussed below.

6.3.1. Inadequate implementation of legislation

Inadequate implementation of legislation on infrastructure projects emerged as the most common challenge with thirteen interviewees alluding to it. This is in tandem with findings from other developing countries struggling with the implementation of legislation (cf. Gebreyesus et al., 2017; Howes et al., 2017; Windapo and Goulding, 2015). The data showed that the inadequacy was due to lack of environmental audits, lack of capacity and lack of resources to implement the legal provisions. For example, P7 noted that, "*ZEMA do the monitoring; the problem is that it is so irregular.*" Most of the agencies which are required to participate in the evaluation of the projects lack capacity and resources to do so effectively. Lack of capacity stems from lack of equipment and personnel to implement the legislative provisions while resources that are lacking are mainly finance and transport. As P12 noted, "*The local authority does not have enough gadgets or all the gadgets that an environmentalist is supposed to have.*" These responses and the fact that thirteen out of the fourteen interviewees alluded to the problem shows that the implementation of the legislative provisions has sever challenges. This finding is line with the finding in South Africa by Windapo and Goulding (2015) that there was a gap between green building legislation and construction project site practices due to poor implementation of the legislation. Gebreyesus et al. (2017) equally highlighted the problem of poor implementation of legislation in Ethiopia and in Kenya. In a systematic literature review of 94 articles, Howes et al. (2017) found that the problem of failure to implement environment protection legislation and policies is prevalent in both developing and developed countries.

6.3.2. Non-compliance by developers

Developers' non-compliance to legal provisions was the second most common challenge with five interviewees alluding to it. P3 noted, "*I think only 20% to 30% of the people will follow or comply with the recommendation that we normally give.*" The interview responses suggest that there is a level of impunity exhibited by some developers. This can be attributed to the low levels of inspections by the regulatory authorities which was highlighted by some interviewees. While no similar findings

were found from extant literature, the finding resonates with studies that highlighted the lack of environmental sustainability in project management and show that project managers have challenges in implementing sustainability in their practices (Marnewick, 2017).

6.3.3. Inadequate physical presence of principle environmental agency in some geographical locations

The results showed that the principle environment protection agent did not have sufficient physical presence across the country. Some interviewees disclosed that some developers were not complying with the legal provision because the principle environment protection agent was not close enough to monitor. This findings is not reported in extant literature but may be the case with other developing countries. P2 said, "*ZEMA is just expanding offices right now, I mean, they only had [offices in] Lusaka, Livingstone and Copperbelt [but] now they are spreading to the borders.*" The absence of the regulators from a large part of the country could be contributing to the low levels of implementation and compliance by developers. However, as noted, the regulators have been slowly spreading to other locations and this may help with implementation and compliance. The problem of lack of physical presence across the country is linked to the problem of lack of resources. Lack of resources to implement environment protection was also found to be a problem in many other countries (Howes et al., 2017).

6.3.4. Political interference

Another challenge identified is that politicians sometimes interfere with the process of project evaluation which is similar to findings in Uganda (cf. Ampaire et al., 2017). Some of the interviewees highlighted that there have been instances where developers with political connections have used their connection to try to influence the evaluation of projects. For example, one interviewee explained that, "*And there's also political challenges because the councils are always attached to the politicians …, you have a client who comes through a politician; a politician will look at the votes versus me a technocrat who is going to look at sustainability; so there's always that conflict.*" (P14).

The challenge of political interference was more prevalent in local authorities. Because local councils work very closely with local politicians, developers frequently ask the local politicians to vouch for their projects. As noted by one interviewee, because the politicians are concerned with winning favour with the electorate, their primary concern is not environment protection. This a similar to the observation made by Ampaire et al. (2017) in Uganda who noted that political interference was hampering the climate change interventions.

6.3.5. Poor coordination between principle environmental agency and other agencies

The results also show that the coordination between the principle environment protection agent and other agencies is not always efficient. This was not found in extant literature but considering the similarity in legislation across most countries in Africa, this may also be the case in those countries. This can be seen in comments like, "*sometimes you find that ZEMA are in a district without your knowledge; will go ahead and review those projects, but meanwhile, you are the person on the ground who knows the nitty gritty of those project's.*" The sentiments expressed by the interviewees who are frequently consulted as stakeholder agencies bemoaned the low level of collaboration with the principle agent which is ZEMA. It appears that these stakeholders unanimously felt that the agency only sends documents for their comments and does not engage any further. The stakeholder agencies seem very keen for a deeper collaboration with the environment protection agent beyond providing comments on the documents. They seem willing to help with monitoring compliance by the developers. Collaboration among stakeholders has been recommended to foster the implementation of policies and legislation and support indigenous knowledge systems (Chepchirchir et al., 2019). Therefore, collaboration among the key stakeholders could also be used to foster better implementation of environmental protection legislation. Gebreyesus et al. (2017) equally highlighted the need to improve the capacity of the environmental protection agencies for both Ethiopia and Kenya if the quality of EIA systems in the countries was to be improved.

6.3.6. Lack of knowledge and appreciation by stakeholders on environmental issues

The results also show that most project stakeholders lack knowledge on environmental protection and its importance which is similar to findings from other studies (e.g. Aghaegbuna et al., 2020). This is supported by comments such as, "*the biggest issue I have seen is lack of knowledge and understanding… because people do not appreciate the role of the environment.*" This resonates with findings in project management where lack of information and knowledge about environmental sustainability was found to lead to delayed projects and the abandonment of sustainability principles in projects (Aghaegbuna et al., 2020). Even with some stakeholders who may have considerable knowledge based on their level of education, it was felt that environmental issues are considered secondary to social and economic issues. This is expected considering that Zambia is a developing country grappling with socio-economic challenges. The challenge of placing economic needs over environment protection was found to be prevalent in many countries including developed ones (Howes et al., 2017).

6.3.7. Hiring of consultants

One interviewee highlighted the flaw of having the developer hiring consultants to do environmental audits for submission to the responsible agency. This result was not found in other studies but is likely to be the case with other developing countries which have the same environmental legal framework. P7 argued, "*The developer paying the consultant becomes a major weakness … because how do you become rough on the person who is paying you; you are a consultant; you need a job and then this one gives you a job.*" P7 further added, "*Monitoring and the audit is by the developer himself; so how do you allow a culprit to collect data and submit reports? So you can dilute the data like it is in the mines; … and then submit reports that are doctored to just bring them within the thresholds*."

While the interviewee is quite opposed to the system of having the developer engage an environmental auditor, this is very similar to financial audits where the company is required to engage a financial auditing firm to audit its books of accounts. While there have been instances in financial auditing where the system did not work as expected, the system has largely been reliable. However, it is worth noting that financial auditing is guided by very stringent rules and regulations and the auditing firms themselves are strictly regulated. Environmental auditing firms on the other hand are neither regulated to the same standard as financial auditing firms nor guided by stringent regulations (De Moor and Beelde, 2005). In this regard, it seems valid to question the appropriateness of having the developer engage the auditor especially that several instances of impropriety have been cited.

6.4. Proposed solutions

In response to some of the challenges, the interviewees suggested some solutions. Based on a cross-mapping of the challenges and proposed solutions, the proposed solutions were synthesised into two themes namely, understanding and implementation of the environment protection process as shown in Fig. 2. The two themes of proposed solutions are discussed below.

6.4.1. Understanding

The interviewees recommended that some of the challenges could be overcome by environmental education, sensitisation and civic advocacy in tandem with other findings (e.g. Aghaegbuna et al., 2020; Gebreyesus et al., 2017; Nkoana, 2018). These three aspects collectively point to the need for increasing the understanding of the importance of environmental protection. Six of the interviewees alluded to this with comments

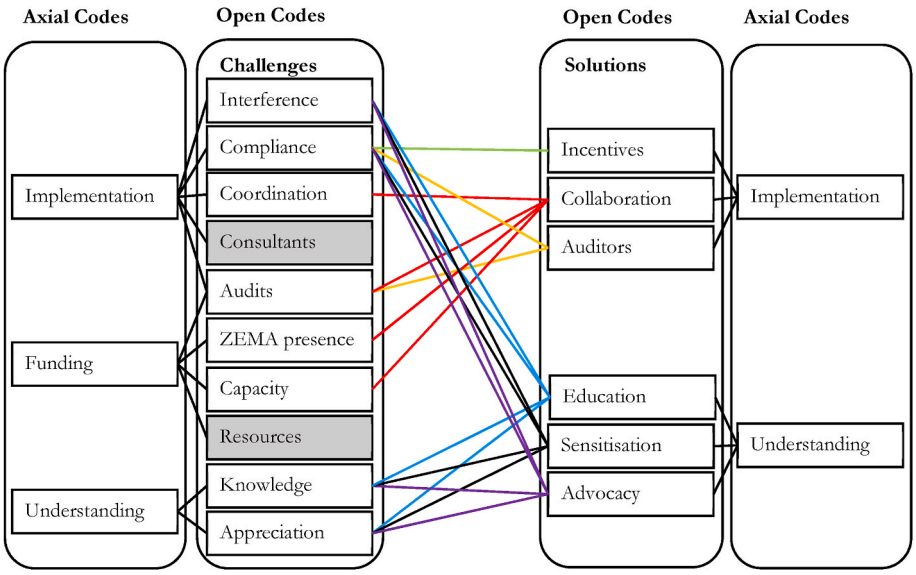

Fig. 2. Cross-mapping of challenges and solutions.

such as, "*To cartel political interference, more sensitisations [is needed] to make people understand that this environmental impact assessment process it is for the greater good of the environment mainly.*" (P9). Environmental education creates awareness of the urgency of the threat of climate change and so compels people to act in a more environmentally cautious manner. An informed citizenry at all levels in the country could help to drive the environmental sustainability agenda by suppressing resistance to the agenda.

One interviewee stressed the need for staff training saying, "… *the staff at the local authority need to undergo training in as far as the use of gadgets is concerned.*" Staff training is obviously important to ensure that staff are proficient with relevant instruments and technology. However, this would need to go together with the acquisition of the relevant instruments and technologies which were reported as being unavailable. These findings resonate with findings in South Africa on challenges in renewable energy projects were it was recommended that awareness and capacity-building interventions for local leaders and community members could help with some of the challenges (Nkoana, 2018). Gebreyesus et al. (2017) also recommended improving the knowledge of communities in order to create an informed citizenry which is more likely to demand for the negative impacts of infrastructure projects to be addressed.

A respondent from an environmental civic organisation suggested that advocacy by civil organisations could alleviate some of the challenges affecting environmental protection. P2 argued that advocacy is important saying, "… b*ecause advocacy will force a politician to open up a table for discussion.*" It was argued that civic advocacy compels politicians to listen to the environmental protection agenda. This is important because politicians were cited as being indifferent to environmental protection by favouring political expediency over the environment because for them, socio-economic issues take pre-eminence over environmental issues. There are several instances were civic organisation have taken legal action against government agencies for failing to enforce environmental protection legislation (cf. Mulenga, 2019; Sishekanu and Katati, 2021). Therefore, civic advocacy could be used to balance political expediency with environment protection. Based on the cross-mapping of the challenges and solutions of environment protection, environmental education, sensitisation and civic advocacy could help the challenges of compliance, lack of knowledge and appreciation of environment protection, and could also help with curtailing political interference. This could help project management practice by dealing with the problem of lack of information and knowledge found by Aghaegbuna et al. (2020) as being a contributing factor to delayed projects and abandonment of sustainability principles in projects.

6.4.2. Implementation

Providing incentives, strengthening inter-agency collaboration and appointing independent environmental auditors were suggested as solutions to some of the challenges. The cross-mapping of the challenges and proposed solutions shown in Fig. 2 shows that providing incentives could alleviate the problem of lack of compliance, improve inter-agency collaboration, help with the challenges of poor coordination among the different agencies, increase audits, improve presence of the regulators by assigning local government environmental planners as proxies and subsequently improve the capacity of the regulator to monitor compliance. Independent auditors could help with problems associated poor compliance levels and the quality of the environmental audits. These proposed solutions were echoed by comments such as, "*There is a need to increase cooperation with ZEMA and environmental planners at district level.*" (P9). On incentives, P10 said, "*We also need to have it on the other side where you need to provide incentives.*" P7 argued that, "… *the law should provide for independent reviewers.*"

It is acknowledged that the principle administrator of the environmental protection law has a lean staff structure and has limited physical presence throughout the country. However, some stakeholder government agencies have a much broader presence throughout the country. Respondents from these agencies and others felt that they could contribute more if the collaboration with the principle environmental agency was enhanced. As highlighted by some of the interviewees, increased collaboration could be in the form of coordinated and combined site-visits, delegation of project monitoring duties and perhaps even with environmental auditing.

It was suggested that developers who comply with the law should be given an incentive to motivate and encourage others to do the same. Considering the fact that the developers are the ones tasked with implementing the regulations, it may encourage some developers to comply if some incentives are provided for compliance alongside the existing penalties for non-compliance. This resonates with findings by Howes et al. (2017) that insufficient incentives to adopt environmentally sustainable practices was one of the reasons for countries failing to implement environmental protection.

In order to deal with the problem associated with the quality of environmental audits which are compromised because the auditor is engaged by the developer himself, it was suggested that environmental

auditors should be engaged independent of the developer. Engaging an independent environmental auditor may improve the levels of compliance and the implementation of the environmental management plan. This is because an independent auditor would not be influenced to prepare a favourable audit report for the developer who is the client. Gebreyesus et al. (2017) equally alluded to the need to enhance the capacity of environmental consultants in the East African countries of Ethiopia and Kenya. This further resonates with recommendations by De Moor and Beelde (2005) that environmental auditors should be multidisciplinary teams. There are several possible ways in which independent auditors could be engaged. Primarily, ZEMA could facilitate the selection of the consultant while the cost would be passed on to the developer through the fees paid to ZEMA.

7. Conclusion

The study examined the adequacy of environmental protection legislation applicable to building infrastructure projects and their associated challenges and solutions using Zambia as a case. The study showed that environmental protection legislation in Zambia is not adequate for ensuring environmental sustainability of building infrastructure projects especially as it pertains to carbon emissions from building projects. This is because the available environmental protection legislation is only focused on preserving the ecology of the environment and does not adequately consider issues of GHG emissions and the carbon footprint of infrastructure projects. The study also found that there are challenges with the implementation of the existing environmental protection legislation due to various institutional inadequacies. The study further established solutions to deal with some of the identified challenges. The findings have implication for project management practice in view of the lack of environmental sustainability inherent in project management practice and the need to integrate sustainability principles with project management which can be enhanced through legislation.

Legislation in Zambia particularly and some African countries generally could be formulated to allow for the evaluation of GHG emissions and the carbon footprint of infrastructure developments because the findings show that the current legislation is only focused on preserving the ecology. This would encourage developers to think critically about the carbon footprint of the projects and not just about the flora and fauna of the proposed development area which seems to be the primary focus of the current legislation. This would help to integrate sustainability principles with project management. A stronger and more structured collaboration between the principle environment regulator with stakeholder agencies could also alleviate some of the challenges associated with the environmental regulator not having physical presence across the country because the findings show that relevant stakeholders are willing to work more closely with the regulator. Specifically, the environmental regulator could leverage on the network of environmental planners at city and district councils across the country to monitor compliance with environmental legislation. This could be achieved by delegating the function of periodic compliance monitoring to the local authorities because they are present in all districts of the country. This could deal with the challenges related to inadequate implementation of the legislation, non-compliance of developers with regulations, and the inadequate physical presence of the environmental regulator across the country. Also, it may be appropriate to reconsider the modalities for engaging consultants to conduct environmental audits so that the consultants are not under the influence of the developers whom they are auditing because the findings suggest that environment auditor are likely to be compromised when they are directly engaged by the developer whose project is being audited.

The theoretical implication of the study is that the absence of legislation pertaining to GHG emissions and the carbon footprint of building infrastructure projects limits the extent to which the construction industry can contribute to the protection of the environment. Further, increasing collaboration among environment protection stakeholders could improve the level of implementation of existing legislation and enhance environmental sustainability in project management. Also, increasing the awareness of the importance of protecting the environment could reduce challenges of environment protection associated with political interference and the implementation of sustainability in project management practice. The findings add to the body of knowledge on the ecological resilience of projects by showing that legislation can be used to promote the environmental sustainability of infrastructure projects in Africa.

The study is subject to some limitations. While the findings have implications for other countries with a similar contextual background, the fact that the study is exploratory and quantitative with a fairly small sample means that the findings lack backing for statistical generalisation. A relatively small number of interviews were conducted because of the limited number of environmental practitioners in a developing country like Zambia. Notwithstanding, Smith (2018) asserted that the rich knowledge and small samples purposefully chosen are unique strengths of qualitative research, even if they are highlighted as limitations in some studies. Future studies can validate the identified infrastructure challenges and solutions through a quantitative study with a large sample size in order to test the proposed theories.

Declaration of competing interest

There are no conflicts of interests to declare.

References

Addaney, M., Boshoff, E., Nyarko, M.G., 2018. Protection of environmental assets in urban Africa: regional and sub-regional human rights and practical environmental protection mechanisms. Aust. J. Hum. Right 24 (2), 182–200.

Aghaegbuna, O., Tasmiyah, C., Zanoxolo, B., Nikiwe, M., 2020. Sustainability in project management practice. In: Paper Presented at the MATEC Web of Conferences.

Akinade, O.O., Oyedele, L.O., Ajayi, S.O., Bilal, M., Alaka, H.A., Owolabi, H.A., Kadiri, K. O., 2017. Design for Deconstruction (DfD): critical success factors for diverting end-of-life waste from landfills. Waste Manag. 60, 3–13. https://doi.org/10.1016/j.wasman.2016.08.017.

Ampaire, E.L., Jassogne, L., Providence, H., Acosta, M., Twyman, J., Winowiecki, L., van Asten, P., 2017. Institutional challenges to climate change adaptation: a case study on policy action gaps in Uganda. Environ. Sci. Pol. 75, 81–90. https://doi.org/10.1016/j.envsci.2017.05.013.

Braun, V., Clarke, V., Gray, D., 2017. In: Braun, V., Clarke, V., Gray, D. (Eds.), Collecting Qualitative Data: A Practical Guide to Textual, Media and Virtual Techniques. Cambridge University Press.

Carruthers, J., 1990. A rationale for the use of semi-structured interviews. J. Educ. Adm. 14, 155–166.

Chandrasekaran, G., Nguyen, T.N., Hemanth, D.J., 2021. Multimodal sentimental analysis for social media applications: a comprehensive review. Wiley Interdisciplinary Rev.: Data Min. Knowl. Discov. 11 (5), e1415.

Chepchirchir, S., Kwanya, T., Kamau, A., 2019. Maximising the socioeconomic value of indigenous knowledge through policies and legislation in Kenya. Global Knowledge Commun. 68 (1/2), 60–75. https://doi.org/10.1108/GKMC-05-2018-0043.

Clarke, J.A., Johnstone, C.M., Kelly, N.J., Strachan, P.A., Tuohy, P., 2008. The role of built environment energy efficiency in a sustainable UK energy economy. Energy Pol. 36 (12), 4605–4609. https://doi.org/10.1016/j.enpol.2008.09.004.

Costa, C., Breda, Z., Pinho, I., Bakas, F., Durão, M., 2016. Performing a thematic analysis: an exploratory study about managers' perceptions on gender equality. Qual. Rep. 21 (13), 34–47.

Creswell, J.W., Poth, C.N., 2016. Qualitative Inquiry and Research Design: Choosing Among Five Approaches. Sage publications, 1506330193.

Cronin, J., Hughes, N., Tomei, J., Caiado Couto, L., Ali, M., Kizilcec, V., Watson, J., 2021. Embedding justice in the 1.5°C transition: a transdisciplinary research agenda. Renewable Sustain. Trans. 1, 100001 https://doi.org/10.1016/j.rset.2021.100001.

d'Young, A.I., 2008. Domiciliary application of CryoCuff in severe haemophilia: qualitative questionnaire and clinical audit. Haemophilia 14 (4), 823–827.

da Rocha, C.G., Sattler, M.A., 2009. A discussion on the reuse of building components in Brazil: an analysis of major social, economical and legal factors. Resour. Conserv. Recycl. 54 (2), 104–112. https://doi.org/10.1016/j.resconrec.2009.07.004.

Darko, A., Chan, A.P.C., Gyamfi, S., Olanipekun, A.O., He, B.J., Yu, Y., 2017. Driving forces for green building technologies adoption in the construction industry: Ghanaian perspective. Build. Environ. 125, 206–215. https://doi.org/10.1016/j.buildenv.2017.08.053.

Darma, M.E., Redi, A., 2018. Penerapan asas polluter pay principle dan strict liability terhadap pelaku pembakaran hutan. Jurnal Hukum Adigama 1 (1), 1657–1683.

De Moor, P., Beelde, I.D., 2005. Environmental auditing and the role of the accountancy profession: a literature review. Environ. Manag. 36 (2), 205–219.

Etikan, I., Musa, S.A., Alkassim, R.S., 2016. Comparison of convenience sampling and purposive sampling. Am. J. Theor. Appl. Stat. 5 (1), 1–4.
Gaffar, A., Moha, A., Seffah, A., 2005. User-centered design practices management and communication. In: Paper Presented at the Proceedings of HCII.
Gan, X., Zuo, J., Ye, K., Skitmore, M., Xiong, B., 2015. Why sustainable construction? Why not? An owner's perspective. Habitat Int. 47, 61–68. https://doi.org/10.1016/j.habitatint.2015.01.005.
García, J.O., Gago, E.J., Bayo, J.A., Montes, G.M., 2007. The use of solar energy in the buildings construction sector in Spain. Renew. Sustain. Energy Rev. 11 (9), 2166–2178. https://doi.org/10.1016/j.rser.2006.03.010.
Gebreyesus, A.T., Koskei, S., Shen, Y., Qian, F., 2017. Review of EIA in east Africa: challenges and opportunities in Ethiopia and Kenya. Earth 6 (4), 44–50.
Ghaffar, S.H., Burman, M., Braimah, N., 2020. Pathways to circular construction: an integrated management of construction and demolition waste for resource recovery. J. Clean. Prod. 244, 118710 https://doi.org/10.1016/j.jclepro.2019.118710.
Gibbs, D., O'Neill, K., 2015. Building a green economy? Sustainability transitions in the UK building sector. Geoforum 59, 133–141. https://doi.org/10.1016/j.geoforum.2014.12.004.
Hansen, J., Sato, M., Ruedy, R., Lo, K., Lea, D.W., Medina-Elizade, M., 2006. Global temperature change. Proc. Natl. Acad. Sci. USA 103 (39), 14288–14293.
Hardy, M.S.T., Valdes-Vasquez, R., 2015. Toward meeting the requirements of high-performance buildings: a case study in the U.S. Federal government. Procedia Eng. 118, 787–793. https://doi.org/10.1016/j.proeng.2015.08.515.
Horton, J., Macve, R., Struyven, G., 2004. Qualitative Research: Experiences in Using Semi-structured Interviews. *The real life guide to accounting research*. Elsevier, pp. 339–357.
Howes, M., Wortley, L., Potts, R., Dedekorkut-Howes, A., Serrao-Neumann, S., Davidson, J., Nunn, P., 2017. Environmental sustainability: a case of policy implementation failure? Sustainability 9 (2), 165.
Ika, L.A., 2012. Project management for development in Africa: why projects are failing and what can be done about it. Proj. Manag. J. 43 (4), 27–41.
Kapotwe, B., Tembo, G., 2021. An analysis of the factors affecting Zambia's GDP per capita. Am. J. Econ. 11 (1), 19–30.
Kesidou, S., Sovacool, B.K., 2019. Supply chain integration for low-carbon buildings: a critical interdisciplinary review. Renew. Sustain. Energy Rev. 113, 109274 https://doi.org/10.1016/j.rser.2019.109274.
Kotzé, L.J., du Plessis, A., 2020. Putting Africa on the stand. Environ. Law 50 (3), 615–663.
Lou, E.C.W., Lee, A., Welfle, A.J., Abdullahi, A.L., 2021. Testing the Nexus between C&D waste management strategies & GHG emission performances: the case of UK student accommodation refurbishment projects. J. Build. Eng. 34, 101812 https://doi.org/10.1016/j.jobe.2020.101812.
Lundgren, M.S., 2016. Energy and architectural consequences of Swedish building code. Smart Sustain. Built Environ. 5 (2), 125–142. https://doi.org/10.1108/SASBE-08-2015-0021.
Madter, N., Brookes, N.J., Bower, D.A., Hagan, G., 2012. Exploring project management continuing professional development in engineering construction. Construct. Manag. Econ. 30 (8), 639–651.
Magano, J., Silvius, G., e Silva, C.S., Leite, Â., 2021. The contribution of project management to a more sustainable society: exploring the perception of project managers. Proj. Leadership Soc. 2, 100020.
Marcott, S.A., Shakun, J.D., Clark, P.U., Mix, A.C., 2013. A reconstruction of regional and global temperature for the past 11,300 years. Science 339 (6124), 1198–1201.
Marnewick, C., 2017. Information system project's sustainability capability levels. Int. J. Proj. Manag. 35 (6), 1151–1166.
Mayda, J., 1984. Environmental legislation in developing countries: some parameters and constraints. Ecology LQ 12, 997.
Mubanga, R.O., Kwarteng, K., 2020. A comparative evaluation of the environmental impact assessment legislation of South Africa and Zambia. Environ. Impact Assess. Rev. 83, 106401.
Mulenga, C., 2019. Judicial mandate in safeguarding environmental rights from the adverse effects of mining activities in Zambia. Potchefstroom Electron. Law J. 22 (1), 1–33.
Murombo, T., 2015. Regulating energy in South Africa: enabling sustainable energy by integrating energy and environmental regulation. J. Energy Nat. Resour. Law 33 (4), 320–348.
Nkoana, E.M., 2018. Community acceptance challenges of renewable energy transition: a tale of two solar parks in Limpopo, South Africa. J. Energy South Afr. 29 (1), 34–40.
Oke, A., Aghimien, D., Aigbavboa, C., Musenga, C., 2019. Drivers of sustainable construction practices in the Zambian construction industry. Energy Proc. 158, 3246–3252. https://doi.org/10.1016/j.egypro.2019.01.995.
Onat, N.C., Kucukvar, M., 2020. Carbon footprint of construction industry: a global review and supply chain analysis. Renew. Sustain. Energy Rev. 124, 109783 https://doi.org/10.1016/j.rser.2020.109783.
Pauna, T., Lampela, H., Aaltonen, K., Kujala, J., 2021. Challenges for implementing collaborative practices in industrial engineering projects. Proj. Leadership Soc. 2, 100029.
Pretorius, O., Drewes, E., van Aswegen, M., Malan, G., 2021. A policy approach towards achieving regional economic resilience in developing countries: evidence from the SADC. Sustainability 13 (5), 2674.
Richardson, B.J., 2000. Environmental law in postcolonial societies: straddling the local-global institutional spectrum. Colo. J. Int'l Envtl. L. & Pol'y 11, 1.
Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., Jinks, C., 2018. Saturation in qualitative research: exploring its conceptualization and operationalization. Qual. Quantity 52 (4), 1893–1907.
Silvius, A., Schipper, R.P., 2014. Sustainability in project management: a literature review and impact analysis. Social Business 4 (1), 63–96.
Sishekanu, M., Katati, M., 2021. Subjectivity in the logic of Zambia's environmental impact assessments (EIA) process: the bedrock of controversial EIA approvals. Law Environ. Dev. J. 17 (0). Retrieved from. http://www.lead-journal.org/content/a1703.pdf.
Smith, B., 2018. Generalizability in qualitative research: misunderstandings, opportunities and recommendations for the sport and exercise sciences. Qualitative REs. Sport Exercise Health. 10 (1), 137–149.
Starks, H., Brown-Trinidad, S., 2007. Choose your method: a comparison of phenomenology, discourse analysis, and grounded theory. Qual. Health Res. 17 (10), 1372–1380.
Todorović, I., Komazec, S., Krivokapić, Đ., Krivokapić, D., 2018. Project management in the implementation of general data protection regulation (GDPR). Euro. Proj. Manage. J. 8 (1), 55–64.
Tokbolat, S., Karaca, F., Durdyev, S., Calay, R.K., 2019. Construction professionals' perspectives on drivers and barriers of sustainable construction. Environ. Dev. Sustain. 1 (18).
Wamsler, C., 2017. Stakeholder involvement in strategic adaptation planning: transdisciplinarity and co-production at stake? Environ. Sci. Pol. 75, 148–157. https://doi.org/10.1016/j.envsci.2017.03.016.
Wang, L., Toppinen, A., Juslin, H., 2014. Use of wood in green building: a study of expert perspectives from the UK. J. Clean. Prod. 65, 350–361. https://doi.org/10.1016/j.jclepro.2013.08.023.
Whitehead, D., Whitehead, L., 2016. Nursing and midwifery research: methods and appraisal for evidence-based practice. In: Sampling Data and Data Collection in Qualitative Research, pp. 111–126.
Whyte, J., Naderpajouh, N., Clegg, S., Matous, P., Pollack, J., Crawford, L., 2022. Project leadership: a research agenda for a changing world. Proj. Leadership Soc. 3, 100044.
Williams, M., Moser, T., 2019. The art of coding and thematic exploration in qualitative research. Int. Manage. Rev. 15 (1), 45–55.
Windapo, A.O., Goulding, J.S., 2015. Understanding the gap between green building practice and legislation requirements in South Africa. Smart Sustain. Built Environ. 4 (1), 67–96. https://doi.org/10.1108/SASBE-01-2014-0002.
Zahar, A., 2018. Implementation of the polluter pays principle in China. Rev. Euro. Compare. Int. Environ. Law 27 (3), 293–305.
Zulu, E., Zulu, S.L., Chabala, M., Kavishe, N., Chifunda, C., Musonda, I., 2022. Infrastructure design stage considerations for environmental sustainability in Zambia. J. Eng. Des. Technol. https://doi.org/10.1108/JEDT-12-2021-0742.