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Research Article

Evaluating the Integration of Environmental Impact Assessment and Construction Social Costs

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Abstract

Construction activities often give rise to significant social challenges, including noise, air pollution, and disruptions to daily routines, particularly in residential areas. These challenges are more severe in developing nations like Iraq, where weak building regulations fail to enforce measures that could reduce these effects, leading to elevated social costs. The inconsistent enforcement of regulations across regions further worsens the problem. This study examines the integration of environmental impact assessment with social construction costs. To achieve this, a combination of qualitative and quantitative methods was employed. The questionnaire focused on identifying the negative impacts of construction on the public and assessing the extent of these social costs across fifteen selected projects. Additionally, twenty-one voluntary participants were interviewed using semi-structured interviews. The framework developed in this research provides a valuable approach to considering social costs within environmental impact assessments, making it a crucial aspect of impact studies. Results from the questionnaire showed that, among 195 respondents, over 55% faced high noise and dust levels, 68% experienced road closures, 56% reported pedestrian disruptions, which were accompanied by a corresponding rise in public complaints, and 25% of projects were temporarily halted. However, construction sites generate numerous negative effects, with noise, dust, air pollution, and disruptions to pedestrian activities being the most significant concerns for nearby communities. Over the past five years, complaints about road closures, pollution, and damage to surrounding areas have notably increased. The framework introduced in this study bridges biophysical and social aspects of construction impacts, promoting sustainable planning and improving environmental assessment processes.

1. Introduction

A detailed review of the existing literature over the past 17 years highlights numerous definitions of social costs, particularly in the context of civil engineering projects [1-3].Allouche et al., [4] defined social costs as the expenses borne by contracting parties during the execution of construction projects. They further noted that costs incurred by third parties arise from exposure to issues like air pollution, noise, vibrations, traffic disruptions, and increased road accidents. Social costs tend to be especially significant in areas with high population density.

The success of any project partially relies on considering how its activities and structures impact the natural environment. The process of evaluating both the potential negative and positive effects of a proposed development during its design phase is known as the Environmental Impact Assessment (EIA) [5]. EIA is rooted in predicting the impacts of proposed projects on various aspects of the environment, including human, natural, economic, and social systems. As a result, it requires a multi-disciplinary approach and should ideally take place during the feasibility stage of a project [6]. The primary focus of EIA is to identify, predict, evaluate, and mitigate significant social and environmental effects early in the project planning process. According to the International Association for Impact Assessment [7], EIA ensures that decision-makers consider all potential impacts. It plays a critical role in integrating environmental considerations into development planning and promoting sustainable development [8]. In every growing society, construction activities, whether temporary or permanent, are essential for providing housing and supporting livelihoods, which are fundamental for sustaining dynamic communities [9, 10].

The growing demand for housing has significantly accelerated urbanization, resulting in a rapid increase in building construction. While this meets housing needs, it also contributes significantly to environmental degradation, primarily due to human activities associated with construction. Rubin and Davidson [11] define "environmental impact" as the consequences of human actions on the environment, encompassing interactions between various environmental factors [12]. The effects of construction activities are evident throughout the entire lifecycle of a building, from on-site construction to its operational phase and, eventually, its demolition. Although the construction phase is relatively brief compared to the operational lifespan of a building, its environmental impacts are both substantial and varied [13]. This highlights the growing importance of addressing the human and environmental consequences of construction projects. Despite its adverse environmental effects, construction plays a vital role in social and economic development, enhancing living standards and improving the overall quality of life [14].

To achieve sustainable development, the environment must be protected and its resources conserved. Dietz et al. [15] emphasize that failing to safeguard the environment would drastically limit the potential for long-term human progress and growth. Therefore, it is crucial to assess the environmental impact of construction activities. The Environmental Impact Assessment (EIA) plays a vital role in this process, contributing to the realization of the Sustainable Development Goals (SDGs) [16]. Many development activities have a significant impact on the environment and require careful management. Ignoring EIA, especially in extreme cases, can lead to serious and persistent challenges over time. For effective management, social and economic development must be aligned with the specific environmental context in which they occur [17].

Previous research has explored the environmental impacts of construction activities [18, 19]. Currently, the Environmental Protection Agency (EPA) oversees the evaluation of significant construction plans through a standardized process to ensure their sustainability before approving [16]. Construction activities in residential areas often have a negative impact on surrounding communities, causing issues such as noise pollution, air pollution, road closures, detours, damaged infrastructure, and a decline in the quality of life. Given the rapid growth of the construction industry, particularly in developing countries, where social costs are often overlooked, it is crucial to analyze the relationship between Environmental Impact Assessments (EIA) and construction social costs to promote more sustainable practices.

Since 2003, the initiation of numerous housing projects and substantial investments in infrastructure have contributed to the growth of the construction industry in Northern Iraq. This growth has amplified the significance of construction social costs, particularly in densely populated areas, highlighting the need to establish a clear connection between Environmental Impact Assessment (EIA) and construction social costs.

This research aims to evaluate the integration of environmental impact assessments (EIA) with the social costs associated with construction activities in Iraq. The study aims to understand the factors that influence social costs in the construction industry and examine their presence within a regional context. Additionally, it aims to investigate the relationship between Environmental Impact Assessments (EIAs) and social costs, developing a conceptual model that links EIA processes to the social costs associated with construction. This model could potentially guide stakeholders in making more informed decisions that consider both the environmental and social implications of construction projects.

2. Methodology

People often misunderstand research by merely gathering information, documenting facts, or conducting general inquiries. However, it is structured process involving collection, analysis, and interpretation of data to gain a deeper understanding of a phenomenon [20].

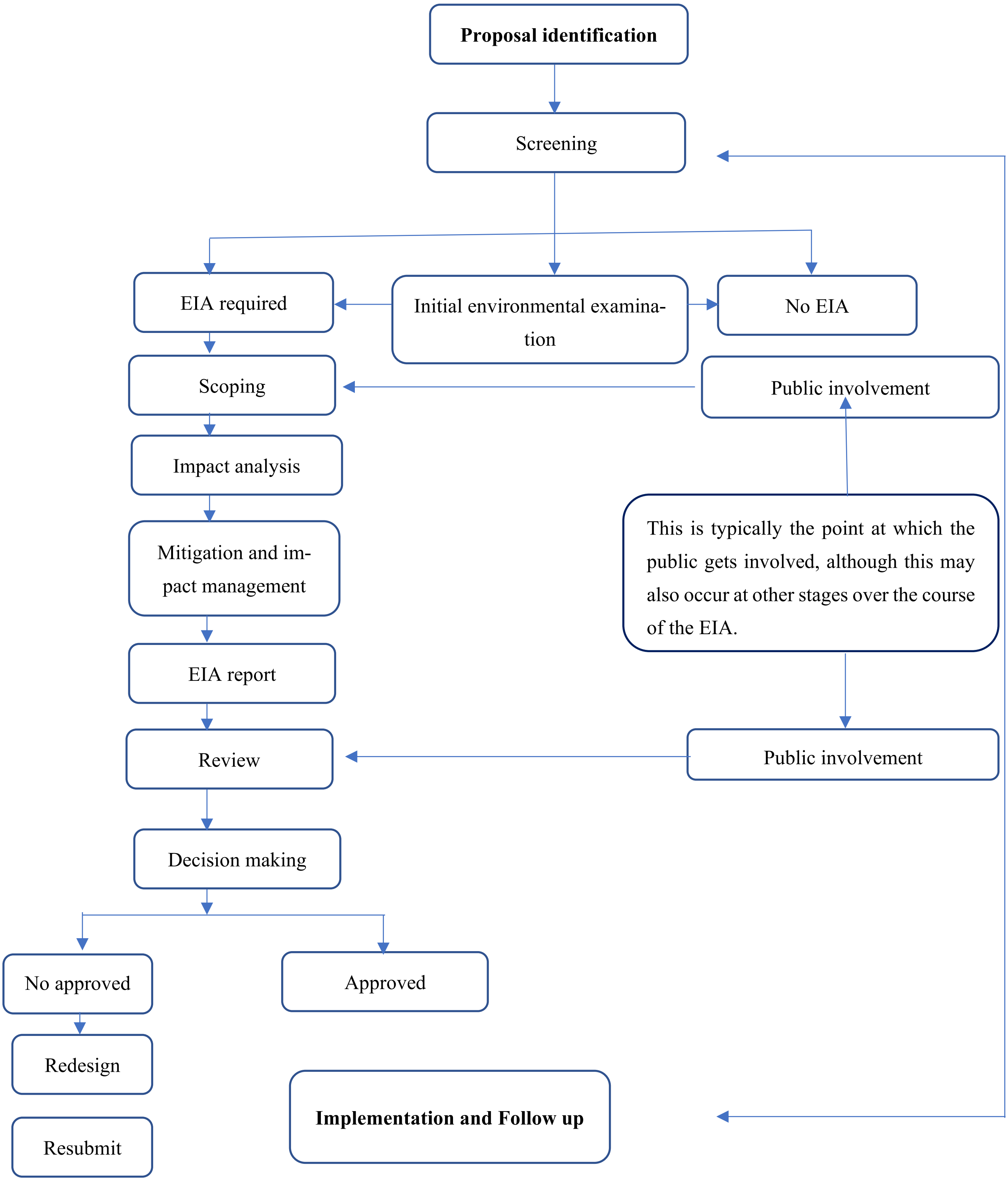

Figure 1. Generalized EIA Process Flow Chart

This process includes setting a clear objective, managing data systematically, and presenting findings in alignment with established frameworks and guidelines. Researchers can define the research topic, select an appropriate methodology, and determine potential conclusions from the results with the help of these frameworks and guidelines.

2.1. EIA Process Flow Chart

The Environmental Impact Assessment (EIA) process is a critical tool for planning and managing new construction projects or expansions. It comprises two primary stages: the Initial Environmental Examination (IEE) and the Environmental Impact Studies (EIA). The IEE acts as a preliminary assessment, identifying potential adverse effects of a proposed project and suggesting solutions that may eliminate the need for further analysis. If significant issues remain unresolved, the process moves to the detailed EIA phase, which conducts an in-depth evaluation of both positive and negative impacts. This phase integrates environmental considerations into the project design, adopting a multidisciplinary approach that addresses social, economic, and environmental factors. Conducted during the project's feasibility stage, this process ensures environmental concerns are systematically evaluated, minimizing adverse impacts from the outset. Figure 1. illustrates the sequential phases of the EIA, from screening to follow-up.

2.2. Overview of Construction Social Costs

The concept of construction social costs, rooted in economic theory for public policy, refers to both direct and indirect expenses associated with construction projects, as well as external impacts on third parties. These costs are particularly significant in densely populated areas, where disruptions such as noise, pollution, and traffic alterations are more pronounced. The magnitude of these costs varies depending on the project's location. Researchers emphasize the need to comprehensively assess these impacts to account for the full societal costs of construction, encompassing environmental, health, and economic aspects. Such evaluations enable stakeholders to address the broader implications for communities and the environment more effectively, as shown in Figure 2.

2.3. Study Site

The case study approach enables the researcher to analyze data within a specific context. Typically, case studies focus on a small and well-defined geographical area or a limited number of subjects. This method examines real-life phenomena by analyzing nature and relationships between various events within a specific setting. This research organizes case studies based on the screening classification of the project used in the Kurdistan Region of Iraq, as shown in Figure 3. The researcher selected fifteen projects as case studies in urban areas, all of which had Environmental Impact Assessment (EIA) reports and were in densely populated areas.

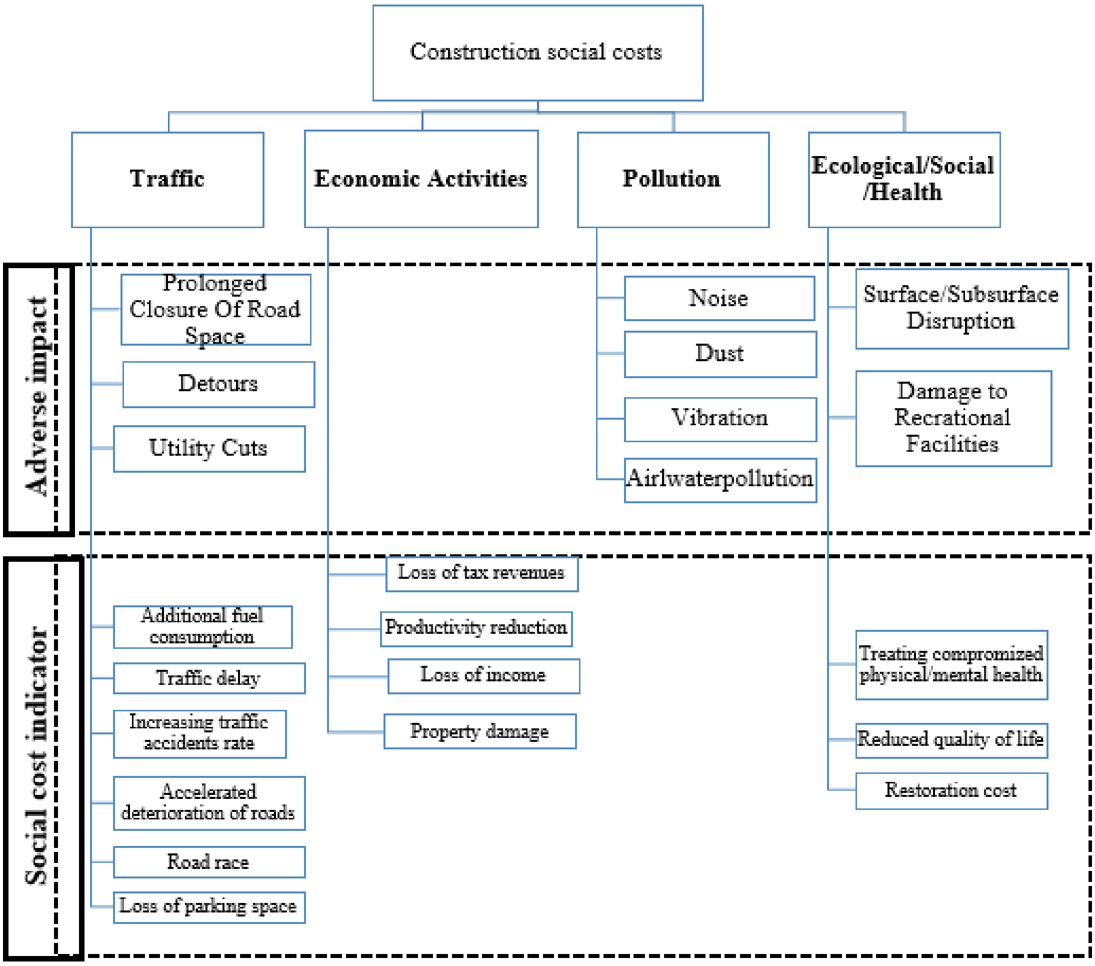

Figure 2. Potential construction adverse impacts that lead to the formation of social costs are re-drawn [21]

Figure 3. Study site: Kurdistan Region of Iraq [22]

2.4. Data Collection Tool

This research utilized both qualitative and quantitative methods. The primary tools for data collection included questionnaires, interviews, and case studies, with information gathered from the knowledge and experiences of individual participants. A mixed-method approach was employed because qualitative and quantitative methods provide unique benefits [23]. The qualitative approach enabled the researcher to explore in-depth insights, understand the reasons behind specific responses, and capture participants' opinions regarding their experiences [24]. Conversely, the quantitative approach, primarily using questionnaires, enabled efficient data collection on various topics within a shorter timeframe.

2.5. Participants

The participants in this survey comprise two distinct groups: the first group consists of stakeholders, including employers, contractors, engineers, and heads of EIA departments, from the Board of Environmental Protection and Improvement, the Municipality, and Construction Companies. The second group of participants are people who reside within a 100 m radius of the construction sites. The primary reason these individuals are of interest is that they possess knowledge relevant to the construction industry, which could enrich their studies.

2.6. Sample Size

Determining an appropriate sample size is a crucial aspect of any study, requiring careful consideration. The sample size must be large enough to ensure the data is representative, yet not so large that it becomes overly time-consuming for both the researcher and the participants. In this study, questionnaires were distributed directly to 215 male and female participants, of whom 195 completed and returned them on time. Following this, the researcher conducted semi-structured interviews with 21 voluntary participants. Additionally, interviews were held with heads of the Environmental Impact Assessment (EIA) Department in environmental directorates across various cities to gather insights into EIA practices. Furthermore, 15 case studies were selected, each representing projects that had EIA reports and were in the construction phase, ensuring relevance to the research objectives.

2.7. Instrument

The initial section of the questionnaire focused on gathering general demographic information about the participants, including their gender, age, level of education, and other relevant details. This demographic data provided insight into the backgrounds and perspectives of the respondents. The second section addressed the negative effects of construction activities on the public, aiming to assess the extent of construction social costs associated with the fifteen selected projects. Each question in this section offered five response options, ranging from "very low" to "very high," to measure the perceived level of impact. The third part consists of interviews with the heads of the EIA departments, while the final part involves interviews with stakeholders, including representatives from construction companies and environmental specialists.

2.8. Questionnaire Design and Data Collection.

2.8.1. Interviews

The researcher observed that interviews in English often prioritized sounding academic and altering responses rather than providing clear and specific answers to the questions. To address this issue, the researcher switched to conducting interviews in Kurdish. This change not only helped alleviate discomfort for participants who were not fluent in English but also boosted their confidence, emphasizing that the focus was on the content of their responses rather than the use of formal academic language.

2.9. Data Analysis

Once all the surveys were collected, the data was analyzed using Microsoft Excel and SPSS (Statistical Package for the Social Sciences), version 22.0. SPSS is a statistical software designed for analyzing quantitative data, offering advanced functionality for processing statistical information and generating accurate results in both graphical and descriptive formats [25-27]. The interview data, on the other hand, underwent content analysis, a method that allows researchers to study human behavior and actions indirectly by examining their communication [28]. The interview responses were thoroughly reviewed to identify meaningful segments that aligned with the research questions. These segments were then assigned descriptive codes for organization and interpretation. The interviews were analyzed, and their findings were further detailed in the data analysis chapter.

3. Result and Discussion

Since 1991, the construction sector has become a significant contributor to the economic growth of the Kurdistan region [29]. Between 2003 and 2013, the region experienced dynamic growth. The Economist Intelligence Unit stated that the region was highly ranked in terms of its macroeconomic environment, market opportunities, and direct investment policy. The year 2006 was particularly productive as foreign investors became allowed to become landowners and majority stakeholders in cooperative ventures [30]. In particular, the building and construction sector contributed significantly to this growth, with a contribution of ID 355 billion in 2006, up from ID 46.8 billion in 2004, and a substantial increase to ID 15,294.17 billion in 2007 [31]. The results section is organized into the following subsections.

3.1. Demography

This section provides generic information on the survey respondents. The aim is to provide background information on the respondent's gender, age, and level of education, and consequently determine the reliability of the information they provide. This questionnaire was distributed to male and female participants, as gender differences are not considered in this study. One hundred three females (52.8%) and 92 males (47.2%) completed the questionnaire, as shown in Figure 4.

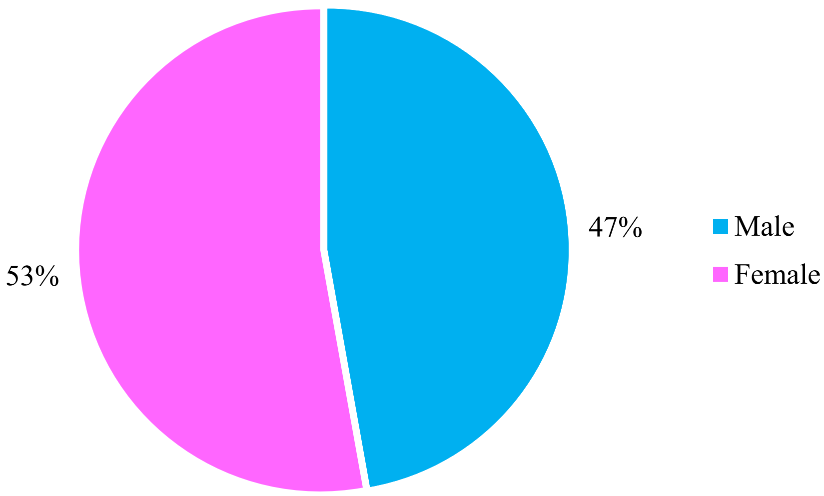

Figure 4. The participant's gender

Although this was not one of the research's primary concerns, it was necessary to ensure that all participants fell within a suitable age range and met the study requirements. As shown in Figure 5, 19% of the participants were between the ages of 18 and 27, 38% were between 28 and 37, 28% were between 38 and 47, 12% were between 48 and 57, and 3% were 58 years or older.

This data indicates that the majority of respondents have a high school education (44%) or a bachelor's degree (26%), suggesting a relatively diverse educational background. The presence of respondents with postgraduate qualifications (PhD, 1%; MSc, 3%) adds an academic perspective, while the 26% in the "others" category highlights potential variations in formal education levels. This distribution reflects a broad range of knowledge and experience among the participants, which may influence their perspectives on the survey topics as shown in Figure 6.

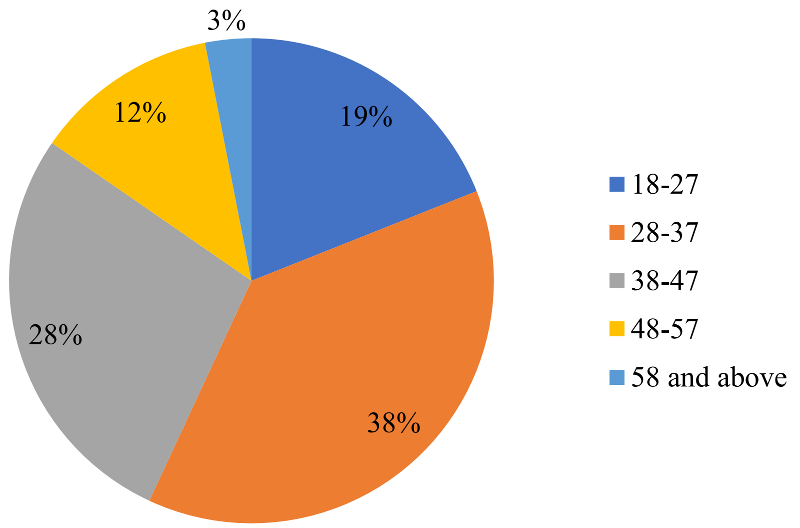

Figure 5. The participants' age.

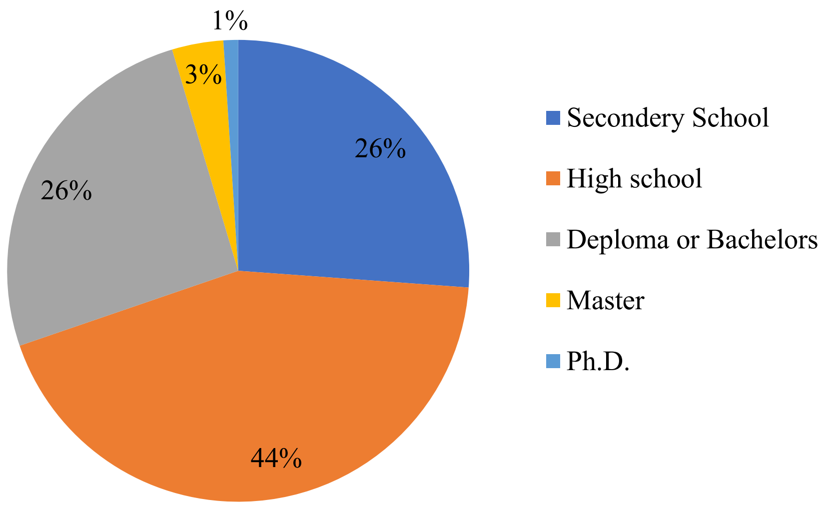

Figure 6. The participants' education level.

3.2. Quantifying Environmental Disruptions in Construction Sites

Table 1 categorizes environmental disruptions in construction sites by noise, dust, vibration, and air pollution levels into five categories: very low, low, medium, high, and very high. For noise levels, 16.4%

of respondents rated it very high, 39% as high, 30.3% as medium, 11.8% as low, and 2.1% as very low. This indicates that over 55% of the 195 participants experienced noise levels ranging from high to very high. Additionally, a total of 167 respondents reported noise levels ranging from medium to very high, highlighting its significant impact.

For dust, the distribution was 12.8% very high, 42.6% high, 33.3% medium, 9.7% low, and 1.5% very low. Notably, 87 participants perceived dust levels as high. Vibration rates were reported as follows: 8.2% very high, 26.2% high, 44.6% medium, 17.9% low, and 3.1% very low, with 77 out of 195 indicating vibration levels ranging from high to very high.

Table 1. Quantifying environmental disruptions in construction sites

Question	Valid	Noise		Dust		Vibration		Air pollution	
		Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Environmental Disruptions at Construction Sites	Very Low	4	2.1	3	1.5	6	3.1	4	2.1
	Low	23	11.8	19	9.7	35	17.9	28	14.4
	Medium	59	30.3	65	33.3	87	44.6	75	38.5
	High	76	39	83	42.6	51	26.2	63	32.3
	Very High	32	16.4	25	12.8	16	8.2	24	12.3

Air pollution levels were rated as follows: 12.3% very high, 32.3% high, 38.5% medium, 14.4% low, and 2.1% very low. Notably, 87 out of 194 respondents categorized it as high or very high. These findings highlight significant environmental concerns associated with construction activities. According to Table 1, noise and dust are the most disruptive environmental factors, with over 55% of respondents reporting high to very high exposure. Noise, identified as the primary concern, affected 55.4% of participants, while dust followed closely, impacting a majority of those surveyed. Though less severe, vibration (34.4%) and air pollution (44.6%) still pose notable environmental challenges. These results underscore the urgent need for enhanced mitigation strategies, particularly for noise and dust, to mitigate their adverse effects on surrounding communities and the environment.

3.3. Impacts of Construction Activities on Urban Infrastructure and Quality of Life

This section examines the effects of construction activities on urban infrastructure and community well-being. It covers road closures, detours, and utility cuts, highlighting their impact on transportation and essential services. Additionally, it assesses disruptions to residents' quality of life, surface conditions, facility damage, and pedestrian accessibility. Collectively, these aspects provide a comprehensive understanding of the social and infrastructural challenges construction activities pose.

3.3.1. What is the Rate of Road Closures Caused by the Execution of Construction Activities?

Figure 7 illustrates the responses regarding the frequency of road closures caused by construction activities. Among the 195 participants, 4% rated road closures as very high, 20% as high, and the largest group, 45%, perceived them as moderate. Conversely, 28% considered the closures to be low, and 5% rated them as very low. Overall, approximately 68% of respondents, equivalent to 132 participants, reported experiencing road closures at moderate to very high levels. This suggests that a substantial portion of the community is affected by road closures, though the extent of disruption varies. Factors such as individual travel routes, the efficiency of construction management, and the duration of closures may influence these perceptions. In summary, while most respondents experience some inconvenience due to road closures, the varying levels of impact underscore the need for improved construction planning and communication to minimize disruptions.

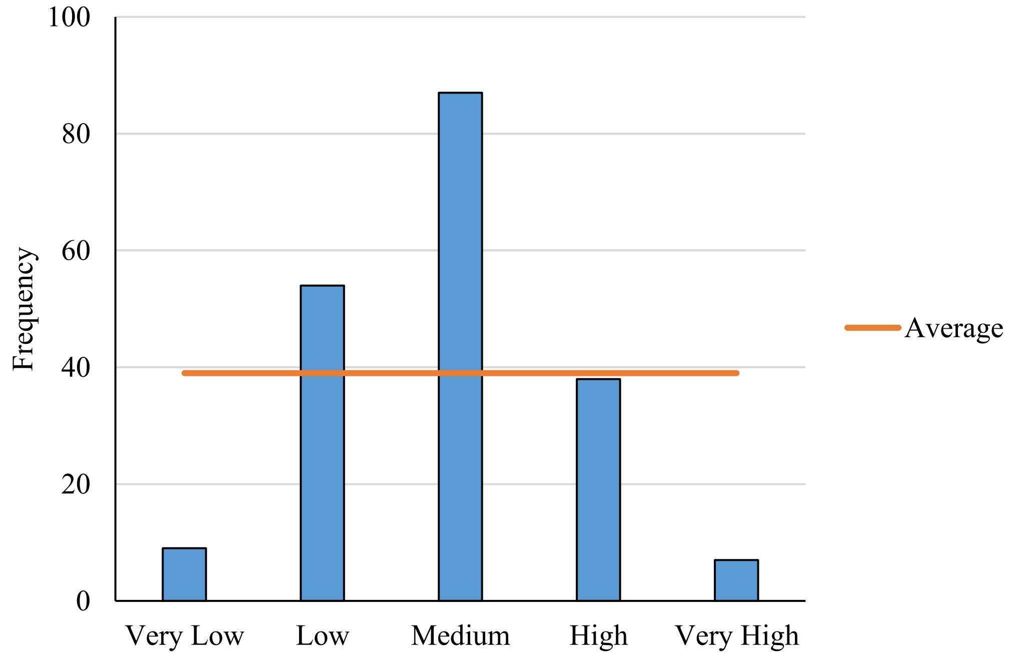

Figure 7. Impact of Construction on Road Closings

3.3.2. What is the Rate of Occurrence of Detours Due to the Execution of Construction Activities?

Figure 8 illustrates respondents' views on detours resulting from construction activities. A very small percentage (0.5%) rated detours as very high, while 20% reported them as frequent. The majority, 37%, perceived detours as moderate, followed by 35% who considered them low, and 8% who rated them as very low. Unlike other construction-related disruptions, only one respondent regarded detours as a major issue. Most participants (141 out of 195) identified detours as occurring at medium or low levels, suggesting that detours, although common in construction zones, are generally not viewed as significant disruptions. This indicates that current detour management strategies may be effective in minimizing inconvenience for the majority. The findings suggest that, although some room for improvement exists, the measures in place for handling detours during construction are mainly successful in mitigating their impact.

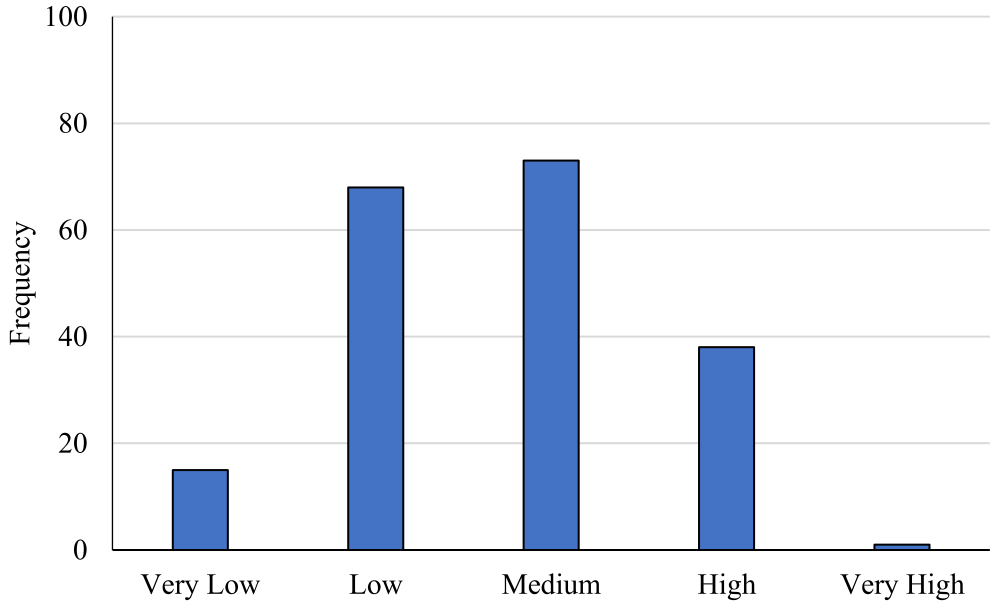

Figure 8. Frequency of Detours Due to Construction Activities

3.3.3. What is the Rate of Utility Cuts Caused by the Execution of Construction Activities?

The distribution of responses in Figure 9 indicates that the frequency of utility cuts due to construction activities varies among respondents. 42% (82 out of 195) reported experiencing utility cuts at a medium rate, making it the most common response. This is followed by 30% (58 respondents) who reported a low rate of utility cuts and 17% (34 respondents) who experienced a high rate of interruptions. The least affected group, 10% (19 respondents), rated utility cuts as very low, while no respondents reported experiencing a very high rate of utility disruptions.

From a statistical perspective, these findings suggest that while severe disruptions are rare, a notable 49% (high and medium combined) of respondents still encounter significant utility interruptions. The absence of "very high" responses suggests that extreme cases are uncommon; however, nearly half of the surveyed individuals still experience moderate to high levels of disturbance. This distribution underscores the need for enhanced planning and communication to mitigate the impact of utility disruptions, ensuring that affected residents and businesses receive timely and adequate support.

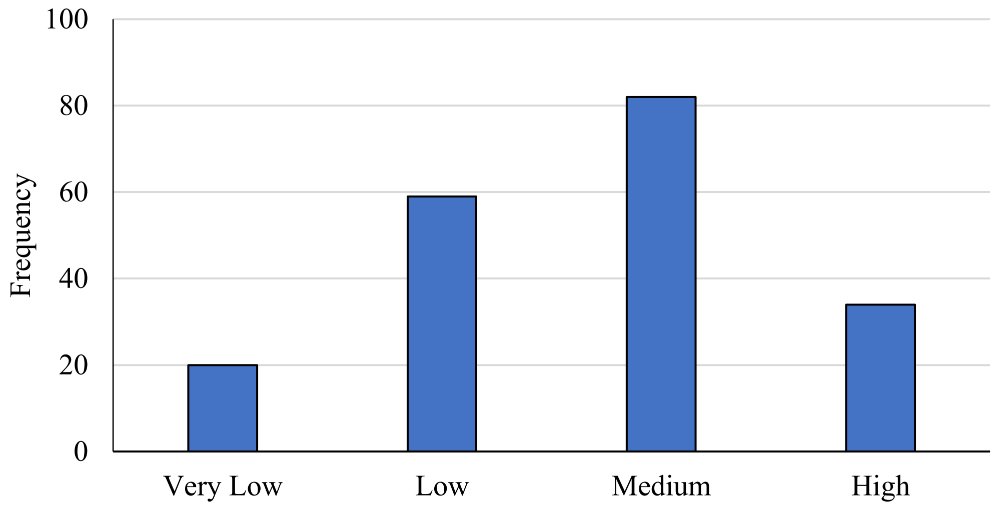

Figure 9. The rate of Utility cuts caused due to execution of the construction.

3.3.4. What is the Negative Effect Rate on Quality of Life Caused by the Execution of Construction Activities?

Figure 10 illustrates respondents' assessments of how construction activities impact their quality of life. A minority, 4%, reported a very high impact, while 25% experienced high negative effects, and the largest segment, 44%, felt only a medium impact. Another 25% reported low effects, and 3% reported very low impacts. Notably, 56 respondents, nearly a third of the total, reported high to very high negative impacts. This indicates a significant disparity in the experience of negative effects, suggesting the need for improved mitigation measures in construction planning to mitigate these impacts on the quality of life of residents. Such measures could include enhanced communication, improved scheduling, and stricter environmental controls.

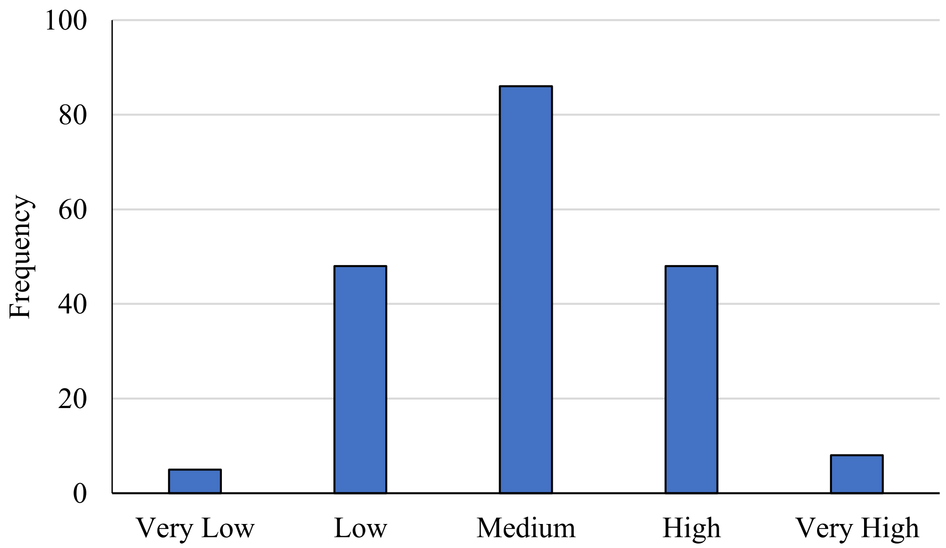

Figure 10. Impact of Construction on Quality of Life.

3.3.5. What is the Rate of Surface Disruption Caused by the Execution of Construction Activities?

Figure 11 shows the extent of surface disruptions caused by construction as perceived by respondents. A minority, 4%, rated the disruption as very high, while a significant 48% experienced it as high and 41% as medium. Only a small number reported low (7%) and very low (0.5%) impacts. Notably, 180 out of 195 respondents reported facing medium to very high levels of surface disruptions. This widespread reporting highlights the prevalent issue of surface disturbances during construction projects, suggesting a critical need for better management practices and mitigation strategies to reduce their impact on the community and environment.

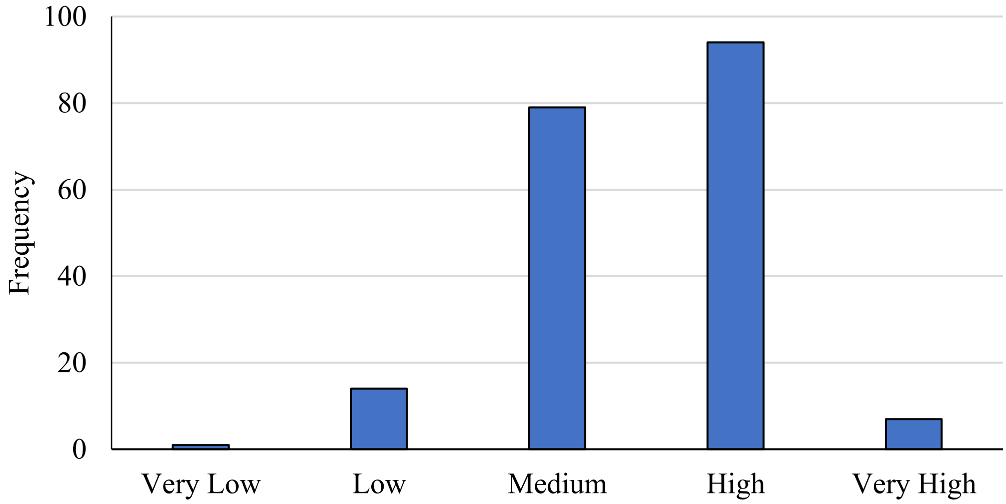

Figure 11. Incidence of Surface Disruptions Due to Construction

3.3.6. What is the Rate of Damaged Facilities Caused by the Execution of Construction Activities?

Figure 12 shows the reported impact of construction on facilities by respondents. A small segment (4%) viewed the damage as very high, while 20% saw it as high, and the majority (44%) rated it as medium. Meanwhile, 28% experienced low levels of damage and 5% very low. Notably, 131 out of 194 respondents observed medium to very high damage to facilities, indicating that most respondents notice significant impacts. This suggests a need for better protection measures and stricter monitoring during construction to minimize damage and improve safety standards for nearby infrastructures. Enhancing preventive strategies and community communication can effectively reduce these adverse effects.

3.3.7. Do the Construction Activities Cause Disruptions to Pedestrian Areas? If Yes, What is the Rate?

Figure 13 provides insights into the disruption of pedestrian activities caused by construction, showing that many respondents experienced noticeable interference. No participants reported a very low impact, while 7% indicated a very high level of disruption; nearly 49% rated it as high, 38% as medium, and only 6% as low. Notably, more than half of the respondents (103 out of 183) perceived pedestrian disruptions as high or very high, highlighting a substantial impact on pedestrian access and mobility near construction sites.

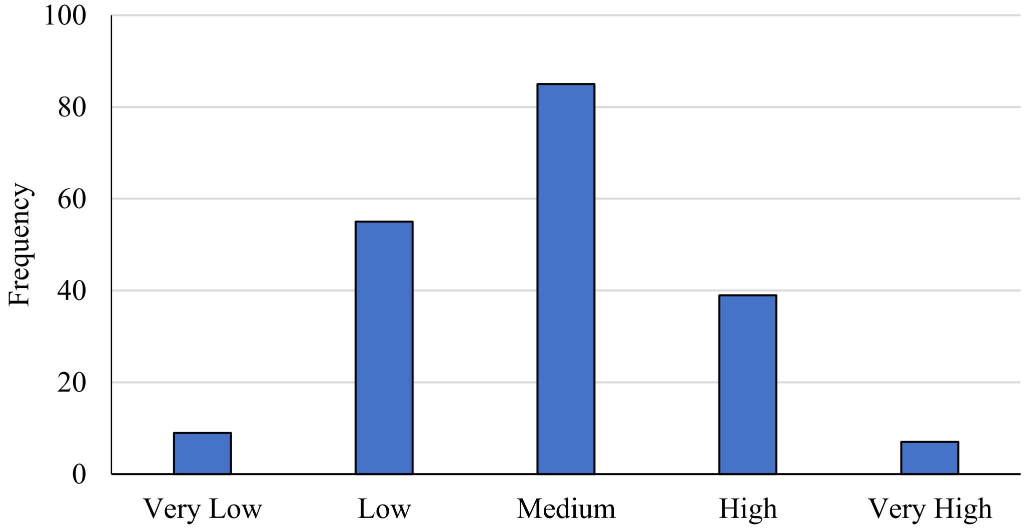

Figure 12. Rate of Facility Damage from Construction Activities.

These findings emphasize the need for effective planning and mitigation strategies to reduce pedestrian inconveniences. Key measures may include enhanced signage, clearly designated alternative pathways, and proactive community engagement to ensure smoother pedestrian movement. Implementing such strategies can minimize disruptions, improve safety, and enhance accessibility in construction zones.

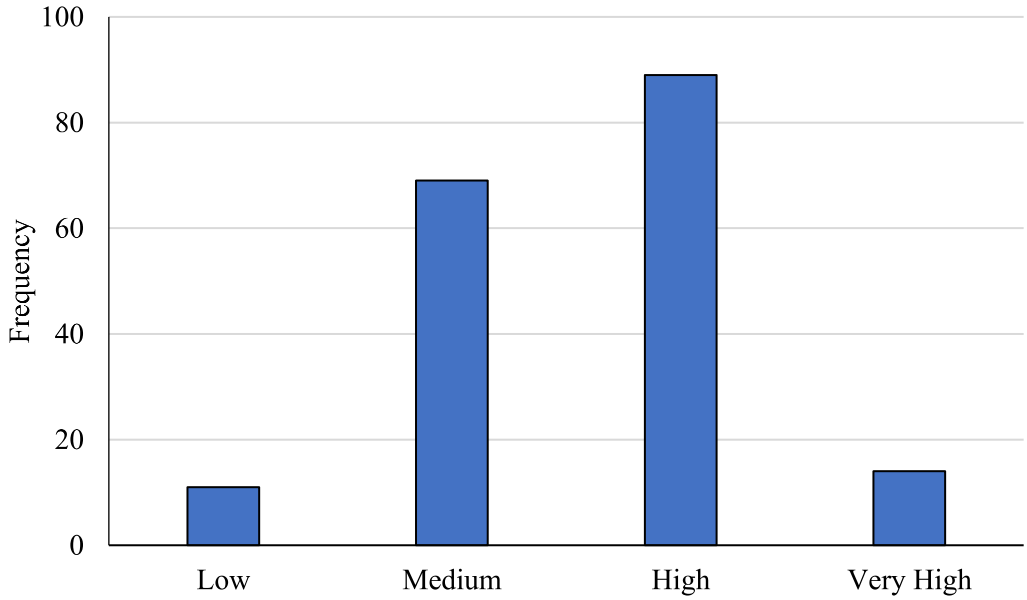

Figure 13. Disruption of Pedestrian Areas by Construction.

3.4. Analysis of Interviews

Participants in the interviews were categorized into three groups to provide a clearer understanding of their perspectives and knowledge regarding environmental impact assessments (EIA) and social construction costs. The first group included municipal employees responsible for handling construction complaints in the cities of Erbil, Sulaymaniyah, and Duhok. The second group consisted of the heads of the EIA departments within the environmental directorates of these cities. The final group consisted of managers from construction companies, site engineers, and environmental specialists from engineering bureaus, all of whom were experienced in preparing Environmental Impact Assessment (EIA) reports.

As shown in Figures 14, 14% of participants were government officials working in municipal roles in major cities, and another 14% were heads of EIA departments. Meanwhile, 33% of participants were environmental specialists from engineering bureaus, and 38% were managers and site engineers from construction companies. These participants were selected for specific reasons. Public complaints about construction projects are typically directed at the municipality, making municipal employees key players in addressing these concerns. The Directorate of Environment is the authority responsible for approving EIA reports, giving the heads of EIA departments a crucial role in project oversight. Lastly, environmentalists, contractors, and site engineers are directly involved as project stakeholders, making their input essential for understanding construction-related impacts.

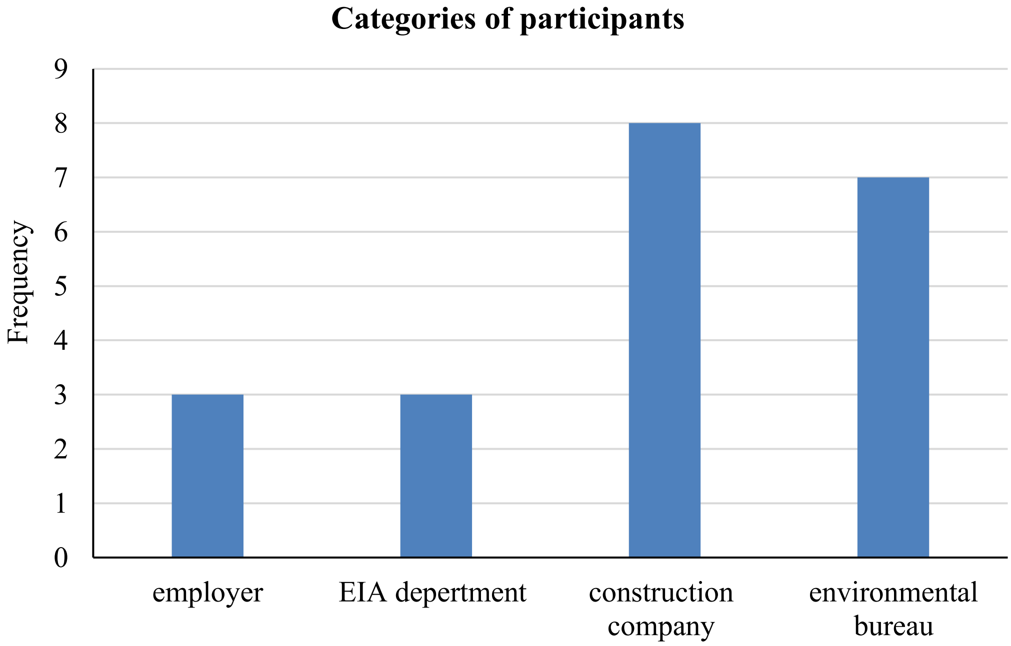

Figure 14. Categories of participants

3.4.1. Employer Interviews in Municipalities

3.4.1.1. Complaints From the Public During Construction.

Table 2 presents the number of complaints received from the public during the construction period. From 2012 to 2016, construction-related impacts varied significantly across Sulaymaniyah, Erbil, and Duhok, with Erbil consistently showing the highest levels of disruption. In terms of noise and vibration, Erbil peaked at 66 cases in 2015, while Sulaymaniyah followed closely with 64 in the same year. Duhok consistently reported lower figures, starting at 24 in 2012 and increasing to 41 in 2015 before slightly declining to 36 in 2016. For pollution, Sulaymaniyah experienced notable fluctuations, with a high of 62 in both 2012 and 2016, but dropped sharply to 36 in 2013. Erbil remained relatively stable, ranging from 47 in 2015 to a peak of 61 in 2012 and 2016, while Duhok consistently recorded the lowest levels, peaking at 43 in 2015. Traffic problems showed a significant upward trend across all cities, with Sulaymaniyah increasing from 39 in 2012 to 73 in 2016, Erbil rising from 43 to 69 over the same period, and Duhok experiencing a more modest increase from 32 to 47. Other impacts, such as surface disruptions and utility cuts, were most variable in Sulaymaniyah, ranging from a low of 6 in 2015 to 23 in 2016. In contrast, Erbil peaked at 21 in 2013 before stabilizing at 9 in 2016, while Duhok remained steady, with a slight peak at 17 in 2014. These trends highlight Erbil as the most impacted city, Duhok as the least, and Sulaymaniyah as highly variable. The steady rise in traffic-related issues across all cities highlights the growing need for improved urban planning and sustainable construction practices to mitigate their impact on urban communities.

Table 2. Several complaints came from the public during construction in Sulaymaniyah, Erbil, and Duhok city

Years	Noise &vibration			Pollution			Traffic problems			Others		
	Sulaymaniyah	Erbil	Duhok	Sulaymaniyah	Erbil	Duhok	Sulaymaniyah	Erbil	Duhok	Sulaymaniyah	Erbil	Duhok
2012	43	53	24	62	61	35	39	43	32	9	12	7
2013	32	44	35	36	54	22	48	63	19	12	21	11
2014	51	52	21	43	49	32	59	57	39	10	19	17
2015	64	66	41	39	47	43	61	59	27	6	15	9
2016	55	57	36	62	61	38	73	69	47	23	9	13

Figure 15 illustrates the total number of public complaints regarding construction activities in Sulaymaniyah, Erbil, and Duhok from 2012 to 2016, showing a steady increase across all three cities. Erbil consistently recorded the highest complaints, rising from 169 in 2012 to 195 in 2016, reflecting significant public disruption due to intense construction activities. Sulaymaniyah showed a sharp increase, surpassing Erbil in 2016 with 213 complaints, indicating an escalation of challenges in managing construction impacts. Duhok reported the lowest figures, increasing from 98 in 2012 to 134 in 2016, suggesting fewer disruptions but still reflecting growing public concern. This trend highlights the need for better urban planning and construction practices, particularly in Erbil and Sulaymaniyah, to address public dissatisfaction effectively.

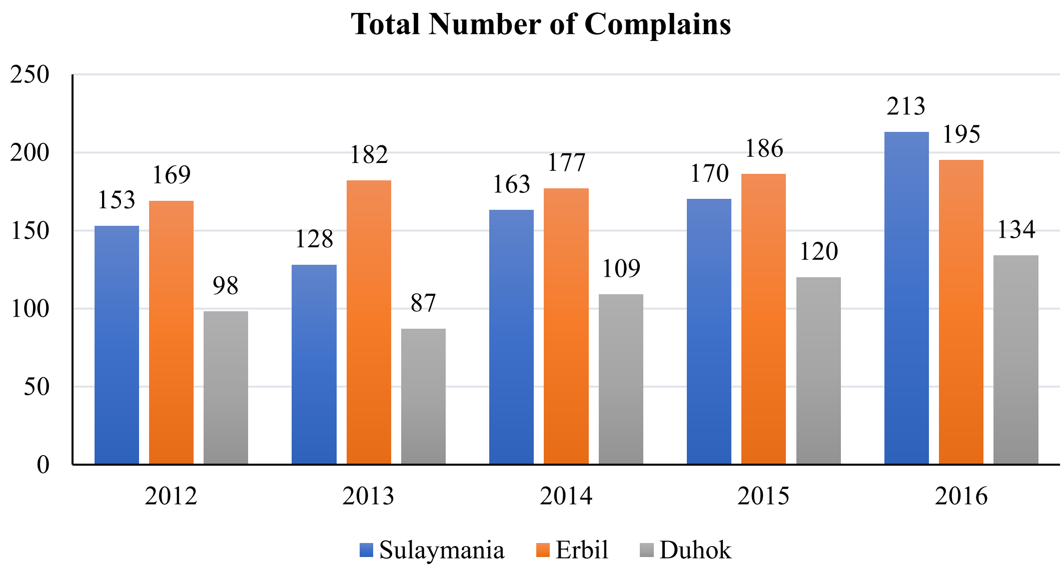

Figure 15. Total number of complaints received from the public during construction.

3.4.2. Interviews With the Head of EIA

A. At What Stage of the Project Should It Be Included in the EIA Report in the System?

The Environmental Impact Assessment Department stated that an EIA report is required at the planning permission stage when projects are proposed. They stated that, as the local authority, we will assess the report, and projects will commence construction after approval.

B. What Type of Project Needs an EIA Report?

The participants explained that the necessity and extent of an Environmental Impact Assessment (EIA) in Northern Iraq depends on the project's potential environmental sensitivity, which determines its classification. Projects are categorized into three groups: Category A includes projects with significant and unprecedented environmental impacts, such as factories, which must be located at least 15 km from populated areas and are generally easier to mitigate than Category B impacts. Category B comprises projects with potential adverse environmental effects, requiring an EIA report if the project exceeds 1,000 m² or involves multistory construction. Category C encompasses projects with minimal or no adverse environmental effects for which an EIA report is not required.

C. To Whom Is the Committee Giving a Proposal? How Do You Assess the Proposal?

The participants explained that each city's environmental directorate has an expert committee responsible for preparing and reviewing proposals. These committees are composed of environmentalists, chemists, and engineers. They emphasized that an EIA report must be prepared and approved by the committee before construction begins. The approval process is based on established criteria and procedures, with the EIA report required to detail mitigation measures and strategies to address negative impacts and resolve potential issues throughout the project's life cycle.

D. What Criteria Help You Assess?

The participants stated that the criteria for approving an Environmental Impact Assessment (EIA) report encompasses a wide range of factors, including buffers, air pollution, proximity, water pollution, geology and hydrology, waste disposal and raw materials, social and cultural impacts, land value, ecology, risks of toxic clouds, fire and explosions, and access.

E. Do You Consider the Social Issue in the EIA Report?

The authorities have a standard format with established criteria and procedures for the report; however, they still do not adequately consider social issues during construction in the EIA reports.

3.4.3. Stakeholders: Interview Construction Companies and Environmentalists.

A. Do you Receive Complaints from the Public During Construction?

Among the interviewees, 87% (including construction stakeholders) identified several social issues that arose during construction, such as road closures, noise, and disruptions affecting the surrounding areas. Additionally, 37% mentioned encountering public protests, particularly in densely populated areas where projects were underway. Furthermore, 25% reported that construction had to be temporarily halted for a few days due to complaints and social problems.

B. What Has Complained? Complaints About What?

All the interviewees (100%) acknowledged common complaints during construction, including road closures, noise, and pollution. Additionally, 50% highlighted concerns about vibrations and the timing of construction activities, such as working on weekends, operating machinery before 8:00 AM, and continuing work during nighttime hours.

C. What Criteria Do You Use to Accept a Report?

The participants said that the criteria used for approving the EIA report are the same as those criteria the authorities determined, including Buffers, Air Pollution, Proximity, Water Pollution, Geology/Hydrology, Waste Disposal/Row Materials, Social/Cultural, Land Value, Ecology, Geology/Hydrology, Risks of Toxic Clouds, Fire and Explosion, Waste Disposal/Row Materials, and Access.

4. Conclusion

This study examined the integration of environmental impact assessments (EIA) and social costs in construction projects, using survey data from 195 respondents in Sulaymaniyah, Iraq. The analysis highlighted significant environmental and social disruptions, including noise (55.4%), dust (55.4%), air pollution (44.6%), and vibrations (34.4%). Additionally, 68% of respondents reported moderate to severe road closures, while facility damage, surface disruptions, and pedestrian disturbances were also significant concerns.

Interviews with municipality officials and construction stakeholders confirmed that public complaints regarding construction activities, such as noise, road closures, and pollution, have increased over the years. 87% of stakeholders acknowledged social issues, and 25% reported temporary project halts due to public concerns. These findings emphasize the unavoidable social costs of construction, which must be managed effectively to minimize disturbances.

The study highlights the need for sustainable construction practices, improved project scheduling, and enhanced urban planning to mitigate the adverse impacts of construction on surrounding communities. The proposed framework bridges the gap between the biophysical and social dimensions of construction impacts, providing a practical tool for incorporating social costs into environmental impact assessments (EIAs). Future impact studies should adopt this framework to ensure balanced and sustainable development.

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