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Project
Master's in Energy and Environmental Engineering

Awareness and Sustainability in the Mineral Resources Sector

Pedro Santana Santos

Leiria, March 2025

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How a population already exposed to the exploitation of mineral resources understands sustainability?

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Master's work carried out under the guidance of Doctor Sandra Mourato, Professor at the Higher School of Technology and Management of the Polytechnic Institute of Leiria, and by Doctor Anabela Veiga, Professor at the Higher School of Technology and Management of the Polytechnic Institute of Leiria.

Leiria, March 2025

Dedicatory

Beatriz and Alice.

Sara and Carla.

To all those who worked hard and continue to work in the exploration of stone for Portuguese sidewalk in Alqueidão da Serra, particularly those who are part of my family, and especially my father, José Carlos (known as “Zé Carlos da Queimada”).

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Rosa dos Ventos

Não foi por acaso que o meu sangue que veio do Sul
se cruzou com o meu sangue que veio do Norte.
Não foi por acaso que o meu sangue que veio do Oriente
se cruzou com o meu sangue que veio do Ocidente.
Não foi por acaso nada do que sou agora.
Em mim se cruzaram finalmente todos os lados da terra.
A Natureza e o Tempo me valeram: séculos e séculos
ansiosos por este resultado um dia
e até hoje fui sempre futuro.
Faço hoje a idade do Antigo
e agora nasço novo como ao Princípio:
foi a Natureza que me guardou a semente
apesar das épocas e gerações.
Cheguei ao fim do fio da continuidade
e agora sou o que até ao fim fui desejo:
o Centro do Mundo já não é no meio da Terra
vai por onde anda a Rosa dos ventos
vai para onde ela vai
anda por onde ela anda.
Agora chego a cada instante pela primeira vez à vida
já não sou um caso pessoal
mas sim a própria pessoa.

(Almada Negreiros, 1893-1970)

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Resumo

O sector dos recursos minerais tem enfrentado um intenso escrutínio social e ambiental nos últimos anos. Sob o argumento da falta de informação e falta de transparência dos projetos, as populações dos territórios abrangidos por projetos do sector dos recursos minerais (minas e pedreiras) têm aumentado consistentemente o grau de contestação e objeção. Neste contexto, o Decreto-Lei n.º 30/2021, de 7 de maio, através de um procedimento de alterações parlamentares, passa a incluir a obrigação de realização de sessões públicas de esclarecimento dirigidas às populações dos territórios afetados por projetos no setor dos recursos minerais.

Este trabalho analisa o estado da arte a nível nacional e internacional, procurando identificar a natureza das disputas e/ou conflitos, como as empresas do sector extrativo enfrentam disputas e/ou conflitos, e o papel das sessões de sensibilização social e de informação pública no contexto de uma nova política de responsabilidade social e ambiental corporativa. Através da realização de um inquérito a uma população-alvo (que está exposta à exploração de recursos minerais), é feita uma análise social, económica e ambiental no contexto do sector dos recursos minerais, procurando compreender como é entendido o contexto da sustentabilidade neste nível.

É possível perceber que a principal força motriz das contestações e/ou conflitos são as questões socioambientais e Portugal é um dos países (se não o único) onde é obrigatória a realização de sessões públicas de informação dirigidas à população.

Através da realização de um trabalho de campo, com base na execução de um inquérito a uma população já exposta à exploração de recursos minerais, foi possível concluir que a população inquirida considera necessária a exploração de recursos minerais, afirmando simultaneamente que é possível a coexistência entre a atividade extrativa e a população, no contexto ambiental, social e económico. Foi ainda possível concluir que a população entende o setor dos recursos minerais dentro de um contexto geral de sustentabilidade, o que em termos gerais corresponde à definição de sustentabilidade que sustenta os SDGs das Nações Unidas. Foi ainda possível concluir que os representantes das instituições também concordam quanto à importância da existência de exploração de recursos minerais.

Paralelamente, verificou-se que a responsabilidade sobre a existência de pedreiras abandonadas na localidade foi atribuída pela população à empresa operadora. Concluiu-se também que existe um efeito NIMBY na população, estimado em $\approx 45 \pm 6\%$, sendo que as mulheres apresentam uma maior propensão para manifestar o efeito NIMBY.

Foi também possível fazer a apresentação de propostas de *Estudos de Sensibilidade Populacional*, *Sessões de Sensibilização e Esclarecimento Público* e *Estimativa do Efeito NIMBY nas Populações*.

Palavras-chave: consciência social, sustentabilidade, recursos minerais, conflitos, sessões de informação pública, efeito NIMBY.

Abstract

The mineral resources sector has faced intense social and environmental scrutiny in recent years. Under the argument of lack of information and lack of transparency of the projects, the populations of the territories covered by projects in the mineral resources sector (mines and quarries) have consistently increased the degree of contestation and objection. In this context, the Portuguese Decree-Law No. 30/2021 of 7 May, through the procedure of parliamentary amendments, now includes the obligation to hold public clarification sessions aimed at the populations of the territories affected by projects in the mineral resources sector.

This work reviews the state of the art at the national and international level, seeking to identify the nature of disputes and/or conflicts, how companies in the extractive sector face disputes and/or conflicts, and the role of social awareness and public information sessions in the context of a new corporate social and environmental responsibility policy. By carrying out a survey of a target population (which is exposed to the exploitation of mineral resources), a social, economic and environmental analysis is carried out in the context of the mineral resources sector, seeking to understand how the context of sustainability is understood at this level.

It is possible to perceive that the main driving force of contestation and/or conflicts are socio-environmental issues; and Portugal is one of the countries (if not the only one) where it is mandatory to hold public information sessions aimed at the population.

Through fieldwork, based on research with a population already exposed to the exploitation of mineral resources, it was possible to conclude that the population surveyed considers the exploration of mineral resources necessary, saying simultaneously that coexistence between quarrying and the population is possible, in the environmental, social and economic context. It was also possible to conclude that population understands the mineral resources sector within a general context of sustainability, which in general terms corresponds to the definition of sustainability that supports the United Nations SDGs. It was also possible to conclude that representatives of institutions also agree on the importance of the existence of exploration of mineral resources.

At the same time, it was verified that the responsibility about the existence of abandoned quarries in the locality was attributed by the population to the Operating company's. It was also concluded that there is a NIMBY effect in the population, estimated in $\approx 45 \pm 6\%$, and the women present a greater propensity to manifest the NIMBY effect.

It was also possible to support the presentation of proposals for *Population Sensitivity Studies*, *Awareness and Public Clarification Sessions* and *NIMBY effect estimation on populations.*

Keywords: social awareness, sustainability, mineral resources, conflicts, public information sessions, NIMBY effect

List of Figures

List of Tables

List of Equations

List of Acronyms

ACPMR – Cluster Portugal Mineral Resource Association(Acronym in Portuguese)

ASSIMAGRA – Portuguese Association of the Mineral Resources Industry(Acronym in Portuguese)

CSR – Corporate Social Responsibility

DGEG – General Directorate of Energy and Geology(Acronym in Portuguese)

EIA – Environmental Impact Studies(Acronym in Portuguese)

Ec – Economic dimension criterion

Ev – Environmental dimension criterion

EU – European Union

ICNF – Institute for Nature and Forest Conservation, I.P. (Acronym in Portuguese)

LNEG – National Laboratory of Energy and Geology(Acronym in Portuguese)

LGK – Level of Geological Knowledge

LULU – Local Unwanted Land Use

LUP – Land-Use Planning

MLC – Mining Life Cycle

MRoPI – Mineral Resources of Public Importance

MRoPIr –Ranking of Mineral Resources of Public Importance

MTC – Mining Transnational Corporations

NIMBY – Not In My Back Yard

BANANA – Build Absolutely Nothing At All Near Anybody

NGO – Non-Governmental Organizations

NPSAC – Natural Park of Serra de Aire e Candeeiros

PLC – Product Life Cycle

SDA – Social Development and Acceptance

SDG – Sustainable Development Goals of the United Nations

SLO – Social Operating License

UN – United Nations

Index

1. Introduction

1.1. Motivation for the project

Under the argument of lack of information and transparency, the populations of the territories covered by projects in the mineral resources sector (mines and quarries) have consistently increased the degree of contestation and objection.

The idea of this project had as its main motivational source the carrying out of work in a professional context which consisted of the development and application (execution) of clarification and awareness sessions for populations that would be covered and subject to prospecting and research work of mineral resources.

The clarification and awareness sessions were held under applicable legislation, resulting from the latest parliamentary amendments, and which would therefore be applied for the first time in Portugal on a broad basis.

Bearing in mind that the challenge being faced was highly complex (mainly due to the great population diversity that was evident through the first contacts with local entities), which required the need to study the thematic of awareness, within the scope of the mineral resources sector, which was complemented and experienced with each awareness session prioritizing the consolidation of knowledge under a "direct application in case" methodology, avoiding the "trial and error" methodology.

As previously mentioned, the great diversity of target populations proved to be a challenge and simultaneously an overcoming supplement. Different doubts and questions were added to each session, making demanding preparation necessary, which led to the development of tools and methodologies for contacting populations that proved capable of creating brief connections, which mostly involved demonstration of equipment and demystification of fears and myths that sometimes appeared to be installed. The fact that this was the first time that this legal obligation was applied in practice transformed the need into a challenge, and the challenge in constructing solutions that did not exist and which the present study aims to systematize and provide.

It is important to say that the sessions were carried out based on a work team made up of four elements, with academic and professional backgrounds in the areas of geology, hydrology, archeology and environment, in order to promote and design robust responses to general concerns, such as those reflected in various studies (Veldhuizena *et al*, 2022) (Lamas, 2023) (Mateus *et al*, 2017) (Mateus & Martins, 2020).

Therefore, the baselines and the driving force behind the motivation are a combination of legal requirements and social needs identified at a scientific level.

1.2. Framework

The mineral resources sector, and consequently the extractive industry, have in recent years been the target of social scrutiny and strong environmental contestation. Given the previous framework, the study and analysis of the Social Operating License (SLO) of companies in the sector and the respective social responsibility, as well as the environmental sustainability of exploration of mineral resources attest and confirm the pertinence and relevance of the theme under analysis in this work.

In Vintróa *et al.* (2014) it is stated that during the last two decades, society has become more concerned about environmental and social issues, and this has forced companies to redefine their strategy. The effects of public interest for a cleaner environment, the pressure of groups that have negatively targeted the mining sector at international levels, and the introduction of environmental legislation have contributed to raising overall environmental awareness. Civil society has started to claim more practical sustainability that endorses other practices than the simple publication of greenwashing reports and manuals. Some studies point to social factors and/or violation of human rights as reasons for the growing scrutiny and social conflict of projects and companies extracting mineral resources. According to Reisch (2023), there is a growing number of conflicts related to natural resource extraction, which can be seen as part of a general trend in Latin American countries. In many countries, people who are raising their voices against extractive projects are increasingly under threat, as several reports show. These reports ((Forst, 2018), (Defenders, 2020), (Witness, 2021)) highlight that restrictions on the operational space of human rights defenders are particularly severe in the extractive and natural resource sectors. Still, according to Reisch (2023), land and environmental defenders are part of the larger group of human rights defenders, which comprises "people who, individually or with others, act to promote or protect human rights peacefully". Land and environmental defenders, specifically, are active in areas such as mining and resource extraction, agribusiness, water resources and dams building, forestry, poaching, fishing, wind energy, or land grabbing.

According to Veldhuizena *et al.* (2022), in a world where we are fast approaching climate and biodiversity tipping points, a widening range of stakeholders are demanding a say in the way things are done. Nevertheless, companies conducting exploration, extraction and processing operations are falling short of societal expectations and of successfully ameliorating their negative impacts. Their approaches to Corporate Social Responsibility (CSR), intended to ensure that value is created for a wide range of stakeholders, not just those with a financial stake in the enterprise, can be reactive, ill-informed, short-term and superficial. This leads to controversy and discord, as extractive operations continue to have deleterious impacts on the wellbeing and quality of life of local and global communities. It also has consequences for perceptions regarding the legitimacy of companies in the sector and whether 'permission' is granted so they can continue their operations, in specific SLO.

In Lamas (2023) it is mentioned that mining corporations can be seen as engines of several forms of dispossession and violence in the lives of the affected populations. This ample spectrum of violence includes but is not limited to – failure to follow and respect labor laws

and commitments; degradation of the environment; forced resettlement; repression against any kind of protest, often enforced by police; or the naturalization of dynamics of oppression through unfulfilled promises and CSR. The study elaborated by Vintróa *et al.* (2014), shows that for mineral resource extraction companies, the core motivations to apply for an environmental system are mainly linked to image and reputation in 85% of the companies. Sustainability, social responsibility and a clean company hallmark are the principal motives. This high percentage could be attributed to the fact that mining has traditionally been considered a dangerous activity due to its adverse environmental and social impacts (severe land disturbance, off-site impacts, community displacement, and health and safety problems).

For Mateus *et al.* (2020), mining conflicts are increasing in number and intensity worldwide, causing additional difficulties to the supply of minerals needed to sustain the ongoing technological evolution. Concerning CSR, Mateus *et al.* (2020) refers that originally the purpose of CSR actions was to provide some kind of social advantage beyond the direct interests of the company and the compliance of its duties imposed by law, which might not necessarily include specific concerns raised by local communities, or the public in general, on ethical or environmental issues.

So, as mentioned by Dubiński (2013), the sustainable development of mining mineral resources is a major challenge for today's global world, addressed to mining companies, people of science associated with mining and many other institutions and organizations. They should provide sustainable and socially acceptable development and continued operation of mining, invariably needed by people, to provide necessary mineral resources.

Taking into account what was described above, the state of the art will then be reviewed at national and international levels, seeking to identify the nature of disputes and/or conflicts, which are: i) the perception of no benefit by the local communities; ii) defense of the environment and natural values; iii) how companies in the extractive sector face disputes and/or conflicts, and the role of social awareness and public information sessions in the context of a new corporate social and environmental responsibility policy. In this context, there are some paths to be explored that can help resolve conflicts, namely: i) development and application of multi-criteria land-use planning methodologies; ii) introduction of the Social Development and Acceptance dimension (SDA); iii) and/or the promotion and implementation of social awareness and public information sessions.

1.3. Objectives

This study has three main objectives, namely:

i. the analysis of the compatibility between environmental sustainability, economic sustainability of extraction and social sustainability of the community surrounding industries in the mineral resources sector;
ii. development of field work collect opinion data from a population exposed to the exploitation of mineral resources, using a survey, in order to understand the perspective and vision that this population has about sustainable development in its different aspects (social, economic and environmental), to which is added a historical perspective on the mineral resources sector; and
iii. systematize a model of preparation and assistance for clarification and awareness sessions among the population in the context of mineral resources

At the same time, it is possible to identify some secondary objectives, such as:

- importance of raising awareness, clarification and even training populations, in the way of doing things, the way of evaluating, or even the meaning of what is intended and should be communicated. In this context, it is significant to qualitatively interpret and validate the relevance of the survey tool as an awareness-raising instrument and not just as an information-gathering instrument;
- what understanding does the extractive industry and entities with local social responsibility have about the sustainability of the sector;
- analyze possible aspects and/or symptoms of the NIMBY phenomenon in the population, proposing a methodology for its quantification;
- understand the role of the mineral resources sector (quarries), in the context of the United Nations Sustainable Development Goals (SDG).

2. Literature Review

2.1. "Not In My Back Yard (NIMBY)" phenomenon

Closely linked to energy production projects (Horst, 2007) and waste management (Lu, 2023) (Hu & Han, 2023), the "Not In My Back Yard" (NIMBY) phenomenon has spread and expanded to other types of projects and economic sectors, such as the mining resources sector and its prospecting, research or exploration, which is in part the object of study and analysis of this project.

The NIMBY concept was proposed by O'Hare (1977) to describe the resistance of local residents toward locally sited projects. Those projects were also known as "Local Unwanted Land Use" (LULU) or "Build Absolutely Nothing at All Near Anybody" (BANANA).

As mentioned in Lu (2023), happens when people are reluctant to have projects with negative externalities, such as waste management facilities, equitable and affordable housing, and wind farms, to be located near where they live. However, as it says Horst (2007), the term NIMBY is often used by proponents of the facility as ''a succinct way of discrediting project opponents''.

In this context, it is relevant to mention that in this matter there are authors who state that the NIMBY effect is a myth (Wolsink, 2000), while others propose to quantify and characterize it (Warren *et al*, 2005).

For Johnson (2013) and Kraft & Clary (1991), NIMBY arises for various reasons, including misinformation, distrust of authority, risk aversion, localized views, or even emotional reactions. Above all, ineffective governance failing to engage with the public can result in negative public reactions to the proposed projects. When the public is excluded, information transparency may be kept low, and the regulations may be lax (Lu, 2023).

Some studies showed that the social impact of NIMBYism increases with economic growth (Gu, 2016). As mentioned in Hu & Han (2023), since the 1990s, researchers have pointed out that improved education and the growing number of middle-class house owners might cause more NIMBYism. Residents started to realize the potential harm and they were well aware of their rights to oppose unwanted development.

As mentioned previously, the NIMBY phenomenon is quite well identified and linked to projects in the energy and waste management areas. Taking into account what was mentioned by Johnson (2013) and Kraft & Clary (1991) regarding the reasons why the phenomenon grows and establishes itself in a population, it is expected that these same reasons will occur in projects in other sectors of activity.

In this context, for the object of study and analysis of this project, it is important to understand, study and analyze possible NIMBY phenomena in the mineral resources sector.

2.2. Origins of socio-environmental conflicts

The operation of companies in the mineral resources sector (exploitation of mineral resources) has been debated and discussed in recent years, specifically about socio-environmental issues related to their operation and respective impact on the local communities.

It is within this scope that, in the context of a CSR policy, as mentioned in Veldhuizena *et al.* (2022) the SLO is one of the most important 'assets' that an enterprise can possess. Veldhuizena *et al.* (2022) says that the notions of CSR and SLO are commonly seen as intertwined, with different approaches to CSR considering their utility for obtaining SLO. On the other hand, SLO has emerged as a self-sufficient field of knowledge, within the literature principally contextualized by the mining industry.

However, according to Veldhuizena *et al.* (2022), the fragility of SLO has been growing, driven by a wide variety of interrelated factors which shape corporate perceptions of stakeholders' demands and influence their responses. One of the conclusions was the introduction of a new perspective for understanding and evaluating approaches to satisfying stakeholder demands in the mineral resources industry. This is important for ensuring that communities are not harmed by and derive benefits from resource extraction activities (mines and/or quarries). In addition, it is also important to perceive and understand the basic pillars that support and/or encourage sustainable development in the mineral resources sector. According to Dubiński (2013), the implementation of sustainable development means the integration of activities in the following three key areas, namely:

- technical and economic activities ensuring economic growth;
- ecological, ensuring the protection of natural resources and the environment;
- social, meaning care for the employee at the workplace and community development in the area of the mining environment.

In Dubiński (2013) it is emphasized that sustainable development is, in any case, an ongoing process, and not a temporary undertaking. It has clearly defined goals and means of achieving them, in all of the above-mentioned key areas.

Among other conclusions in Dubiński (2013), one is that modern mining (which usually negatively affects the environment, and also causes more or less discomfort for people living in mining areas or their immediate surroundings), must have public acceptance for its activities. Thus, the real concern about the environment is becoming an important factor in obtaining it.

Is still concluded in Dubiński (2013) that the complexity of the problems for the sustainable development of mining and the resulting diversity on a global scale point to the need for the continuous exchange of experience in the field of knowledge, methods, technologies, and other solutions. They should provide sustainable and socially acceptable development and continued operation of mining, invariably needed by people, to provide necessary mineral resources.

An example of reality in South American countries (Latin America) identifies companies also presents in other geographical locations, such as Canada and Mozambique, that is, embody Mining Transnational Corporations (MTCs) reality.

Specifically, as mentioned in Lamas (2023), international regulations concerning MTCs are mainly voluntary. In practice, this results in corporations operating mostly according to the laws of host states. Their responsibilities are not clearly defined, particularly in the case of human rights violations. Other relevant works (Börzel & Hönke, 2010) (Cheshire, 2010), specifically focus on how extractive corporations, mainly in Africa and Latin America, take on these roles as providers of collective goods and social welfare through CSR actions and community investment. The involvement of the corporation with activities that count as a "government role" can exist as a consequence of international standards, national regulations, agreements with the government, corporate policy, and/or as an answer to the demands of the population.

In the case study presented by Lamas (2023), the empirical data discussed point to similarities among the difference's characteristic of Vale's[1] involvement in mining megaprojects in Brazil, Canada, and Mozambique. Empirical data from Vale's presence in Mozambique, Canada and Brazil shows that there are important differences in the exercise of everyday governance by the corporation, molded also by the contours of the political economy arrangements in each context. Although it is clearly more intensive in the cases of Mozambique and Brazil, Vale also exercises a "government role"[2] in the case of Canada.

In Lamas (2023) is possible to conclude that the ultimate consequence of all this is the emergence of an idea that there is a governance gap. In questioning the way that the processes of the market and the mining companies have come to be inserted into their lives and territories, socio-environmental conflicts emerge as a vehicle of critique. These conflicts become the battlefields for the adoption of a critical posture and counter-proposals from the affected communities. The search for socio-environmental justice associated with this kind of conflict means that these conflicts have the potential to create positive change.

According to Reisch (2023), civil society's operational space consists in "the possibilities and capacities to function as an organization and to perform the key tasks of the organization". In recent years, scholars have been observing with concern developments on a global level that increasingly restrict the operational space of activists and civil society organizations. This phenomenon is called shrinking or closing (civic) spaces. To describe and recognize corresponding patterns of restrictions, (Borgh & Terwindt, 2014) develop a categorization named "Actions and policies that restrict political space" which lists five sets of policies, laws, and measures that Non-Governmental Organizations (NGO) can experience as pressure. Building on this, Reisch (2023) suggests four differentiated categories which help to better identify the forms in which subtle restrictions occur. Those

[1] Vale S.A. is a brazilian multinational mining company
[2] that means, the provision of services and the exercise of functions that would traditionally be performed by the government (Graz & Nolke, 2012)

four categories are (1) the relationship between land and environmental defenders, state, and companies, (2) existing spaces, (3) access to information, and (4) narratives.

In 2009, the Indigenous and Tribal Peoples Convention No. 169 (ILO 169 for short) adopted by the International Labor Organization (1989) entered into force in Chile. It guarantees indigenous peoples' participation in administrative and legislative decisions that may affect them (Article 7), especially before the approval of projects for the exploration and extraction of mineral resources (Article 15). However, the results are not binding under Chilean law and therefore often have little effect.

Reisch (2023) says that, although communities and companies have accepted each other's existence for decades, tensions and conflicts remain. In the Salar de Atacama, and especially between the *Atacameños* people and the companies, "a circle of relationships marked by conflict can open up space for agreements on local development or for a series of actions of assistentialism and then re-escalate tensions and problems" (Gundermann & Göbel, 2018).

It is important to mention that, according to Reisch (2023) local citizens often perceive the underlying processes as non-transparent, and information is sometimes difficult or impossible to obtain. Affected communities report that explorations and test drilling are carried out in a rather clandestine manner. They are not informed at all or only very irregularly. Sometimes they become aware of explorations themselves when strangers or unknown cars are on the territory. NGO's also make it their task to process information that is not publicly available or in some cases not even collected.

One of the most relevant conclusions of Reisch (2023) is that the lack of "good faith" on the part of authorities and companies in public participation processes often turns them into so-called fake spaces.

Regarding Europe, Vintróa *et al.* (2014) research, which focuses on the environmental sustainability of the mining sector based on examples of Catalan companies, it is noted that it is no longer just large companies that are under public scrutiny. The study shows that medium and small companies have also undertaken various environmentally responsible actions. The study results show that companies have committed themselves to environmental and sustainable issues. Around 75% of the companies have implemented at least three different environmentally sustainable practices and 12% have applied six or more.

Companies claim to understand the effects of their activities on the environment, and they are aware of the need to implement sustainable working criteria in their business policies. Vintróa *et al.* (2014) refers that the enterprises that target sustainable aware consumers can take advantage of being the first to offer less contaminated products, and therefore, these may facilitate the entrance into new markets. Recent trends show that social and environmental reporting is becoming part of mainstream business, with a significant increase in the number of companies issuing reports of this nature. One fundamental aspect to include in these reports is the measurement of the environmental behavior of the company.

Some of the conclusions in Vintróa *et al.* (2014) state that most companies understand the negative impacts of their activities on the environment, and they implement different practices. Also concludes that social responsibility and a clean company hallmark are the principal motives to apply for these practices since mining activities are commonly considered dangerous activities with environmental effects on the air, water, and soil. Finally, concludes that several environmentally friendly practices are possible in mining activities, even in small companies. These practices may improve the image of mining companies and help them accomplish a better environmental balance.

2.3. Possible Solutions

2.3.1. General background

In Gugerell *et al.* (2019) territorial governance is identified as being gaining increasing importance in policy debates, and closely related to the normative notions of territorial cohesion and spatial planning. From a policy perspective territorial governance is crucial to achieve territorial cohesion, which is a core component of the territorial agenda of the European Union (EU) 2020. The EU (2019) advocates the importance of area-based, territorially sensitive and integrated approaches of policy development and to improve synergies between different policy actions.

As mentioned in Gugerell *et al.* (2019) mineral resources are bound to their locality, hence they (can) play an important role for local and regional development that might support territorial cohesion and economic development.

In a broader view of the mineral resources sector, Mateus & Martins (2020) analyzes at the European level the balance between social acceptance and secure supply. The analysis carried out starts from the basis that several recent signs consistently indicate the need for changes in the way mineral raw materials are used and their (primary and secondary) sources are managed. These signs include widespread concerns about material waste in modern societies and social inequities fostered by poorly regulated globalization agendas, in addition to apprehensions related to environmental impacts triggered by fossil fuel combustion and heavy industrial activities. Accordingly, some expectations exist about the reorganization of the current raw material supply chains to better deal with these signs, which also represent the main grounds of societal reluctance regarding mining and mineral processing activities.

In Mateus & Martins (2020) we can read that all the roadmaps oriented to eco-efficient and low-Carbon intensity economies stimulate the reliance on a large number of minerals and metals whose increasing demand cannot be fulfilled based on reuse, recycling, and/or substitution practices. This means that material inputs derived from primary resources will always be necessary to balance the demand/supply ratio, filling the gaps of material stocks and flows in the economy that are not provided by secondary sources, even when suitably managed. In fact, the expected growth rates for demography and gross *per capita* incomes will boost spreads in the consumption of conventional raw materials.

In this sense, Mateus & Martins (2020) argues that an open and systematically updated database about ongoing or planned industrial activities should be created by competent authorities and duly disclosed to the public in general, stimulating further communication/discussion frameworks with a wide spectrum of stakeholders. This will minimize the polarization of public opinion caused by biased interpretations or conjectures and allow to anticipate potential conflicts at local scales.

Bearing in mind that the need for minerals and metals will remain high in the coming decades despite recent efforts to dematerialize the economy and increase the recycling rates of discarded end-of-life products and residues resulting from mineral exploitation and processing activities, Graedel *et al* (2015) and McCarthy & Börkey (2018) argues also that incorporation of recycled materials into smelting/refining and fabrication activities, the growth of remanufacturing rates, the widening of obsolescence cycles of products, and incentives for consumption reduction are major guidelines towards sustainable management of material flows in the economy.

All these are included in, or directly related to, the Product Life Cycle (PLC), but their contributions do not exclude or reduce the importance of inputs from the Mining Life Cycle (MLC). The major challenge is the continuous search for the adequate material mix supplied by primary and secondary sources that can support the current and foreseen needs. It is about this general and integrated context of PLC and MLC; dematerialization, delocalization, and deindustrialization of economies and the implications to the mineral raw material industry; the relevance of regional inputs to global mineral-based supply chains; regional-based MLC-related and PLC-related activities; MLC-related and PLC-related activities in the EU; and the need of a robust mineral-based value chain in the EU; and bearing in mind the difficulties in accessing resources identified in Vintróa *et al* (2014) and Borgh & Terwindt (2014).

Structuring of a mineral-based value chain in the EU, supported by strong domestic integration of MLC and PLC activities, requires levels of social commitment quite different from those prevailing nowadays in the european society, refers Mateus & Martins (2020). Also says that public opinion about these economic activities will have to change, particularly in what concerns mining, shifting constructively the prerogatives conferred by the SLO.

In Johnston-Billings *et al* (2019) point of view, narratives about the use of mineral resources and opinions of people who have no direct interaction with companies are becoming major determinants of future developments of MLC/PLC-related activities in the EU and worldwide. That's why getting a social licence to operate can no longer be seen as an interpersonal relationship–building process involving just the communities close to the industrial facility and/or key stakeholders.

Various studies, as Reisch (2023), Defenders (2020), Veldhuizena *et al* (2022) or Lamas (2023) show that conflicts occur where a significant number of local mining-sceptical individuals mobilise resistance against any kind of activity related to mineral exploration, exploitation or transformation. In these circumstances, sectoral authorities and companies promoting MLC-related activities have to make additional efforts to better communicate and

justify what they intend to do, how, where, and why. Only then it will be possible to gradually reverse the unfavourable opinion trends and improve the global image of those industrial activities. Innovative approaches to effective and educated social engagements are among the most challenging issues that the industry has to face. In what concerns mineral exploration and mining development endeavours, perceptible and latent misgivings are usual, ever more replaced by active forms of protest, not always duly substantiated.

For Mateus & Martins (2020) a key step towards a satisfactory framework of sociopolitical acceptance of MLC-related and PLC-related activities in the EU consists of changes in how the authorities and companies communicate their plans and decisions, along with a timely spreading of contextualised information. It is crucial to understand why conventional and regulated practices are raising so many suspicions by society. Furthermore, in dealing with social misgivings about MLC-related activities, it is also essential to examine the real usefulness of procedures that have been used within the scope of CSR and in the context of public consultation to obtain the so-called SLO. In an analysis of CSR and its relationship with social acceptance, despite the efforts done in recent years, CSR responses to operational, reputational and regulatory/political risks are insufficient or misunderstood by society, and the reasons behind these difficulties are quite diverse. In some cases, trade-offs between future land uses (or aesthetic values provided by natural systems) and mining developments are no longer considered acceptable or necessary by local communities. The trust levels to obtain social acceptance require extra care in the way critical information is disclosed by companies and authorities to the public in general, communities, and key stakeholders. The intended trust levels must cover various items, ensuring as well unquestionable levels of integrity and competence by the companies throughout the mining project lifetime, and yielding a long-lasting social consensus that should support a stable social license.

At this point, the conclusions in Mateus & Martins (2020) stand out in social aspects, starting by concluding that social impacts in this kind of assessment will require further methodological development, not only to record the social benefits of activities in the supply chain but also to analyze the relationship between all the relevant players in the supply chain. For this author, in what concerns the social opposition to mainstay MLC-related and PLC-related activities, a systematic investigation of the prevalent roadblocks in communication between all the relevant players (companies, authorities, and the public in general) must be done. Additional efforts should be completed to address various perspectives of risk (based on techno-scientific approaches and social perceptions), intending an assessment of the real value of the "social acceptability risk" (the mainstay of SLO) for the emerging (and growing) mining-skeptical social movements.

In another study, Carvalho *et al* (2021), wider at the European level, where specifically, projects covering five countries are analyzed: Austria; Norway; Poland; Portugal and Sweden; a broad synthesis is made of the practices used by companies to identify mineral resources that, given the consideration of various aspects, deserve to be safeguarded within the scope of land use planning.

In Carvalho *et al* (2021) it is considered that land scarcity, competing interests and the location dependency of mineral resources are increasing possible tensions between potential land-use options. In this context, mineral resources safeguarding (or minerals safeguarding) is the Land-Use Planning (LUP) process of ensuring that areas containing or potentially containing mineral resources are not needlessly occupied by other uses that may prevent their future extraction, including the places for installing all kind of mining/quarrying infrastructures and needs. In the analysis carried out, it is mentioned that for the identification of mineral deposits deserving to be safeguarded in LUP, there are only a few mature proposals for multi-criteria assessment of mineral resources recognized within Europe.

Specifically, the multi-criteria assessment of mineral resources mentioned above belongs to the five identified European countries. The list of elements taken into account in such mineral deposits' assessment is quite extensive and detailed parameters are commonly very different as identified in Kot-Niewiadomska & Galos (2019). The most important groups of assessment criteria for the discernment of which deposits deserve to be safeguarded in LUP are identified, summarized and characterized in Table 1, by country. The information in Table 1 is related to:

- Geological features of the mineral deposits (quality, quantity, geometry, location and spatial arrangement);
- The economic value of the deposits and their relative importance at various scales (international, domestic, regional, or local);
- Environmental protection issues resulting from extraction and processing methodologies;
- Aspects related to social license to operate;
- Possible conflicts with other land uses.

Table 1 – Groups of Assessment Criteria and Respective Importance in Each Multi-criteria Approach [adapted from *Carvalho* et al *(2021)*]

Country	***1st importance level***	***2nd importance level***
Austria	• LUP conflicts • Environmental issues	• Geological features • Economic importance
Norway	• Geological features • Economic importance	
Poland	• Geological features • Economic importance	
Portugal	• Level of geological knowledge	• Environmental issues • LUP conflicts • Economic importance • Social issues
Sweden	• Geological features • Economic importance	

Briefly, Carvalho *et al* (2021) says that the Austrian and the Polish approaches both use several assessment criteria of the considered groups, except those related to social conflicts. The Norwegian and Swedish approaches are very similar. They only use geological and economic criteria for the discernment of which mineral deposits deserve to be safeguarded.

The valorisation of mineral deposits, aiming to distinguish those to which access must be guaranteed during the LUP process, should be done through multi-criteria assessments. In Portugal, such approach is not part of the legislative framework but is being applied by its geological survey (National Laboratory of Energy and Geology – LNEG) when asked to contribute to LUP at the municipal level. The author also conclude that these methodologies apply to all types of mineral deposits and make use of an extensive and detailed set of parameters for assessing the areas where they occur. These methodologies should be targeted to the identification and classification of Mineral Resources of Public Importance (MRoPI) in three levels of importance (european, national, regional), and the creation of a proposal for a Mineral Safeguard Area for each one.

2.3.2. Nacional Panorama

Concerning the state of the art in the mineral resources sector in Portugal, and consequently the extractive industry, a set of studies produced and published since 2016 gained prominence, and which together constitute a conjectural line of action in the context of multi-dimensional planning for the safeguarding and/or exploitation of mineral resources in Portugal (Carvalho *et al* (2016), Mateus *et al* (2017) , Carvalho *et al* (2018), C. Lopes (2018), António Mateus (2019), Mateus & Martins (2020) or Carvalho *et al* (2021)).

According to Carvalho *et al.* (2021) a very different approach is adopted by the Portuguese methodology (relatively to the multi-criteria approach in relation to those used in the other countries mentioned in the Table 1) to integrate the assessment of very promising areas into the overall assessment process. Instead of assessing the intrinsic characteristics of the mineral deposits (quality, quantity, etc.), the methodology evaluates the level of existing geological knowledge about the areas where they exist or are supposed to exist, assuming that the greater the likelihood of a deposit occurs, the greater the existing geological knowledge. This approach does not include the concept of "conflict-free mineral zones" or other LUP-related issues, because it considers that mineral resources should be taken in parity with other resources. Hence, the decision on land use should be the result of a fair weighting process during LUP, whatever other land use interests may exist.

The study Mateus *et al*. (2017) address the need for a multi-dimensional methodology to support the decision to safeguard future access to mineral resources, there is a definition of a methodology that is based on a set of densified criteria capable of categorizing mineral resources (according to the available geological knowledge), as well as their mapping, after deciding about the threshold to be used for that purpose.

According to Mateus *et al.* (2017) the basic task should focus on suitable criteria to be used in delimiting areas with promising potential to supply mineral products besides others hosting mineral resources with already demonstrated interest. All these meet the basic conditions to be classified as MRoPI. Thus, the aforementioned methodology is based on guiding principles. The build-up of criteria densification took into consideration the following guiding principles: comprehensibility (i.e. clear, logical, and coherent criteria); defendable (i.e. accountable, transparent and independently validated criteria); consistency

(reliable and regular/systematic criteria application); and knowledge-based (i.e. criteria grounded in impartial assessments of the accessible data and/or information).

In this context, Mateus *et al.* (2017) defines the Level of Geological Knowledge (LGK) that is available for each specific tract (from a cluster of critical outcrops to an area including mineral resources differently evaluated) and its regional setting. The past, ongoing or foreseen exploitation of that specific tract could be assessed using a set of criteria pondering equally the *Economic (Ec)*, *Environmental (Ev)* and *Social Development and Acceptance (SDA)* dimensions. Therefore, a general MRoPI ranking ($MRoPI_r$) can be established by the Equation 1:

$$\text{Equation 1} \qquad MRoPI_r = 5.5LGK + 1.5(Ec + Ev + SDA)$$

Considering the guiding principles and criteria mentioned above, a brief description of the different dimensions considered in the determination of $MRoPI_r$ is important to make. So, according to Mateus *et al.* (2017):

- The *LGK* dimension | This critical dimension discriminates distinct levels of geological data, information and knowledge at different scales (from regional to local), making use of four complementary criteria (G_1 to G_4), each one scored from "*AccepTable*" (0.25) to "*Excellent*" (1.00). Considering the goals intended for the methodological approach, the relative weight of G_1, G_2, G_3 and G_4 should be slightly different, pondering equally and heavily the criteria directly related to (regional and local) exploration data;
- The *Ec* dimension | Is here understood as a general measure of what is currently exploited or expectedly mined in future (its nature and relative importance), and for how long, as well as the corresponding impacts on the domestic mineral value chain and trade balance. It comprises five complementary criteria (Ec_1 to Ec_5), each one rated into four levels (0.25 to 1.00);
- The *Ev* dimension | In the proposed methodology, the environmental dimension (*Ev*) seeks a general measure of the impacts in natural systems related to the past, present and/or foreseen mineral extraction activities in a specific tract. It comprises seven complementary criteria (Ev_1 to Ev_7), each one rated into four levels (0.25 to 1.00);
- The *SDA* dimension | The social development and acceptance dimension (*SDA*) comprises five complementary criteria (SDA_1 to SDA_5), each one rated into four levels (0.25 to 1.00). The intention is double: (1) to weigh the communal development triggered by mining/ quarrying operations in a specific tract, including their comparative impact to other (traditional and non-traditional) economic sectors; and (2) to evaluate the community awareness and acquiescence with mining/quarrying operations in a specific tract, as well as the compatibility between these industrial activities with other land uses by society.

Updating Equation 1 by replacing each parameter with the respective set of criteria presented in sections from "The LGK dimension" to "The SDA dimension", results the Equation 2.

Equation 2

$$MRoPI_r = 5.5 \sum_{i=1}^{4} (G_i k_i)\, QDA_i + 1.5 \left(\sum_{j=1}^{5} (Ec_j k_j)\, QDA_j + \sum_{l=1}^{7} (Ev_l k_l)\, QDA_l + \sum_{w=1}^{5} (SDA_w k_w)\, QDA_w \right)$$

Mateus *et al.* (2017) concludes that the well-succeeded tests so far suggest that the multi-dimensional MRoPI methodology here presented can be considered in workouts intended to support a 'safeguarding decision' on the future access to mineral resources, if $MRoPI_r$ scores were subjected to a periodic and thorough revision to integrate up to date information.

The applicability and versatility of Equation 2 are somehow demonstrated in the study and subsequent analysis carried out (where, after the design and composition of Equation 2 it was applied to minerals with a "metallic base"), and complementary in Carvalho *et al.* (2018), where Equation 2 is used in the sense of planning the future of ornamental stone explorations in Portugal.

As mentioned in Vintróa *et al.* (2014) and Carvalho *et al.* (2018), the sector has been facing increased difficulties in accessing known resources due to several constraints emerging from land-use planning. Particularly for the SDA criterion, no information was found, so a null score was assigned to all the tracts when applied Equation 2. Also, the Environmental Impact Studies (EIA) do not have much information on the social development and acceptance dimension. Regarding this point, Carvalho *et al.* (2018) concludes that the database that should support the different dimensions considered in the multi-criteria assessment are far from being ideal, but it has the advantage of objectively indicate the main weaknesses in the information body needed to planning the future sustainable exploitation of ornamental stones in Portugal.

It is important also to mention the Carvalho *et al.* (2016) study that highlights work carried out in the Natural Park of Serra de Aire e Candeeiros (NPSAC) to reconcile the activity of extracting mineral resources (in this specific case exploration of quarries) with other land uses and the protection of nature and biodiversity.

In Carvalho *et al.* (2016), we can verify that the competent authority for the management of the Natura 2000 Area and an industrial association representative of the mining stakeholders worked together on a project aimed at the conciliation of exploitation activities in the protected area through improvement in their economic and environmental performance. That project, funded by European Funds and by the mining stakeholders, was aimed at:

- defining strategies for the sustainable development of the extractive industry in the protected area;
- creating the geological and environmental background information for land use planning of the areas subjected to mining activity and for the implementation of joint exploitation projects in each area;
- characterising and monitoring the hydrogeological conditions within the protected areas, evaluating their vulnerability to the extractive industry;

- inventorying, characterising and presenting a proposal for the management of the geological heritage within the protected area, given its association with ornamental stones as identity brands of the region;
- developing a Communication and Public Awareness Program to demonstrate the harmonisation between extractive activity and nature conservation;
- defining a panel of sustainable development indicators for the mining activity within the protected area.

In 2010, a new land use plan and respective regulatory framework were implemented for the NPSAC Carvalho *et al.* (2016). Recognising the social and economic importance of the extractive activity within the Natural Park, this new management plan established the general rules for the mining industry aiming at its compatibility with environmental protection and valorisation of natural resources.

Based on the previously described methodology, Carvalho *et al.* (2016) concludes that although the present land use proposal is just one step of a long process, it is extremely relevant for the whole procedure; it represents a turning point in the relationship between mining industry stakeholders and environmental protection authorities after more than 20 years of land use conflicts. As it was possible to verify for the ornamental rocks subsector in Carvalho *et al.* (2018), working collaboratively (such as the LNEG, Faculty of Sciences of the University of Lisbon, Dom Luíz Institute and ASSIMAGRA), it was possible to accomplish a balance between nature conservation and the mining industry.

On the other hand, it is important to make a brief introduction and analysis of Decree-Law Nº. 30/2021, of May 7, which generally regulates Law Nº. 54/2015, of June 22, concerning mineral deposits. Mention at this point that the objective is not a broad legislative analysis (regarding the legislation that applies to the mineral resources sector), but only a specific decree-law, since it is intended to analyze a possible singularity.

The relevance of this specific decree-law relates to the fact that the most recent amendment introduced by the parliamentary amendment (Comissão de Ambiente (2021)) introduces into the framework Portuguese law the obligation to hold public clarification sessions. In point n.º 9 of Article 6.º, it says that:

- in all cases of attribution of prospecting rights and attribution of exploration concession, the applicant promotes, in each municipality covered, at least one public clarification session, aimed essentially at the populations of the territories covered by the claim, which is advertised, at least 20 days in advance, in two newspapers, one with national circulation and the other with regional circulation, and on the websites of the municipality and the DGEG.

Another relevant aspect introduced by the parliamentary amendment is in Article 26.º (conditions for granting experimental exploitation rights) and Article 29.º (exploitation concession contract). In these two articles, two new paragraphs were introduced (j. and k., point 2 of Article 26.º, and ee. and ff., point 1 of Article 29.º) where it is required:

- Social Impact Assessment to analyze perspectives of local communities, anticipate points of conflict, clarify public benefits and identify strategies for engagement and collaboration;
- Communication plan that systematizes guidelines for disseminating information and the instruments to be used.

The parliamentary amendments aforementioned, taking into account the state of the art mentioned above, constitutes a legislative innovation at the European and world level. It is possible to say that the parliamentary amendments introduced in the Decree-Law Nº. 30/2021 of May 7 find considerably consolidated technical support in Mateus & Martins, (2020), Vintróa *et al.* (2014) and Carvalho *et al.* (2018).

Portuguese legislators acted in the face of a national (and international) need, that was quite well-identified. According to the state of the art previously carried out, places Portugal as a case of a singular action, regarding the need to communicate, clarify and raise awareness among the populations and communities, concerning mineral resources sector projects.

2.4. Sustainable Development Goals (SDG)

2.4.1. General background

In the present work, it is considered interesting and relevant to frame it within a global sustainability perspective, which in a certain way may reflect the context of international guidelines (accepted worldwide) on the topic of sustainable development.

From this perspective, the main reference is the Sustainable Development Goals (SDG) of the United Nations 2030 Agenda, adopted by all Member States in 2015, and which defines the priorities and aspirations of global sustainable development for 2030 (BCSD (2024)). According to United Nations Department of Economic and Social Affairs (2024) which identifies, illustrates and frames all SDGs, a total of 17 SDGs are assumed by the United Nations (UN), each dealing with a specific theme of action. In a generic way, it is possible to understand the SDGs subdivided into three areas: environmental sustainability, social inclusion and equality, and economic development; based on the five principles of the 2030 Agenda for Sustainable Development: People, Planet, Prosperity, Peace and Partnership (United Nations, (2024)).

In this context, it is considered of great interest to understand the level of global progress in implementing the SDGs, which is why the most recent UN report on the implementation of the SDGs was consulted. In this report it becomes clear that, halfway to 2030, only 15% of the SDGs are on track, 48% of the SDGs are moderately or severely off track, and 37% of the SDGs are in stagnation or regression, according to Figure 1 (United Nations, 2023).

It is also possible to see from Figure 1 that despite investment increasing gradually since 2016, in broad terms the progress in implementing the SDGs does not exceed 15% in terms of SDG on track, as previously mentioned.

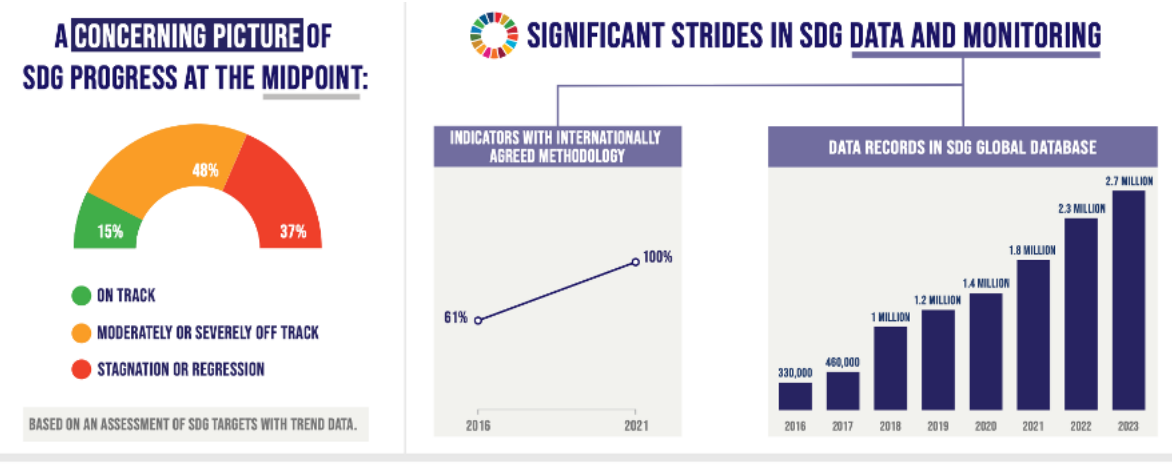


Figure 1 – Illustration of the progress of implementing the SDGs globally (adapted from *Nations, The Sustainable Development Goals Report 2023 (2023)*, page 11)

Given the context and global image on the application of the SDGs, it is important within the scope of this project to understand the state of the art of the SDGs at the mineral resources sector level.

Thus, it was possible to consult some specific reports on the mineral resources sector (such as Investment *et al.* (2016) and Foundation & Investment (2020)), that provide an analysis in a mining context (Figure 2), and not in the context of quarrying.

Figure 2 – Major issue areas where mining may have an impact (positive or negative) on each of the 17 goals (adapted form Investment *et al.* (2016)).

The report produced in 2016, (Investment et al. (2016)) finds ways that the 17 SDGs can somehow have contributions from the mining sector, and this same analysis is well expressed in the image represented in Figure 2, where for each SDG, opportunities for action are linked. Maps and establish a relationship between mining and the SDGs by using examples of good practice in the resources industry and the existing knowledge in sustainable development, that if replicated or scaled up could make useful contributions to the SDGs. It is considered important to understand the current situation in the mining context, with a view to enabling an analogous scenario (although, possibly overvalued).

After a specific analysis for each of the 17 objectives, where paths of progress and possible actions are identified, the report concludes that many companies in the mining industry are already doing much of the work shared in the report Investment *et al.* (2016). Also, concludes that SDGs offer opportunities for companies not only to focus inward on their own operations and metrics, but also outward, by participating in ongoing discussion with industry and its stakeholders on contributing to sustainable development.

On the other hand, Foundation & Investment, (2020) report updates the mining sector in the context of the SDGs, and makes an analysis of the mining sector in 2020 that somewhat contradicts the conclusions of Investment *et al.* (2016), further substantiating the conclusions of the United Nations itself (United Nations, (2023)).

In Foundation & Investment, (2020), the action of mining companies in relation to the SDGs is described and substantiated as: "There are a few frontrunners in integrating the SDGs"; "Prioritisation of SDGs is often superficial."; "Much of the reporting on the SDGs appears 'cosmetic'"; and "Reporting on SDG actions is generally very selective". Although recognizing a laudable effort to advance industry action in the sector and some unexpected better performers, Foundation & Investment, (2020) also draws attention to the fact that in the reports prepared by companies there is a lack of public disclosures about the negative impacts of companies on progress towards achieving objectives.

As long as reporting remains unbalanced, there is a real risk that companies will be accused of SDG-Washing, concept that means the practice of only mentioning positive contributions towards the SDGs and ignoring negative ones (Responsible Mining Foundation (2020)).

2.4.2. Nacional Panorama

In relation to the mineral resources sector in Portugal, it is important to understand its positioning and proactiveness in the context of the SDGs. In this context, it was possible to understand with sector associations some of the most significant and relevant actions or projects that are being developed in the field of sustainability and circular economy.

On Cluster Portugal Mineral Resource Association – ACPMR website (ACPMR, 2024) it is possible to find out about projects that aim to integrate and build sustainability and circular economy, in the mining sector and in the natural stone sector.

As mentioned in ACPMR, (2024), the project "*REVIVING – revisiting mine tailings to innovate metals biorecovery*" is focused on evaluating mine tailings as resources, supplying

metals that are extracted today via other processes, promoting recycling, minimizing the production of hazardous waste and thereby embracing the circular economy. The project "*Agenda Sustainable Stone by Portugal - Valorization of Natural Stone for a digital, sustainable and qualified future*", as mentioned in ACPMR, (2024) and Sustainable Stone by Portugal, (2024), the Sustainable StonebyPORTUGAL agenda aims to contribute to increasing exports and added value in the Natural Stone Sector, increasing investment in Research and Development and Innovation, contributing to the sector decarbonization.

Some of the main results and outputs expected from the project Sustainable Stone by Portugal, (2024) are:

- contribution to the reduction of CO_2, with less energy and improved productivity;
- make way towards zero waste;
- increase the economic, social and environmental sustainability of quarries and complementary stone cutting processes; and
- studying the Ecological Footprint of the Natural Stone Sector.

On the Portuguese Association of the Mineral Resources Industry - ASSIMAGRA website (ASSIMAGRA, (2024)), while it is possible to find information about the Sustainable StonebyPORTUGAL project, it is also possible to check the existence of another project in the natural stone sector, called ROADTO2050 – Roadmap for the Decarbonization of the Natural Stone Sector.

As stated in ASSIMAGRA, (2024), this roadmap aims to leverage the decarbonization of this industry by promoting a change in paradigms, in technologies and resources, seeking to train companies in this sector in this area and thus achieving the transition to a carbon neutral economy, presenting as main objectives:

- Decarbonization of the Natural Stone Sector;
- Promote corporate social responsibility;
- Respond to national and international environmental regulations; and
- Promote reduction of production costs.

The projects mentioned above embody concrete actions by the mineral resources sector that fit into some of the SDGs, such as the following:

- 7 Affordable and Clean Energy;
- 9 Industry, Innovation and Infrastructure;
- 12 Responsible Consumption and Production;
- 13 Climate Action; and
- 15 Life on Land.

It is reasonable to admit that other SDGs can also be worked on, either in the projects mentioned above or in other projects that may be worked on in the future, and it is equally possible to admit that companies in the sector, individually, can work on other SDGs in the context of the organization, such as:

- 1 No Poverty
- 2 Zero Hunger
- 8 Decent Work and Economic Growth
- 11 Sustainable Cities and Communities

3. Methodology

3.1. Study Area - Location and characteristics

The Parish of Alqueidão da Serra (established in 1615), belongs to the Municipality of Porto de Mós, in the district of Leiria. Located in the Aire mountains, it is partially included in the Serra de Aire e Candeeiros Natural Park. In the region, limestones from the Middle Jurassic predominate, which in the past and currently allowed the opening and exploitation of several quarries for various purposes. As Figure 3 shows, the parish is located in the central region of Portugal, and has an area of 21,27km^2, with 1.549 inhabitants (Statistics, National Institute of, (2024)).

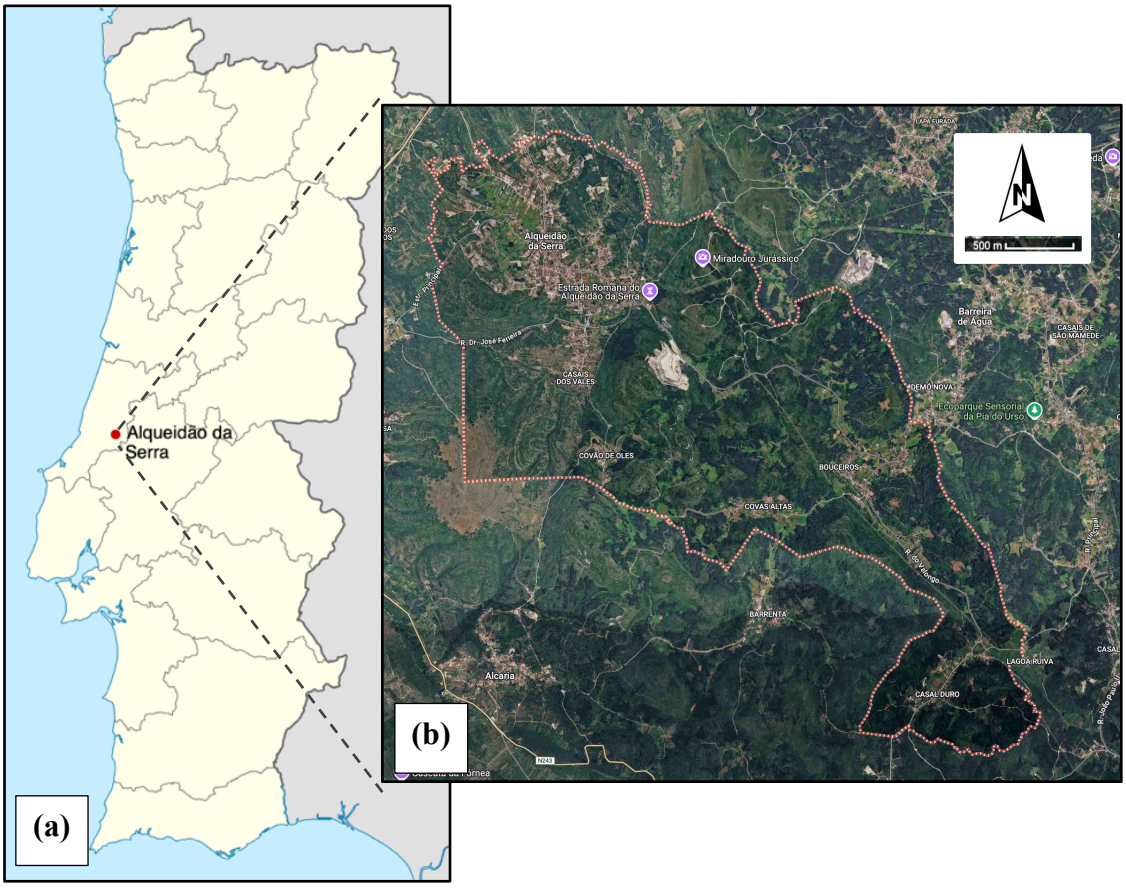


Figure 3 – **(a)** Geographical framework of Alqueidão da Serra parish (adapted from Wikipédia, *(2024)*; **(b)** Configuration of the parish of Alqueidão da Serra, with boundaries delineated with a red line (photography adapted from Google Maps).

According to what is described on the website of the Parish Council of Alqueidão da Serra, (2024), the immense exploration and cutting of limestone for sidewalks did not survive the economic crisis of 2011. Activity with strong economic impact over the last three decades. Alqueidão da Serra was the capital of Portuguese sidewalks.

In Figure 4, it is possible to see the village in aerial photography, with the identification of the two main "cores" for the exploitation of limestone for paving (black, blue and grey) in relation to the village. In Figure 4, highlighted with the yellow oval (roughly to the

southwest) the "core" of Moinhos and Zambujal, highlighted with the blue oval (roughly to the northeast) the "core" of Cumeira and Vale das Matas. In the parish of Alqueidão da Serra, there is also a Class 2 quarry for the exploitation of limestone for civil construction and industry (not visible in the image in Figure 4).

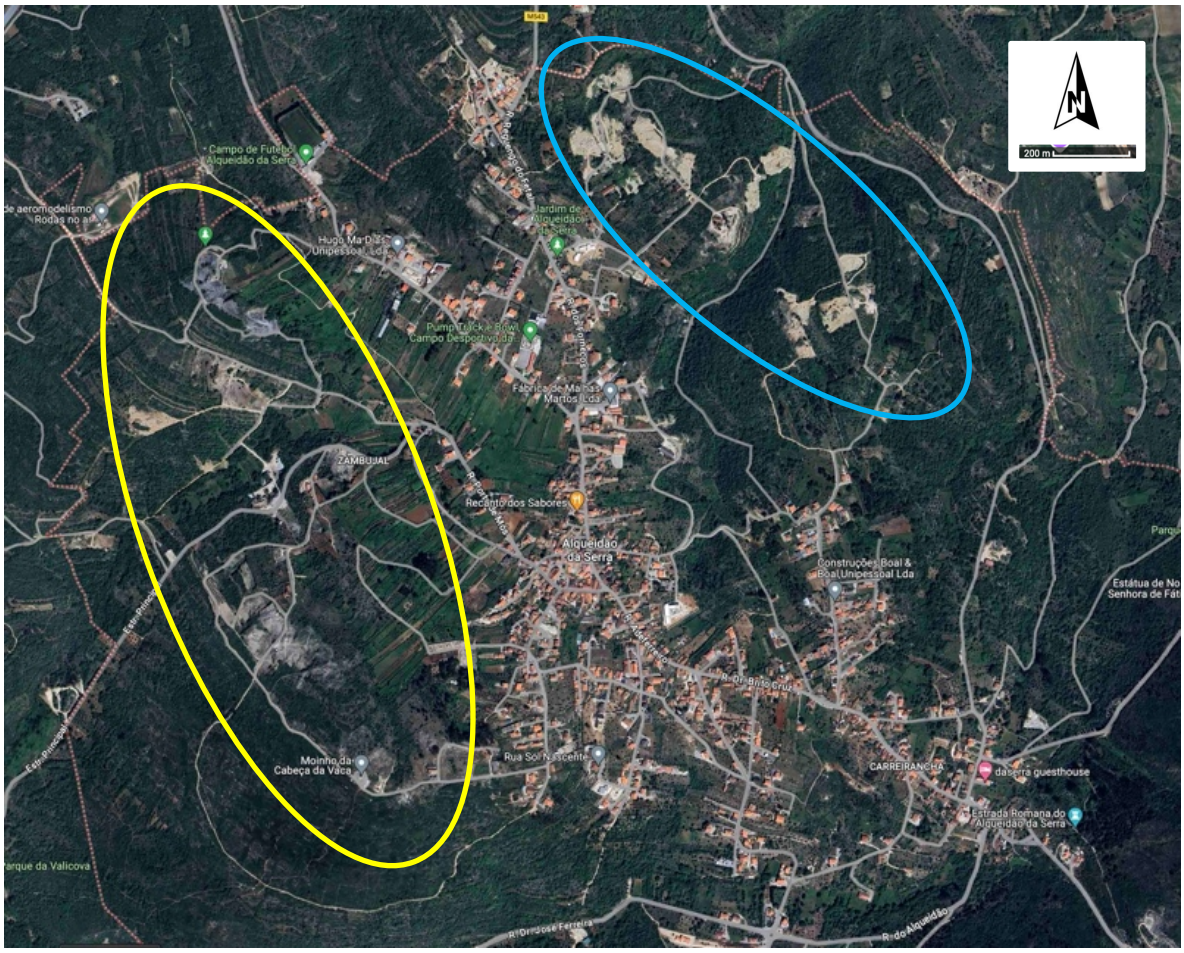


Figure 4 – Location of the main "cores" for the exploitation of paving stone in relation to the village of Alqueidão da Serra. In the yellow oval, Moinhos and Zambujal area. In the blue oval, Cumeira and Vale das Matas area (photography adapted from Google Maps).

3.2. Survey

Within this project, a questionnaire was carried out in the form of a survey throughout the inhabitants of the parish of Alqueidão da Serra. The questionnaire began on December 1, 2023 and ended on January 31, 2024, and was made available to the population in two different formats, paper and digitally (by Google Forms platform).

The use of these two supports aimed to increase access and coverage of the questionnaire, mainly with regard to the elimination of possible info-exclusion factors on the part of the target population in relation to new IT technologies, namely, difficulty in accessing and/or inability to browse the internet.

Regarding the digital survey, was activated an option to guarantee that each email address could only respond once to the questionnaire, and the option of not identifying the origin of the response was also activated, what means that it was guaranteed that the responses collected were anonymous. Likewise, the questionnaires carried out on paper were also completely anonymous, and in the work of distributing and collecting surveys on paper, a check was made with the respondent to ensure that they had not already responded in a digital format.

The survey consists of eighteen questions grouped thematically. After some questions characterizing the respondents (gender, age and academic background), questions of a general scope are asked, followed by questions of a social, environmental, economic and historical nature.

The Attachment I – The Survey presents all the questions of the questionnaire. The results obtained in the survey are treated and systematized in the Table A.IV-1 to Table A.IV-30 of the Attachment IV – Survey Analysis. These tables are arranged according to the numbering and organization presented in the Table A.III-1 of the Attachment III - Survey Answers, so the analysis carried out is based on the following order:

Part 1. Characterization of the respondents
Part 2. General questions
Part 3 & 4. Need for mineral resource exploration
Part 5. Exploration of mineral resources
Part 6. Compensatory measures
Part 7. Social responsibility
Part 8. History and information
Part 9. Information to be provided
Part 10. Abandoned quarries

The size of the universe studied is 1 327 people. In this study, was considered the entire population of the parish aged 18 years or over (Statistics, National Institute of, (2024)).

3.3. Statistical analysis

The analysis of the data collected in the population survey is based on the systematization of the data collected and recorded in a spreadsheet (typically Excel software), and the statistical software IBM SPSS (version 29.0.2.0 (20)).

The IBM SPSS software allows the answers obtained in the questionnaire to be cross-analyzed. This means that, in a systematic way, it is possible to understand how the differences in the respondent's age (A), gender (B), educational level (C), or other questions, were analyzed through non-parametric tests.

It is important to say that the results obtained in paper format were subsequently submitted on the Google Forms platform to standardize the methodology for processing results.

To achieve this, after checking the normality of the sample (and having verified in the present case that the data obtained do not follow the normal law), non-parametric tests can be used in order to carry out a statistically significant analysis of relevant data resulting from cross-tables. So, it is carry out a statistical test, called Kruskal-Wallis[3] (non-parametric method that allows two or more independent samples of equal or different sizes to be compared), with the support of SPSS software tools.

It is important to say that the statistical analysis that follows has three distinct starting points that are considered to be relevant in order to enable a comprehensive reading and interpretation of the data (taking into account the objectives of the present work), namely:

A. characterize and analyze the effect of respondents' gender (Question 1.1), age (Question 1.2) and education level (Question 1.3) on the answers given to the other research questions;
B. analyze the effect between responses to specific questions, which (according to the objectives outlined in this study) are considered to be relevant analysis, specifically:
    - effect between responses to "Question 2.5" and "Question 2.7";
    - effect between responses to "Question 2.7" and "Question 5.2";
    - effect between responses to "Question 8.1" and "Question 2.7";
C. cross-table analysis between responses to specific question (about collective memory):
    - effect between responses to "Question 1.2" and "Question 5.3".

It is important to mention at this point that the possibility of analyzing and testing all possible combinations between the survey questions (and their different possible answers) would be a highly complex and dense exercise, and its execution would fall outside the objectives set for the study. So, it was decided to direct the analysis to previously selected questions.

3.4. Interviews

Simultaneously with the population surveys, interviews were also conducted with representatives of local entities, which in some way represent legitimate interests at a social level. Specifically, representatives of seven entities were interviewed, in particular:

- Porto de Mós City Hall;
- Alqueidão da Serra Parish Board;
- Casa do Povo of Alqueidão da Serra;
- Alqueidão da Serra Cultural and Recreational Center (CCR);
- Hunting, fishing and shooting club of the Parishes of Alqueidão da Serra and Reguengo do Fetal;

[3] The Kruskal–Wallis one-way analysis of variance (which is an extension of the Mann–Whitney U test for more than two groups) was used to test whether the difference in distributions of three or more groups concerning one factor is significant, considering multiple comparisons. The statistically significant differences are highlighted in the results sections, and the *p*-values of the Kruskal–Wallis analysis.

- Alecrim e Salva - Civic, Cultural and Environmental Association; and
- Association of Portuguese Sidewalk Explorers.

The interviews were carried out using a set of questions similar to the population survey. Eight main questions were thus adapted to be asked of the interviewees, in order to later be able to establish terms of comparison with the answers obtained in the research.

The Attachment II – The Interview shows the questions that were asked to representatives of the different entities with social responsibility at the local level.

The treatment of data obtained in the interview starts with the records made in the Attachment VII - Results of the interviews, from which an interpretative analysis with a common basis for all represented entities (4.3 Interviews) took place. Subsequently enabling a systematization of the results in a specific table (Table 16), and finally, a comparative analysis of the results obtained, as well as a comparative analysis with the results of the population research.

3.5. Model of NIMBY effect estimation

In order to make it possible to estimate the NIMBY effect on the population surveyed, the assumptions implied in Question 2.5 (*Would you rather there were no quarries near where you live (within a 5km radius)?*) and Question 2.7 (| *Do you consider it necessary to explore mineral resources (for example, quarries)?*) of the population surveys were considered relevant.

The estimate of the NIMBY effect is based on the model established in Equation 3, which is a simplified model of the relationship between the answers of the two questions previously identified, and their consequent logical meaning.

The development of the model started with performing a cluster analysis in relation to the Question 2.5 and Question 2.7 (Attachment VI). Supported by the SPSS software, the cluster analysis started with the Hierarchical Method (which allowed determining the existence of three groups), and subsequently, after determining the three groups, the cluster analysis was carried out using the K-means method.

4. Results and analysis

4.1. Survey results

The survey gathered responses from a total of 210 (134 in digital format, and 76 in paper format). Using Cochran's modified formula for finite populations, the sample size of 210 has a 95% confidence level and a maximum margin of error of 6.21%, which is considered a satisfactory and representative sample size.

It should be said in advance that all the results and detailed analysis in this chapter are based on the data recorded and detailed in the different tables in Attachment IV.

Thus, in accordance with the order described above, as well as the order described in subchapter 3.2 Survey, the data analysis is as follows.

4.1.1. Part 1. Characterization of the respondents

The sample of respondents is divided into 110 responses from women (52%) and 100 responses from men (48%), distributed by age according to the graphic in Figure 5.

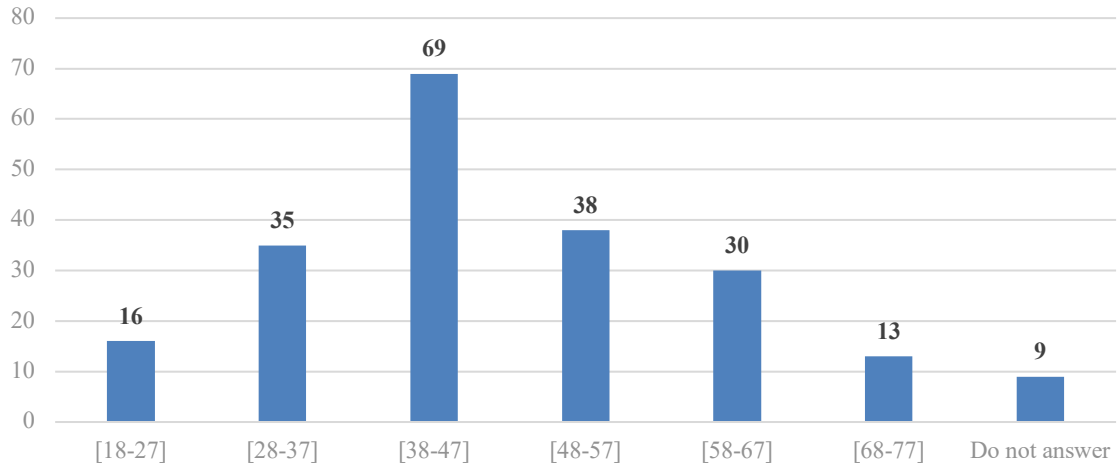


Figure 5 – Graphic with answers about age distribution, based on Table A.IV- 2 (age classes in "x" axis).

The Figure 5 provides a graphic interpretation of data relating to the age distribution of people who responded to the survey, and which are recorded in Table A.IV-2. It is possible to see that the most representative age group is the class [38-47] with 69 respondents (≈ 33%), followed by the class [48-57] with 38 respondents (≈ 18%), class [28-37] with 35 respondents (≈ 17%), class [58-67] with 30 respondents (≈ 14%), class [18-27] with 16 respondents (≈ 8%), and finally the class [68-77] with 13 respondents (≈ 6%).

In Figure 6, it is possible to verify that 112 (≈ 53%) of respondents have higher education level, 46 (≈ 22%) have up to 12th grade, 24 (≈ 11%) have up to 9th grade, 12 (≈ 6%) have up to 6th grade, and 12 (≈ 6%) have the "former 4th class".

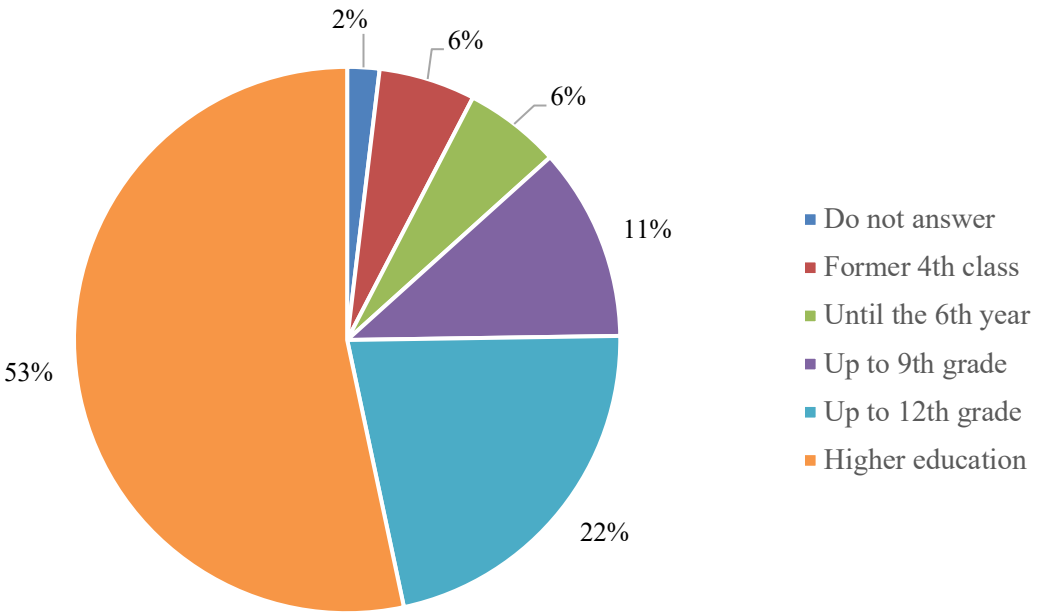


Figure 6 – Graphic with answers about education level, based on Table A.IV-3.

It is also interesting to note that ≈ 75% of the population surveyed have a level of education up to 12th grade or higher education.

4.1.2. Part 2. General Questions

In the general questions, the survey starts trying to understand whether the respondents knew what a mineral resource is ("*2.1 – Can you identify/define what a mineral resource is?*"), asking them to give an example afterwards ("*2.2 – If you answered yes to the previous question, give an example of a mineral resource*"). The answers to the questions are recorded in Table A.IV-4 and Table A.IV-5, respectively.

It is possible to see that 196 (≈ 93%) respondents say they can identify and define what a mineral resource is, in contrast to the remaining 14 (≈ 7%) who say they cannot identify and define what a mineral resource is. Sequentially, 188 (≈ 91%) respondents were actually able to mention a type of mineral resource, and 22 (≈ 9%) were unable to.

A joint analysis of the two previous tables shows that the number of respondents who say that can identify a mineral resource, and those who actually mention a type of mineral resource have the same order of magnitude (≈ 93% / ≈ 91%). The same appends with the number of individuals who say they cannot identify a mineral resource and the individuals who do not respond when asked to indicate a mineral resource (≈ 7% / ≈ 9%).

The graphic in Figure 7 identifies the main types of mineral resources cited by respondents within the scope of the "*Question 2.2 | If you answered yes to the previous question, give an example of a mineral resource*". It is interesting to understand the great diversity of mineral resources mentioned by the interviewees, with the three most representative being "Stone", "Limestone" and "Coal", with 41, 38 and 21 responses respectively. Together, they correspond to ≈ 53% of the answers given.

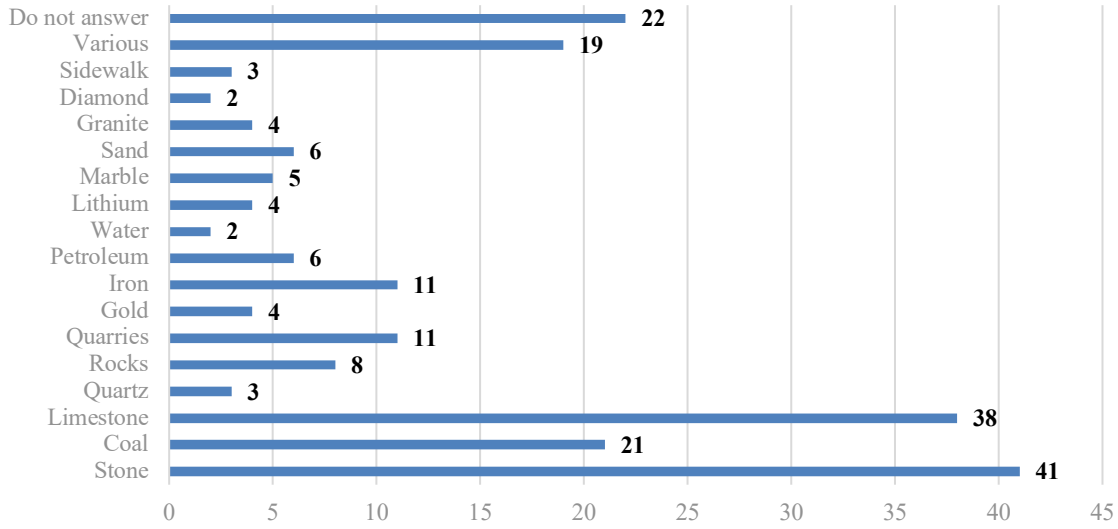


Figure 7 – Graphic with answers about the different types of mineral resources identified by respondents, based on Table A.IV-5.

Regarding "*Question 2.3 | Can you identify one or more mineral resource(s) exploration(s) close to where you live (up to a radius of 5km)? [for example; mines or quarries]*", the results obtained can be found in Table A.IV-6. In this table it is possible to see that 193 (≈ 92%) respondents can identify one or more mineral resource explorations close to where they live, and only 17 (≈ 8%) cannot do so. It should be noted that the order of magnitude of the responses obtained in this question is similar to the order of magnitude of the responses obtained in Questions 2.1 and 2.2.

Complementary to Question 2.3, Question 2.4 wants to know "*If you answered yes to the previous question, indicate approximately how many in the options below:*", allowing to choose five different options, as can be seen in the graphic in Figure 8.

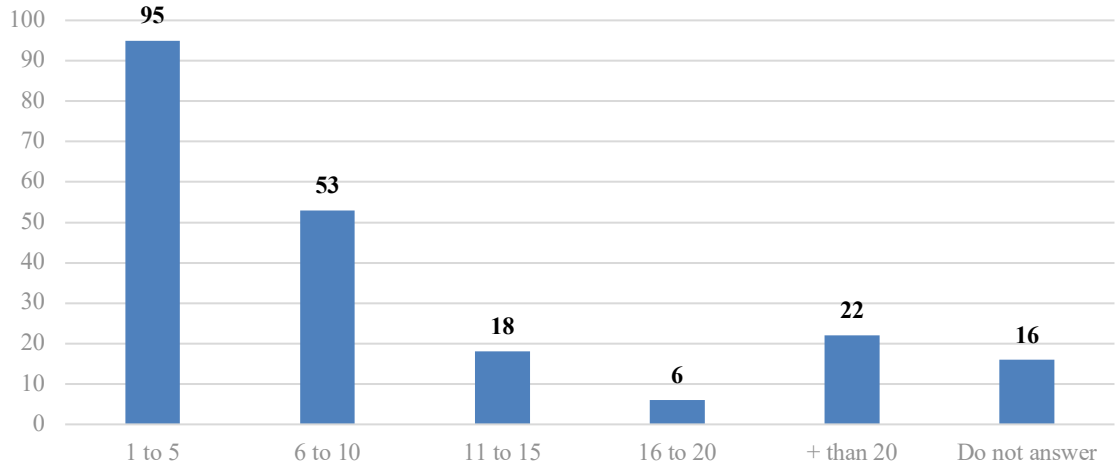


Figure 8 – Graphic with answers obtained in the "*Question 2.4 | If you answered yes to the previous question, indicate approximately how many in the options below:*", based on Table A.IV-7 (number of mineral resource explorations in "x" axis).

The graphic in Figure 8 allows us to understand that 95 (≈ 45%) respondents indicate that near the place where they live there are 1 to 5 mineral resource explorations, 53 (≈ 25%) respondents indicate that there are 6 to 10, 18 (≈ 9%) respondents indicate the existence of 11 to 15 explorations of mineral resources, 6 (≈ 3%) respondents indicate 16 to 20, and 22 (≈ 11%) respondents say that there are more than 20 explorations of mineral resources near where they live.

It should be noted that ≈ 70% of respondents focus their answers on a maximum of 10 mineral resource explorations.

The Table A.IV-8 records the answers given to "*Question 2.5 | Would you rather there were no quarries near where you live (within a 5km radius)?*". The analysis says that 107 (51%) of those interviewed answer "yes", and 103 (49%) answer "no". In this sense, there is a slight advantage (2%) for those interviewed who refer that there are no quarries close to where they live, which demonstrates a somewhat unexpected balance, taking into account the contestation that the mineral resources sector has been subject to, in general terms (chapter 2 Literature Review).

The answers to "*Question 2.6 | How many quarry operations do you think could exist near the place where you live without causing you any discomfort?*", are recorded in Table A.IV-9. For this question, a set of answer options was available, as illustrated in the graphic in Figure 9.

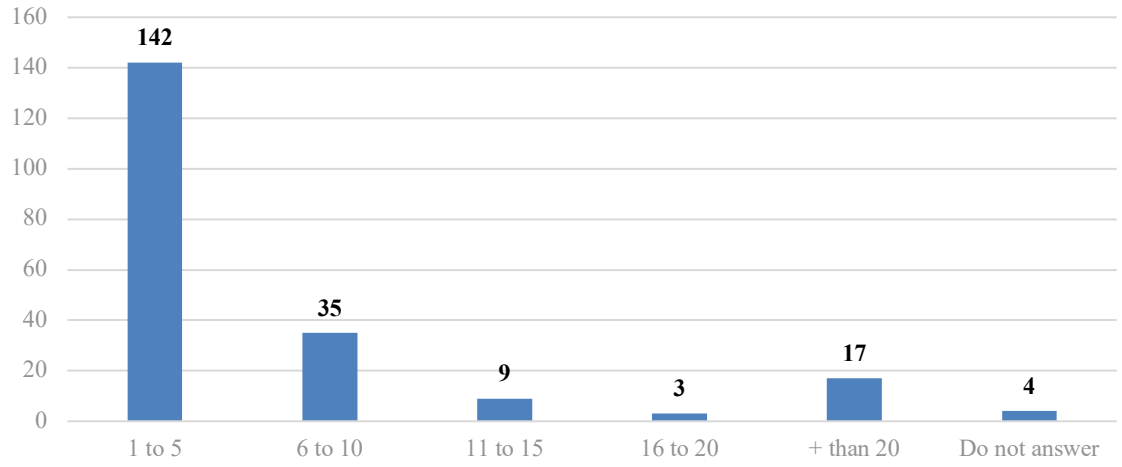


Figure 9 – Graphic with answers obtained in the "*Question 2.6 | How many quarry operations do you think could exist near the place where you live without causing you any discomfort?*", based on Table A.IV-9 (number of mineral resource explorations options in "x" axis).

In a general reading, the data in the graphic in Figure 9 shows that there is a perception on the part of the surveyed population that coexistence between quarrying and the population will be possible without creating discomfort for the population. This interpretation is based on the expressive fact that 142 (≈ 68%) respondents state that could exist near the place where they live without causing any discomfort a maximum amount of mineral resource exploration, specifically, they establish a limit up to a maximum of five quarries in operation for a "friendly" coexistence.

The Table A.IV-10 shows the answers to the "*Question 2.7 | Do you consider it necessary to explore mineral resources (for example, quarries)?*". In that, 198 (≈ 94%) respondents answered "yes", and only 12 (≈ 6%) respondents answered "no". It can therefore be seen that, in general terms the vast majority of respondents consider it necessary to explore mineral resources.

By asking this question in the inquiry, it does not ignore the current social context in Portugal regarding a broad protest against mineral resource exploration projects, as well as mineral resource prospecting and research projects. Thus, indirectly, the question may bring lines of understanding about the way the population in question is interpreting and/or absorbing the general context of contestation. Put simply and directly, the question asks respondents to evaluate the need (development of today's society) vs. contestation (based on the premises identified in the subchapter 2.2 Origins of socio-environmental conflicts), without forgetting that the survey took place in a target population that is already exposed to the mineral resources exploration industry (as will be demonstrated in the subchapter 4.2.3).

4.1.3. Part 3 & 4. Need for mineral resource exploration

The answers to "*Question 3.1 | Regarding the need for exploration of mineral resources, classify the options described below:*", are recorded in Table A.IV-11, and illustrated in the graphic in Figure 10.

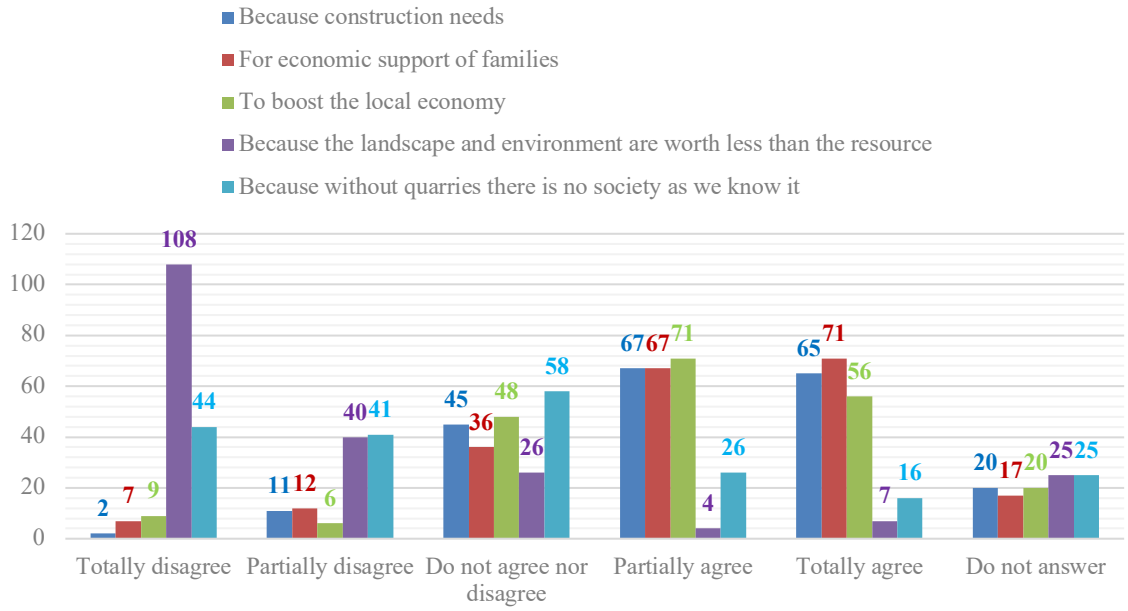


Figure 10 – Graphic with answers to the "*Question 3.1 | Regarding the need for exploration of mineral resources, classify the options described below:*", based on Table A.IV-11.

This question was answered only by those interviewed who answered "yes" to Question 2.7 (that is, 198 respondents maximum), being presented with a list of five options, with statements about why they consider the exploration of mineral resources necessary. Respondents had to classify the statements according to the following agreement scale:

totally disagree; partially disagree; do not agree nor disagree; partially agree; and totally agree.

The analysis of this question will be done by reading the results in each of the response options identified in the graphic in Figure 10, in order to allow the verification of agreement or disagreement in cumulative terms.

Based on the graphic in Figure 10, it is possible to create a summary table with the balance between agreeing, neutral and disagreeing opinions about each option, as shown in Table 2.

Table 2 - Balance between agreeing, neutral and disagreeing opinions about each option in the Question 3.1.

OPTIONS	CLASSIFICATION		
	AGREEING OPINONS	DO NOT AGREE NOR DISAGREE	DISAGREEING OPINIONS
Because construction needs	132 (≈ 63 %)	45 (21 %)	13 (≈ 6 %)
For economic support of families	138 (≈ 66 %)	36 (17 %)	19 (≈ 9 %)
To boost the local economy	127 (≈ 61 %)	48 (23 %)	15 (≈ 15 %)
Because the landscape and environment are worth less than the resource	11 (≈ 5 %)	26 (≈ 12 %)	148 (≈ 70 %)
Because without quarries there is no society as we know it	42 (≈ 20 %)	58 (≈ 28 %)	85 (≈ 41 %)

Regarding the aggregated data in Table 2, it is possible to say that the statement that deserves the greatest agreement (on the need to explore mineral resources) is "*For economic support of families*" with ≈ 66% of respondents expressing an agreeing opinion. The statement "*Because construction needs*" is agreed by ≈ 63% of respondents, and the statement "*To boost the local economy*" is agreed by ≈ 61% of respondents. On the other hand, these same statements obtain 17%, 21% and 23%, respectively, of neutral opinions, and obtain ≈ 9%, ≈ 6% and ≈ 15%, respectively, of discordant opinions.

The statement that deserves the most disagreement (on the need to explore mineral resources) is "*Because the landscape and environment are worth less than the resource*" with ≈ 70% of respondents expressing a general disagreeing opinion. At the same time ≈ 12% of respondents have a neutral opinion, and ≈ 5% have an agreeing opinion.

When we interpret the statement "*Because the landscape and environment are worth less than the resource*" looking at its environmental character, it is clear that respondents give great importance to the landscape and environmental factor, since ≈ 70% of respondents express disagreement with the eventuality that the landscape and the environment have a lower value than the need to exploit mineral resources. The expressive value of the disagreement allows us to affirm that, for those interviewed, the environmental nature should not be disregarded in the context of the exploration of mineral resources.

When interpreting the statements "*For economic support of families*" and "*To boost the local economy*" as being of an economic nature, it becomes clear that the economic context

represents a solid justification for agreeing (accepting) the exploration of mineral resources, with agreement above 60% of respondents, and disagreements of less than 15% of respondents.

Regarding the statements "*Because construction needs*" and "*Because without quarries there is no society as we know it*", they can be interpreted together as being a social nature. This interpretation calls into question the role of the exploration of mineral resources in society as a whole. The results obtained in Table 2 show that the needs of the construction sector with a high level of agreement (≈ 63%), a low level of disagreement (≈ 6%), and the neutral opinions around 21%. However, when the question is posed from a more general perspective (as it is "*Because without quarries there is no society as we know it"*), the opinion of respondents changes, and disagreement increases to ≈ 41%, and agreement drops to ≈ 20% (with the neutral position growing slightly to ≈ 28%).

This oscillation of results in the social axis should deserve a deeper analysis. Taking into account that the relevance of the social axis in the mineral resources sector has gained relevance (expressed in social contestation for example). Eventually it becomes necessary to demonstrate the role of the mineral resources sector in society (campaigns, awareness sessions, education sessions, demonstrations, and other means). In the subchapter 4.1.6 this issue will be analyzed in more detail.

The answers to "*Question 4.1 | Since you consider the existence of exploration of mineral resources to be unnecessary, classify the options described below:*", are recorded in Table A.IV-12, and illustrated in the graphic in Figure 11.

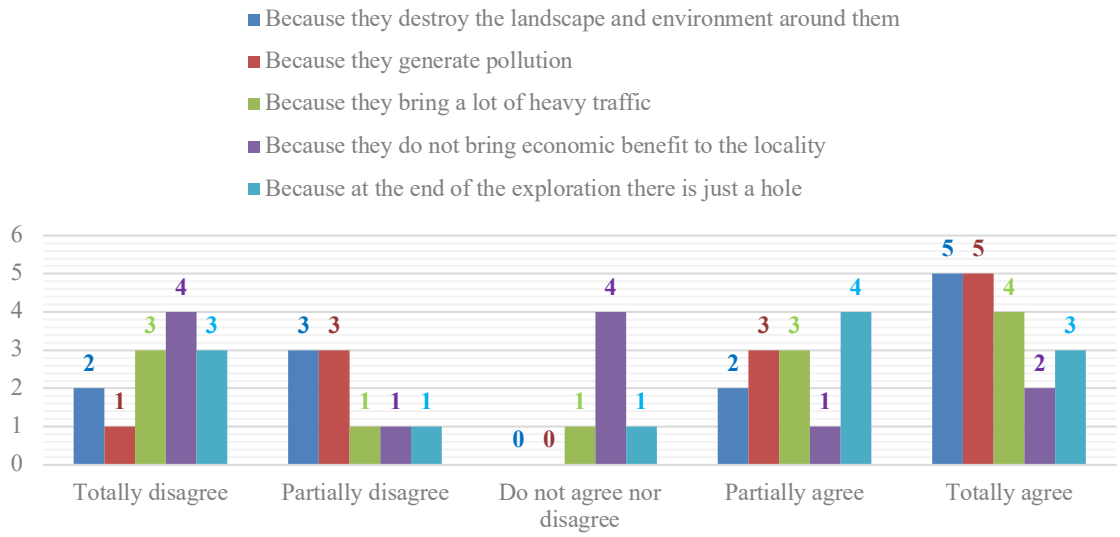


Figure 11 – Graphic with answers to the "*Question 4.1 | Since you consider the existence of exploration of mineral resources to be unnecessary, classify the options described below:*", based on Table A.IV-12.

This question was answered only by those interviewed who answered "no" to Question 2.7 (that is, 12 respondents at most), being presented with a list of five options, with statements about why they consider the exploration of mineral resources is not necessary. Respondents had to classify the statements according to the same agreement scale of the Question 3.1.

To interpret the results obtained, it's necessary to take into account that the maximum number of respondents is quite small (as a result of the answers to Question 2.7). In this context, it is considered that the sample collected is too small for broad and well-founded readings of the results.

4.1.4. Part 5. Exploration of Mineral Resources

The first question about the exploration of mineral resources itself was "*Question 5.1 | What is the main problem/annoyance you see in a quarry*?". In this question, respondents should select one of five options, as shown in Table A.IV-13, and illustrated in the graphic in Figure 12, allowing a more accurate reading and analysis.

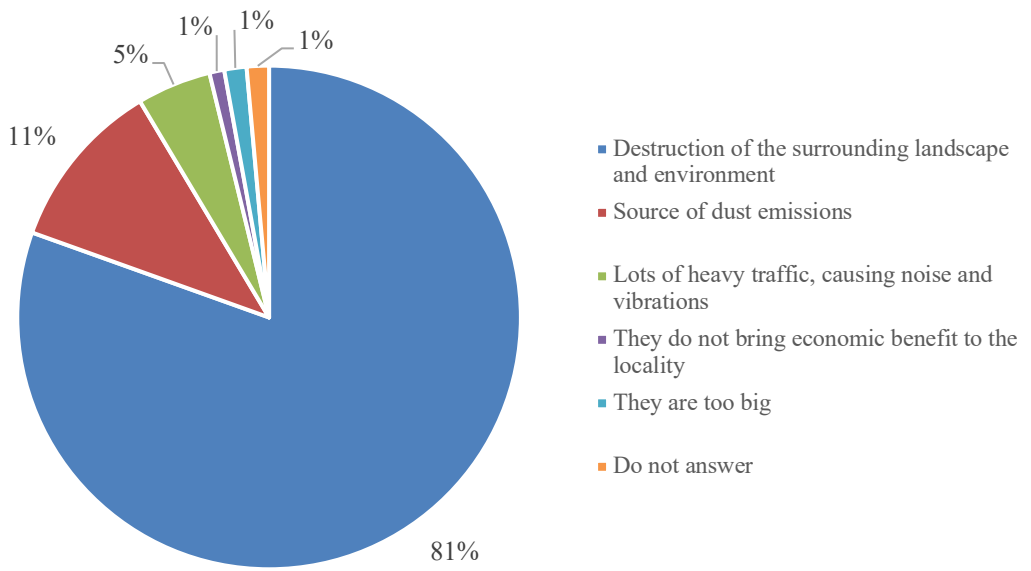


Figure 12 – Graphic with answers to the "*Question 5.1 | What is the main problem/annoyance you see in a quarry?*", and respective results obtained, based in Table A.IV-13.

The results obtained in this question, reliably indicate that the population surveyed is not unaware of environmental issues related to the exploitation of resources. With 81% of responses (4.5 times more than the sum of all other responses), they demonstrate concern about the environmental impact that the exploitation of mineral resources causes, specifically with the destruction of the landscape.

Analyzing this question cumulatively with the results obtained in the "*Question 2.7 | Do you consider it necessary to explore mineral resources (for example, quarries)?*", it can be said that the acceptance of the need to explore mineral resources by the population does not leads to omitting or ignoring the quarries environmental impacts.

It is also possible to verify that the results obtained in this question are in line with the results obtained in "*Question 3.1 | Regarding the need for exploration of mineral resources, classify the options described below:*" (Table 2). Specifically, as previously mentioned, in the option "*Because the landscape and environment are worth less than the resource*" respondents

expressed ≈ 70% of disagreement, and in the present question the option "*Destruction of the surrounding landscape and environment*" as the main problem/annoyance in a quarry, obtained the agreement of 81% of those interviewed. In other words, it represents conformity and harmonization in the responses obtained.

The answers given to "*Question 5.2 | Do you think it is possible to reconcile quarrying with environmental protection?*" are recorded in Table A.IV-14. It is possible to verify that 83 (≈ 40%) respondents partially agree that it is possible to reconcile quarrying with environmental protection, and 60 (≈ 29%) respondents totally agree. Around 46 (≈ 22%) of the respondents do not agree nor disagree, 14 (≈ 7%) respondents partially disagree, and only 6 (≈ 3%) respondents totally disagree with the possibility of reconciling quarrying with environmental protection.

Overall, it appears that there are around ≈ 69% of agreeing opinions on the possibility of reconciling quarrying with environmental protection, approximately ≈ 22% of neutral opinions, and ≈ 10% of disagreeing opinions.

The "*Question 5.3 | How long do you think there have been quarries close to your location (within a 5km radius)?*", it is specially related with local observation from respondents, has the data recorded in Table A.IV-15, and the graphic in Figure 13 illustrates that data.

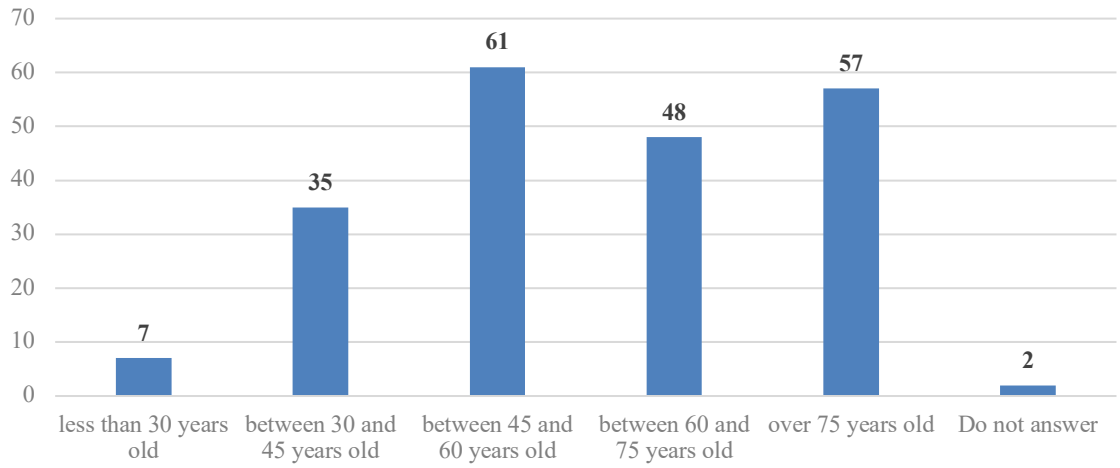


Figure 13 – Graphic with answers to "*Question 5.3 | How long do you think there have been quarries close to your location (within a 5km radius)?*", based in Table A.IV-15.

Analysis of the graphic in Figure 13 shows that for 105 (≈ 50%) of respondents, quarries have existed for more than 60 years, and for 166 (≈ 69%) of respondents, quarries close to their location have existed for more than 45 years. Bearing in mind that the average age of the respondents is ≈ 46 years, it is clear that, in general, the respondents consider that there have been quarries close to their locality for approximately as long as their lifetime.

This aspect, being very relevant, for example in relation to the condition that leads to greater acceptance of this type of industry, requires more in-depth study, in order to understand in greater detail, for example the position of more recent generations. In this context, it will be analyzed in more detail in 4.2.3 subchapter.

With regards to "*Question 5.4 | Do you know anyone who works or has worked in quarrying?*" (related to local observation from respondents, such as Question 5.3), the answers are recorded in Table A.IV-16. That table shows that 192 (≈ 91%) respondents say they know someone who works or has worked in a quarry, in contrast to the 17 (≈ 8%) respondents who say they do not know anyone who works or has worked in a quarry.

Following the Question 5.4, is "*Question 5.5 | If you answered yes to the previous question, indicate how many people?*", with four answer options as shown in Table A.IV-17, and illustrated in the graphic in Figure 14.

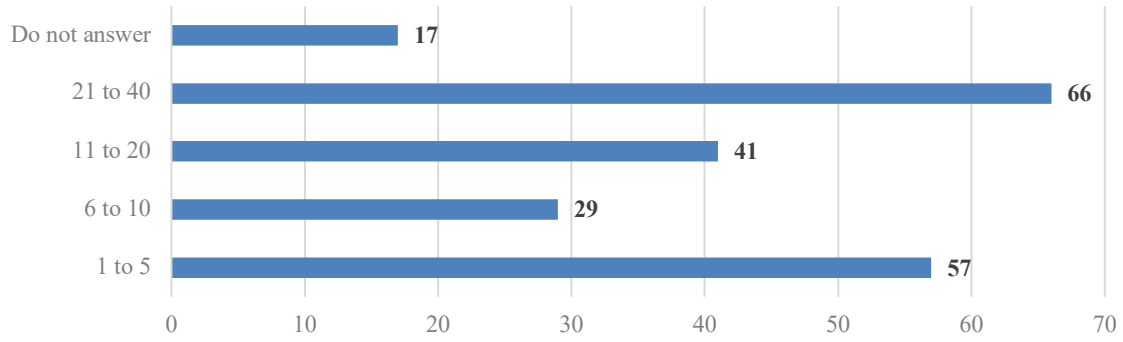


Figure 14 – Graphic with answers to the "*Question 5.5 | If you answered yes to the previous question, indicate how many people?*", based in the Table A.IV-17 (number of answers in each option in "x" axis).

The results obtained show some inconsistency. The option with the most responses is the one that identify between 21 and 40 people who work / worked in a stone quarry, with 66 (≈ 31%) responses, followed by the option that indicates the knowledge of 1 to 5 persons work / worked in quarries, with 57 (≈ 27%) responses. Options 11 to 20 and 6 to 10, have 41 (≈ 20%) and 29 (≈ 14%) responses respectively. Based in the inconsistency showed, it is not wise to proceed with any conclusion.

The last question related to the exploration of mineral resources is "*Question 5.6 | In your opinion, do you think there is any measure that can compensate for the environmental damage that quarries cause?*", and the results are recorded in Table A.IV-18.

The responses recorded in the table mentioned above show that 179 (≈ 85%) of those questioned believe that there are measures capable of compensating for the quarries environmental damage, with only 30 (≈ 14%) respondents considering that there are no.

It is important to note that, comparing the results obtained in "*Question 2.7 | Do you consider it necessary to explore mineral resources (for example, quarries)?*", with the results obtained in "*Question 5.1 | What is the main problem/annoyance you see in a quarry*?", and the results obtained in the Question 5.6, it is fair to say that there is similarity of the results, that is, the order of magnitude of respondents who consider it necessary to explore mineral resources (≈ 94%), the order of magnitude of the respondents who consider that the main problem/annoyance in a quarry is the destruction of the surrounding landscape and environment (≈ 81%), and the order of magnitude of the respondents who consider that there

are measures capable of compensating for the environmental damage caused by quarries (≈ 85%), is identical, with a $\Delta_{max} \approx 13\%$.

There is a certain degree of consistency in the answers given, but above all it can be a relevant indication of a somewhat structured interpretation of the mineral resources sector, its environmental impacts, and finally the possibility of minimizing and/or compensating. However, the present work does not have enough information to say this safely, which is why it is considered that it needs to be further studied.

4.1.5. Part 6. Compensatory measures

The answers to "*Question 6.1 | Once you consider the possibility of compensating measures for the environmental damage caused by quarries, classify the options described below:*", are recorded in Table A.IV-19, and illustrated in the graphic in Figure 15.

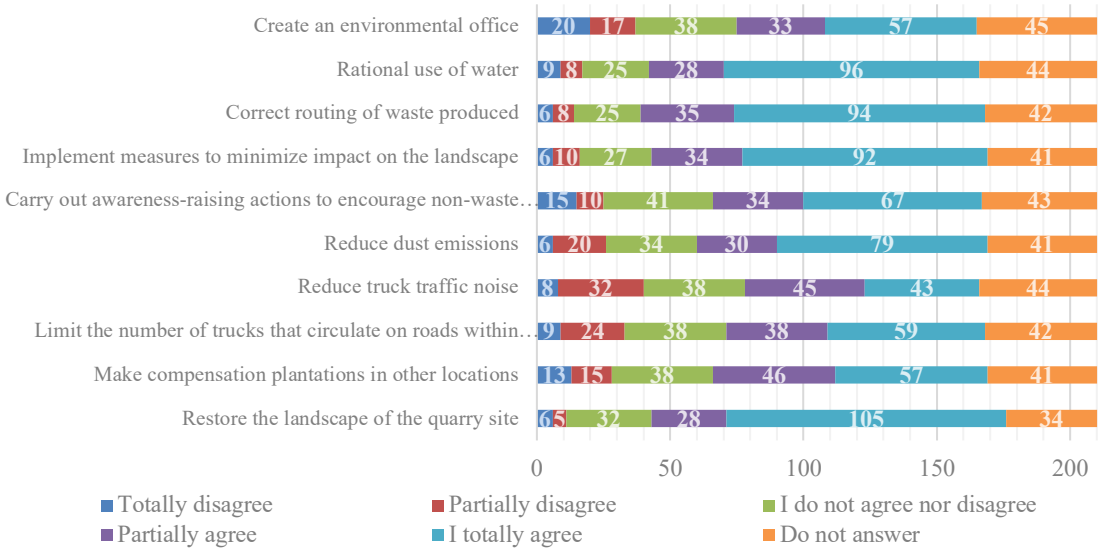


Figure 15 – Graphic with answers to the "*Question 6.1 | Once you consider the possibility of compensating measures for the environmental damage caused by quarries, classify the options described below:*", based in the Table A.IV-19 (number of answers in each option in "x" axis).

This question was answered only by those interviewed who answered "yes" to Question 5.6 (179 respondents maximum), with a list of ten statements about possible minimization and/or compensation measures for the environmental damage caused by quarries. Respondents had to classify the statements according to the agreement scale: totally disagree; partially disagree; do not agree nor disagree; partially agree; and totally agree.

The analysis of this question (as happened in Question 3.1) will be done by reading the results in each of the response options identified in the graphic in Figure 15, in order to allow the verification of agreement and/or disagreement in cumulative terms.

Based on the graphic in Figure 15, it is possible to create a summary table with the balance between agreeing, neutral and disagreeing opinions about each option, as shown in Table 3.

Table 3 - Balance between agreeing, neutral and disagreeing opinions about each option, in Question 6.1.

OPTIONS	CLASSIFICATION		
	AGREEING OPINONS	DO NOT AGREE NOR DISAGREE	DISAGREEING OPINIONS
Restore the landscape of the quarry site	133	32	11
	(≈ 63 %)	(≈ 15 %)	(≈ 5 %)
Make compensation plantations in other locations	103	38	28
	(≈ 49 %)	(≈ 18 %)	(≈ 13 %)
Limit the number of trucks that circulate on roads within localities	97	38	33
	(≈ 46 %)	(≈ 18 %)	(≈ 16 %)
Reduce truck traffic noise	88	38	40
	(≈ 42 %)	(≈ 18 %)	(≈ 19 %)
Reduce dust emissions	109	34	26
	(≈ 52 %)	(≈ 16 %)	(≈ 12%)
Carry out awareness-raising actions to encourage non-waste of mineral resources	101	41	25
	(≈ 48 %)	(≈ 20 %)	(≈ 12 %)
Implement measures to minimize impact on the landscape	126	27	16
	(≈ 60 %)	(≈ 13 %)	(≈ 8%)
Correct routing of waste produced	129	25	14
	(≈ 62 %)	(≈ 12 %)	(≈ 7 %)
Rational use of water	124	25	17
	(≈ 59 %)	(≈ 12 %)	(≈ 8 %)
Create an environmental office	90	38	37
	(≈ 43 %)	(≈ 18 %)	(≈ 18 %)

Thus, it is possible to say that the statement that deserves the greatest agreement is "*Restore the landscape of the quarry site*" with ≈ 63% of respondents expressing an agreeing opinion. The statement "*Correct routing of waste produced*" is agreed by ≈ 62% of respondents, and the statement "*Implement measures to minimize impact on the landscape*" is agreed by ≈ 60% of respondents. On the other hand, these same statements obtain ≈ 15%, ≈ 12% and ≈ 13%, respectively, of neutral opinions, and obtain ≈ 5%, ≈ 7% and ≈ 8%, respectively, of discordant opinions.

The statements that have the largest disagreements opinions are "*Reduce truck traffic noise*" with ≈ 19% of respondents expressing a disagreeing opinion, followed by "*Create an environmental office*" with ≈ 18% of respondents, and "*Limit the number of trucks that circulate on roads within localities*" with ≈ 16% of respondents. These same statements have about ≈ 18% neutral opinions each, and ≈ 42%, ≈ 43%, and ≈ 46% agreeing opinions, respectively (which correspond to the three lowest agreeing opinions).

It should be noted that the statements "*Restore the landscape of the quarry site*", "*Reduce dust emissions*", "*Implement measures to minimize impact on the landscape*", "*Correct routing of waste produced*" and "*Rational use of water*" obtained, each one agreeing opinions above 50%. Although the statements "*Make compensation plantations in other locations*" and "*Carry out awareness-raising actions to encourage non-waste of mineral resources*" had more than 100 respondents with agreeing opinions, which means that obtained ≈ 49% and ≈ 48% respectively (less than 50%).

Another aspect that is considered relevant to note is the fact that two of the three statements that deserve the most agreeing opinions (in particular, the first and the third), are related to measures to minimize the impact on the landscape.

When reading together the results obtained in "*Question 5.1 | What is the main problem/annoyance you see in a quarry?*", and the "*Question 5.6 | In your opinion, do you think there is any measure that can compensate for the environmental damage that quarries cause?*", with the fact that two of the three statements that deserve the most agreeing opinions are related to measures to minimize the impact on the landscape, the coherence of the results becomes more perceptible and evident.

In particular, it is important to highlight the importance given by the population surveyed to the impact on the landscape that the exploitation of a quarry can cause, the possibility that surveyed consider the existence of measures capable of compensate for environmental damage caused by a quarry, and the specific measures that they point has capable to be adopted to compensate for environmental damage.

Although measures of a social nature do not appear to be so foreshadowed in this matter, it is noted that the two compensation measures that can be said to have a social nature ("*Carry out awareness-raising actions to encourage non-waste of mineral resources*" and "*Create an environmental office*"), both were below 50% of agreeing opinions, and one of them was the second statement with the lowest number of agreeing opinions.

Therefore, it is considered that the social axis should deserve a deeper analysis, noticing that in this point of analysis there seems to be a constant "gap/need".

4.1.6. Part 7. Social responsibility

In relation to the topic of social responsibility, the first question asked was "*Question 7.1 | In your opinion, do companies that operate quarries have or can have social responsibility in the locality where they are located?*", and the answers are recorded in the Table A.IV-20.

As can be seen in Table A.IV-20, ≈ 89% of respondents answered "yes", considering that companies that operate quarries have or can have social responsibility in the locality where they are located. On the contrary, around ≈ 11% of respondents consider that companies that operate quarries do not or should not have social responsibility in the locality.

Thus, after Question 7.1, there is "*Question 7.2 | If you answered yes to the previous question, then consider the possibility of social responsibility on the part of the quarries, classify the options described below:*", which was just answered by the respondents who answered "yes" to Question 7.1, which means the Question 7.2 will have 186 answers maximum.

As in previous questions (3.1, 4.1 and 6.1), the respondents had to classify the statements according to the following agreement scale: totally disagree; partially disagree; do not agree nor disagree; partially agree; and totally agree. The graphic in Figure 16 translates the results from Table A.IV-21.

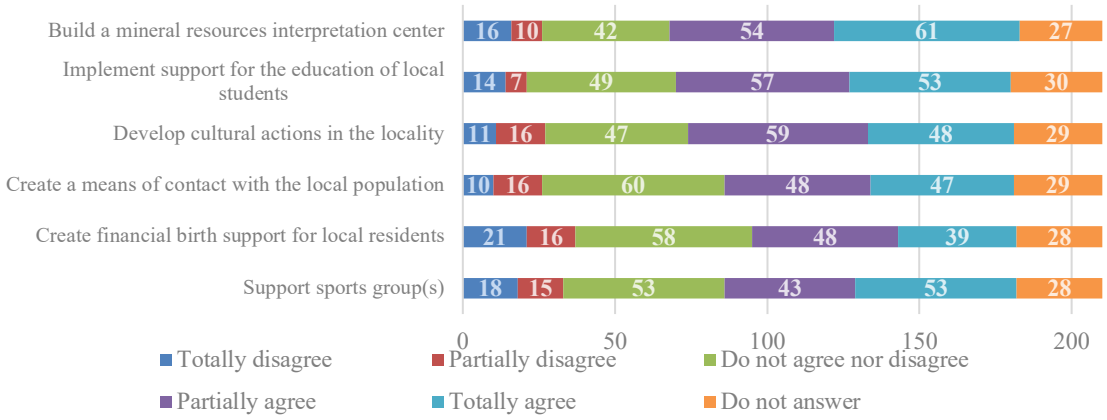


Figure 16 – Graphic with answers to the "*Question 7.2 | If you answered yes to the previous question, then consider the possibility of social responsibility on the part of the quarries, classify the options described below:*", based in the Table A.IV-21 (number of answers in each option in "x" axis).

Based on the graphic in Figure 16, created a summary table with the balance between agreeing, neutral and disagreeing opinions about each option, as shown in Table 4.

Table 4 – Balance between agreeing, neutral and disagreeing opinions about each option, in Question 7.2.

OPTIONS	CLASSIFICATION		
	AGREEING OPINONS	DO NOT AGREE NOR DISAGREE	DISAGREEING OPINIONS
Support sports group(s)	96 (≈ 46 %)	53 (≈ 25 %)	33 (≈ 16 %)
Create financial birth support for local residents	87 (≈ 42 %)	58 (≈ 28 %)	37 (≈ 18 %)
Create a means of contact with the local population	95 (≈ 45 %)	60 (≈ 29 %)	26 (≈ 12 %)
Develop cultural actions in the locality	107 (≈ 51 %)	47 (≈ 22 %)	27 (≈ 13 %)
Implement support for the education of local students	110 (≈ 52 %)	49 (≈ 23 %)	21 (≈ 10%)
Build a mineral resources interpretation center	115 (≈ 55 %)	42 (≈ 20 %)	26 (≈ 12 %)

It is possible to say that the statement that deserves the greatest agreement is "*Build a mineral resources interpretation center*" with ≈ 55% of respondents expressing an agreeing opinion. The statement "*Implement support for the education of local students*" is agreed by ≈ 52% of respondents, and the statement "*Develop cultural actions in the locality*" is agreed by ≈ 51% of respondents. On the other hand, these same statements obtain ≈ 20%, ≈ 23% and ≈ 22%, respectively, of neutral opinions, and obtain ≈ 12%, ≈ 10% and ≈ 13%, respectively, of discordant opinions.

It is noted that the three statements with the most agreeing opinions are all related to information, awareness and/or education, two financial options in the background ("*Support sports group(s)*" and "*Create financial birth support for local residents*") and one of a purely social nature ("*Create a means of contact with the local population*").

An aspect of interest that is possible to verify in the aggregated data in Table 4, is the average growth of neutral opinions in all statements, when compared relatively with the aggregated data in Table 2 and Table 3, where neutral opinions assume a lesser relevance. This could be a reflection of the existence of a bigger number of respondents without an opinion with doubts, or simply in need of obtaining more information about this axis of action.

A possible interpretation for this fact, will be the hypothesis already mentioned previously (subchapter 4.1.5), which refers to the possible existence of a constant "gap/need" in the part of the surveyed population in relation to the social axis, that is, in relation to the social responsibility of companies that operate quarries. It is therefore considered necessary more in-depth studies on the social axis.

The Table 4 also shows that the statement that received the least agreeing opinions was "*Create financial birth support for local residents*", with 87 (≈ 42%) agreeing opinions, 58 (≈ 28%) neutral opinions, and 37 (≈ 18%) disagreeing opinion.

4.1.7. Part 8. History and information

The topic of History and Information, the first question asked was "*Question 8.1 | Do you think that quarrying in your locality is, or was, important economically and/or socially?*", and their answers are recorded in the Table A.IV-22.

The respondents are asked to classify the Question 8.1 according to the following agreement scale: totally disagree; partially disagree; do not agree nor disagree; partially agree; and totally agree. The graphic in Figure 17 translates the results from Table A.IV-22.

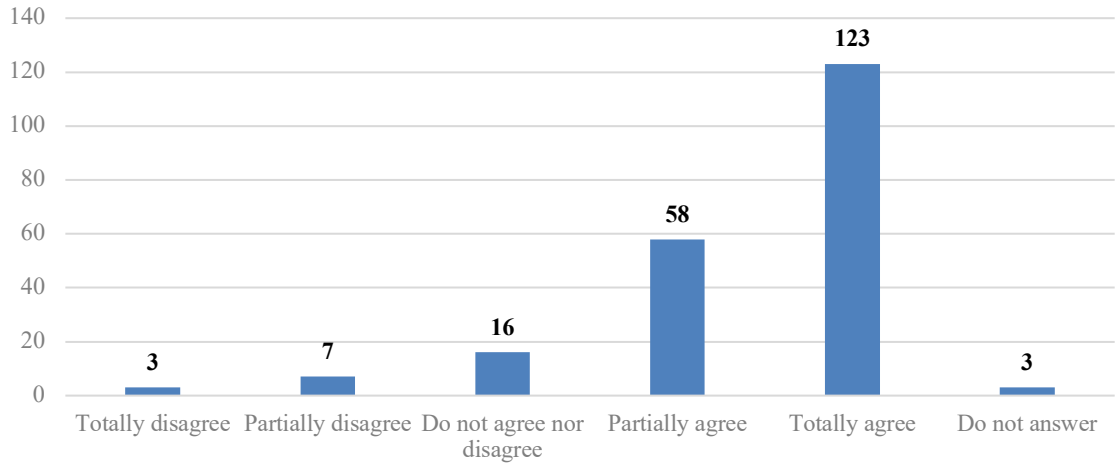


Figure 17 – Graphic with answers to "*Question 8.1 | Do you think that quarrying in your locality is, or was, important economically and/or socially?*", based in Table A.IV-22.

In general, it appears that together there are ≈ 86% of agreeing opinions about the economical and/or social importance of quarrying in their locality, approximately ≈ 8% neutral opinions, and ≈ 5% of disagreeing opinions.

Clearly, the vast majority of respondents view the exploration of quarries in the locality as economically and/or socially important, which, in part, may help to understand and

substantiate the results obtained in "*Question 2.7 | Do you consider it necessary to explore mineral resources (e.g. quarries)?*", with 94% affirmative answers. Also, the results obtained in "*Question 3.1 | Regarding the need for exploration of mineral resources, classify the options described below:*", where the statement with the highest number of agreeing opinions is "*For economic support of families*" (≈ 66%) and the third statement with the highest number of agreeing opinions is "*To boost the local economy*" (≈ 61%).

It thus seems that coherence is beginning to emerge in the responses obtained in the survey in the economic context associated with the exploration of quarries (and therefore the mineral resources sector).

The answers to the "*Question 8.2 | Do you think there is enough information about quarries close to where you live (within a 5km radius)?*", are recorded in the Table A.IV-23. In this table it is possible to verify that 157 (≈ 75%) of the respondents say they do not have enough information about the quarries located close to where they live, and 51 (≈ 24%) say they have enough information.

Considering that, the vast majority of respondents say they do not have enough information about the quarries located near them, it is fair to say that they would be available and/or would like to obtain and consume more related information.

Regarding "*Question 8.3 | Who do you think should be responsible for making the information referred to in the previous question available? (you can choose more than one option)*" the answers obtained are recorded in Table A.IV-24, and illustrated in the graphic in Figure 18.

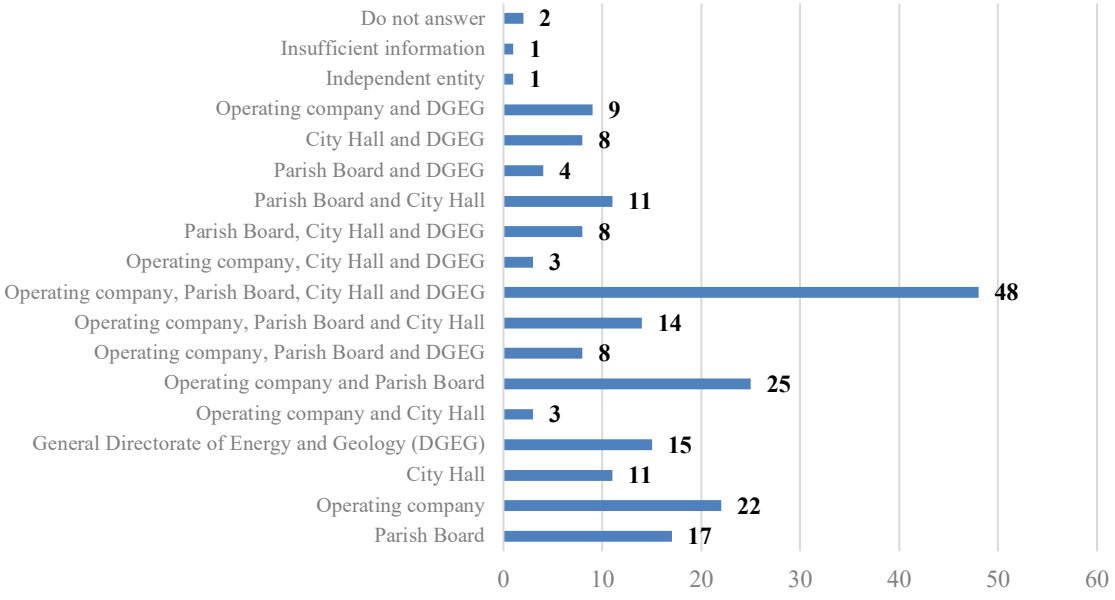


Figure 18 – Graphic with answers to "*Question 8.3 | Who do you think should be responsible for making the information referred to in the previous question available? (you can choose more than one option)*", based in Table A.IV-24.

The respondents had the possibility of choosing more than one option, which allows the existence of different combinations of responsibilities. For a general analysis it is considered

relevant to make an accounting related to the number of times that the responsibility for informing is attributed to each entity, whether in combined form or in individual form. So, the Table 5 shows the number of times each entity is mentioned.

Table 5 – Individual accounting of each entity mentioned in Table A.IV-24, relating to Question 8.3.

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Parish Board	135	64,3%
Operating company	132	62,9%
City Hall	106	50,5%
DGEG – General Directorate of Energy and Geology	103	49,0%
Independent entity	1	0,5%
Insufficient information	1	0,5%
Do not answer	2	1,0%

Analyzing Table 5, it can be seen that the combined results of the accounting made, place the *Parish Board* as the entity that respondents hold most responsible for providing information regarding quarries in the locality, with 135 (≈ 64%) of references, followed by *Operating company* with 132 (≈ 63%) references, *City Hall* with 106 (≈ 51%) and finally *DGEG* with 103 (≈ 50%) references.

From this accounting, it is clear that respondents attribute greater responsibility to the public entity closest to the location, that means Parish Board, followed by the Operating company (also in the locality), followed by another closest public entity, City Hall, and finally the furthest entity from the location, DGEG.

The "*Question 8.4 | Do you think it would be important to have access to information about quarries close to where you live (within a radius of 5km)*?" the answers obtained are recorded in Table A.IV-25. In this question, 186 (≈ 89%) of those interviewed say that they believe it is important to have access to more information about the quarries in the locality, and 22 (≈ 11%) say no.

Doing a cross-analysis of the results of this question with the results obtained in Question 8.2, it would be expected that the results would be a little more coincident, once, with ≈ 75% of respondents saying that they do not consider the information on quarries to be sufficient, it would be expected that approximately the same number of respondents would understand that it is important to have access to more information about the quarries in the locality. Now, it was found that the percentage of individuals who think more information is needed is bigger in ≈ 14%, which reinforces the understanding of the need for information.

In another cross-analysis, when analyzing the answer to this question together with "*Question 7.2 | If you answered yes to the previous question, then consider the possibility of social responsibility on the part of the quarries, classify the options described below*:", it is verified the existence of a relevant coherence, that is, if in this question the vast majority of respondents consider it important to have access to information about quarries, regarding Question 7.2, it turns out that the statement that received the most agreeing opinions was

"*Build a mineral resources interpretation center*", which can be interpreted as a way to obtain more information.

4.1.8. Part 9. Information to be provided

Following Question 8.4, respondents who considered it important to have access to information about quarries close to where they live responded to the question "*Question 9.1 | Since you consider it important to have access to information about the quarries that exist close to where you live, classify the options described below:*", which have their data recorded in Table A.IV-26. So, this question was answered by a maximum of 186 respondents.

As in previous questions, the respondents had to classify the statements presented according to the following agreement scale: totally disagree; partially disagree; do not agree nor disagree; partially agree; and totally agree. The graphic in Figure 19 translates the results from Table A.IV-26.

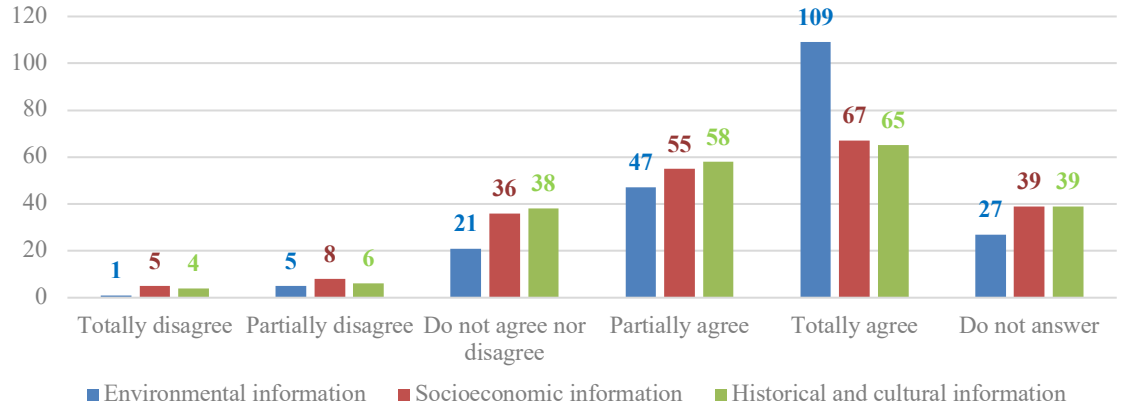


Figure 19 – Graphic with answers to "*Question 9.1 | Since you consider it important to have access to information about the quarries that exist close to where you live, classify the options described below:*", based in Table A.IV-26.

Based on the graphic in Figure 19, it is possible to create a summary table with the balance between agreeing, neutral and disagreeing opinions about each option, as shown in Table 6.

Table 6 – Balance between agreeing, neutral and disagreeing opinions about each option, in Question 9.1.

OPTIONS	CLASSIFICATION		
	AGREEING OPINONS	DO NOT AGREE NOR DISAGREE	DISAGREEING OPINIONS
Environmental information	156	21	6
	(≈ 74 %)	(≈ 10 %)	(≈ 3 %)
Socioeconomic information	122	36	13
	(≈ 58 %)	(≈ 17 %)	(≈ 6 %)
Historical and cultural information	125	38	10
	(≈ 59 %)	(≈ 18 %)	(≈ 5 %)

Regarding the aggregated data in Table 6, these are analyzed in the perspective of understanding which option (statement) deserves more agreement or disagreement from the respondents.

Thus, it is possible to say that the statement that deserves the greatest agreement is "*Environmental information*" with ≈ 74% of respondents expressing an agreeing opinion. The statement "*Historical and cultural information*" is agreed by ≈ 59% of respondents, followed closely by the statement "*Socioeconomic information*" that is agreed by ≈ 58% of respondents. On the other hand, these same statements obtain ≈ 10%, ≈ 18% and ≈ 17%, respectively, of neutral opinions, and obtain ≈ 3%, ≈ 5% and ≈ 6%, respectively, of discordant opinions.

It is relevant to carry out an analysis in conjunction with previous questions, in order to verify the existence of coherences (or lack of it).

So, when interviewees answer "*Question 5.2 | Do you think it is possible to reconcile quarrying with environmental protection?*" in agreement (≈ 68%), it is not forced to consider that given this stance they later want to have information on reference situations, situation monitoring, compensation and minimization measures, or even progress/setbacks in projects, in quarries under exploration or even in already deactivated quarries.

With regard to "*Historical and cultural information*" (which are considered the second most answered with ≈ 59% responses), it is also interesting to note that in relation to the answers obtained in "*Question 7.2 | If you answered yes to the previous question, then consider the possibility of social responsibility on the part of the quarries, classify the options described below:*", where it appears that the statements with the most agreeing opinions ("*Build a mineral resources interpretation center*", "*Implement support for the education of local students*" and "*Develop cultural actions in the locality*") can be framed in a historical cultural context, which appears to be coherent, in contrast to the socio-economic context which was also relegated to the background in Question 7.2.

4.1.9. Part 10. Abandoned quarries

The Part 10 of the questionnaire is the last one, and as the name suggests it concerns the existence of abandoned quarries in the locality.

The answers to "*Question 10.1 | Are you aware of the existence of abandoned quarries in your locality?*", are recorded in Table A.IV-27, and in this it is possible to verify that 186 (≈ 89%) of the respondents answered "yes", they are aware of the existence of abandoned quarries in the locality, and 23 (≈ 11%) of respondents who answered "no".

The results obtained in this question are in agreement with the results obtained in "*Question 5.1 | What is the main problem/annoyance you see in a quarry?*". Specifically, when ≈ 81% of respondents say that the main problem of quarries is the "*Destruction of the surrounding landscape and environment*", it is possible to imply in a non-forceful way that, they do so bearing in mind the existence of an environmental/landscape liability existing in their locality.

In relation to "*Question 10.2 | Who do you consider to be primarily responsible for the existence of abandoned quarries? (you can choose more than one option)*", the data is recorded in Table A.IV-28, and illustrated in the graphic in Figure 20. The respondents had the possibility of choosing more than one option, allowing the existence of different combinations of responsibilities.

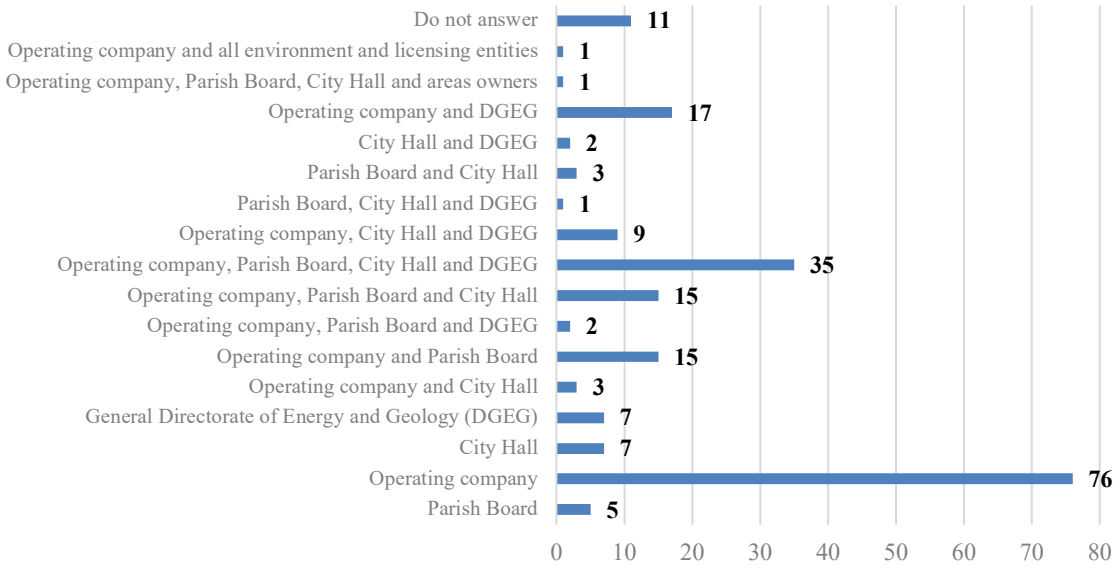


Figure 20 – Graphic with answers to "*Question 10.2 | Who do you consider to be primarily responsible for the existence of abandoned quarries? (you can choose more than one option)*", based in Table A.IV-28.

Based on the graphic in Figure 20, it is considered relevant to make an accounting related to the number of times that the responsibility for the existence of abandoned quarries is attributed to each entity, whether in combined form or in individual form. In this context, the Table 7 shows the number of times each entity is mentioned.

Table 7 – Individual accounting of each entity mentioned in Table A.IV-28, relating to Question 10.2.

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Parish Board	77	36,7%
Operating company	174	82,9%
City Hall	76	36,2%
DGEG – General Directorate of Energy and Geology	73	34,8%
Independent entity	1	0,5%
Do not answer	11	5,2%

In Table 7, it can be seen that the combined results of the accounting made, place the "*Operating company"* as the entity that respondents hold most responsible for the existence of abandoned quarries in the locality, with 174 (≈ 83%) of references, followed by "*Parish Board"* with 77 (≈ 37%) references, "*City Hall"* with 76 (≈ 36%) and finally "*DGEG"* with 73 (≈ 35%) references.

From this accounting, it is clear that respondents attribute greater responsibility to the "*Operating company*". Only after the company do they assign responsibilities to the "*Parish Board*", "*City Hall*", and finally "*DGEG*".

In relation to "*Question 8.3 | Who do you think should be responsible for making the information referred to in the previous question available? (you can choose more than one option)*" there is a change in assigned responsibilities, that is, whether in Question 8.3 the main responsibility for providing information is attributed to the closest public entity (the "*Parish Board*"), regarding the responsibility for the existence of abandoned quarries in the locality (and as a consequence of environmental liabilities), this is attributed to the "*Operating company*" in a very strong manner (≈ 83%), and only then are public entities held responsible by order of proximity ("*Parish Board*", "*City Hall*" and "*DGEG*").

It is therefore fair to say that the respondents are very aware of the allocation of responsibilities, as well as the attribution of different roles in the mineral resources sector.

The answers to "*Question 10.3 | Do you consider it important for the local community that these abandoned quarries are restored to a landscaping level?*", are recorded in Table A.IV-29 and illustrated in graphic in Figure 21.

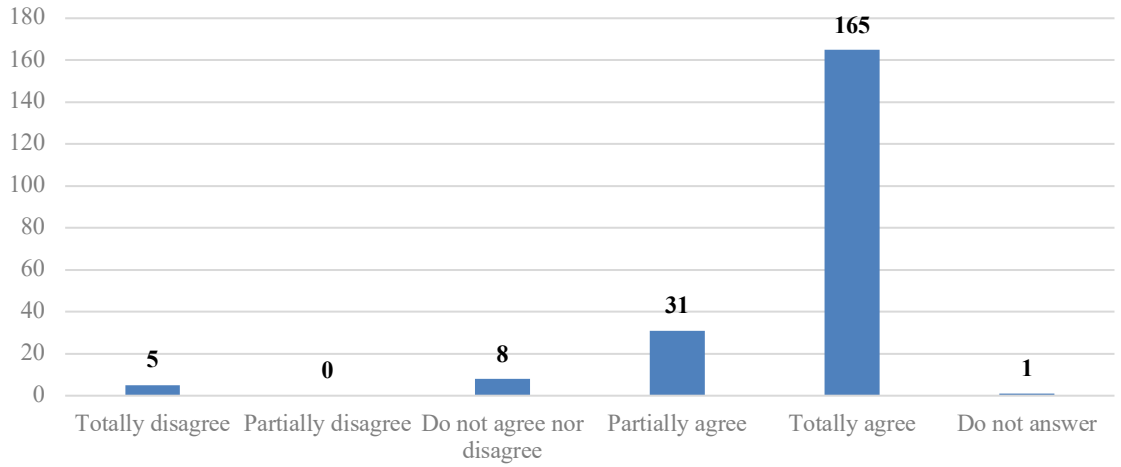


Figure 21 – Graphic with answers to "*Question 10.3 | Do you consider it important for the local community that these abandoned quarries are restored to a landscaping level?*", based in Table A.IV-29.

In general, it appears that together there are ≈ 93% of agreeing opinions about the important for the local community that the abandoned quarries will be restore, approximately ≈ 4% neutral opinions, and ≈ 2% of disagreeing opinions. Clearly, the vast majority of respondents see the restoration of abandoned quarries as very important for the local community.

Carrying out a joint analysis with other questions previously analyzed, it appears that the result obtained in Question 10.3 is in agreement with the results obtained in some previously identified questions, in particular, it is consistent with the results obtained in "*Question 5.1 | What is the main problem/annoyance you see in a quarry?*" (Figure 12) which identifies as the main problem/annoyance that respondents see in a quarry is the "*Destruction of the surrounding landscape and environment*", with ≈ 81%.

It is also possible to verify consistency with the results obtained in "*Question 5.2 | Do you think it is possible to reconcile quarrying with environmental protection?*", where there is ≈ 69% of opinions in agreement on the possibility of reconciling quarrying with environmental protection.

It should also be noted that, in "*Question 6.1 | Once you consider the possibility of compensating measures for the environmental damage caused by quarries, classify the options described below:*", where the statement that deserves the greatest agreement is "*Restore the landscape of the quarry site*" (Table 3) with ≈ 63%, which shows consistency of results.

Regarding to "*Question 10.4 | Do you agree that, in the case of a company recovering abandoned quarries, this recovery can be considered positive for opening a new quarry?*", the results are recorded in Table A.IV-30, and illustrated in the graphic in Figure 22.

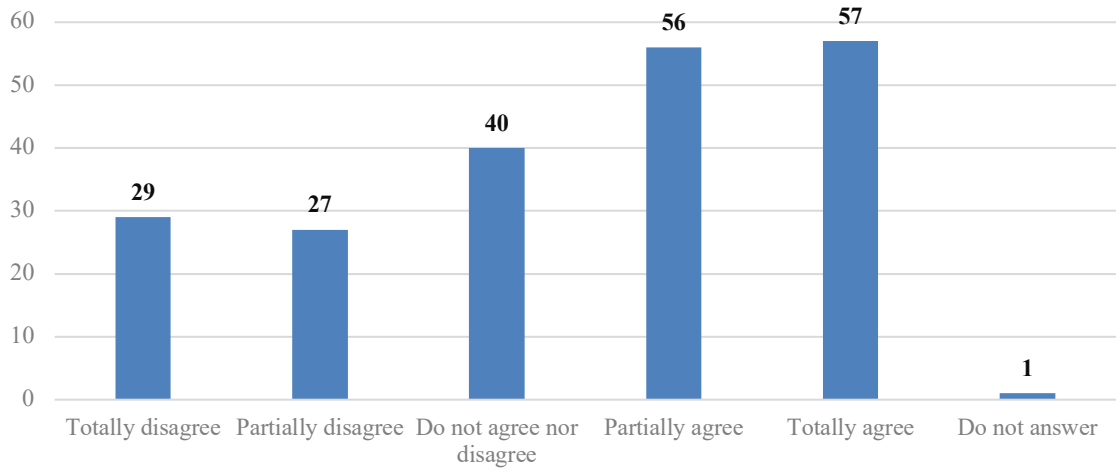


Figure 22 – Graphic with answers to "*Question 10.4 | Do you agree that, in the case of a company recovering abandoned quarries, this recovery can be considered positive for opening a new quarry?*", based in Table A.IV-30

In general, it appears that together ≈ 54% of agreeing opinions with the statement that say that in the case of a company recovering abandoned quarries, this recovery can be considered positive for opening a new quarry, approximately ≈ 19% neutral opinions, and ≈ 27% of disagreeing opinions.

In this question it appears that there is a majority of favorable opinions, however it cannot be ignored that a significant part of the respondents answered the question in a discordant way, that is, they do not agree that in the case of a company recovering abandoned quarries, this recovery can be considered positive to open a new quarry.

The answer to this question assumes greater interest and preponderance taking into account that in the Serra de Aire e Candeeiros Natural Park, the premise implied in Question 10.4 has regulatory force, provided in the article 25 and 26 of the Deliberation (extract) n.º 1049-A/2023, october 19th, which approves the Management Regulations for the Serras de Aire and Candeeiros Natural Park (ICNF, 2023), in its current writing.

4.2. Statistical analysis

The results obtained in the research are now the target of a cross-analysis, that this subchapter will carry out based on cross-tables of data from the different answers given and recorded in Attachment IV – Survey Analysis.

In order to assess which type of statistical test (parametric or non-parametric) applies to the data obtained in the survey, a normality test was initially carried out. With the support of SPSS software, it was possible to obtain results for normality tests based on two different methods, Kolmogorov-Smirnov (used to assess whether data fit any known reference distribution (e.g., normal, exponential)) and Shapiro-Wilk (checks whether data fits or differs from a normal distribution). In any of the tests, consider that the distribution of data is normal if the value of $p > 0.05$.

The table in Attachment V records the results of the two normality testing methods used. Although the results of the two methods are not completely coincident, it was option to record the results of both methods. However, the interpretation of data referring to the Shapiro-Wilk method is considered the most appropriate to the survey data.

Analysis of the data in relation to the Shapiro-Wilk method shows that only the answers to Question 4.1.4. do not differ from a normal distribution (Shapiro-Wilk, $p = 0.066$). It is important to remember at this point that the responses to this set of questions were previously considered (4.1.3) too small for broad and well-founded readings of the results, since only 12 respondents had the opportunity to respond. Therefore, also in this context the group of responses is considered non-representative.

All remaining responses to the survey questions indicate that the data deviate significantly from a normal distribution (Shapiro-Wilk, $p < 0.05$).

Considering the aforementioned, it is considered that in general all responses to the survey questions follow a non-normal distribution, therefore, for the following statistical analysis, will be used a non-parametric statistical test, specifically, the Kruskal-Wallis.

The results of the Kruskal-Wallis test and the result of the cross-tables are recorded in Attachment V – Statistic analysis of the results, and are the basis of the analysis that follows.

4.2.1. Effect of gender, age and educational level

To analyze the effect of gender, age and education level on the answers given, a total "sweep" of all the answers obtained was carried out, in order to undermine the significance of the effect of these aspects previously mentioned in the survey answers.

The results were recorded in Attachment VI - Statistic analysis of the results, in tables:

- Table A.VI-1 | Hypothesis test summary for the gender of respondents;
- Table A.VI-2 | Hypothesis test summary for the age of respondents; and
- Table A.VI-3 | Hypothesis test summary for the education level of respondents.

Sequentially to the results obtained in Table A.VI-1, Table A.VI-2 and Table A.VI-3, and bearing in mind in which questions there is a significant effect of the respondents' gender, age and education level on the answers given, the respective cross-tables and illustrative graphics were prepared (Attachment VI – Statistic analysis of the results), and now analyzed.

- **Gender characterization (effect on the answers)**

The cross-tables and graphics obtained that support the gender characterization are ordered according to the ordering of the questions to which they relate. The Table A.VI-4 summarizes the data obtained and demonstrates in a synthetic way for each specified question the effect of gender on the responses.

It is important to note that in a considerable part of the responses obtained, the gender is not a factor capable of having significant effects on the responses given. Those where there was a gender effect (summarized in Table A.VI-4) are identified and analyzed next. Therefore we have:

- *Question 2.1 | Can you identify/define what a mineral resource is?*
  In contrast to the balance that exists in relation to the respondents who answered "yes", the respondents who answered "no" are mostly women.

- *Question 2.4 | If you answered yes to the previous question, indicate approximately how many in the options below:*
  Women mostly indicate and identify up to five mineral resources explorations close to where they live (up to a radius of 5km), with men overwhelmingly dominating the answers given to the other classes of the number of mineral resource explorations.

- *Question 2.5 | Would you prefer that there were no quarries close to where you live (within a 5km radius)?"*
  In general, it is possible to see that those who responded in the sense that they preferred that there were no quarries near the place where they live, the majority were women, in contrast to the respondents who responded that they did not prefer that there were no quarries close to the place where they live, where the majority are men. Note also that the overall results for Question 2.5 (subchapter 4.1.2) show a balance of results (≈ 51% / ≈ 49%), however, as it is possible to see in the results of the gender characterization for this question, there is a significant effect on the results obtained.

- *Question 2.6 | How many quarry operations do you think could exist near the place where you live without causing you any discomfort?*
  It can be seen that, similar to what happened with the answers to Question 2.4, women mostly indicate up to five quarries in operation near the place where they live without causing any discomfort, with men dominating the answers given to the other classes of quarries in operation without causing discomfort.

- *Question 5.3 | How long do you think there have been quarries close to your location (within a 5km radius)?*

It is clear that only in the option “less than 30 years old” men are the majority in the answers given, while in all other available options women are the majority.

- *Question 5.5 | If you answered yes to the previous question, indicate how many people?*
  Men’s constitute a large majority of respondents who say they know up to 40 people who work or have worked in quarries, which counterbalances the three previous options where women (in each one of the options) are the majority of the answers given, noting that, in the option that identifies up to a maximum of 5 people who work or have worked in quarries, the majority constituted is quite large.

- *Question 5.6 | In your opinion, do you think there is any measure that can compensate for the environmental damage that quarries cause?*
  It is possible to verify that in relation to positive responses, although men are in the majority, in relation to negative responses women are a clear majority.

- *Question 6.1.2 | Once you consider the possibility of compensating measures for the environmental damage caused by quarries, classify the options described below: Make compensation plantations in other location*
  From the previous data, it becomes clear that the majority of agreeing responses are from women (with the majority being in the Totally agree option). On the other hand, it appears that the majority of the discordant opinions are given by men.

- *Question 6.1.10 | Once you consider the possibility of compensating measures for the environmental damage caused by quarries, classify the options described below: Create an environmental office*
  Similar to option 6.1.2, it becomes noticeable that the majority of agreeing responses are from women (with the majority being the majority in the Totally agree option), as well as the majority of disagreeing opinions being given by men. One aspect that stands out in this issue is related to neutral opinions, where the majority of opinions are given by women.

- *Question 7.2.5 | If you answered yes to the previous question, then consider the possibility of social responsibility on the part of the quarries, classify the options described below: Implement support for the education of local students*
  It is clear that the majority of agreeing answers are from women (in both degrees of agreement). In relation to neutral opinions, these are mostly given by men, with a relative gender balance in dissenting opinions.

- *Question 8.2 | Do you think there is enough information about quarries close to where you live (within a 5km radius)?*
  A considerable majority of people who consider that there is not enough information are women, in contrast to those who consider that there is sufficient information about quarries, of which the majority are men.

- *Question 10.1 | Are you aware of the existence of abandoned quarries in your locality?*
  The vast majority of people who say they are not aware of the existence of abandoned quarries in their locality are women, and of the respondents who say they are aware of the existence of abandoned quarries in their locality the majority are men.

- *Question 10.4 | Do you agree that, in the case of a company recovering abandoned quarries, this recovery can be considered positive for opening a new quarry?*
  The majority of responses agreeing with the statement "*in the case of a company recovering abandoned quarries, this recovery can be considered positive for opening a new quarry*" are from men (although the balance in the option Partially agree). Disagreeing responses are mostly from women, as are the neutral opinions.

Having carried out the previous question-by-question analysis, it is possible to say that the gender of the respondents has a partial significant influence on some types of questions, namely, influence was noted on questions of a general nature (subchapter 4.1.2), questions related to exploration of resources (subchapters 4.1.4 and 4.1.5), of a social nature (subchapter 4.1.6), information (subchapter 4.1.7) and environmental nature (subchapter 4.1.5 and 4.1.9).

It is also possible to say that from a general perspective, and based on the previous analysis, women demonstrate a more focused perspective on environmental conservation (Question 2.5, Question 2.6, Question 5.6, Question 6.1.2 and Question 6.1.10) expressing a need for more information (Question 7.2.5 and Question 8.2).

In relation to men, they seem to show more openness to the sector (Question 2.5 and Question 5.5), in what simultaneously appears to be some "lack of direction" in relation to environmental issues (Question 6.1.2, Question 6.1.10 and Question 7.2.5) although they consider the existence of impacts (Question 5.6, Question 10.1 and Question 10.4).

- **Age characterization (effect on the answers)**

In relation to the age characterization in the answers given, the main reading that can be obtained from the results in Table A.VI-2 is that age is not a factor capable of having significant effects on the responses given. The statistical analysis of the effect significance of age (Kruskal-Wallis test) shows that only Question 2.6 has a significant age effect.

So, it is considered interesting to understand and carry out an analysis of the results obtained in the cross-table and respective graphic about Question 2.6, which can be found in Attachment VI – Statistical analysis of the results.

The Table 8 summarizes the data obtained and shows in a synthetic way the effect of age on the responses.

Table 8 – Age effect in Question 2.6 based in Table A.VI-2

QUESTION 2.6	AGE EFFECT					
	[18-27]	[28-37]	[38-47]	[48-57]	[58-67]	[68-77]
until 5 quarries	≈ 10%	≈ 20%	≈ 30%	≈ 18%	≈ 15%	≈ 7%
until 10 quarries	≈ 6%	≈ 6%	≈ 53%	≈ 22%	≈ 9%	≈ 3%
until 15 quarries	0%	0%	≈ 44%	≈ 11%	≈ 33%	≈ 11%
until 20 quarries	0%	≈ 33%	0%	≈ 33%	≈ 33%	0%
more than 20 quarries	0%	≈ 19%	≈ 44%	≈ 19%	≈ 12%	≈ 6%

Based on the information in Table 8, it is possible to verify the relevance of the age group [38-47]. Adding to this the fact that the statistical analysis (Kruskal-Wallis test) shows that only one question (Question 2.6) was found to be significant age effect, we can say that the results obtained do not allow a well-founded analysis of a general scope. Therefore, it is considered safe to say that the age of the respondents does not influence the answers given.

- **Education level characterization (effect on the answers)**

The education level characterization in the answers given is analyzed in Table A.VI-3. Similar to the age characterization, the education level does not seem capable of having significant effects on the responses given, since in only three questions (Question 2.1, Question 3.1.2 and Question 10.3) a statistically significant effect was identified.

Similar to age characterization, was carry out an analysis of the results obtained in the cross-table and respective graphic about the Question 2.1, Question 3.1.2 and Question 10.3, which can be found in Attachment VI – Statistical analysis of the results. The Table 9 summarizes the data obtained and shows in a synthetic way the effect of education level on the responses.

Table 9 – Education level effect based in Table A.VI-3

QUESTIONS		EDUCATION LEVEL EFFECT				
		Former 4th class	Up to 6th grade	Up to 9th grade	Up to 12th grade	Higher education
2.1	*Who answer "Yes"*	≈ 5%	≈ 5%	≈ 10%	≈ 22%	≈ 58%
	Who answer "No"	≈ 15%	≈ 15%	≈ 39%	≈ 23%	≈ 8%
3.1.2	*Totally disagree*	≈ 29%	0%	≈ 14%	≈ 29%	≈ 29%
	Partially disagree	0%	≈ 8%	0%	≈ 8%	≈ 83%
	Not agree or disagree	≈ 3%	≈ 6%	0%	≈ 28%	≈ 64%
	Partially agree	0%	≈ 2%	≈ 11%	≈ 23%	≈ 65%
	Totally agree	≈ 7%	≈ 12%	≈ 20%	≈ 19%	≈ 42%
10.3	*Totally disagree*	0%	≈ 20%	≈ 60%	≈ 20%	0%
	Partially disagree	0%	0%	0%	0%	0%
	Not agree or disagree	0%	≈ 13%	13%	≈ 50%	≈ 25%
	Partially agree	≈ 10%	≈ 7%	≈ 27%	≈ 20%	≈ 37%
	Totally agree	≈ 6%	≈ 5%	≈ 7%	≈ 22%	≈ 61%

Based on the information in Table 9, it is possible to say about each question:

- *Question 2.1 | Can you identify/define what a mineral resource is?*
  The results obtained in relation to interviewees who answered "yes" are quite similar (in order of magnitude) with the general characterization of the level of education expressed in the graphic in Figure 6. Among interviewees who answered "no", there

is a relative balance in relation to all education levels, with a non-negligible rise in relation to respondents with "Up to 9th grade".

- *Question 3.1.2 | Regarding the need for exploration of mineral resources, classify the options described below: For economic support of families*
  With regard to the answers available for choice to Question 3.1, the option now under analysis "*For economic support of families*" proved to have a significant statistical effect in relation to education level. It is possible to observe that at all levels of education there is a relevant degree of agreement with the importance for the local community that abandoned quarries are restored to a landscaping level.

- *Question 10.3 | Do you consider it important for the local community that these abandoned quarries are restored to a landscaping level?*
  Similar to the previous question, it is possible to observe that at all levels of education there is a great degree of agreement with the importance for the local community that abandoned quarries are restored to a landscaping level.

In the context of the analysis carried out, it is considered that it is not possible to make any additional reading from the analyzed data. Adding to this the fact that the statistical analysis (Kruskal-Wallis test) shows that only three questions (Question 2.1, Question 3.1.2 and Question 10.3) was found to be significant education level effect, we can say that the results obtained do not allow a well-founded analysis of a general scope.

Therefore, it is considered safe to say that the education level of the respondents is not capable of influencing the answers given.

4.2.2. Effect between responses in specific questions

Testing all possible combinations between the survey questions (and their different possible answers) would be a highly complex and dense exercise, with no obvious added value from the outset, and its execution would fall outside the objectives set for the study. This opens up the possibility of analyzing all possible combinations as the object of their own study.

In this context it was decided to direct the analysis to previously selected questions whose potential relationship was considered to be able to provide new relevant information and/or an interpretation of the recorded data, namely:

i. *Question 2.5 | Would you rather there were no quarries near where you live (within a 5km radius)?* and *Question 2.7 | Do you consider it necessary to explore mineral resources (for example, quarries)?*;

ii. *Question 2.7 | Do you consider it necessary to explore mineral resources (for example, quarries)?* and *Question 5.2 | Do you think it is possible to reconcile quarrying with environmental protection?*;

iii. *Question 2.7 | Do you consider it necessary to explore mineral resources (for example, quarries)?* and *Question 8.1 | Do you think that quarrying in your locality is, or was, important economically and/or socially?*.

The issues mentioned previously (and their combination) had the basic intention of trying to identify the possible existence of a NIMBY effect (i), the possible existence of a path of acceptance of the sector by the exposed population through the possibility of environmental recovery of the explored site (ii), or its social and economic impact (iii).

Once the questions were selected, the significance of the effect of these was determined using the Kruskal-Wallis test. Based on this methodology the results were recorded in Attachment VI - Statistic analysis of the results, in Table A.VI-5 | Hypothesis test summary for specific questions respondents.

Sequentially to the results obtained the analysis is the following.

- *Question 2.5 | Would you rather there were no quarries near where you live (within a 5km radius)?* and *Question 2.7 | Do you consider it necessary to explore mineral resources (for example, quarries)?*
  To verify and understand the responses of the interviewees who answered Question 2.5 and subsequently the type of the answers to Question 2.7, the Table 10 summarize the results obtained in the cross-table between these two questions.

Table 10 – Quantification of cross-answers between Question 2.5 and Question 2.7

	QUESTION 2.5	
QUESTION 2.7	**"Yes"**	**"No"**
"Yes"	≈ 85%	100 %
"No"	≈ 11%	0%

Interpreting the Table 10, it is possible to say:

- in a way, it is expected that interviewees who answered "no" to Question 2.5, would later answer "yes" to Question 2.7, since when they consider that they would not prefer that there were no quarries close to where they live, consider for some reason that there is a need for exploration of mineral resources (since they already showed in question 2.5 openness to the proximity of quarries);
- the assumption made in the previous consideration was fully verified, with 100% answering "no" in Question 2.5 and answering "yes" in question 2.7;
- on the other hand, it would also be expected that interviewees who answered "yes" to Question 2.5 would later answer "no" in Question 2.7, being able to consider that, once the respondent considered preferring that there were no quarries close to where they live, and assuming one social perspective of equality referred in Article 66 of the Constitution of the Portuguese Republic[4] in its most recent wording, when mentioning in point 1 that "*Everyone has the right to a*

[4] Decree of Approval of the Constitution, of April 10, published in the Official Gazette of the Portuguese Republic nº 86/1976, Series I of April 10, 1976, which can be consulted here: https://diariodarepublica.pt/dr/legislacao-consolidada/decreto-aprovacao-constituicao/1976-34520775

healthy and ecologically balanced human living environment and the duty to defend it." (something that in the present context could be understood in a simplified way as "I don't wish for others what I don't wish for myself"), in logical sequence we can say that they consider the existence of exploration of mineral resources as not being necessary;

– the assumption made in the previous consideration was not verified, having found that ≈ 85% of the interviewees who answered "yes" to Question 2.5, later also answered "yes" to Question 2.7, and only 11% of the interviewees who answered "yes" to Question 2.5 they later answered "no" to Question 2.7.

- **Model of NIMBY effect estimation**

From the previous observation, it is considered possible to say that, from a general perspective, those who say they prefer that there were no quarries close to where they live, but then consider for some reason the existence of explorations of mineral resources to be necessary (taking quarries as an explicit example), shows some signs of a "bias" that could be said to be a self-protective nature in relation to the locality where they lives, which in a straightforward way can be called the NIMBY effect.

Therefore, based on the identification of the NIMBY effect in this work, it is considered possible to give it a quantitative character, and not just a qualitative character (as identified in subchapter 2.1).

It is then proposed that the model to estimate the NIMBY effect in the target population studied is based on the following equation:

$$\text{Equation 3} \qquad E_{NIMBYSamPop} = \left(\frac{YY}{T_{SamPop}} \times 100\right) \pm e$$

where

$E_{NIMBYSamPop}$ – NIMBY effect of the sampled population

YY – number of interviewees who answered "yes" to both questions

T_{SamPop} – total interviewees who answered both questions

e – sampled universe error[5]

Therefore, in the present work is possible to estimate the NIMBY effect in the sampled population by applying the Equation 3:

$$E_{NIMBYSamPop} = \left(\frac{95}{210} \times 100\right) \pm 6{,}2\%$$

$$E_{NIMBYSamPop} = 45{,}2 \pm 6{,}2\%$$

[5] since the error associated with the sample universe is 6,21% (for a confidence level of 95%), it is appropriate to consider also that the NIMBY estimate is affected by the error associated with the sampled universe.

it is thus estimated that in the population sample researched, there is a NIMBY effect of ≈ 45 ± 6%.

Once the NIMBY effect has been estimated, and bearing in mind that it was verified that there is a significant effect of the gender of the interviewees in the answers given to Question 2.5 (subchapter 4.2.1), it is considered appropriate to understand whether such a significant effect could also be reflected in the NIMBY effect.

The number of women and men who simultaneously answered "yes" to Question 2.5 and Question 2.7 was counted, resulting in the Table 11.

Table 11 – Quantification of women and men who simultaneously answered "yes" to Question 2.5 and Question 2.7

GENDER	ANSWERS	
	NUMBER	PERCENTAGE
Women	57	60,0%
Men	38	40,0%

The Table 11 shows that there is a non-negligible difference regarding the percentage of women and men who demonstrate the NIMBY effect, with Δ 20%.

This finding may indicate that there is a greater propensity for women to manifest the NIMBY effect, however, it is believed that this type of analysis requires greater justification, which is believed to require its own study, especially in the context of social analysis, and which does not was the target of this study.

- *Question 2.7 | Do you consider it necessary to explore mineral resources (for example, quarries)?* with *Question 5.2 | Do you think it is possible to reconcile quarrying with environmental protection?*
  It is intended to verify and understand the responses of the interviewees who answered Question 2.7 and subsequently the type of the answers to Question 5.2, the Table 12 summarize the results obtained in the cross-table between these two questions.

Table 12 – Quantification of cross-answers between Question 2.7 and Question 5.2

QUESTION 2.7	QUESTION 5.2				
	Totally Disagree	**Partially Disagree**	**Do Not Agree Nor Disagree**	**Partially Agree**	**Totally Agree**
"Yes"	≈ 2%	≈ 7%	≈ 21%	≈ 41%	≈ 28%
"No"	≈ 17%	0%	≈ 33%	≈ 17%	≈ 33%

Interpreting the Table 12, it is possible to say:

- that ≈ 70% (137 responses) of interviewees who consider it necessary to explore mineral resources (for example quarries), show agreement with the possibility of reconciling the exploitation of quarries with environmental protection (although to different degrees);

- it can also be seen that ≈ 21% (42 responses) of those interviewed expressed a neutral opinion, in relation to the need for mineral exploration and the possibility of reconciling the exploitation of mineral resources with environmental protection, and ≈ 9% (18 responses) of those interviewed expressed discordant opinion (to different degrees);
- it is thus possible to say that the surveyed population show a "vision" about the mineral resources exploration sector that points to a context of environmental sustainability, where they believe in the possibility of coexistence of the sector with environmentally demanding standards (it is possible to estimate the standards of environmental demands through the answer to Question 5.1 and Question 6.1);
- the interpretation explained finds support in the high level of agreement demonstrated (≈ 70%), taking as a basis for decision two scenarios that initially seemed to be incompatible, "need for resources vs. environmental protection".

- *Question 2.7 | Do you consider it necessary to explore mineral resources (for example, quarries)?* with *"Question 8.1 | Do you think that quarrying in your locality is, or was, important economically and/or socially?"*
  It is intended to verify and understand the responses of the interviewees who answered Question 2.7 and subsequently the type of the answers to Question 8.1, the Table 13 summarize the results obtained in the cross-table between these two questions.

Table 13 – Quantification of cross-answers between Question 2.7 and Question 8.1

QUESTION 2.7	QUESTION 8.1				
	Totally Disagree	Partially Disagree	Do Not Agree Nor Disagree	Partially Agree	Totally Agree
"Yes"	≈ 1%	≈ 3%	≈ 7%	≈ 29%	≈ 61%
"No"	≈ 8%	≈ 17%	≈ 25%	≈ 17%	≈ 33%

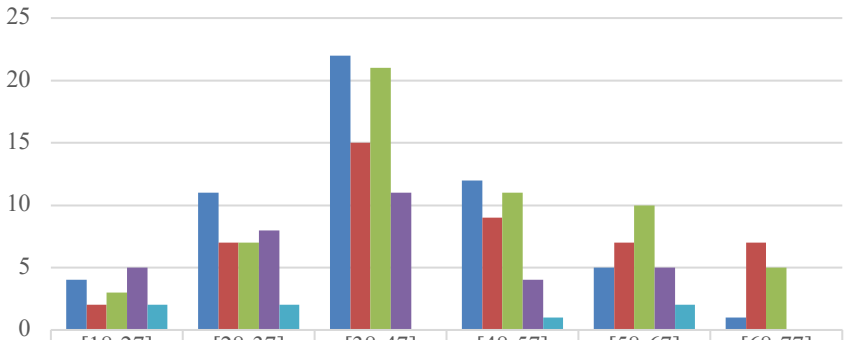
Interpreting the Table 13, it is possible to say:

- in a way, it is possible to say that ≈ 90% (175 responses) of interviewees who consider it necessary to explore mineral resources (for example quarries), show agreement (in the present or in the past) with the economic and/or social importance of the exploration of quarries in the locality (although in different degrees);
- it can also be seen that ≈ 7% (13 responses) of those interviewed expressed a neutral opinion, in relation to the economic and/or social importance of the exploration of quarries in the locality, and ≈ 4% (7 responses) of those interviewed expressed discordant opinion (in different degrees);
- based on the previous analysis, it is possible to interpret that the surveyed population shows a very consolidated recognition of the (present and/or past) social and economic importance of the mineral resources sector, by expressing a level of general agreement of ≈ 90 %;
- the very low level of disagreement is also relevant, which is generally ≈ 4%;

– by expressing high levels of agreement with the need to explore mineral resources, with the social and economic importance of the sector in the locality, and cumulatively (through the analysis in the cross-table/graphic between Question 2.7 and Question 5.2) with the possibility of reconciling exploration of mineral resources with environmental protection, solidifies the interpretation of the existence of a sustainability context, not only environmental sustainability (as indicated in the cross-table/graphic between Question 2.7 and Question 5.2) but also presents the social and economic context;
– it is therefore possible to safely assert that the population surveyed understands the mineral resources sector within a general context of sustainability, where the environmental, social and economic pillars are present, which in general terms corresponds to the most widely accepted definition of sustainability, and which supports the SDGs developed by the United Nations (subchapter 2.4 Sustainable Development Goals (SDG)).

4.2.3. Specific analysis (about collective memory)

When the analysis was carried out in the point Age characterization, it was considered that the age class did not have the capacity to influence the answers given. Therefore, this analysis is based on the cross-table and the graphic in Figure 23.



	[18-27]	[28-37]	[38-47]	[48-57]	[58-67]	[68-77]
over 75 years old	4	11	22	12	5	1
between 60 and 75 years old	2	7	15	9	7	7
between 45 and 60 years old	3	7	21	11	10	5
between 30 and 45 years old	5	8	11	4	5	0
less than 30 years old	2	2	0	1	2	0

Figure 23 – Graphic with cross-table illustration from "*Question 1.2 | Age*" with "*Question 5.3 | How long do you think there have been quarries close to your location (within a 5km radius)?*".

However, taking into account the objectives that this work proposes, and taking into account the interpretation that was possible to make the cross-table that relates Question 2.7 and Question 8.1, it is considered pertinent to evaluate the possible relationship between the class age of the interviewees and the notion of longevity and/or continuity of the mineral resources sector in the location where they live.

The relevance of this analysis therefore involves the possible evidence of the existence of a "collective memory" of those interviewed.

In this sense, the analysis to be carried out will be done in terms of sets of age groups (to evaluate and interpret averages of age groups), and not directly the quantitative results recorded and illustrated in the Figure 23, and from this it results the Table 14.

The Table 14 was built based on the combination of options available in Question 5.3 in order of age class, specifically:

- age classes [18-27] and [28-37], which together have an average age of around 28 years, analyzing the number of answers obtained above and below the options that mark the limit of 30 years, such as how long the interviewees think that there are quarries close to where they live (Questions 5.3);
- age classes [38-47] and [48-57], which together have an average age of around 48 years, analyzing the number of answers obtained above and below the options that mark the limit of 45 years, such as how long the interviewees think that there are quarries close to where they live (Questions 5.3);
- age classes [58-67] and [68-77], which together have an average age of around 68 years, analyzing the number of answers obtained above and below the options that mark the limit of 60 years, such as how long the interviewees think that there are quarries close to where they live (Questions 5.3).

Table 14 – Results aggregation of the cross-table illustrated in Figure 23.

OPTIONS ON QUESTION 5.3	AGE CLASS					
	[18-27]	**[28-37]**	**[38-47]**	**[48-57]**	**[58-67]**	**[68-77]**
over 75 years old	14 (87,5 %)	33 (94,3 %)	58 (84,1 %)	32 (86,5 %)	12 (41,4 %)	8 (61,5 %)
over 60 years old						
over 45 years old					17 (58,6 %)	5 (38,5 %)
over 30 years old			11 (15,9 %)	5 (13,5 %)		
less than 30 years old	2 (12,5 %)	2 (5,7 %)				
TOTAL	16 (100,0 %)	35 (100,0 %)	69 (100,0 %)	37 (100,0 %)	29 (100,0 %)	13 (100,0 %)

So, analyzing Table 14 it is possible to say:

i. in the age classes [18-27] and [28-37] it appears that ≈ 88% and ≈ 94% of interviewees, respectively, think that there are quarries close to their location for more than 30 years, which means that, for the vast majority of these interviewees, the existence of quarries close to the location where they live is a reality that has existed for longer than their own age (average of 28 years). It is possible to safely say that for these interviewees the existence of quarries has always been a reality;
ii. in the age classes [38-47] and [48-57] it appears that ≈ 84% and ≈ 87% of interviewees, respectively, think that there are quarries close to their location (within a 5km radius) over 45 years, which means that, for the vast majority of these interviewees, the existence of quarries close to the location where they live is a reality

that has existed for approximately the same time as their own age (average of 48 years). It is therefore possible to safely say that for these interviewees the existence of quarries has always been a reality;

iii. in the age classes [58-67] and [68-77] it appears that ≈ 41% and ≈ 62% of interviewees, respectively, think that there are quarries close to their location (within a 5km radius) over 60 years. These age classes, show a different understanding regarding the length of time quarries have existed close to where they live. Bearing in mind that on average the age of these two age classes is 68 years old, it is not safe to say that for these age groups the quarries are older than themselves, however, indicating that they admit that the quarries are over 60 years old, they admit that the sector has been installed close to the location for a long time as well. This opinion is not surprising, as they are the two oldest age classes;

iv. in general terms, it is possible to safely say that the evidence described above identifies aspects that establish the existence of a "collective memory" regarding the mineral resources sector in the interviewees, which confirms that the population surveyed represents a reality of prolonged exposure to the mineral resources sector, and naturally all the circumstances that characterize the sector and the industry.

v. this context of "collective memory" of the surveyed population does not directly mean that the opinions formed about the industry are tending to be positive or to be negative (for this it is considered that additional study will be necessary). However, it is admitted that when interviewees express their opinion in this survey, they do so in a more consistent and secure way, which gives the survey results robustness;

vi. in this sense, the context of the existence of a "collective memory" also helps to supports the conclusions that are obtained in the Chapter 5 Final Considerations.

4.3. Interviews

As previously identified in subchapter 3.4 simultaneously with the population surveys, were also carried out interviews with representatives of local entities. In the tables in Attachment VII – Results of the interviews, there are the records of the interviews carried out (Table A.VII-1 and Table A.VII-2),

Thus, the results obtained are analyzed in order to interpret the "relative vision" of the institutions represented, in relation to the sector and the mineral resources industry in the locality. The analysis will be carried out for each of the institutions on an individual basis.

A. Remembering that according to current legislation, the City Hall is a public entity which in the case of class 3 and 4 quarries (e.g. sidewalk quarries) is a licensing entity, and in the case of class 1 and 2 quarries (e.g. products for civil construction, such as gravel or blocks) is a supervisory entity, reading Table A.VII-1 allows us to say:

   i) chaired by a 62 year old man with higher education, this leadership considers that the exploration of mineral resources is necessary in the locality/parish, seeing as reasons for this demonstrated need, the civil construction sector, economic support of local families and the local economy itself, and simultaneously admits that "*without quarries there is no society as we know it*";

ii) admits also that the exploitation of quarries in the parish is not properly regulated, distributing responsibilities between the companies themselves, parish board, DGEG, as well as the City Hall itself;
iii) considers that it is possible to reconcile quarrying with the protection of environmental values, referring as main measures the "*simultaneous recovery with exploration*" and "*Raising awareness among companies with municipality*";
iv) states that he is aware of environmental liabilities caused by quarries (abandoned or active) in the parish;
v) in sequence with previously question, the leader of de city hall admit that it is important for the local community that these be recovered, considering even that this recovery is "inevitable";
vi) this leadership also says that companies that operate quarries have or should have social responsibility in the locality, such as in supporting sport, participating in the health response, or even in employability;
vii) also says that he considers that there is not enough information available to the population about quarrying operations;
viii) finally, he agrees that the recovers abandoned quarries (from other companies) in the locality, as a measure to minimize and mitigate environmental impact for opening a new exploration, is advantageous.

B. It is important to say that Parish Board, being public entities of a local nature (and very close), do not have any responsibility for licensing or supervising quarries (of any type). However, their role of proximity should not be minimized, given that they are often the first line in listening to populations. Reading the Table A.VII-1 allows us to say:
i) led by a 47 year old man with higher education, this leadership considers that the exploration of mineral resources is not necessary in the locality/parish, seeing as reasons for this opinion the destruction of the landscape and environment around them, the pollution generation, the large amount of heavy traffic and simultaneously admits that " *at the end of the exploration there is just a hole*";
ii) admits that the exploitation of quarries in the parish is not properly regulated, assigning responsibility to the companies, only;
iii) considers that it is possible to reconcile quarrying with the protection of environmental values, referring as main measures for that are the "*application of the existent rules*", and "*Provide training to companies*";
iv) follows the City Hall in the opinion that he is aware of environmental liabilities caused by quarries (abandoned or active) in the parish;
v) the leader of the parish board admit that it is important for the local community that these be recovered, because according to him, "*it gave a different look to the land, more pleasant, at least in visual terms*";
vi) this leadership also says that companies that operate quarries have or should have social responsibility in the locality, "*in the context of supporting local institutions*";

vii) for this leadership there is not enough information available to the population about quarrying operations, saying that the main responsibility for that is based in City Hall and in the Parish itself;

viii) finally, he agrees that the recovers abandoned quarries (from other companies) in the locality, as a measure to minimize and mitigate environmental impact for opening a new exploration, is advantageous.

C. The Casa do Povo of Alqueidão da Serra is a Public Institution of Social Solidarity, whose main mission is to support the elderly and people in need in the parish, as well as the development of cultural and/or social activities. The Table A.VII-1 allows us to say:

i) led by a 45 year old man with higher education, this leadership considers that the exploration of mineral resources is necessary in the locality/parish, seeing as reasons for this demonstrated need, the civil construction sector, economic support of local families and the local economy itself, and simultaneously admits that "*without quarries there is no society as we know it*";

ii) says that the exploitation of quarries in the parish is properly regulated;

iii) he considers that it is possible to reconcile quarrying with the protection of environmental values, referring as main measures for that is the "*Changing exploration methodologies and techniques*";

iv) follows the City Hall and the Parish Board in the opinion that he is aware of environmental liabilities caused by quarries (abandoned or active) in the parish;

v) the association also admit that it is important for the local community that these be recovered, because according to him, is "*very important, for the landscape and its importance for the population*";

vi) this leadership also says that companies that operate quarries have or should have social responsibility in the locality, mainly in "*sponsor different environmental activities*" and "*support some activities of Casa do Povo*";

vii) says that there is not enough information available to the population about quarrying operations, saying that all entities have responsibility on that, but mainly the parish board and companies;

viii) finally, he agrees that the recovers abandoned quarries (from other companies) in the locality, as a measure to minimize and mitigate environmental impact for opening a new exploration, is advantageous.

D. The Alqueidão da Serra Cultural and Recreational Center is the local sports club, with the focus of its activity is sports activities, to which it adds active collaboration in children's leisure and socio-cultural activities. The Table A.VII-1 allows us to say:

i) led by a 48 year old man with higher education, this leadership considers that the exploration of mineral resources is necessary in the locality/parish, seeing as reasons for this demonstrated need, the civil construction sector, economic support of local families and the local economy itself, and simultaneously admits that "*without quarries there is no society as we know it*";

ii) says that the exploitation of quarries in the parish is not properly regulated, distributing responsibilities between the companies, DGEG and the City Hall;

iii) he considers that it is possible to reconcile quarrying with the protection of environmental values, referring as main measures for that is the "*Comply with working conditions rules (environmental and social)*";
iv) follows the City Hall, the Parish Board and Casa do Povo of Alqueidão da Serra in the opinion that he is aware of environmental liabilities caused by quarries (abandoned or active) in the parish;
v) in sequence with the previous question, they admit that it is important for the local community that quarries be recovered, because to him "*Those who live here have strong contact with nature, which ultimately means well-being and quality of life*";
vi) for this leadership the companies that operate quarries have or should have social responsibility in the locality, for example "*support for local sport*", "*promote population well-being*" and "*support ambulance to the population*";
vii) says that there is not enough information available to the population about quarrying operations, and for him "*all entities have responsibility, including the population that has not shown interest*";
viii) finally, he agrees that the recovers abandoned quarries (from other companies) in the locality, as a measure to minimize and mitigate environmental impact for opening a new exploration, is advantageous.

E. The Hunting, fishing and shooting club of the Parishes of Alqueidão da Serra and Reguengo do Fetal, with focusing on recreational hunting and fishing activities. Reading the Table A.VII-2 allows us to say:
i) led by a 39 year old man with higher education, this leadership considers that the exploration of mineral resources is necessary in the locality/parish, seeing as reasons the civil construction sector, economic support of local families, and simultaneously admits that "*without quarries there is no society as we know it*";
ii) says that the exploitation of quarries in the parish is not properly regulated, distributing responsibilities between the companies and the City Hall;
iii) he considers that it is possible to reconcile quarrying with the protection of environmental values, referring as main measure it must be "*Recover/restore the surrounding landscape*";
iv) as expected, he is aware of environmental liabilities caused by quarries (abandoned or active) in the parish;
v) they also say that it is important for the local community that these be recovered, to "*value the landscape*";
vi) for him, the companies that operate quarries have or should have social responsibility in the locality, and "*support the communities*";
vii) says that there is not enough information available to the population about quarrying operations, and for him "*this responsibility lies with companies*";
viii) finally, he agrees that the recovers abandoned quarries (from other companies) in the locality, as a measure to minimize and mitigate environmental impact for opening a new exploration, is advantageous.

F. Alecrim e Salva - Civic, Cultural and Environmental Association it is an association that develops its main activity within the scope of cultural and recreational associations, and the four main themes in which it intends to act are: culture, environment, heritage and partnerships. Reading the Table A.VII-2 allows us to say:

i) led by a 55 year old woman with higher education, this leadership considers that the exploration of mineral resources is necessary in the locality/parish, seeing as reasons for this demonstrated need, the civil construction sector, economic support of local families, and the local economy itself;

ii) says that she does not have enough knowledge to say if the exploitation of quarries in the parish is or not properly regulated, however, she admits that this responsibility will lie with the companies;

iii) considers that it is possible to reconcile quarrying with the protection of environmental values, referring as main measures for that the "*introduction of recycling standards"* and *"carbon sequestration*";

iv) she is aware of environmental liabilities caused by quarries in the parish;

v) following on from the previous question, they admit that it is important for the local community that these be recovered, "*for environmental reasons*" and "*appreciation of the landscape*";

vi) this leadership also says that companies that operate quarries have or should have social responsibility in the locality, in the context of "*landscaping/environmental issues, vibration and noise"* and *"social programs with hiring assistants for small problems*";

vii) for her there is not enough information available to the population about quarrying operations, saying that the "*population doesn't want to know*", and the main responsibility for that is based on Parish Board and local associations;

viii) finally, she disagrees that the recovers abandoned quarries (from other companies) in the locality, as a measure to minimize and mitigate environmental impact for opening a new exploration, is advantageous.

G. Association of Portuguese Sidewalk Explorers aims to promote and develop the exploration of portuguese sidewalk and ornamental rocks, as well as defending the social, professional and economic interests of quarry explorers. Currently its activity is very reduced. Reading the Table A.VII-2 allows us to say:

i) led by a 48 year old man with 9th grade, this representative considers that the exploration of mineral resources is necessary in the locality/parish, seeing as reasons for this demonstrated need, the civil construction sector, economic support of local families, and and the local economy itself;

ii) admits that the exploitation of quarries in the parish is not properly regulated, however, it does not assign responsibilities to any specific entity;

iii) he considers that it is possible to reconcile quarrying with the protection of environmental values, referring as main measures for that are the "*landscape requalification (modeling and planting)"* and *"reforestation in another area*";

iv) just like all other entities, they are aware of environmental liabilities caused by quarries (abandoned or active) in the parish;

v) in sequence with previously question, they admit that it is important for the local community that these be recovered, because according to him is "*very important to encourage acceptance*";

vi) for them, the companies that operate quarries should not have social responsibility in the locality;

vii) they admit that there is not enough information available to the population about quarrying operations, saying that the main responsibility lies with the Parish Board;

viii) finally, he agrees that the recovers abandoned quarries (from other companies) in the locality, as a measure to minimize and mitigate environmental impact for opening a new exploration, is advantageous.

4.3.1. Summary and statistical analysis

It is important to systematize the interviews previously described, in order to make a comparative analysis possible and easier, among the interviewees themselves and also with the results obtained from the survey.

The Table 15 summarizes the interviews. The table is filled out taking into account the general meaning of the answer obtained in the items identified previously, specifically, it will be filled in with "yes" or "no" in accordance to the expression of agreement or disagreement with the questions asked.

Table 15 – Summarized interviews results.

INTERVIEWED		**INTERVIEW TOPICS**							
		i)	**ii)**	**iii)**	**iv)**	**v)**	**vi)**	**vii)**	**viii)**
A		Yes	No	Yes	Yes	Yes	Yes	No	Yes
B		No	No	Yes	Yes	Yes	Yes	No	Yes
C		Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
D		Yes	No	Yes	Yes	Yes	Yes	No	Yes
E		Yes	No	Yes	Yes	Yes	Yes	No	Yes
F		Yes	*No knowledge*	Yes	Yes	Yes	Yes	No	No
G		Yes	No	Yes	Yes	Yes	No	No	Yes
TOTAL	YES	6 (85,7 %)	1 (14,3 %)	7 (100,0 %)	7 (100,0 %)	7 (100,0 %)	6 (85,7 %)	0 (0,0 %)	6 (85,7 %)
	NO	1 (14,3 %)	5 (71,4 %)	0 (0,0 %)	0 (0,0 %)	0 (0,0 %)	1 (14,3 %)	7 (100,0 %)	1 (14,3 %)
	No knowledge	0 (0,0 %)	1 (14,3 %)	0 (0,0 %)	0 (0,0 %)	0 (0,0 %)	0 (0,0 %)	0 (0,0 %)	0 (0,0 %)

Reading the Table 15 it is possible to analyze the responses obtained from the seven institutions interviewed, which will be done question by question, making it possible to say:

i) Do you consider the existence of mineral resource exploration (for example, quarries) necessary for the parish/locality?

In relation to this issue, it appears that only the local Parish Board says that the existence of exploration of mineral resources is not necessary for the parish/locality. The remaining institutions (≈ 86%) say that existence exploration of mineral resources are necessary for the parish/locality.
In comparing the statistics obtained from this question, with *Question 2.7 | Do you consider it necessary to explore mineral resources (for example, quarries)?* (subchapter 4.1.2) of the survey conducted in the population, and without ignoring that the target universe is different, it is possible to observe a degree of agreement in the same order of magnitude (≈ 86% / ≈ 94%). Taking into consideration that exceptioning the City Hall leadership, all remaining leaderships are individuals of the Parish/locality, it can be said that the results are spectable, and in some way help to consolidate the results obtained from the survey.

ii) *Do you consider that the exploitation of quarries in the parish is properly regulated taking into account the applicable legislation? If not, who is primarily responsible?*
It is seen that only the Casa do Povo of Alqueidão da Serra considers that quarries are well regulated. The Alecrim e Salva Association, considers not to possess sufficient knowledge to answer the question. The remaining entities consider that quarries are not well regulated, specifically, ≈ 71%.
This issue has no direct analogy with any other issue in the inquiry, however, lets you realize that the vast majority considers the legislation is not being met, including the City Council which is an entity with enforcement and/or licensing powers. In this regard, he gains parallel relevance the fact that also the Association of Portuguese Sidewalk Explorers representative admits that the legislation is not being respected.
Thus, generally speaking, the issue under analysis shows a reading and perception of the situation present on the context of the exploration of mineral resources that undergoes an admission of defaulting the legislation, which is considered a relevant aspect in itself.

iii) *Do you think it is possible to reconcile quarrying with the protection of environmental values?*
From the answer to this question, it is possible to see that there is a unanimity, all interviewed consider that it is possible to reconcile quarrying with the protection of environmental values.
This question does not have direct comparison with the issues posed in the population's inquiry, however, it is important to note that 100% of the entities considered in the interview agree it is possible to reconcile with the protection of environmental value.

iv) *Are you aware of environmental liabilities caused by quarries (abandoned or active) in the parish?*
From the answer to this question, it is possible to see that there is a unanimity. All entities interviewed say they know environmental liability caused by quarries (abandoned or active) in the parish.

In this question it is possible to make a comparative analysis with a question made in the inquiry, namely *Question 10.1 | Are you aware of the existence of abandoned quarries in your locality?* (subchapter 4.1.9).
Thus, it is found that 100% of the entities considered in the interview say they know environmental liability caused by quarries in locality, with ≈ 89% of respondents being aware of the existence of abandoned quarries in your locality. It is thus possible to say that the order of magnitude of the results is similar, which cannot be considered unexpected.

v) Do you consider it important for the local community that these abandoned quarries are restored?

Once more, also on this question there is a unanimousness of answers, where 100% of the entities considered in the interview say it is important for the local community that these abandoned quarries are remaining.
Comparing the results obtained in this question with the results obtained from *Question 10.3 | Do you consider it important for the local community that these abandoned quarries are remained to a landscaping level?* (subchapter 4.1.9), it is possible to see that the order of magnitude of the obtained results is similar.
In this context, we can see that 100% of the entities considered in the interview agree that it is important for the local community that these abandoned quarries are restored, and ≈ 93% of surveyed also agree (although in different degrees of agreement) that it is important for the local community that these abandoned quarries are restored to a landscaping level.

vi) In your opinion, do companies that operate quarries have or should have social responsibility in the locality?

On this question, it appears that only the Association of Portuguese Sidewalk Explorers says that the companies that operate quarries do not have or should have social responsibility in the locality were operates. It cannot be said that this position is unexpected, however, is in complete counterpoint with the position of the remaining entities interviews. The remaining institutions (≈ 86%) consider that the companies have or should have social responsibility in the locality were operates.
Comparing this question, with *Question 7.1 | In your opinion, do companies that operate quarries have or can have social responsibility in the locality where they are located?* (subchapter 4.1.6) of the survey conducted in the population, it is possible to observe a degree of agreement in the same order of magnitude (≈ 86% / ≈ 89%).
In this regard, it is possible to say safely that the results obtained are concordant.

vii) Do you think that sufficient information is available to the population about quarrying operations?

In Table 15, it is possible to see that also in this question there is unanimity. In the present question 100% of the entities considered in the interview say that there is not enough information available to the population on exploitation quarry.

Regarding this question, it is possible to do a comparative analysis with *Question 8.2 Do you think there is enough information about quarries close to where you live (within a 5km radius)?* (subchapter 4.1.7).
In this case exist a non-deployable discrepancy, specifically, whereas in the interviews conducted 100% of the respondents states that there is not enough information available to the population on exploitation quarry, in the survey this opinion is fixed at ≈ 75%.
It is noted that even the representatives of the Association of Portuguese Sidewalk Explorers agree and admit the fellowship on quarries is not enough. In this context, there may be room for project development that promote the rapport of companies with the remaining entities, either with the population of the locality.

viii) *The recovers abandoned quarries (from other companies) in the locality, as a measure to minimize and mitigate environmental impact for opening a new exploration, would you consider this advantageous?*
In the latter question, it is possible to see that ≈ 86% of the entities interviewed say that they consider that the recovery of abandoned quarry (from other companies) in the locality, should be considered advantageous in the context of measures of minimization and mitigation of environmental impacts for opening new quarries.
As in previous questions, it is also possible to make a comparative analysis with *Question 10.4 | Do you agree that, in the case of a company recovering abandoned quarries, this recovery can be considered positive for opening a new quarry?* (subchapter 4.1.9) of the population survey.
It is then realized that, similar to the previous question, also here a non-deployable discrepancy, where about ≈ 54% of the population agrees (in different degrees of agreement) that in the case of a component recovering abandoned quarries, this recovery can be considered positive for opening a new quarry, which contrasts with the ≈ 86% of respondents.
In this context, it is noted that in the two situations, there are majorities (although with different weights) favorable to the use of abandoned quarry retrieved in benefit from opening new quarries.

In a general scope, it is possible to see in Table 15 that four of the eight interview questions merited unanimous answers, with three being directly related to environmental issues (iii, iv and v), and the fourth directly related to sensitization information (vii).

It is possible to say that de magnitude of the statistics obtained in the Question *i)* from de interview and the Question 2.7 from the survey (two comparable questions), have the same order. The vast majority of the interviewees considers the legislation is not being met, that is, the exploration of mineral resources may be in breach of legislation.

All interviewed consider that it is possible to reconcile quarrying with the protection of environmental values. Simultaneously, all entities interviewed say they know environmental liability caused by quarries (abandoned or active) in the parish, approximately the same order of magnitude as the answers given to Question 10.1(two comparable questions).

Also, 100% of the entities considered in the interview say it is important for the local community that these abandoned quarries are remaining, approximately the same order of magnitude as the answers given to Question 10.3(two comparable questions).

Only the Association of Portuguese Sidewalk Explorers says that the companies that operate quarries not have or should have social responsibility in the locality were operates. Comparing with Question 7.1 it is observable a degree of agreement in the same order of magnitude.

All entities considered in the interview say that there is not enough information available to the population on exploitation quarry, which is not fully comparable with the results obtained in question 8.2 (two comparable questions).

Finally, most of the entities interviewed consider that the recovery of abandoned quarry (from other companies) in the locality, should be considered advantageous in the context of measures of minimization and mitigation of environmental impacts for opening new quarries. This compares with about ≈ 54% of the population, which means a non-negligible discrepancy.

4.4. Discussion of the results

In order to enable the elaboration of logical conclusions of this study with greater capacity for interpretation and comprehensibility, it is considered advantageous to gather and organize the most relevant aspects that became possible to understand in each preceding subchapter. The Table 16 summarizes the responses given in each preceding subchapter, and also identifies the main lines of conclusions that could be followed subsequently.

Table 16 – Answers summary and line of conclusion in each subchapter.

SUBCHAPTER	COMPLETION POINTS	REPORT PAGE
4.1.1 PART 1. CHARACTERIZATION	**Main answers** • 52% of the respondents are women and 48% responses are men; • the most representative age group is the class [38-47] with ≈ 33% • ≈ 53% of respondents have higher education level, and is possible to say that ≈ 75% of the population surveyed have at least a level of education up to 12th grade.	*27-28*
4.1.2 PART 2. GENERAL QUESTIONS	**Main answers** • ≈ 93% of the respondents identify and define what a mineral resource is; • ≈ 92% of the respondents identify one or more mineral resource explorations close to where they live; • ≈ 70% of the respondents say that near the place where they live there are a maximum of 10 mineral resource explorations; • 51% of interviewed say they would prefer there were no quarries near where they live, and 49% say they wouldn't prefer there were no quarries near where they live; • ≈ 68% of the respondents state that could exist near the place where they live without causing any discomfort a maximum of five quarries in operation; • ≈ 94% of the respondents consider that is necessary to explore mineral resources. **Main concluding axes** • the coexistence between quarrying and the population will be possible; • the vast majority of respondents consider it necessary to explore mineral resources.	*28-31*

SUBCHAPTER	COMPLETION POINTS	REPORT PAGE
4.1.3 PART 3 & 4. NEED FOR MINERAL RESOURCE EXPLORATION	**Main answers** • ≈ 66% of the respondents agree that the exploration of mineral resources are needed *for economic support of families*; • ≈ 63% of the respondents agree that the exploration of mineral resources are needed *because construction needs*; • ≈ 61% of the respondents agree that the exploration of mineral resources are needed *to boost the local economy*; • ≈ 70% of respondents disagree that *the landscape and environment are worth less than the resource;* • ≈ 70% of respondents disagree that the landscape and environment are worth less than the resource. **Main concluding axes** • that respondents give great importance to the landscape and environmental factor, and for that the environmental nature should not be disregarded in the context of the exploration of mineral resources; • the economic context represents a solid justification for agreeing (accepting) the exploration of mineral resources; • the social axis in the context of the exploration of mineral resources should deserve a deeper analysis.	*31-34*
4.1.4 PART 5. EXPLORATION OF MINERAL RESOURCES.	**Main answers** • 81% of respondents demonstrate concern about the environmental impact that the exploitation of mineral resources, specifically with the destruction of the landscape; • ≈ 69% agreeing opinions about the possibility of reconciling quarrying with environmental protection; • ≈ 69% of respondents say that quarries close to they live have existed for more than 45 years, and for ≈ 50% of respondents quarries have existed for more than 60 years; • ≈ 91% of the respondents say they know someone who works or has worked in a quarry; • (≈ 85%) of those questioned believe that there are measures capable of compensating the quarries environmental damage. **Main concluding axes** • population surveyed is not unaware of environmental issues related to the exploitation of resources; • the acceptance of the need to explore mineral resources does not mean ignoring the quarries environmental impacts; • the order of magnitude of respondents who consider it necessary to explore mineral resources (≈ 94%), the order of magnitude of the respondents who consider that the main problem/annoyance in a quarry is the destruction of the surrounding landscape and environment (≈ 81%), and the order of magnitude of the respondents who consider that there are measures capable of compensating for the environmental damage caused by quarries (≈ 85%), is identical, with a Δ_{max} ≈ 13%.	*34-37*
4.1.5 PART 6. COMPENSATORY MEASURES	**Main answers** • 63% of respondents demonstrate agreement with the restore of the landscape of the quarry site; • 62% of respondents demonstrate agreement with the correct routing of waste produced; • 60% of respondents demonstrate agreement with the implementation of measures to minimize the impact on the landscape; • the statements "*Restore the landscape of the quarry site*", "*Reduce dust emissions*", "*Implement measures to minimize impact on the landscape*", "*Correct routing of waste produced*" and "*Rational use of water*" obtained, each one agreeing opinions above 50%. **Main concluding axes** • two statements that deserve the most agreeing opinions, are related to measures to minimize the impact on the landscape; • the population surveyed give considerable importance to the impact on the landscape, the possibility of existence of measures capable of compensate for environmental damage caused by quarries.	*37-39*
4.1.6 PART 7. SOCIAL RESPONSIBILITY	**Main answers** • ≈ 89% of the respondents consider that companies that operate quarries have or can have social responsibility in the locality where they are located; • ≈ 55% of the respondents expressed agreement with possibility of build a mineral resources interpretation center"; • ≈ 52% of the respondents expressed agreement with the implementation of a support for the education of local students; • ≈ 51% of respondents expressed agreement with the development of cultural actions in the locality; • the statement with least agreeing opinions was "*Create financial birth support for local residents*", with ≈ 42%. **Main concluding axes** • the statements with the most agreeing opinions are all related to information, awareness and/or education; • reinforces the hypothesis that advances with the existence of a constant "gap/need" in the surveyed population in relation to the social axis.	*39-41*

SUBCHAPTER	COMPLETION POINTS	REPORT PAGE
4.1.7 PART 8. HISTORY AND INFORMATION	**Main answers** • ≈ 86% of the respondents agreed with the economical and/or social importance of quarrying in their locality; • ≈ 75% of the respondents say they do not have enough information about the quarries located close to where you live; • ≈ 89% of the respondents believe that it is important to have access to more information about the quarries in the locality; • ≈ 64% of the respondents say that the Parish Board is the entity most responsible for providing information regarding quarries in the locality; • ≈ 63% of the respondents say that the operating company is the entity most responsible for providing information regarding quarries in the locality. **Main concluding axes** • the vast majority of respondents view the exploration of quarries in the locality as economically and/or socially important; • a coherence is beginning to emerge in the economic context associated with the exploration of quarries (and therefore the mineral resources sector); • the vast majority of respondents would be available and/or would like to obtain more information about quarries; • the respondents attribute greater responsibility to the public entity closest to the location to obtain more information about quarries.	*41-44*
4.1.8 PART 9. INFORMATION TO BE PROVIDED	**Main answers** • ≈ 74% of the respondents express agreement with the need of more environmental information; • ≈ 59% of the respondents express agreement with the need of more historical and cultural information; • ≈ 58% of the respondents express agreement with the need of more socioeconomic information. **Main concluding axes** • it is not forced to consider that the respondents want to have information on reference situations, situation monitoring, compensation and minimization measures, or even progress/setbacks in quarrying projects; • the need for historical and cultural information is coherent with the answers given in the type of compensating measures for the environmental damage caused by quarries.	*44-45*
4.1.9 PART 10. ABANDONED QUARRIES	**Main answers** • ≈ 89% of the respondents are aware of the existence of abandoned quarries in the locality; • the entity that respondents hold most responsible for the existence of abandoned quarries in the locality are the Operating company's, with ≈ 83%; • ≈ 93% of the respondents agreed about the important for the local community that the abandoned quarries shod be restore; • ≈ 54% of the respondents say that in the case of a company recovering abandoned quarries, this recovery can be considered positive for opening a new quarry. **Main concluding axes** • the respondents attribute greater responsibility to the Operating company's, about the existence of abandoned quarries in the locality; • the respondents are aware of the allocation of responsibilities, as well as the attribution of different roles in the mineral resources sector; • the results obtained in the answers to this last question are consistent with the answers previously given to the previous questions, which reinforces the credibility of the general results obtained.	*45-48*
4.2.1 EFFECT OF GENDER, AGE AND EDUCATIONAL LEVEL	**Main answers** • Gender characterization o the respondents who answered "no" to the Question 2.1. are mostly women's; o women's mostly identify up to five mineral resources explorations close to where they live, and men's dominate the answers given to the other classes; o women's are de majority of the ones that preferred that there were no quarries near the place where they live; o women's mostly indicate up to five quarries in operation near the place where they live without causing any discomfort, and men's dominating the answers given to the other classes; o men's are the majority in the answers that say the quarries have existed for less than 30 years old close to the place where they live; o men's constitute a large majority of respondents who say they know up to 40 people who work or have worked in quarries; o in relation to measure that can compensate for the environmental damage that quarries cause, in positive responses men's are in the majority, and in negative responses women's are the majority; o the majority of agreeing responses in the case of compensation plantations are from women's, and the majority of the discordant opinions are given by men's; o the majority of agreeing responses in the case of create an environmental office are from women's, and the majority of the discordant opinions are given by men's; o the majority of agreeing responses in the case of implement support for the education of local students are from women's;	*49-54*

SUBCHAPTER	COMPLETION POINTS	REPORT PAGE
	○ considerable majority of people who consider that there is not enough information are women, and those who consider that there is sufficient information about quarries the majority are men's; ○ the vast majority of people who say they are not aware of the existence of abandoned quarries in their locality are women's, and of the respondents who say they are aware of the existence of abandoned quarries in their locality the majority are men's; ○ the majority of responses agreeing with the statement "*in the case of a company recovering abandoned quarries, this recovery can be considered positive for opening a new quarry*" are from men's. • Age characterization ○ the results obtained do not allow a well-founded analysis of a general scope. • Education level characterization ○ the results obtained do not allow a well-founded analysis of a general scope. **Main concluding axes** • the gender of the respondents has a partial significant influence on some types of questions, namely in some questions of general nature, exploration of resources, social nature, information and environmental nature; • women's demonstrate a more focused perspective on environmental conservation expressing a need for more information; • men's show more openness to the sector, and simultaneously appears to have some "lack of direction" in relation to environmental issues although they consider the existence of impacts; • it is considered safe to say that the age of the respondents does not influence the answers given; • it is considered safe to say that the education level of the respondents is not capable of influencing the answers given.	
4.2.2 EFFECT BETWEEN RESPONSES IN SPECIFIC QUESTIONS	**Main answers** • ≈ 89% of the respondents who answered "yes" to Question 2.5, later also answered "yes" to Question 2.7; • when the respondents say they prefer that there were no quarries close to where they live, but then consider the existence of explorations of mineral resources to be necessary, shows a "bias" that could be said to be a self-protective nature in relation to the locality where he lives, which in a straightforward way can be called the NIMBY effect; • it is estimated that in the population sample researched, there is a NIMBY effect of ≈ 45 ± 6%; • there is a non-negligible difference regarding the percentage of women and men who demonstrate the NIMBY effect, with Δ 20%. There is a greater propensity for women to manifest the NIMBY effect; • ≈ 70% of the respondents who consider it necessary to explore mineral resources, agreed with the possibility of reconciling the exploitation of quarries with environmental protection; • ≈ 90% of the respondents who consider it necessary to explore mineral resources, show agreement with the economic and/or social importance of the exploration of quarries in the locality; • by expressing high levels of agreement with the need to explore mineral resources, with the social and economic importance of the sector in the locality, and cumulatively with the possibility of reconciling exploration of mineral resources with environmental protection, solidifies the interpretation of the existence of a sustainability context, not only environmental sustainability but also the social and economic context. **Main concluding axes** • it is thus possible to say that the surveyed population show a "vision" about the mineral resources exploration sector that points to a context of environmental sustainability, where they believe in the possibility of coexistence of the sector with environmentally demanding standards; • the surveyed population shows a consolidated recognition about the (present and/or past) social and economic importance of the mineral resources sector; • it is safely assert that the population surveyed understands the mineral resources sector within a general context of sustainability, where the environmental, social and economic pillars are present, which in general terms corresponds to the most widely accepted definition of sustainability, and which supports the SDGs developed by the United Nations; • It was possible to confirm the existence of a NIMBY effect in the population surveyed, and it was also possible to estimate that the general NIMBY effect is ≈ 45 ± 6%, and that there is a greater propensity for women to manifest the NIMBY effect.	*54-59*
4.2.3 SPECIFIC ANALYSIS (ABOUT COLLECTIVE MEMORY)	**Main answers** • ≈ 88% and ≈ 94% of the respondents in the age classes [18-27] and [28-37], respectively, think that there are quarries close to their location for more than 30 years, which means that has existed for longer than their own age (average of 28 years). It means for these respondents the existence of quarries has always been a reality; • ≈ 84% and ≈ 87% of the respondents in the age classes [38-47] and [48-57], respectively, think that there are quarries close to their location over 45 years, which means that has existed for approximately the same time as their own age (average of 48 years). It means for these respondents the existence of quarries has always been a reality; • ≈ 41% and ≈ 62% of the respondents in the age classes [58-67] and [68-77], respectively, think that there are quarries close to their location over 60 years, which means that they admit that the sector has been installed close to the location for a long time as well (average age is 60 years old).	*59-61*

SUBCHAPTER	COMPLETION POINTS	REPORT PAGE
	Main concluding axes • it is possible to say that there are aspects that establish the existence of a "collective memory" regarding the mineral resources sector in the respondents, which confirms that the population surveyed represents a reality of prolonged exposure to the mineral resources sector; • the context of "collective memory" does not mean that the opinions are tending to be positive or negative. However, it is admitted that when interviewees express their opinion, they do so in a more consistent and secure way, which gives the survey results robustness.	
4.3 INTERVIEWS	**Main answers** • ≈ 86% of the interviewed say that existence exploration of mineral resources are necessary for the parish/locality; • ≈ 71% of the interviewed consider that quarries are not well regulated; • 100% of the entities considered in the interview agree it is possible to reconcile with the protection of environmental value; • 100% of the interviewed are aware of the existence of abandoned quarries in your locality; • 100% of the entities say it is important for the local community that these abandoned quarries are remaining; • ≈ 86% of the interviewed consider that the companies have or should have social responsibility in the locality were operates; • 100% of the entities considered in the interview say that there is not enough information available to the population on exploitation quarry; • ≈ 86% of the entities interviewed say that consider the recovery of abandoned quarry in the locality, should be considered advantageous in the context of measures of minimization and mitigation of environmental impacts for opening new quarries. **Main concluding axes** • it is possible to observe a degree of agreement in the same order of magnitude between the interviewed institutions and de respondents of the survey about the existence of exploration of mineral resources for and in the parish/locality; • the vast majority of the interviewed considers the legislation related with the quarries is not being met. There is the perception that the present situation on the context of the exploration of mineral resources that undergoes an admission of defaulting the legislation; • there is a unanimity between the interviewed, in the sense of considering that it is possible to reconcile quarrying with the protection of environmental values; • there is a unanimity between the interviewed, once all of them say they know environmental liability caused by quarries (abandoned or active) in the parish. The order of magnitude between the interviewed institutions and de respondents of the survey is similar; • about the importance for the local community that the abandoned quarries are restored, we verify that there is a similarity in the answers between the interviewed institutions and de respondents of the survey, with the same order of magnitude in accordance; • about the social responsibility of the companies that operate quarries, we verify that the interviewed institutions and de respondents of the survey, have the same order of magnitude in the answers, that means that the companies have or should have social responsibility in the locality were operates; • there is a non-deployable discrepancy in the responses of the interviews and the responses of the surveyed population about the existence of enough information available about quarries exploitation. All institutions say that there aren't enough information, and ≈ 75% of the surveyed population say that; • also are a non-deployable discrepancy in the responses of the interviews and the responses of the surveyed population about considering advantageous in the context of measures of minimization and mitigation of environmental impacts for opening new quarries, once only ≈ 54% of the population consider that, and the interviewed institutions the percentage grow until ≈ 86%.	*61-70*

In the context of the summary made by Table 16, it is possible to discuss the results, in order to make some proposals that are considered to meet the responses obtained, and thus the inferred needs.

It is possible to safely state that the compatibility between environmental sustainability, economic sustainability of extraction and social sustainability of the community surrounding industries in the mineral resources sector was fully demonstrated by analyzing the responses obtained in the survey carried out with the target population.

For this, the main responses and main axes of conclusions described in points 4.1.5 to 4.1.8 summarized in Table 16 illustrate and demonstrate a global understanding on the part of the population that in the context of the SDGs, it was also possible to identify consistent lines

of understanding in the surveyed population that indicate the existence of a sustainability position in the environmental, social and economic context.

Consequently, by stating the previously mentioned point, it is demonstrated that field work carried out allowed to understand the perspective and vision that a population exposed to the exploitation of mineral resources has about a historical perspective on the mineral resources sector.

It is also important to mention that the analysis of specific issues and aspects (4.2.2 and 4.2.3) made it possible to analyze possible aspects and/or symptoms of the NIMBY phenomenon in the population, proposing a methodology for its estimation.

It was also possible to understand how the sector and industry of mineral resource extraction is understood by entities with local social responsibility, as it is possible to understand in point 4.3 of the Table 16.

The survey conducted in this study (and the responses obtained) allowed us to interpret, understand and respond to the way in which the population views the industry and the mining resources exploration sector, as well as the way in which they consider that it should behave in environmental, social, historical and economic terms, as well as with regard to corporate communication.

It was thus possible in the present study to design and substantiate a proposal for carrying out population awareness studies, designated in the following proposal as *Population Sensitivity Studies*.

Likewise, it was possible systematize a model of preparation and assistance for clarification and awareness sessions among the population in the context of mineral resources, and subsequently outline a proposal for an action model, designated in the following proposal as *Awareness and Public Clarification Sessions*.

Finally, it is considered pertinent and appropriate to make a proposal to estimate the NIMBY effect in a population already exposed to the mineral resources sector and industry, designated in the following proposal as *NIMBY effect estimation on populations*.

In a summary context, it is possible to consider that was possible to demonstrate that all the objectives (the three main and the four secondary) initially set for this study were fully met, and that it is therefore possible to make the following proposals, capable of promoting a path of acceptance and/or introducing added value in the "relationship" between the mineral resources sector and the exposed populations.

4.4.1. Proposal A | Population Sensitivity Studies

Therefore, it is considered relevant and therefore capable of being implemented that, simultaneously with the definition in the Municipal Direct Plan (PDM) of reserve areas for the exploration of mineral resources, a sensitivity survey of the populations potentially

exposed to the reserve areas is prepared by the municipalities and/or other relevant entities in the context of mineral resources.

Understanding the sensitivity of the populations to the sector, which should not be a limiting factor in the definition of reserve areas for the exploration of mineral resources (it is important to take into account that the location and potential for the exploration of mineral resources is an aspect that cannot be "relocated"), should above all be an instrument that enhances or creates methodologies and/or tools that provide responses to the fears and constraints that the populations may demonstrate.

In this context, it is considered that the research conducted in the present study on a population already exposed to the mineral resources sector, expressly identifies aspects and themes that should be considered in **Population Sensitivity Studies**, namely:

i) characterization of the population to be researched (gender, age and level of education);
ii) the population's existing knowledge about the mining resources sector;
iii) understand the openness of populations to the existence of industry in the sector in their proximity
iv) opinion about the possibility of environmental and social compensation measures;
v) understand the social, historical and economic sensitivity and/or connections of the population to the sector;
vi) inquire the population’s need for information relatively to the sector;
vii) inquire about specific or cultural aspects of local populations that may interact with the mineral resources sector.

The analysis and study of the results to be obtained will thus allow the development of responses to the fears and constraints demonstrated, where the responses that are necessary can be foreseen in the PDM, or lead to the development of specific programs aimed at the target populations.

4.4.2. Proposal B | Awareness and Public Clarification Sessions

The analysis of the data collected in the inquiry performed, allowed to realize the need for information about the mineral resources sector, also allowing to identify the topics on which the needs of information are felt.

Respondents identified and/or significantly agreed in the needs in the topics:

- environmental;
- historical and cultural;
- socioeconomic.

In this basis of needs, the development and implementation of clarification and/or awareness actions are considered important. Although not studied and analyzed the support in which

the population wishes to have access to information they consider necessary, in the face of the diversity and amplitude of the previously identified topics, it is defective that they can assume differentiated supports (consumption topics).

However, adopting as a basis of necessity the free interpretation of point n.º 9 in the Article 6.º of the Decree-Law No. 30/2021, of May 7, which defines the need to promote "*(...) at least one public clarification session, aimed essentially at the populations of the territories covered by the claim (...)*", the experience of practical application that has been adopted by the mineral resources sector, and the result of the data analysis of the survey carried out in this study, a methodology of approach in **Public Clarification Sessions** is proposed then.

The Public Clarification Sessions should preferably be supported by a digital presentation of the prospection and/or exploration project, to be projected to the audience, convened in accordance with the legal requirements. It should address the topics identified in the Board 1.

Board 1 – Topics that should be part of the clarification presentation to the population

	TOPICS	CONTENT COVERED
I.	IDENTIFICATION	Identification of the operating company and the business group to which it belongs
II.	PARTNERS AND STAKEHOLDERS	Identification of partners and/or subcontractors participating in the project and their role in it
III.	LEGAL FRAMEWORK	General legal framework of the sector, as well as the specific obligations of the installation area (mainly the environmental context)
IV.	HISTORICAL CONTEXT	History of the sector at the installation site
V.	GEOLOGICAL BASIS	Framing and geological foundation for installation on site
VI.	THE PROJECT	Identification of the legal steps to which the project is required, as well as the national, regional and local entities with which it relates and may interact
VII.	TYPES OF FIELD WORK	Explanation and explanation of the work that will take place on the ground, the way in which it can be observed by the population, and the purpose of carrying it out
VIII.	SOCIO-ECONOMIC IMPACTS	Socio-economic impacts of the project in the location where it is implemented

The thematic order presented in Board 1 does not reflect a fixed order, only a suggested one.

4.4.3. Proposal C | NIMBY effect estimation on populations

Within the same logical order used for the population researched in the present study, it is considered that the calculation developed to estimate the NIMBY effect could be applied to populations under the same conditions of exposure to the mineral resources sector.

The survey applied in the present study, if it can be replicated and applied to populations under the same conditions, has the potential to constitute a credible source of information capable of enabling the determination of the NIMBY effect in the target populations.

Therefore, the **estimate of the NIMBY effect** in relation to mineral resource projects is considered an added value, and could become an advantageous indicative tool.

5. Final Considerations

Based on the results and analysis presented in chapter 4, and systematized in the Table 16, it is possible to draw some conclusions from the survey carried out on a population already exposed to the exploitation of mineral resources, which will be explained in the following paragraphs.

In this sense, it is possible to safely say that the population surveyed considers the exploration of mineral resources necessary, while simultaneously saying that coexistence between quarrying and the population is possible, considering coexistence in an environmental, social and economic context.

The survey carried out revealed that the population gives great importance to the landscape and environmental factor, and that environmental nature should not be disregarded in the context of the exploration of mineral resources. Likewise, the economic context represents a solid justification for the acceptance of the exploration of mineral resources by the population.

During the responses to the survey, it becomes clear that the population surveyed gives considerable importance to the impact on the landscape, but at the same time considers the possible existence of measures capable of compensating for environmental damage caused by quarries.

At the same time, the opinions expressed show a need felt by the population to have access to more information, in order to fill the existing "gap/need".

During the analysis of the various responses obtained (as a whole) it was possible in several aspects to perceive the existence of coherence in the responses given, which helped to securely consolidate the perception of the existence of an intrinsic concept of sustainability on the part of the population surveyed, although not directly but rather in an inferred way.

In this context, it is important to mention the example that the vast majority of respondents view the exploration of quarries in the locality as economically and/or socially important, that the statements with the most agreeing opinions are all related to information, awareness and/or education, or as already mentioned, despite the population accepting the need to explore mineral resources, it does ignore the quarries environmental impacts and the respective possibility of implementing measures capable of compensating for environmental damage caused by quarries.

At the same time, the respondents attribute responsibility to the Operating company's, about the existence of abandoned quarries in the locality.

With support from statistical analysis, it was found that the gender of the respondents has a partial significant influence on some types of questions. Women's demonstrate a more focused perspective on environmental conservation, while men showed more openness to

the sector, and simultaneously appears to have some “lack of direction” in relation to environmental issues although they consider the existence of impacts.

Conversely, it was possible to see that the age and education level of the respondents does not influence the answers given.

The statistical analysis helped to consolidate the interpretation that the population surveyed understands the mineral resources sector within a general context of sustainability, where the environmental, social and economic pillars are present, which in general terms corresponds to the most widely accepted definition of sustainability, and which supports the SDGs developed by the United Nations.

At the same time, it was possible to verify the existence of aspects that establish the existence of a “collective memory” regarding the mineral resources sector in the respondents, which confirms that the population surveyed represents a reality of prolonged exposure to the mineral resources sector, without this meaning that the opinions are tending to be positive or negative.

It was possible to verify the existence of a NIMBY effect in the population researched, and it was also possible to estimate that the general NIMBY effect is ≈ 45 ± 6%. Additionally, statistical analysis revealed that there is a greater propensity for women to manifest the NIMBY effect. When we additionally consider the fact that more than 50% of respondents have higher education level, it can be seen that the data analyzed in this study also seem to indicate an agreement with the literature review data (Hu & Han (2023)), that is, improved education may cause more NIMBYism.

In a final line of analysis, based on the interviews carried out with representatives of local entities (which represent legitimate interests at a social level), it is possible to say that representatives of institutions also agree on the importance of the existence of exploration of mineral resources for and in the parish/locality.

There is the perception among the interviewees and the population surveyed that the legislation related to the context of the exploration of mineral resources is not being complied with.

Those interviewed, unanimously consider that it is possible to reconcile quarrying with the protection of environmental values, and that it is important for the parish to recover the abandoned quarry areas, which is in complete agreement with the population's opinion.

Representatives of the institutions say that the companies have or should have social responsibility in the locality where they operate. However, regarding the existence of sufficient information available about quarries exploitation there is a non-deployable discrepancy in the responses of the interviews and the responses of the surveyed population, as exists in relation to considering advantages in the context of measures of minimization and mitigation of environmental impacts for opening new quarries.

In the context of summary conclusion, the present study allowed us to understand that a population already exposed to the exploitation of mineral resources presents a consolidated sense of sustainability (in the environmental, social and economic axis). They understand and accept the need to explore mineral resources, however they do not ignore their environmental impacts nor give up the need to recover and minimize environmental impacts, given that the social and economic context are intrinsically related, as well as the historical and information context. It was also possible to perceive the existence of a NIMBY effect, where women are more likely to manifest this effect.

Finally, based on the results and analysis (and the previous conclusions), it is considered relevant to signal, identify and mention what are considered to be aspects that are important to deepen or develop knowledge and analyses, since they have proven to be defective (not allowing conclusions to be drawn) and/or constitute potential interest for new axes of study and research.

5.1. Further studies

The analyses and conclusions made in this study revealed the need to deepen some lines of analysis and/or new axes of study, namely:

- deeper analysis of the social axis in the context of the exploration of mineral resources, in the sense of perceiving the condition that leads to greater acceptance of this type of industry, especially the understanding of more recent generations. The social axis should deserve a deeper analysis, noticing that there seems to be a constant "gap/need";
- there is a certain degree of consistency in the answers given. However, the present work does not have enough information to say this safely, mainly with regard to relevant indication of a somewhat structured interpretation of the mineral resources sector, its environmental impacts, and finally the possibility of minimizing and/or compensating. Therefore, this is considered to be an important axis for further studies;
- it was possible to perceive the need to carry out more studies regarding the type of information and information support that the populations demand in relation to the mineral resources sector;
- the findings in the study indicate that there is a greater propensity for women to manifest the NIMBY effect, however, it is believed that this type of analysis requires greater justification, which is believed to require its own study;
- despite it being possible to perceive and detect aspects that establish the existence of a "collective memory" regarding the mineral resources sector in the interviewees, it is considered necessary to conduct and carry out targeted studies in order to confirm and eventually generate understanding about this context.

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Attachments

Attachment I – The survey

Attachment II – The Interview

Attachment III – The results

Attachment IV – Survey Analysis

Attachment V – Normality test

Attachment VI – Statistic analysis of the results

Attachment VII – Results of the interviews

Attachment I – The Survey

POLITÉCNICO DE LEIRIA | ESCOLA SUPERIOR DE TECNOLOGIA E GESTÃO | 30 ANOS

SURVEY WITHIN THE CONTEXT OF THE MASTERS IN ENERGY AND ENVIRONMENTAL ENGINEERING

Project

Awareness and Sustainability in the Mineral Resources Sector

This survey is completely anonymous, and the data collected is for the exclusive use of this master's thesis, with the ultimate aim of statistical analysis integrated into the objectives of the study.

Subtitle:

DT – Totally Disagree

DP - Partially Disagree

NCND – Neither Agree nor Disagree

CP – Partially Agree

CT – Totally agree

Gender			Age	Education level				
Fem.	Mas.	DNR		Former 4th class	Until the 6th year	Up to 9th grade	Up to 12th grade	Higher education

1. Can you identify/define what a mineral resource is?

Yes ☐

No ☐

- If yes, give an example: _____

2. Can you identify one or more mineral resource(s) exploration(s) close to where you live (up to a radius of 5km)? [for example; mines or quarries]

Yes ☐

No ☐

- If you answered yes to the previous question, indicate approximately how many in the options below:

1 to 5	6 to 10	11 to 15	16 to 20	+ than 20

3. Do you consider it necessary to explore mineral resources (for example, quarries)?

Yes ☐

No ☐

- If you answered yes, classify the options described below:

	DT	DP	NCND	CP	CT
Why construction needs					
For economic support of families					
To boost the local economy					
Because the landscape and environment are worth less than the resource					
Because without quarries there is no society as we know it					

- If you answered no, classify the options described below:

	DT	DP	NCND	CP	CT
Because they destroy the landscape and environment around them					
Because they generate pollution					
Because they bring a lot of heavy traffic					
Because they do not bring economic benefit to the locality					
Because at the end of the exploration there is just a hole					

4. Would you rather there were no quarries near where you live (within a 5km radius)?

Yes	
No	

5. How many quarry operations do you think could exist near the place where you live without causing you any discomfort?

1 to 5	6 to 10	11 to 15	16 to 20	+ than 20

6. What is the main problem/annoyance you see in a quarry?

Destruction of the surrounding landscape and environment	
Source of dust emissions	
Lots of heavy traffic, causing noise and vibrations	
They do not bring economic benefit to the locality	
They are too big	

7. Do you think it is possible to reconcile quarrying with environmental protection?

Totally Disagree	Partially Disagree	Neither Agree nor Disagree	Partially Agree	Totally Agree

8. How long do you think there have been quarries close to your location (within a 5km radius)?

over 75 years old	between 60 and 75 years old	between 45 and 60 years old	between 30 and 45 years old	less than 30 years old

9. Do you know someone who works or has worked in quarrying?

Yes	
No	

- If yes, how many?

1 to 5	6 to 10	11 to 20	21 to 40

10. In your opinion, do you think there is any measure that can compensate for the environmental damage that quarries cause?

Yes	
No	

- Classify the following measures:

	DT	DP	NCND	CP	CT
Restore the landscape of the quarry site					
Make compensation plantations in other locations					
Limit the number of trucks that circulate on roads within localities					
Reduce truck traffic noise					
Reduce dust emissions					
Carry out awareness-raising actions to encourage non-waste of mineral resources					
Implement measures to minimize impact on the landscape					
Correct routing of waste produced					
Rational use of water					
Create an environmental office					
Others:_____					

11. In your opinion, do companies that operate quarries have or can have social responsibility in the locality where they are located?

Yes	
No	

- Classify the following measures:

	DT	DP	NCND	CP	CT
Support sports group(s)					
Create financial birth support for local residents					
Create a means of contact with the local population					
Develop cultural actions in the locality					
Implement support for the education of local students					
Build a mineral resources interpretation center					
Others:_____					

12. Do you think that quarrying in your locality is, or was, important economically and/or socially?

Totally Disagree	Partially Disagree	Neither Agree nor Disagree	Partially Agree	Totally Agree

13. Do you think there is enough information about quarries close to where you live (within a 5km radius)?

Yes	
No	

14. Do you think it would be important to have access to information about quarries close to where you live (within a radius of 5km)?

Yes	
No	

- If yes, what type of information?

	DT	DP	NCND	CP	CT
Environmental information					
Socioeconomic information					
Historical and cultural information					
Others:_____					

15. Who do you think should be responsible for making the information referred to in the previous question available? (you can choose more than one option)

Parish Board	
Operating company	
City Hall	
General Directorate of Energy and Geology (DGEG)	
Others:_____	

16. Are you aware of the existence of abandoned quarries in your locality?

Yes	
No	

- If you answered yes to the previous question, who do you think is primarily responsible?

Parish Board	
Operating company	
City Hall	
General Directorate of Energy and Geology (DGEG)	
Others:_____	

17. Do you consider it important for the local community that these abandoned quarries are restored to a landscaping level?

Totally Disagree	Partially Disagree	Neither Agree nor Disagree	Partially Agree	Totally Agree

18. Do you agree that, in the case of a company recovering abandoned quarries, this recovery can be considered positive for opening a new quarry?

Totally Disagree	Partially Disagree	Neither Agree nor Disagree	Partially Agree	Totally Agree

Attachment II – The Interview

The interview with the different entities with community representation in the Parish of Alqueidão da Serra, was carried out based on the questions outlined in below.

1. Do you consider the existence of mineral resource exploration (for example, quarries) necessary for the parish/locality?
2. Do you consider that the exploitation of quarries in the parish is properly regulated taking into account the applicable legislation? If not, who is primarily responsible?
3. Do you think it is possible to reconcile quarrying with the protection of environmental values?
4. Are you aware of environmental liabilities caused by quarries (abandoned or active) in the parish?
5. Do you consider it important for the local community that these abandoned quarries are restored?
6. In your opinion, do companies that operate quarries have or should have social responsibility in the locality?
7. Do you think that sufficient information is available to the population about quarrying operations?
8. The recovers abandoned quarries (from other companies) in the locality, as a measure to minimize and mitigate environmental impact for opening a new exploration, would you consider this advantageous?

Attachment III – Survey Answers

Answers obtained in the survey

In order to enable better and easier processing of data resulting from the survey carried out, at the computer support level, the questions were numbered and identified according to the list identified below:

Part 1. Characterization of the respondents
Part 2. General questions
Part 3 & 4. Need for mineral resource exploration
Part 5. Exploration of mineral resources
Part 6. Compensatory measures
Part 7. Social responsibility
Part 8. History and information
Part 9. Information to be provided
Part 10. Abandoned quarries

Table A.III-1 – List of survey questions at the computer support level

PART	N.º	QUESTION
1		Gender
		Age
		Education level
2	2.1	Can you identify/define what a mineral resource is?
	2.2	If you answered yes to the previous question, give an example of a mineral resource.
	2.3	Can you identify one or more mineral resource(s) exploration(s) close to where you live (up to a radius of 5km)? [for example; mines or quarries]
	2.4	If you answered yes to the previous question, indicate approximately how many in the options below:
	2.5	Would you rather there were no quarries near where you live (within a 5km radius)?
	2.6	How many quarry operations do you think could exist near the place where you live without causing you any discomfort?
	2.7	Do you consider it necessary to explore mineral resources (for example, quarries)?
3	3.1	Regarding the need for exploration of mineral resources, classify the options described below:
	3.1.a	*Why construction needs*
	3.1.b	*For economic support of families*
	3.1.c	*To boost the local economy*
	3.1.d	*Because the landscape and environment are worth less than the resource*
	3.1.e	*Because without quarries there is no society as we know it*
4	4.1	Since you consider the existence of exploration of mineral resources to be unnecessary, classify the options described below:
	4.1.a	*Because they destroy the landscape and environment around them*
	4.1.b	*Because they generate pollution*
	4.1.c	*Because they bring a lot of heavy traffic*
	4.1.d	*Because they do not bring economic benefit to the locality*
	4.1.e	*Because at the end of the exploration there is just a hole*
5	5.1	What is the main problem/annoyance you see in a quarry?
	5.1.a	*Destruction of the surrounding landscape and environment*
	5.1.b	*Source of dust emissions*
	5.1.c	*Lots of heavy traffic, causing noise and vibrations*
	5.1.d	*They do not bring economic benefit to the locality*

PART	N.º	QUESTION
	5.1.e	*They are too big*
	5.2	Do you think it is possible to reconcile quarrying with environmental protection?
	5.3	How long do you think there have been quarries close to your location (within a 5km radius)?
	5.4	Do you know someone who works or has worked in quarrying?
	5.5	If you answered yes to the previous question, indicate how many people?
	5.6	In your opinion, do you think there is any measure that can compensate for the environmental damage that quarries cause?
6	6.1	Once you consider the possibility of compensating measures for the environmental damage caused by quarries, classify the options described below:
	6.1.a	*Restore the landscape of the quarry site*
	6.1.b	*Make compensation plantations in other locations*
	6.1.c	*Limit the number of trucks that circulate on roads within localities*
	6.1.d	*Reduce truck traffic noise*
	6.1.e	*Reduce dust emissions*
	6.1.f	*Carry out awareness-raising actions to encourage non-waste of mineral resources*
	6.1.g	*Implement measures to minimize impact on the landscape*
	6.1.h	*Correct routing of waste produced*
	6.1.i	*Rational use of water*
	6.1.j	*Create an environmental office*
7	7.1	In your opinion, do companies that operate quarries have or can have social responsibility in the locality where they are located?
	7.2	If you answered yes to the previous question, then consider the possibility of social responsibility on the part of the quarries, classify the options described below:
	7.2.a	*Support sports group(s)*
	7.2.b	*Create financial birth support for local residents*
	7.2.c	*Create a means of contact with the local population*
	7.2.d	*Develop cultural actions in the locality*
	7.2.e	*Implement support for the education of local students*
	7.2.f	*Build a mineral resources interpretation center*
8	8.1	Do you think that quarrying in your locality is, or was, important economically and/or socially?
	8.2	Do you think there is enough information about quarries close to where you live (within a 5km radius)?
	8.3	Who do you think should be responsible for making the information referred to in the previous question available? (you can choose more than one option)
	8.4	Do you think it would be important to have access to information about quarries close to where you live (within a radius of 5km)?
9	9.1	Since you consider it important to have access to information about the quarries that exist close to where you live, classify the options described below:
	9.1.a	*Environmental information*
	9.1.b	*Socioeconomic information*
	9.1.c	*Historical and cultural information*
	9.2	Other:
10	10.1	Are you aware of the existence of abandoned quarries in your locality?
	10.2	Who do you consider to be primarily responsible for the existence of abandoned quarries? (you can choose more than one option)
	10.3	Do you consider it important for the local community that these abandoned quarries are restored to a landscaping level?
	10.4	Do you agree that, in the case of a company recovering abandoned quarries, this recovery can be considered positive for opening a new quarry?

As said before, as result of the work carried out, 134 surveys were collected in digital format, and 76 in paper format, totaling 210 completed surveys.

It should be noted that the results obtained in paper format were subsequently submitted on the Google Forms platform to standardize the methodology for processing results.

Attachment IV – Survey Analysis

In the present attachment, the tables presented the survey answers by percentage. In this context, taking into consideration the numbering of the survey questions carried out in Attachment III, the results are presented.

Part 1 – Characterization of the respondents

Table A.IV-1 – Gender characterization.

GENDER	ANSWERS	
	NUMBER	PERCENTAGE
Male	100	47,6 %
Female	110	52,4 %
Do not answer	0	0,0 %
TOTAL	210	100,0 %

Table A.IV-2 – Age characterization.

AGE CLASS	ANSWERS	
	NUMBER	PERCENTAGE
[18-27]	16	7,6 %
[28-37]	35	16,7 %
[38-47]	69	32,9 %
[48-57]	38	18,1 %
[58-67]	30	14,3 %
[68-77]	13	6,2 %
[78-87]	0	0,0 %
Do not answer	9	4,3 %
TOTAL	210	100,0 %

Table A.IV-3 – Education level characterization.

EDUCATION LEVEL	ANSWERS	
	NUMBER	PERCENTAGE
Former 4th class	12	5,7 %
Until 6th year	12	5,7 %
Up to 9th grade	24	11,4 %
Up to 12th grade	46	21,9 %
Higher education	112	53,3 %
Do not answer	4	1,9 %
TOTAL	210	100,0 %

Part 2 – General questions

Table A.IV-4 – Question 2.1 | Can you identify/define what a mineral resource is?

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Yes	196	93,3 %
No	14	6,7 %
Do not answer	0	0,0 %
TOTAL	210	100,0 %

Table A.IV-5 – Question 2.2 | If you answered yes to the previous question, give an example of a mineral resource.

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Stone	41	19,5 %
Coal	21	10,0 %
Limestone	38	18,1 %
Quartz	3	1,4 %
Rocks	8	3,8 %
Quarries[††]	11	5,2 %
Gold	4	1,9 %
Iron	11	5,2 %
Petroleum	6	2,9 %
Water	2	1,0 %
Lithium	4	1,9 %
Marble	5	2,4 %
Sand	6	2,9 %
Granite	4	1,9 %
Diamond	2	1,0 %
Sidewalk[‡‡]	3	1,4 %
Various	19	10,5 %
Do not answer	22	9,0 %
TOTAL	210	100,0 %

Table A.IV-6 – Question 2.3 | Can you identify one or more mineral resource(s) exploration(s) close to where you live (up to a radius of 5km)? [for example; mines or quarries]

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Yes	193	91,9 %
No	17	8,1 %
Do not answer	0	0,0 %
TOTAL	210	100,0 %

[††] The option does not correspond to a mineral resource, but rather a place where mineral resources are explored, which is interpreted as a manifestation of knowledge about the object being worked on, seeing the entire space as the object itself.

[‡‡] The option does not correspond to a mineral resource. In this case, it identifies an application of a natural/ornamental stone product.

Table A.IV-7 – Question 2.4 | If you answered yes to the previous question, indicate approximately how many in the options below:

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
1 to 5	95	45,2 %
6 to 10	53	25,2 %
11 to 15	18	8,6 %
16 to 20	6	2,9 %
+ than 20	22	10,5 %
Do not answer	16	7,6 %
TOTAL	210	100,0 %

Table A.IV-8 – Question 2.5 | Would you rather there were no quarries near where you live (within a 5km radius)?

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Yes	107	51,0 %
No	103	49,0 %
Do not answer	0	0,0 %
TOTAL	210	100,0 %

Table A.IV-9 – Question 2.6 | How many quarry operations do you think could exist near the place where you live without causing you any discomfort?

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
1 to 5	142	67,6 %
6 to 10	35	16,7 %
11 to 15	9	4,3 %
16 to 20	3	1,4 %
+ than 20	17	8,1 %
Do not answer	4	1,9 %
TOTAL	210	100,0 %

Table A.IV-10 – Question 2.7 | Do you consider it necessary to explore mineral resources (for example, quarries)?

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Yes	198	94,3 %
No	12	5,7 %
Do not answer	0	0,0 %
TOTAL	210	100,0 %

Part 3 & 4 – Need for mineral resource exploration

Table A.IV-11 – Question 3.1 | Regarding the need for exploration of mineral resources, classify the options described below:

OPTIONS	CLASSIFICATION						TOTAL
	TOTALLY DISAGREE	PARTIALLY DISAGREE	DO NOT AGREE NOR DISAGREE	PARTIALLY AGREE	TOTALLY AGREE	DO NOT ANSWER	
Because construction needs	2	11	45	67	65	20	210
	(1,0 %)	(5,2 %)	(21,4 %)	(31,9 %)	(31,0 %)	(9,5 %)	(100,0%)
For economic support of families	7	12	36	67	71	17	210
	(3,3 %)	(5,7 %)	(17,1 %)	(31,9 %)	(33,8 %)	(8,1 %)	(100,0%)
To boost the local economy	9	6	48	71	56	20	210
	(4,3 %)	(2,9 %)	(22,9 %)	(33,8 %)	(26,7 %)	(9,5 %)	(100,0%)
Because the landscape and environment are worth less than the resource	108	40	26	4	7	25	210
	(51,4 %)	(19,0 %)	(12,4 %)	(1,9 %)	(3,3 %)	(11,9 %)	(100,0%)
Because without quarries there is no society as we know it	44	41	58	26	16	25	210
	(21,0 %)	(19,5 %)	(27,6 %)	(12,4 %)	(7,6 %)	(11,9 %)	(100,0%)

Table A.IV-12 – Question 4.1 | Since you consider the existence of exploration of mineral resources to be unnecessary, classify the options described below:

OPTIONS	CLASSIFICATION						TOTAL
	TOTALLY DISAGREE	PARTIALLY DISAGREE	DO NOT AGREE NOR DISAGREE	PARTIALLY AGREE	TOTALLY AGREE	DO NOT ANSWER	
Because they destroy the landscape and environment around them	2	3	0	2	5	198	210
	(1,0 %)	(1,4 %)	(0,0 %)	(1,0 %)	(2,4 %)	(94,3 %)	(100,0%)
Because they generate pollution	1	3	0	3	5	198	210
	(0,5 %)	(1,4 %)	(0,0 %)	(1,4 %)	(2,4 %)	(94,3 %)	(100,0%)
Because they bring a lot of heavy traffic	3	1	1	3	4	198	210
	(1,4 %)	(0,5 %)	(0,5 %)	(1,4 %)	(1,9 %)	(94,3 %)	(100,0%)
Because they do not bring economic benefit to the locality	4	1	4	1	2	198	210
	(1,9 %)	(0,5 %)	(1,9 %)	(0,5 %)	(1,0 %)	(94,3 %)	(100,0%)
Because at the end of the exploration there is just a hole	3	1	1	4	3	198	210
	(1,4 %)	(0,5 %)	(0,5 %)	(1,9 %)	(1,4 %)	(94,3 %)	(100,0%)

Part 5 – Exploration of Mineral Resources

Table A.IV-13 – Question 5.1 | What is the main problem/annoyance you see in a quarry?

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Destruction of the surrounding landscape and environment	169	80,5 %
Source of dust emissions	23	11,0 %
Lots of heavy traffic, causing noise and vibrations	10	4,8 %
They do not bring economic benefit to the locality	2	1,0 %
They are too big	3	1,4 %
Do not answer	3	1,4 %
TOTAL	210	100,0 %

Table A.IV-14 – Question 5.2 | Do you think it is possible to reconcile quarrying with environmental protection?

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Totally disagree	6	2,9 %
Partially disagree	14	6,7 %
Do not agree nor disagree	46	21,9 %
Partially agree	83	39,5 %
Totally agree	60	28,6 %
Do not answer	1	0,5 %
TOTAL	210	100,0 %

Table A.IV-15 – Question 5.3 | How long do you think there have been quarries close to your location (within a 5km radius)?

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Less than 30 years old	7	3,3 %
Between 30 and 45 years old	35	16,7 %
Between 45 and 60 years old	61	29,0 %
Between 60 and 75 years old	48	22,9 %
Over 75 years old	57	27,1 %
Do not answer	2	1,0 %
TOTAL	210	100,0 %

Table A.IV-16 – Question 5.4 | Do you know someone who works or has worked in quarrying?

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Yes	192	91,4 %
No	17	8,1 %
Do not answer	1	0,5 %
TOTAL	210	100,0 %

Table A.IV-17 – Question 5.5 | If you answered yes to the previous question, indicate how many people?

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
1 to 5	57	27,1 %
6 to 10	29	13,8 %
11 to 20	41	19,5 %
20 to 40	66	31,4 %
Do not answer	17	8,1 %
TOTAL	210	100,0 %

Table A.IV-18 – Question 5.6 | In your opinion, do you think there is any measure that can compensate for the environmental damage that quarries cause?

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Yes	179	85,2 %
No	30	14,3 %
Do not answer	1	0,5 %
TOTAL	210	100,0 %

Part 6 – Compensatory measures

Table A.IV-19 – Question 6.1 | Once you consider the possibility of compensating measures for the environmental damage caused by quarries, classify the options described below:

OPTIONS	CLASSIFICATION						TOTAL
	TOTALLY DISAGREE	PARTIALLY DISAGREE	DO NOT AGREE NOR DISAGREE	PARTIALLY AGREE	TOTALLY AGREE	DO NOT ANSWER	
Restore the landscape of the quarry site	6	5	32	28	105	34	210
	(2,9 %)	(2,4 %)	(15,2 %)	(13,3 %)	(50,0 %)	(16,2 %)	(100,0%)
Make compensation plantations in other locations	13	15	38	46	57	41	210
	(6,2 %)	(7,1 %)	(18,1 %)	(21,9 %)	(27,1 %)	(19,5 %)	(100,0%)
Limit the number of trucks that circulate on roads within localities	9	24	38	38	59	42	210
	(4,3 %)	(11,4 %)	(18,1 %)	(18,1 %)	(28,1 %)	(20,0 %)	(100,0%)
Reduce truck traffic noise	8	32	38	45	43	44	210
	(3,8 %)	(15,2 %)	(18,1 %)	(21,4 %)	(20,5 %)	(21,0 %)	(100,0%)
Reduce dust emissions	6	20	34	30	79	41	210
	(2,9 %)	(9,5 %)	(16,2 %)	(14,3 %)	(37,6 %)	(19,5 %)	(100,0%)
Carry out awareness-raising actions to encourage non-waste of mineral resources	15	10	41	34	67	43	210
	(7,1 %)	(4,8 %)	(19,5 %)	(16,2 %)	(31,9 %)	(20,5 %)	(100,0%)
Implement measures to minimize impact on the landscape	6	10	27	34	92	41	210
	(2,9 %)	(4,8 %)	(12,9 %)	(16,2 %)	(43,8 %)	(19,5 %)	(100,0%)
Correct routing of waste produced	6	8	25	35	94	42	210
	(2,9 %)	(3,8 %)	(11,9 %)	(16,7 %)	(44,8 %)	(20,0 %)	(100,0%)
Rational use of water	9	8	25	28	96	44	210
	(4,3 %)	(3,8 %)	(11,9 %)	(13,3 %)	(45,7 %)	(21,0 %)	(100,0%)
Create an environmental office	20	17	38	33	57	45	210
	(9,5 %)	(8,1 %)	(18,1 %)	(15,7 %)	(27,1 %)	(21,4 %)	(100,0%)

Part 7 – Social responsibility

Table A.IV-20 – Question 7.1 | In your opinion, do companies that operate quarries have or can have social responsibility in the locality where they are located?

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Yes	186	88,6 %
No	22	10,5 %
Do not answer	2	1,0 %
TOTAL	210	100,0 %

Table A.IV-21 – Question 7.2 | If you answered yes to the previous question, then consider the possibility of social responsibility on the part of the quarries, classify the options described below:

OPTIONS	CLASSIFICATION						TOTAL
	TOTALLY DISAGREE	PARTIALLY DISAGREE	DO NOT AGREE NOR DISAGREE	PARTIALLY AGREE	TOTALLY AGREE	DO NOT ANSWER	
Support sports group(s)	18	15	53	43	53	28	210
	(8,6 %)	(7,1 %)	(25,2 %)	(20,5 %)	(25,2 %)	(13,3 %)	(100,0%)
Create financial birth support for local residents	21	16	58	48	39	28	210
	(10,0 %)	(7,6 %)	(27,6 %)	(22,9 %)	(18,6 %)	(13,3 %)	(100,0%)
Create a means of contact with the local population	10	16	60	48	47	29	210
	(4,8 %)	(7,6 %)	(28,6 %)	(22,9 %)	(22,4 %)	(13,8 %)	(100,0%)
Develop cultural actions in the locality	11	16	47	59	48	29	210
	(5,2 %)	(7,6 %)	(22,4 %)	(28,1 %)	(22,9 %)	(13,8 %)	(100,0%)
Implement support for the education of local students	14	7	49	57	53	30	210
	(6,7 %)	(3,3 %)	(23,3 %)	(27,1 %)	(25,2 %)	(14,3 %)	(100,0%)
Build a mineral resources interpretation center	16	10	42	54	61	27	210
	(7,6 %)	(4,8 %)	(20,0 %)	(25,7 %)	(29,0 %)	(12,9 %)	(100,0%)

Part 8 – History and information

Table A.IV-22 – Question 8.1 | Do you think that quarrying in your locality is, or was, important economically and/or socially?

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Totally disagree	3	1,4 %
Partially disagree	7	3,3 %
Do not agree nor disagree	16	7,6 %
Partially agree	58	27,6 %
Totally agree	123	58,6 %
Do not answer	3	1,4 %
TOTAL	210	100,0 %

Table A.IV-23 – Question 8.2 | Do you think there is enough information about quarries close to where you live (within a 5km radius)?

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Yes	51	24,3 %
No	157	74,8 %
Do not answer	2	1,0 %
TOTAL	210	100,0 %

Table A.IV-24 – Question 8.3 | Who do you think should be responsible for making the information referred to in the previous question available? (you can choose more than one option)

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Parish Board	17	8,1%
Operating company	22	10,5%
City Hall	11	5,2%
General Directorate of Energy and Geology (DGEG)	15	7,1%
Operating company and City Hall	3	1,4%
Operating company and Parish Board	25	11,9%
Operating company, Parish Board and DGEG	8	3,8%
Operating company, Parish Board and City Hall	14	6,7%
Operating company, Parish Board, City Hall and DGEG	48	22,9%
Operating company, City Hall and DGEG	3	1,4%
Parish Board, City Hall and DGEG	8	3,8%
Parish Board and City Hall	11	5,2%
Parish Board and DGEG	4	1,9%
City Hall and DGEG	8	3,8%
Operating company and DGEG	9	4,3%
Independent entity	1	0,5%
Insufficient information	1	0,5%
Do not answer	2	1,0%
TOTAL	210	100,0 %

Table A.IV-25 – Question 8.4 | Do you think it would be important to have access to information about quarries close to where you live (within a radius of 5km)?

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Yes	186	88,6 %
No	22	10,5 %
Do not answer	2	1,0 %
TOTAL	210	100,0 %

Part 9 – Information to be provided

Table A.IV-26 – Question 9.1 | Since you consider it important to have access to information about the quarries that exist close to where you live, classify the options described below:

OPTIONS	CLASSIFICATION						TOTAL
	TOTALLY DISAGREE	PARTIALLY DISAGREE	DO NOT AGREE NOR DISAGREE	PARTIALLY AGREE	TOTALLY AGREE	DO NOT ANSWER	
Environmental information	1	5	21	47	109	27	210
	(0,5 %)	(2,4 %)	(10,0 %)	(22,4 %)	(51,9 %)	(12,9 %)	(100,0%)
Socioeconomic information	5	8	36	55	67	39	210
	(2,4 %)	(3,8 %)	(17,1 %)	(26,2 %)	(31,9 %)	(18,6 %)	(100,0%)
Historical and cultural information	4	6	38	58	65	39	210
	(1,9 %)	(2,9 %)	(18,1 %)	(27,6 %)	(31,0 %)	(18,6 %)	(100,0%)

Part 10 – Abandoned quarries

Table A.IV-27 – Question 10.1 | Are you aware of the existence of abandoned quarries in your locality?

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Yes	186	88,6 %
No	23	11,0 %
Do not answer	1	0,5 %
TOTAL	210	100,0 %

Table A.IV-28 – Question 10.2 | Who do you consider to be primarily responsible for the existence of abandoned quarries? (you can choose more than one option)

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Parish Board	5	2,4%
Operating company	76	36,2%
City Hall	7	3,3%
General Directorate of Energy and Geology (DGEG)	7	3,3%
Operating company and City Hall	3	1,4%
Operating company and Parish Board	15	7,1%
Operating company, Parish Board and DGEG	2	1,0%
Operating company, Parish Board and City Hall	15	7,1%
Operating company, Parish Board, City Hall and DGEG	35	16,7%
Operating company, City Hall and DGEG	9	4,3%
Parish Board, City Hall and DGEG	1	0,5%
Parish Board and City Hall	3	1,4%
City Hall and DGEG	2	1,0%
Operating company and DGEG	17	8,1%
Operating company, Parish Board, City Hall and areas owners	1	0,5%
Operating company and all environment and licensing entities	1	0,5%
Do not answer	11	5,2%
TOTAL	210	100,0 %

Table A.IV-29 – Question 10.3 | Do you consider it important for the local community that these abandoned quarries are restored to a landscaping level?

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Totally disagree	5	2,4%
Partially disagree	0	0,0%
Do not agree nor disagree	8	3,8%
Partially agree	31	14,8%
Totally agree	165	78,6%
Do not answer	1	0,5%
TOTAL	210	100,0 %

Table A.IV-30 – Question 10.4 | Do you agree that, in the case of a company recovering abandoned quarries, this recovery can be considered positive for opening a new quarry?

OPTIONS	ANSWERS	
	NUMBER	PERCENTAGE
Totally disagree	29	13,8%
Partially disagree	27	12,9%
Do not agree nor disagree	40	19,0%
Partially agree	56	26,7%
Totally agree	57	27,1%
Do not answer	1	0,5%
TOTAL	210	100,0 %

Attachment V – Normality test

The present attachment shows the results of the normality tests, performed using the SPSS software. The tests performed were the Kolmogorov-Smirnov (K-S) and the Shapiro-Wilk.

Table A.V-1 – Results of the normality tests, Kolmogorov-Smirnov (K-S) and the Shapiro-Wilk.

QUESTION	KOLMOGOROV-SMIRNOV[A]			SHAPIRO-WILK		
	STATISTIC	df	SIG.	STATISTIC	df	SIG.
1.1	0,349	198	0,000	0,636	198	0,000
1.2	0,066	198	0,038	0,982	198	0,011
1.3	0,315	198	0,000	0,732	198	0,000
2.1	0,541	191	0,000	0,200	191	0,000
2.3	0,524	191	0,000	0,046	191	0,000
2.4	0,272	191	0,000	0,730	191	0,000
2.5	0,345	191	0,000	0,636	191	0,000
2.6	0,383	191	0,000	0,591	191	0,000
2.7	0,540	191	0,000	0,231	191	0,000
3.1.1	0,214	185	0,000	0,857	185	0,000
3.1.2	0,233	185	0,000	0,840	185	0,000
3.1.3	0,231	185	0,000	0,848	185	0,000
3.1.4	0,338	185	0,000	0,709	185	0,000
3.1.5	0,163	185	0,000	0,898	185	0,000
4.1.1	0,244	12	0,046	0,801	12	0,010
4.1.2	0,255	12	0,030	0,806	12	0,011
4.1.3	0,238	12	0,058	0,824	12	0,018
4.1.4	0,200	12	0,198	0,870	12	0,066
4.1.5	0,263	12	0,021	0,839	12	0,027
5.1	0,473	189	0,000	0,468	189	0,000
5.2	0,240	189	0,000	0,862	189	0,000
5.3	0,180	189	0,000	0,882	189	0,000
5.4	0,524	189	0,000	0,046	189	0,000
5.5	0,217	189	0,000	0,810	189	0,000
5.6	0,515	189	0,000	0,416	189	0,000
6.1.1	0,353	160	0,000	0,719	160	0,000
6.1.2	0,198	160	0,000	0,861	160	0,000
6.1.3	0,203	160	0,000	0,865	160	0,000
6.1.4	0,188	160	0,000	0,893	160	0,000
6.1.5	0,274	160	0,000	0,815	160	0,000
6.1.6	0,235	160	0,000	0,826	160	0,000
6.1.7	0,318	160	0,000	0,752	160	0,000
6.1.8	0,328	160	0,000	0,736	160	0,000
6.1.9	0,340	160	0,000	0,722	160	0,000
6.1.10	0,195	160	0,000	0,858	160	0,000
7.1	0,540	174	0,000	0,229	174	0,000
7.2.1	0,167	174	0,000	0,879	174	0,000
7.2.2	0,184	174	0,000	0,893	174	0,000
7.2.3	0,177	174	0,000	0,887	174	0,000
7.2.4	0,211	174	0,000	0,879	174	0,000
7.2.5	0,209	174	0,000	0,859	174	0,000
7.2.6	0,216	174	0,000	0,849	174	0,000
8.1	0,355	169	0,000	0,704	169	0,000
8.2	0,485	169	0,000	0,504	169	0,000
8.4	-	169	-	-	169	-
9.1.1	0,342	169	0,000	0,730	169	0,000
9.1.2	0,222	169	0,000	0,832	169	0,000
9.1.3	0,222	169	0,000	0,832	169	0,000
10.1	0,527	209	0,000	0,361	209	0,000

QUESTION	KOLMOGOROV-SMIRNOV[A]			SHAPIRO-WILK		
	STATISTIC	df	SIG.	STATISTIC	df	SIG.
10.3	0,452	209	0,000	0,472	209	0,000
10.4	0,208	209	0,000	0,872	209	0,000

[A] Lilliefors Significance Correction

Attachment VI – Statistic analysis of the results

In the present attachment, the tables relating to the treatment and analysis of the results obtained are presented and illustrated, taking into consideration the tables in de attachment IV.

A. Kruskal-Wallis test about effect of gender, age and educational level

Table A.VI-1 – Hypothesis test summary for the gender of respondents.

NULL HYPOTHESIS	TEST	SIG. [a,b]	DECISION	SUMMARY OF ANALYSIS OF INDEPENDENT SAMPLES OF KRUSKAL-WALLIS TEST
The distribution of Question 2.1 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,043	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of gender on question 2.1 [$X^2(1) = 4.105$; $p<0.05$]*
The distribution of Question 2.2 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,290	Retain the null hypothesis.	-
The distribution of Question 2.4 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,001	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of gender on question 2.4 [$X^2(1) = 11.981$; $p<0.05$]*
The distribution of Question 2.5 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,006	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of gender on question 2.5 [$X^2(1) = 7.531$; $p<0.05$]*
The distribution of Question 2.6 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,000	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of gender on question 2.6 [$X^2(1) = 19.309$; $p<0.05$]*
The distribution of Question 2.7 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,107	Retain the null hypothesis.	-
The distribution of Question 3.1.1 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,859	Retain the null hypothesis.	-
The distribution of Question 3.1.2 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,917	Retain the null hypothesis.	-
The distribution of Question 3.1.3 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,790	Retain the null hypothesis.	-
The distribution of Question 3.1.4 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,663	Retain the null hypothesis.	-
The distribution of Question 3.1.5 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,405	Retain the null hypothesis.	-
The distribution of Question 4.1.1 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,438	Retain the null hypothesis.	-
The distribution of Question 4.1.2 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,284	Retain the null hypothesis.	-
The distribution of Question 4.1.3 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,340	Retain the null hypothesis.	-

NULL HYPOTHESIS	TEST	SIG. [a,b]	DECISION	SUMMARY OF ANALYSIS OF INDEPENDENT SAMPLES OF KRUSKAL-WALLIS TEST
The distribution of Question 4.1.4 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,701	Retain the null hypothesis.	-
The distribution of Question 4.1.5 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,774	Retain the null hypothesis.	-
The distribution of Question 5.1 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,795	Retain the null hypothesis.	-
The distribution of Question 5.2 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,515	Retain the null hypothesis.	-
The distribution of Question 5.3 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,000	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of gender on question 5.3 [$X^2(1) = 14.596$; $p<0.05$]*
The distribution of Question 5.4 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,113	Retain the null hypothesis.	-
The distribution of Question 5.5 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,000	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of gender on question 5.5 [$X^2(1) = 14.552$; $p<0.05$]*
The distribution of Question 5.6 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,035	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of gender on question 5.6 [$X^2(1) = 4.450$; $p<0.05$]*
The distribution of Question 6.1.1 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,859	Retain the null hypothesis.	-
The distribution of Question 6.1.2 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,046	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of gender on question 6.1.2 [$X^2(1) = 3.986$; $p<0.05$]*
The distribution of Question 6.1.3 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,358	Retain the null hypothesis.	-
The distribution of Question 6.1.4 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,212	Retain the null hypothesis.	-
The distribution of Question 6.1.5 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,983	Retain the null hypothesis.	-
The distribution of Question 6.1.6 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,299	Retain the null hypothesis.	-
The distribution of Question 6.1.7 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,754	Retain the null hypothesis.	-
The distribution of Question 6.1.8 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,110	Retain the null hypothesis.	-
The distribution of Question 6.1.9 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,778	Retain the null hypothesis.	-
The distribution of Question 6.1.10 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,043	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of gender on question 6.1.10 [$X^2(1) = 4.114$; $p<0.05$]*
The distribution of Question 7.1 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,112	Retain the null hypothesis.	-
The distribution of Question 7.2.1 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,179	Retain the null hypothesis.	-

NULL HYPOTHESIS	TEST	SIG. [a,b]	DECISION	SUMMARY OF ANALYSIS OF INDEPENDENT SAMPLES OF KRUSKAL-WALLIS TEST
The distribution of Question 7.2.2 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,135	Retain the null hypothesis.	-
The distribution of Question 7.2.3 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,131	Retain the null hypothesis.	-
The distribution of Question 7.2.4 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,052	Retain the null hypothesis.	-
The distribution of Question 7.2.5 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,024	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of gender on question 7.2.5 [$X^2(1) = 5.064$; $p<0.05$]*
The distribution of Question 7.2.6 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,085	Retain the null hypothesis.	-
The distribution of Question 8.1 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,553	Retain the null hypothesis.	-
The distribution of Question 8.2 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,016	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of gender on question 8.2 [$X^2(1) = 5.796$; $p<0.05$]*
The distribution of Question 8.4 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,491	Retain the null hypothesis.	-
The distribution of Question 9.1.1 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,192	Retain the null hypothesis.	-
The distribution of Question 9.1.2 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,479	Retain the null hypothesis.	-
The distribution of Question 9.1.3 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,703	Retain the null hypothesis.	-
The distribution of Question 10.1 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,000	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of gender on question 10.1 [$X^2(1) = 15.799$; $p<0.05$]*
The distribution of Question 10.3 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,981	Retain the null hypothesis.	-
The distribution of Question 10.4 is the same across the categories of Question 1.1.	Kruskal-Wallis Test Independent Samples	0,042	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of gender on question 10.4 [$X^2(1) = 4.125$; $p<0.05$]*

a. The significance level is ,050.
b. Asymptotic significance is displayed.

Table A.VI-2 – Hypothesis test summary for the age of respondents.

NULL HYPOTHESIS	TEST	SIG. [a,b]	DECISION	SUMMARY OF ANALYSIS OF INDEPENDENT SAMPLES OF KRUSKAL-WALLIS TEST
The distribution of Question 2.1 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,717	Retain the null hypothesis	-
The distribution of Question 2.2 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,348	Retain the null hypothesis	-

NULL HYPOTHESIS	TEST	SIG. [a,b]	DECISION	SUMMARY OF ANALYSIS OF INDEPENDENT SAMPLES OF KRUSKAL-WALLIS TEST
The distribution of Question 2.4 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,803	Retain the null hypothesis	-
The distribution of Question 2.5 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,517	Retain the null hypothesis	-
The distribution of Question 2.6 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,007	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of age on question 2.6 [$X^2(51) = 79.209$; $p<0.05$]*
The distribution of Question 2.7 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,986	Retain the null hypothesis.	-
The distribution of Question 3.1.1 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,412	Retain the null hypothesis.	-
The distribution of Question 3.1.2 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,324	Retain the null hypothesis.	-
The distribution of Question 3.1.3 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,672	Retain the null hypothesis.	-
The distribution of Question 3.1.4 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,065	Retain the null hypothesis.	-
The distribution of Question 3.1.5 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,299	Retain the null hypothesis.	-
The distribution of Question 4.1.1 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,440	Retain the null hypothesis.	-
The distribution of Question 4.1.2 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,440	Retain the null hypothesis.	-
The distribution of Question 4.1.3 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,440	Retain the null hypothesis.	-
The distribution of Question 4.1.4 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,440	Retain the null hypothesis.	-
The distribution of Question 4.1.5 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,440	Retain the null hypothesis.	-
The distribution of Question 5.1 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,505	Retain the null hypothesis.	-
The distribution of Question 5.2 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,570	Retain the null hypothesis.	-
The distribution of Question 5.3 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,243	Retain the null hypothesis.	-
The distribution of Question 5.4 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,369	Retain the null hypothesis.	-
The distribution of Question 5.5 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,032	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of age on question 5.5 [$X^2(51) = 71.278$; $p<0.05$]*
The distribution of Question 5.6 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,783	Retain the null hypothesis.	-

NULL HYPOTHESIS	TEST	SIG. [a,b]	DECISION	SUMMARY OF ANALYSIS OF INDEPENDENT SAMPLES OF KRUSKAL-WALLIS TEST
The distribution of Question 6.1.1 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,294	Retain the null hypothesis.	-
The distribution of Question 6.1.2 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,005	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of age on question 6.1.2 [$X^2(50) = 79.950$; $p<0.05$]*
The distribution of Question 6.1.3 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,094	Retain the null hypothesis.	-
The distribution of Question 6.1.4 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,122	Retain the null hypothesis.	-
The distribution of Question 6.1.5 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,320	Retain the null hypothesis.	-
The distribution of Question 6.1.6 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,696	Retain the null hypothesis.	-
The distribution of Question 6.1.7 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,493	Retain the null hypothesis.	-
The distribution of Question 6.1.8 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,176	Retain the null hypothesis.	-
The distribution of Question 6.1.9 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,496	Retain the null hypothesis.	-
The distribution of Question 6.1.10 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,472	Retain the null hypothesis.	-
The distribution of Question 7.1 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,445	Retain the null hypothesis.	-
The distribution of Question 7.2.1 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,379	Retain the null hypothesis.	-
The distribution of Question 7.2.2 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,433	Retain the null hypothesis.	-
The distribution of Question 7.2.3 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,500	Retain the null hypothesis.	-
The distribution of Question 7.2.4 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,637	Retain the null hypothesis.	-
The distribution of Question 7.2.5 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,410	Retain the null hypothesis.	-
The distribution of Question 7.2.6 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,200	Retain the null hypothesis.	-
The distribution of Question 8.1 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,705	Retain the null hypothesis.	-
The distribution of Question 8.2 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,193	Retain the null hypothesis.	-
The distribution of Question 8.4 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,978	Retain the null hypothesis.	-

NULL HYPOTHESIS	TEST	SIG. [a,b]	DECISION	SUMMARY OF ANALYSIS OF INDEPENDENT SAMPLES OF KRUSKAL-WALLIS TEST
The distribution of Question 9.1.1 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,913	Retain the null hypothesis.	-
The distribution of Question 9.1.2 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,969	Retain the null hypothesis.	-
The distribution of Question 9.1.3 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,566	Retain the null hypothesis.	-
The distribution of Question 10.1 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,301	Retain the null hypothesis.	-
The distribution of Question 10.3 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,953	Retain the null hypothesis.	-
The distribution of Question 10.4 is the same across the categories of Question 1.2.	Kruskal-Wallis Test Independent Samples	0,420	Retain the null hypothesis.	-

a. The significance level is ,050.
b. Asymptotic significance is displayed.

Table A.VI-3 – Hypothesis test summary for the education level of respondents.

NULL HYPOTHESIS	TEST	SIG. [a,b]	DECISION	SUMMARY OF ANALYSIS OF INDEPENDENT SAMPLES OF KRUSKAL-WALLIS TEST
The distribution of Question 2.1 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,001	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of education level on question 2.1 [$X^2(4) = 18.389$; $p<0.05$]*
The distribution of Question 2.2 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,205	Retain the null hypothesis.	-
The distribution of Question 2.4 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,166	Retain the null hypothesis.	-
The distribution of Question 2.5 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,498	Retain the null hypothesis.	-
The distribution of Question 2.6 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,109	Retain the null hypothesis.	-
The distribution of Question 2.7 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,872	Retain the null hypothesis.	-
The distribution of Question 3.1.1 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,922	Retain the null hypothesis.	-
The distribution of Question 3.1.2 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,008	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of education level on question 3.1.2 [$X^2(4) = 13.667$; $p<0.05$]*
The distribution of Question 3.1.3 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,184	Retain the null hypothesis.	-
The distribution of Question 3.1.4 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,070	Retain the null hypothesis.	-

NULL HYPOTHESIS	TEST	SIG. [a,b]	DECISION	SUMMARY OF ANALYSIS OF INDEPENDENT SAMPLES OF KRUSKAL-WALLIS TEST
The distribution of Question 3.1.5 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,184	Retain the null hypothesis.	-
The distribution of Question 4.1.1 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,205	Retain the null hypothesis.	-
The distribution of Question 4.1.2 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,038	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of education level on question 4.1.2 [$X^2(3) = 8.399$; $p<0.05$]*
The distribution of Question 4.1.3 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,076	Retain the null hypothesis.	-
The distribution of Question 4.1.4 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,565	Retain the null hypothesis.	-
The distribution of Question 4.1.5 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,251	Retain the null hypothesis.	-
The distribution of Question 5.1 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,540	Retain the null hypothesis.	-
The distribution of Question 5.2 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,502	Retain the null hypothesis.	-
The distribution of Question 5.3 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,946	Retain the null hypothesis.	-
The distribution of Question 5.4 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,403	Retain the null hypothesis.	-
The distribution of Question 5.5 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,140	Retain the null hypothesis.	-
The distribution of Question 5.6 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,922	Retain the null hypothesis.	-
The distribution of Question 6.1.1 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,049	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of education level on question 6.1.1 [$X^2(4) = 9.545$; $p<0.05$]*
The distribution of Question 6.1.2 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,799	Retain the null hypothesis.	-
The distribution of Question 6.1.3 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,584	Retain the null hypothesis.	-
The distribution of Question 6.1.4 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,516	Retain the null hypothesis.	-
The distribution of Question 6.1.5 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,265	Retain the null hypothesis.	-
The distribution of Question 6.1.6 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,102	Retain the null hypothesis.	-
The distribution of Question 6.1.7 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,438	Retain the null hypothesis.	-
The distribution of Question 6.1.8 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,780	Retain the null hypothesis.	-

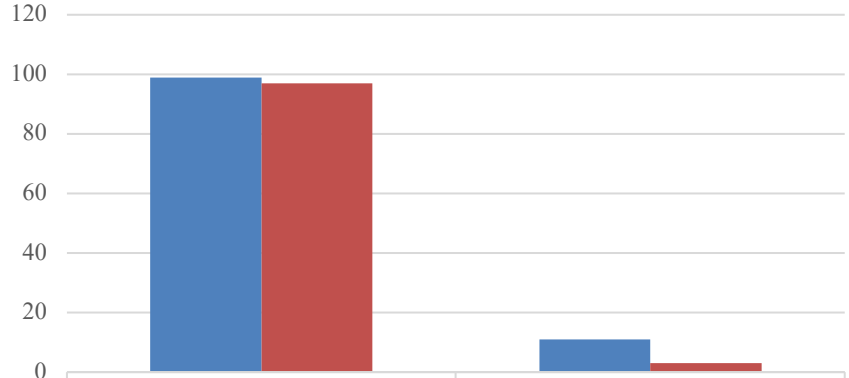
NULL HYPOTHESIS	TEST	SIG. [a,b]	DECISION	SUMMARY OF ANALYSIS OF INDEPENDENT SAMPLES OF KRUSKAL-WALLIS TEST
The distribution of Question 6.1.9 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,138	Retain the null hypothesis.	-
The distribution of Question 6.1.10 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,242	Retain the null hypothesis.	-
The distribution of Question 7.1 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,153	Retain the null hypothesis.	-
The distribution of Question 7.2.1 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,079	Retain the null hypothesis.	-
The distribution of Question 7.2.2 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,901	Retain the null hypothesis.	-
The distribution of Question 7.2.3 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,497	Retain the null hypothesis.	-
The distribution of Question 7.2.4 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,773	Retain the null hypothesis.	-
The distribution of Question 7.2.5 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	1,000	Retain the null hypothesis.	-
The distribution of Question 7.2.6 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,905	Retain the null hypothesis.	-
The distribution of Question 8.1 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,609	Retain the null hypothesis.	-
The distribution of Question 8.2 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,380	Retain the null hypothesis.	-
The distribution of Question 8.4 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,850	Retain the null hypothesis.	-
The distribution of Question 9.1.1 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,539	Retain the null hypothesis.	-
The distribution of Question 9.1.2 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,678	Retain the null hypothesis.	-
The distribution of Question 9.1.3 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,964	Retain the null hypothesis.	-
The distribution of Question 10.1 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,612	Retain the null hypothesis.	-
The distribution of Question 10.3 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,000	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of education level on question 10.3 [$X^2(4) = 20.761$; $p<0.05$]*
The distribution of Question 10.4 is the same across the categories of Question 1.3.	Kruskal-Wallis Test Independent Samples	0,076	Retain the null hypothesis.	-

a. The significance level is ,050.
b. Asymptotic significance is displayed.

Based on the results obtained and summarized in the Table A.VI-1, Table A.VI-2 and Table A.VI-3, were developed the following cross-tables and graphics, for the questions identified as being affected by Questions 1.1, Questions 1.2 and Questions 1.3:

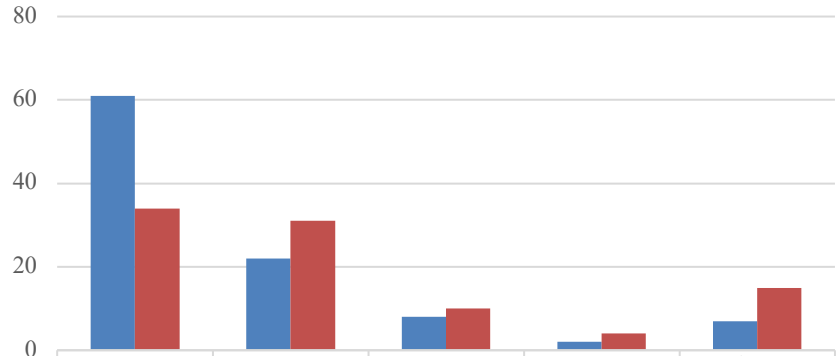
- the following graphics illustrate the results obtained in the respective tables, related to the ***gender characterization*** of the answers obtained.

Graphic with cross-table illustration from "*Question 2.1 | Can you identify/define what a mineral resource is?*" with "*1.1 | Gender*"



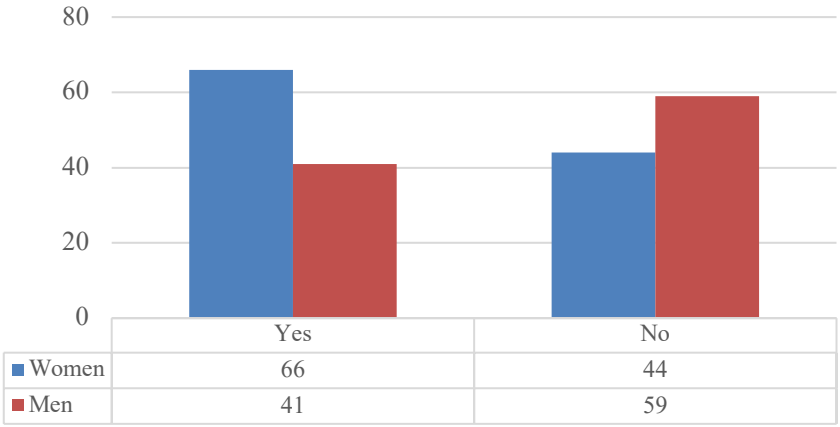
	Yes	No
Women	99	11
Men	97	3

Graphic with cross-table illustration from "*Question 2.4 | If you answered yes to the previous question, indicate approximately how many in the options below:*" with "*1.1 | Gender*"



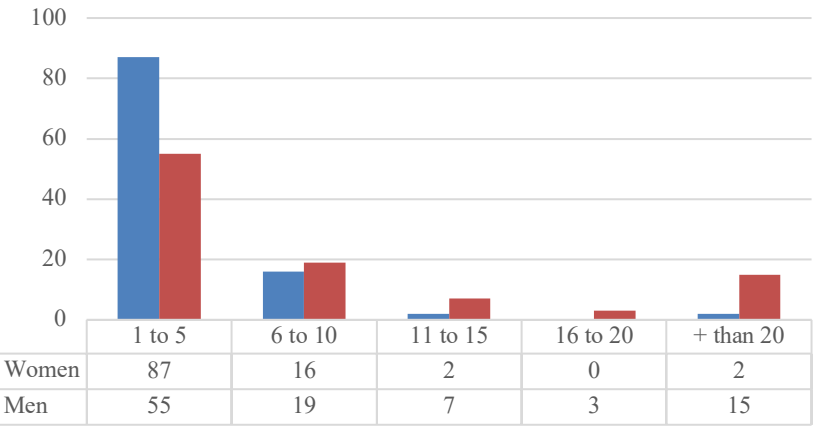
	1 to 5	6 to 10	11 to 15	16 to 20	+ than 20
Women	61	22	8	2	7
Men	34	31	10	4	15

Graphic with cross-table illustration from "*Question 2.5 | Would you prefer that there were no quarries close to where you live (within a 5km radius)?*" with "*1.1 | Gender*"



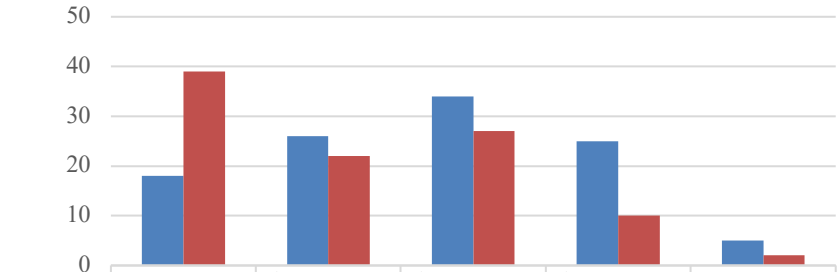
	Yes	No
Women	66	44
Men	41	59

Graphic with cross-table illustration from "*Question 2.6 | How many quarry operations do you think could exist near the place where you live without causing you any discomfort?*" with "*1.1 | Gender*"



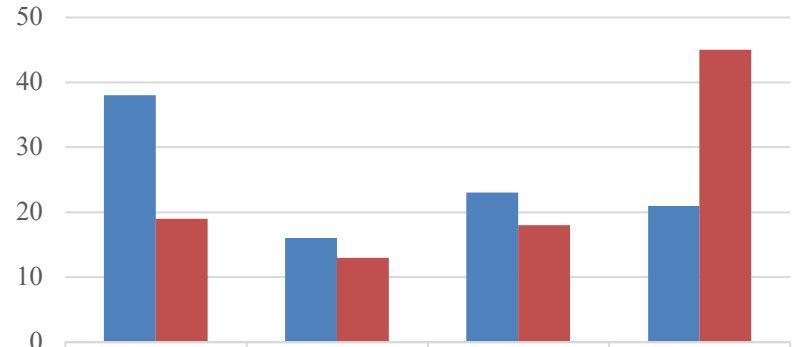
	1 to 5	6 to 10	11 to 15	16 to 20	+ than 20
Women	87	16	2	0	2
Men	55	19	7	3	15

Graphic with cross-table illustration from "*Question 5.3 | How long do you think there have been quarries close to your location (within a 5km radius)?*" with "*1.1 | Gender*"



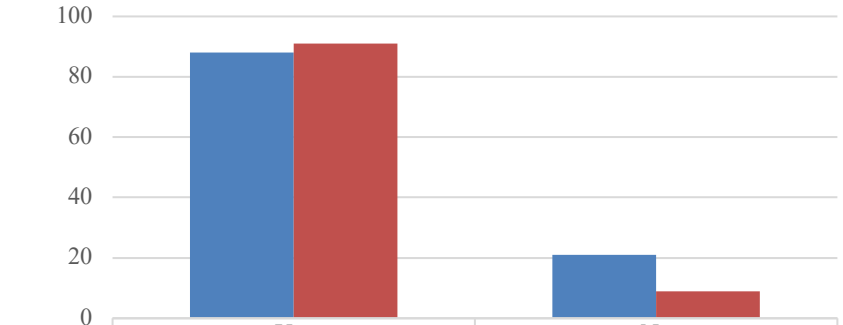
	less than 30 years old	between 30 and 45 years old	between 45 and 60 years old	between 60 and 75 years old	over 75 years old
Women	18	26	34	25	5
Men	39	22	27	10	2

Graphic with cross-table illustration from "*Question 5.5 | If you answered yes to the previous question, indicate how many people?*" with "*1.1 | Gender*"



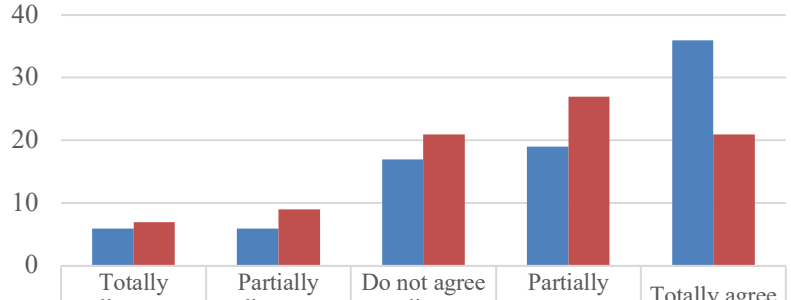
	1 to 5	6 to 10	11 to 20	21 to 40
Women	38	16	23	21
Men	19	13	18	45

Graphic with cross-table illustration from "*Question 5.6 | In your opinion, do you think there is any measure that can compensate for the environmental damage that quarries cause?*" with "*1.1 | Gender*"



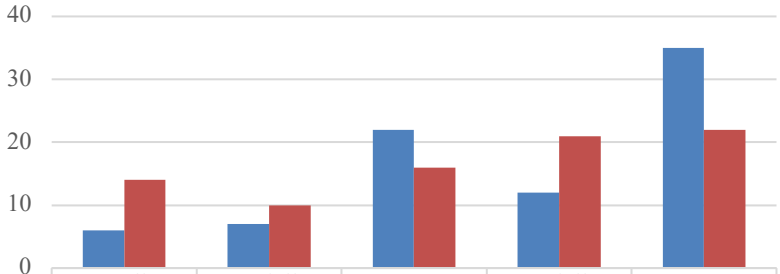
	Yes	No
Women	88	21
Men	91	9

Graphic with cross-table illustration from "*Question 6.1.2 | Once you consider the possibility of compensating measures for the environmental damage caused by quarries, classify the options described below: Make compensation plantations in other locations*



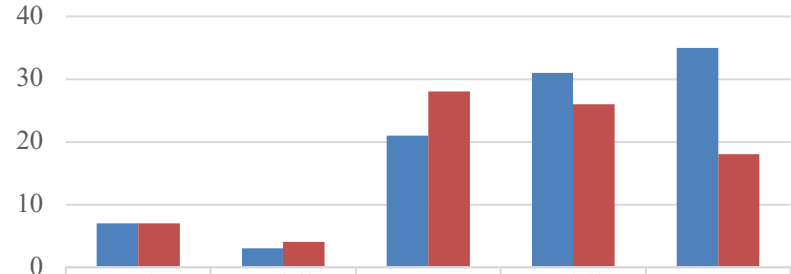
	Totally disagree	Partially disagree	Do not agree nor disagree	Partially agree	Totally agree
Women	6	6	17	19	36
Men	7	9	21	27	21

Graphic with cross-table illustration from "*Question 6.1.10 | Once you consider the possibility of compensating measures for the environmental damage caused by quarries, classify the options described below: Create an environmental office*" with "*1.1 | Gen*



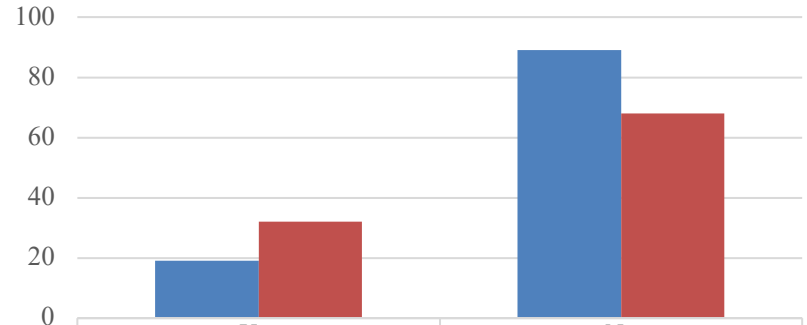
	Totally disagree	Partially disagree	Do not agree nor disagree	Partially agree	Totally agree
Women	6	7	22	12	35
Men	14	10	16	21	22

Graphic with cross-table illustration from "*Question 7.2.5 | Once you consider the possibility of compensating measures for the environmental damage caused by quarries, classify the options described below: Create an environmental office*" with "*1.1 | Gend*



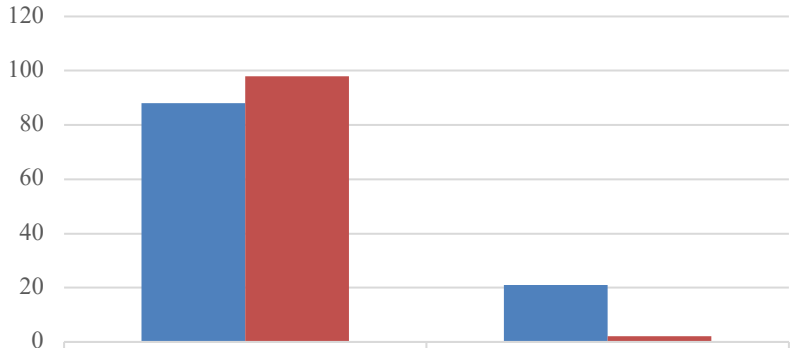
	Totally disagree	Partially disagree	Do not agree nor disagree	Partially agree	Totally agree
Women	7	3	21	31	35
Men	7	4	28	26	18

Graphic with cross-table illustration from "*Question 8.2 | Do you think there is enough information about quarries close to where you live (within a 5km radius)?*" with "*1.1 | Gender*"



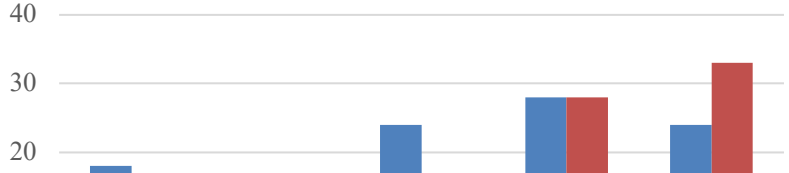
	Yes	No
Women	19	89
Men	32	68

Graphic with cross-table illustration from "*Question 10.1 | Are you aware of the existence of abandoned quarries in your locality?*" with "*1.1 | Gender*"



	Yes	No
Women	88	21
Men	98	2

Graphic with cross-table illustration from "*Question 10.4 | Do you agree that, in the case of a company recovering abandoned quarries, this recovery can be considered positive for opening a new quarry?*" with "*1.1 | Gender*"



	Totally disagree	Partially disagree	Do not agree nor disagree	Partially agree	Totally agree
Women	18	15	24	28	24
Men	11	12	16	28	33

- the following table summarizes the data obtained and demonstrates in a synthetic way for each specified question the effect of gender on the responses.

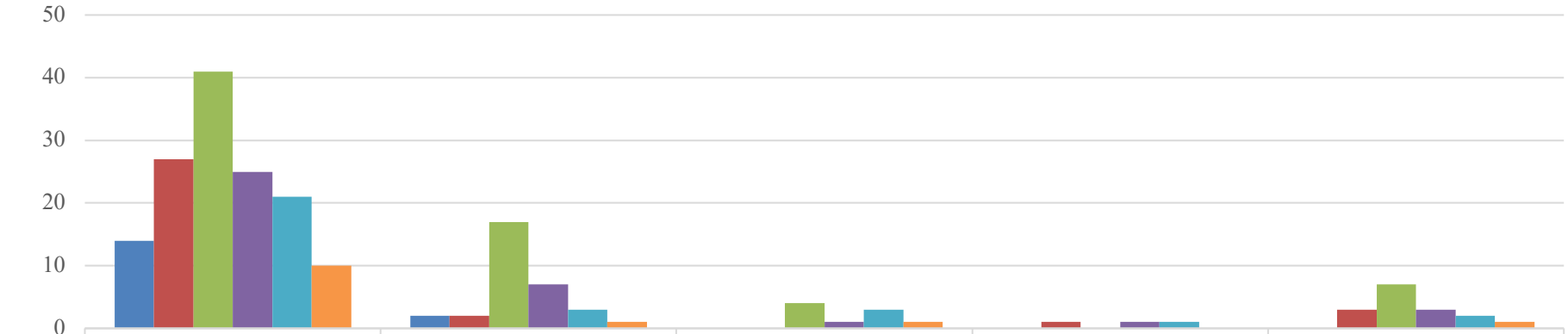
Table A.VI-4 – Summarized gender effect on the responses

	2.1		2.4		2.5		2.6		5.3		5.5		5.6		6.1.2		6.1.10		7.2.5		8.2		10.1		10.4	
	W	M	W	M	W	M	W	M	W	M	W	M	W	M	W	M	W	M	W	M	W	M	W	M	W	M
WHO ANSWER "YES"	≈ 51%	≈ 49%			≈ 62%	≈ 38%							≈ 49%	≈ 51%							≈ 37%	≈ 63%	≈ 47%	≈ 53%		
WHO ANSWER "NO"	≈ 79%	≈ 21%			≈ 57%	≈ 43%							≈ 70%	≈ 30%							≈ 57%	≈ 43%	≈ 91%	≈ 9%		
UP TO 5 MINERAL			≈ 64%	≈ 36%																						
UP TO 10 MINERAL			≈ 41%	≈ 59%																						
UP TO 15 MINERAL			≈ 44%	≈ 56%																						
UP TO 20 MINERAL			≈ 67%	≈ 33%																						
+ THAN 20 MINERAL			≈ 68%	≈ 32%																						
UP TO 5 QUARRIES							≈ 61%	≈ 39%																		
UP TO 10 QUARRIES							≈ 46%	≈ 54%																		
UP TO 15 QUARRIES							≈ 22%	≈ 78%																		
UP TO 20 QUARRIES							0%	100%																		
+ THAN 20 QUARRIES							≈ 12%	≈ 88%																		
LESS THAN 30 YEARS OLD									≈ 32%	≈ 68%																
BETWEEN 30 AND 45 YEARS OLD									≈ 54%	≈ 46%																
BETWEEN 45 AND 60 YEARS OLD									≈ 56%	≈ 44%																
BETWEEN 60 AND 75 YEARS OLD									≈ 71%	≈ 29%																
OVER 75 YEARS OLD									≈ 71%	≈ 29%																
UP TO 5 PEOPLE											≈ 67%	≈ 33%														
UP TO 10 PEOPLE											≈ 55%	≈ 45%														
UP TO 20 PEOPLE											≈ 56%	≈ 44%														
UP TO 40 PEOPLE											≈ 32%	≈ 68%														
TOTALLY DISAGREE															≈ 46%	≈ 54%	≈ 30%	≈ 70%	≈ 50%	≈ 50%					≈ 62%	≈ 38%
PARTIALLY DISAGREE															≈ 40%	≈ 60%	≈ 41%	≈ 59%	≈ 43%	≈ 57%					≈ 56%	≈ 44%

	2.1		2.4		2.5		2.6		5.3		5.5		5.6		6.1.2		6.1.10		7.2.5		8.2		10.1		10.4	
	W	M	W	M	W	M	W	M	W	M	W	M	W	M	W	M	W	M	W	M	W	M	W	M	W	M
NOT AGREE OR DISAGREE															≈ 45%	≈ 55%	≈ 58%	≈ 42%	≈ 43%	≈ 57%					≈ 60%	≈ 40%
PARTIALLY AGREE															≈ 41%	≈ 59%	≈ 36%	≈ 64%	≈ 54%	≈ 46%					≈ 50%	≈ 50%
TOTALLY AGREE															≈ 63%	≈ 37%	≈ 61%	≈ 39%	≈ 66%	≈ 34%					≈ 42%	≈ 58%

- the following graphics illustrate the results obtained in the respective tables, related to the ***age characterization*** of the answers obtained.

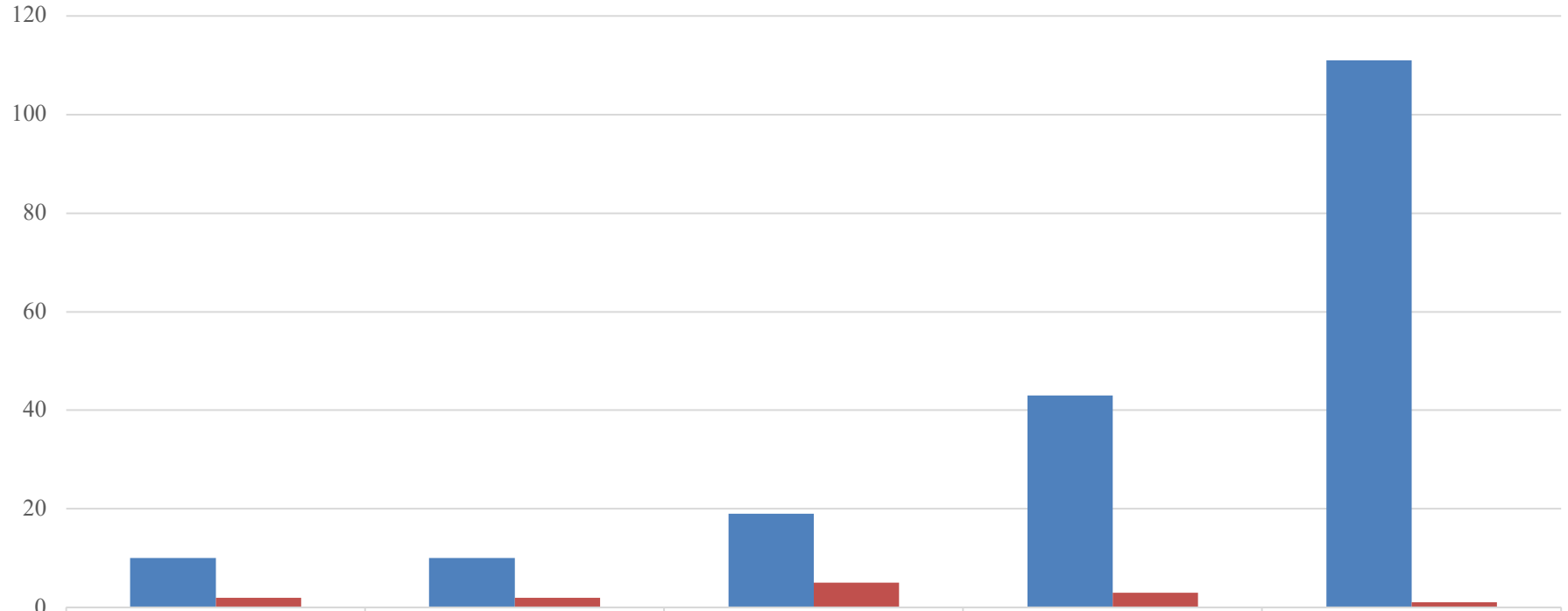
Graphic with cross-table illustration from "*Question 2.6 | How many quarry operations do you think could exist near the place where you live without causing you any discomfort?*" with "*1.2 | Age*"



	1 to 5	6 to 10	11 to 15	16 to 20	+ than 20
[18-27]	14	2	0	0	0
[28-37]	27	2	0	1	3
[38-47]	41	17	4	0	7
[48-57]	25	7	1	1	3
[58-67]	21	3	3	1	2
[68-77]	10	1	1	0	1

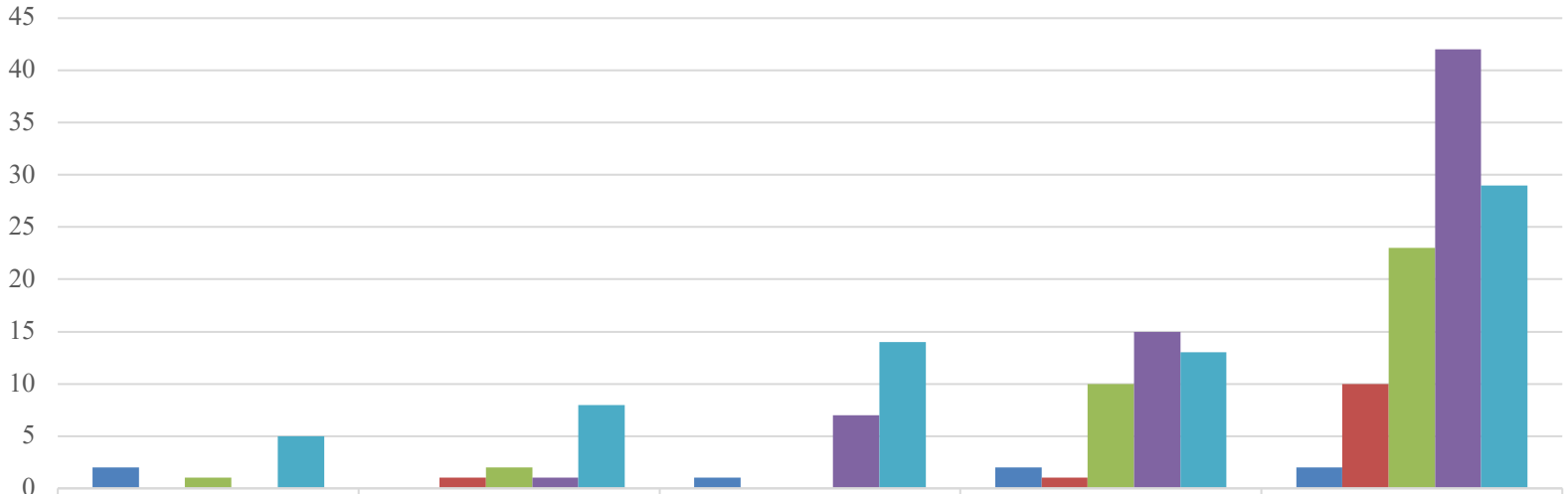
- the following graphics illustrate the results obtained in the respective tables, related to the ***education level characterization*** of the answers obtained.

Graphic with cross-table illustration from "*Question 2.1 | Can you identify/define what a mineral resource is?*" with "*1.3 | Education Level*"



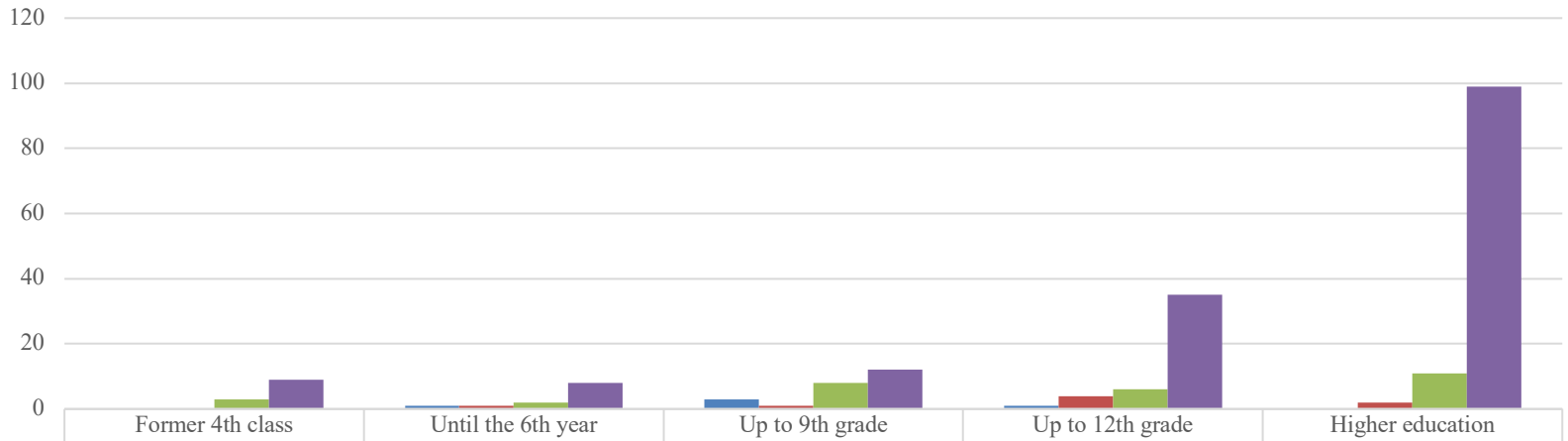
	Former 4th class	Until the 6th year	Up to 9th grade	Up to 12th grade	Higher education
Yes	10	10	19	43	111
No	2	2	5	3	1

Graphic with cross-table illustration from "*Question 3.1.2 | Regarding the need for exploration of mineral resources, classify the options described below: For economic support of families*" with "*1.3 | Education Level*"



	Former 4th class	Until the 6th year	Up to 9th grade	Up to 12th grade	Higher education
Totally disagree	2	0	1	2	2
Partially disagree	0	1	0	1	10
Do not agree nor disagree	1	2	0	10	23
Partially agree	0	1	7	15	42
Totally agree	5	8	14	13	29

Graphic with cross-table illustration from "*Question 10.3 | Do you consider it important for the local community that these abandoned quarries are restored to a landscaping level?*" with "*1.3 | Education Level*"



	Former 4th class	Until the 6th year	Up to 9th grade	Up to 12th grade	Higher education
Totally disagree	0	1	3	1	0
Do not agree nor disagree	0	1	1	4	2
Partially agree	3	2	8	6	11
Totally agree	9	8	12	35	99

B. Kruskal-Wallis test about effect between responses in specific questions

Table A.VI-5 – Hypothesis test summary for specific questions respondents

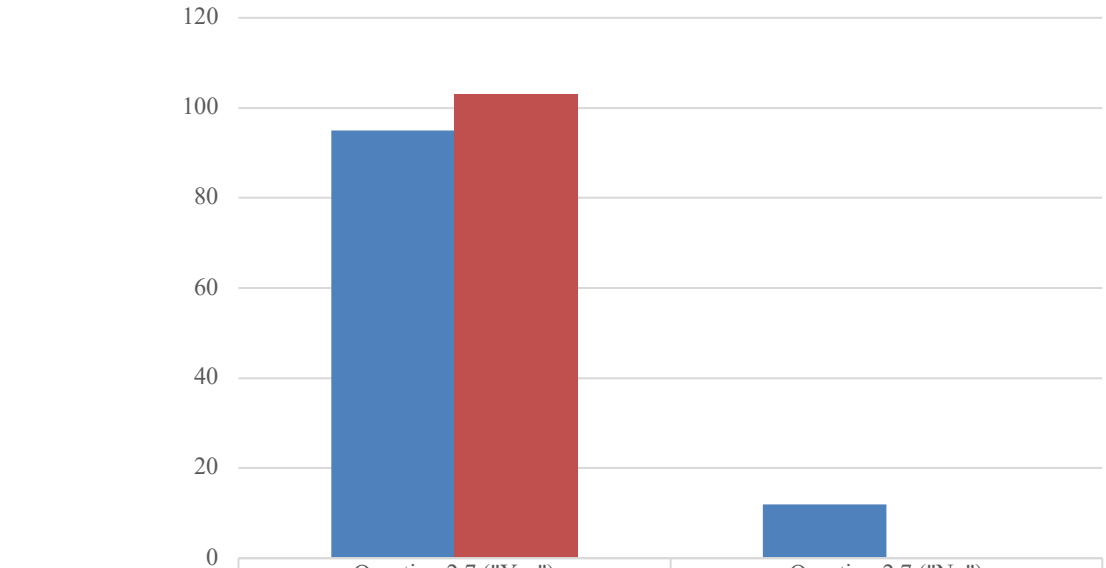
NULL HYPOTHESIS	TEST	SIG. [a,b]	DECISION	SUMMARY OF ANALYSIS OF INDEPENDENT SAMPLES OF KRUSKAL-WALLIS TEST
The distribution of Question 2.5 is the same across the categories of Question 2.7.	Kruskal-Wallis Test Independent Samples	0,000	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of question 2.5 on question 2.7 [$X^2(1) = 12.193$; $p<0.05$]*
The distribution of Question 2.7 is the same across the categories of Question 5.2.	Kruskal-Wallis Test Independent Samples	0,019	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of question 2.7 on question 5.2 [$X^2(4) = 11.776$; $p<0.05$]*
The distribution of Question 8.1 is the same across the categories of Question 2.7.	Kruskal-Wallis Test Independent Samples	0,006	Reject the null hypothesis.	*The Kruskal-Wallis test showed that there is an effect of question 8.1 on question 2.7 [$X^2(1) = 7.445$; $p<0.05$]*

a. The significance level is ,050.
b. Asymptotic significance is displayed.

Based on the results obtained and summarized in the Table A.VI-5, were developed the following cross-tables and graphics, for the questions identified as being significant effect, one on the other.

- the following graphic illustrate the results obtained in the cross-table between Question 2.5 and Question 2.7.

Graphic with cross-table illustration from "*Question 2.5 | Would you rather there were no quarries near where you live (within a 5km radius)?*" with "*Question 2.7 | Do you consider it necessary to explore mineral resources (for example, quarries)?*"



	Question 2.7 ("Yes")	Question 2.7 ("No")
Question 2.5 ("Yes")	95	12
Question 2.5 ("No")	103	0

Cluster analysis

The initial use of the Hierarchical Method allowed the identification of three distinct groups, as illustrated in the following image.

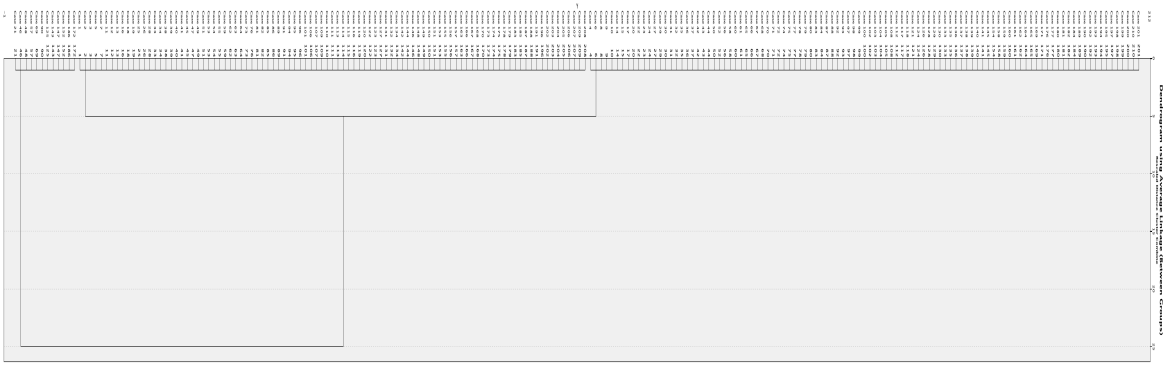


Figure A.VI-1 - Dendrogram resulting from using the hierarchical method

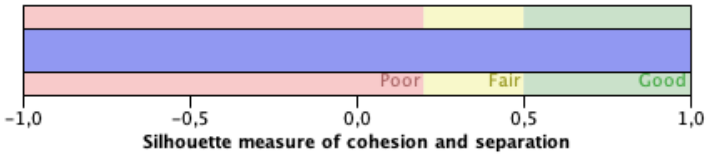
Sequentially, after identifying the existence of three distinct groups, it was possible to use the K-means method. The groups identified are:

- group of respondents who answered "yes" to two questions (2.5 and 2.7);
- group of respondents who answered "no" to question 2.5, and "yes" to question 2.7;
- group of respondents who answered "yes" to question 2.5, and "no" to question 2.7.

Model Summary

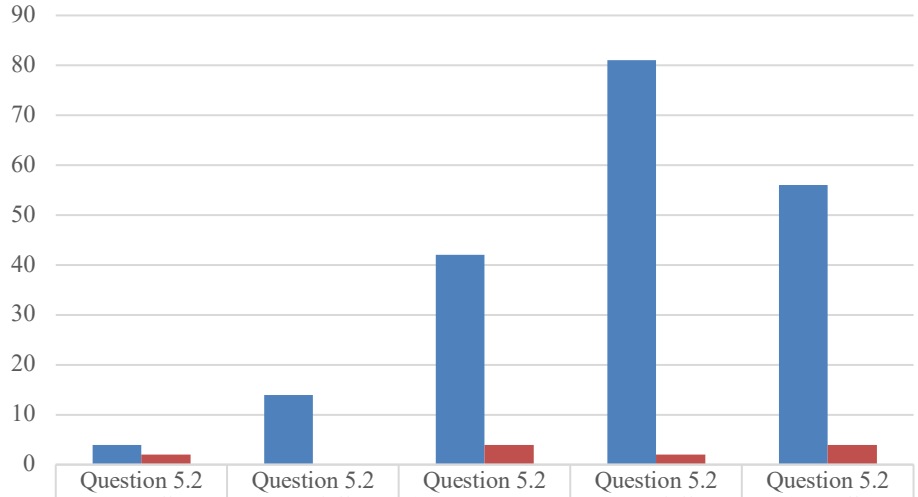
Algorithm	TwoStep
Inputs	2
Clusters	3

Cluster Quality



- the following graphic illustrate the results obtained in the cross-table between Question 2.7 and Question 5.2.

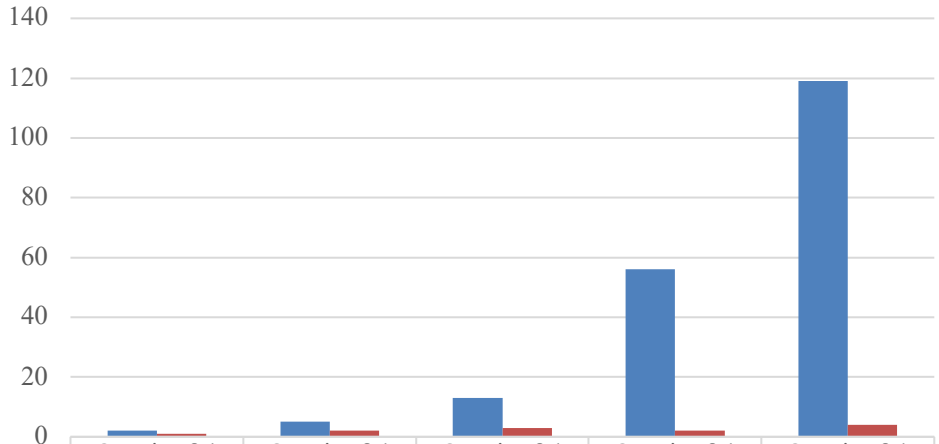
Graphic with cross-table illustration from "*Question 5.2 | Do you think it is possible to reconcile quarrying with environmental protection?*" with "*Question 2.7 | Do you consider it necessary to explore mineral resources (for example, quarries)?*"



	Question 5.2 ("Totally Disagree")	Question 5.2 ("Partially Disagree")	Question 5.2 ("Do Not Agree Nor Disagree")	Question 5.2 ("Partially Agree")	Question 5.2 ("Totally Agree")
Question 2.7 ("Yes")	4	14	42	81	56
Question 2.7 ("No")	2	0	4	2	4

- the following graphic illustrate the results obtained in the cross-table between Question 2.7 and Question 8.1.

Graphic with cross-table illustration from "*Question 2.7 | Do you consider it necessary to explore mineral resources (for example, quarries)?*" with "*Question 8.1 | Do you think that quarrying in your locality is, or was, important economically and/or soci*



	Question 8.1 ("Totally Disagree")	Question 8.1 ("Partially Disagree")	Question 8.1 ("Do Not Agree Nor Disagree")	Question 8.1 ("Partially Agree")	Question 8.1 ("Totally Agree")
Question 2.7 ("Yes")	2	5	13	56	119
Question 2.7 ("No")	1	2	3	2	4

Attachment VII – Results of the interviews

In the present attachment, the tables presented the interviews answers. In this context, taking into consideration the numbering of the survey questions carried out in Attachment II, the results are presented.

Table A.VII-1 – Results of interviews carried out with local entities (Part 1/2)

QUESTIONS		PUBLIC ENTITIES		PUBLIC INSTITUTION OF SOCIAL SOLIDARITY	SPORTS CLUB
		Porto de Mós City Hall	*Alqueidão da Serra Parish Board*	*Casa do Povo of Alqueidão da Serra*	*Alqueidão da Serra Cultural and Recreational Center*
Representative	**Gender**	Men	Men	Men	Men
	Age	62	47	45	48
	Education level	Higher Education	Higher Education	Higher Education	Higher Education
1	**Do you consider the existence of mineral resource exploration (for example, quarries) necessary for the parish/locality?**	Yes	No	Yes	Yes
1.1	*Why construction needs*	Partially Agree		Partially Agree	Totally Agree
1.2	*For economic support of families*	Totally Agree		Totally Agree	Totally Agree
1.3	*To boost the local economy*	Totally Agree		Totally Agree	Totally Agree
1.4	*Because the landscape and environment are worth less than the resource*	Totally Disagree		Totally Disagree	Do Not Agree Nor Disagree
1.5	*Because without quarries there is no society as we know it*	Partially Agree		Totally Agree	Partially Agree
1.6	*Because they destroy the landscape and environment around them*		Totally Agree		
1.7	*Because they generate pollution*		Partially Agree		
1.8	*Because they bring a lot of heavy traffic*		Partially Agree		
1.9	*Because they do not bring economic benefit to the locality*		Do Not Agree Nor Disagree		
1.10	*Because at the end of the exploration there is just a hole*		Partially Agree		
2	**Do you consider that the exploitation of quarries in the parish is properly regulated taking into account the applicable legislation? If not, who is primarily responsible?**	No	No	Yes	No

	QUESTIONS	PUBLIC ENTITIES		PUBLIC INSTITUTION OF SOCIAL SOLIDARITY	SPORTS CLUB
		Porto de Mós City Hall	*Alqueidão da Serra Parish Board*	*Casa do Povo of Alqueidão da Serra*	*Alqueidão da Serra Cultural and Recreational Center*
2.1	*Operating company*	X	X		X
2.2	*Parish Board*	X			
2.3	*City Hall*	X			X
2.4	*General Directorate of Energy and Geology (DGEG)*	X			X
2.5	*Other*				
3	**Do you think it is possible to reconcile quarrying with the protection of environmental values?**	Yes	Yes	Yes	Yes
3.1	*How do you think this is possible?*	Simultaneous recovery with exploration; Raising awareness among companies with municipality	Apply the existent rules; Provide training to companies	Changing exploration methodologies and techniques	Comply with working conditions rules (environmental and social)
4	**Are you aware of environmental liabilities caused by quarries (abandoned or active) in the parish?**	Yes	Yes	Yes	Yes
5	**Do you consider it important for the local community that these abandoned quarries are restored?**	Yes	Yes	Yes	Yes
5.1	*Why?*	It is inevitable with environmental recovery projects	It gave a "different look" to the land, more pleasant, at least in visual terms.	Very important, for the landscape and its importance for the population.	Those who live here have strong contact with nature, which ultimately means well-being and quality of life
6	**In your opinion, do companies that operate quarries have or should have social responsibility in the locality?**	Yes	Yes	Yes	Yes
6.1	*In what way?*	Support Sport; Participate in the health response; Employability	In the context of supporting local institutions	Sponsor different environmental activities. Support some activities of Casa do Povo	Support for local sport. Promote population well-being. Support ambulance to the population;
7	**Do you think that sufficient information is available to the population about quarrying operations?**	No	No	No	Yes
7.1	*Who considers that is responsible for the information available?*	Exploration is a “taboo” topic, as such, is treated in a closed manner.	Parish Board and City Hall	All entities, but mainly the parish board and companies.	All entities have responsibility, including the population that has not shown interest.

	QUESTIONS	PUBLIC ENTITIES		PUBLIC INSTITUTION OF SOCIAL SOLIDARITY	SPORTS CLUB
		Porto de Mós City Hall	*Alqueidão da Serra Parish Board*	*Casa do Povo of Alqueidão da Serra*	*Alqueidão da Serra Cultural and Recreational Center*
8	**The recovers abandoned quarries (from other companies) in the locality, as a measure to minimize and mitigate environmental impact for opening a new exploration, would you consider this advantageous?**	Yes	Yes	Yes	Yes
	RELEVANT OBSERVATIONS	*2 - Taking into account different weights in different entities* *8 - It is inevitable to continue along this path, but it must however have a diverse and differentiated application.*	*1 - They are necessary evils, which must be balanced* *2 – City Hall is holding back "too much", which gives companies the wrong idea of responsibility if it is not done with discipline.* *4 - Does not consider it to have a relevant role*	*8 - It can be advantageous, however it must be done with criteria and limits, and should not be a sufficient factor.*	*1 - It is a necessary evil;* *8 - Agree that it is a weighting factor, but not an absolute value. It can be a differentiating and distinctive factor.*

Table A.VII-2 – Results of interviews carried out with local entities (Part 2/2)

	QUESTIONS	LOCAL ASSOCIATIONS		
		Hunting, fishing and shooting club of the Parishes of Alqueidão da Serra and Reguengo do Fetal	***Alecrim e Salva - Civic, Cultural and Environmental Association***	***Association of Portuguese Sidewalk Explorers***
Representative	**Gender**	Men	Women	Men
	Age	39	55	48
	Education level	Higher Education	Higher Education	9th grade
1	**Do you consider the existence of mineral resource exploration (for example, quarries) necessary for the parish/locality?**	Yes	Yes	Yes
1.1	*Why construction needs*	Totally Agree	Partially Agree	Partially Agree
1.2	*For economic support of families*	Partially Agree	Partially Disagre	Totally Agree
1.3	*To boost the local economy*	Do Not Agree Nor Disagree	Partially Disagre	Totally Agree
1.4	*Because the landscape and environment are worth less than the resource*	Totally Disagree	Totally Disagree	Partially Disagre
1.5	*Because without quarries there is no society as we know it*	Partially Agree	Do Not Agree Nor Disagree	Do Not Agree Nor Disagree

	QUESTIONS	LOCAL ASSOCIATIONS		
		Hunting, fishing and shooting club of the Parishes of Alqueidão da Serra and Reguengo do Fetal	***Alecrim e Salva - Civic, Cultural and Environmental Association***	***Association of Portuguese Sidewalk Explorers***
1.6	*Because they destroy the landscape and environment around them*			
1.7	*Because they generate pollution*			
1.8	*Because they bring a lot of heavy traffic*			
1.9	*Because they do not bring economic benefit to the locality*			
1.10	*Because at the end of the exploration there is just a hole*			
2	**Do you consider that the exploitation of quarries in the parish is properly regulated taking into account the applicable legislation? If not, who is primarily responsible?**	No	Have no knowledge	No
2.1	*Operating company*	X	X	
2.2	*Parish Board*			
2.3	*City Hall*	X		
2.4	*General Directorate of Energy and Geology (DGEG)*			
2.5	*Other*			X
3	**Do you think it is possible to reconcile quarrying with the protection of environmental values?**	Yes	Yes	Yes
3.1	*How do you think this is possible?*	Recover/restore the surrounding landscape	Start introducing recycling standards and carbon sequestration	Landscape requalification (modeling and planting) and reforestation in another area
4	**Are you aware of environmental liabilities caused by quarries (abandoned or active) in the parish?**	Yes	Yes	Yes
5	**Do you consider it important for the local community that these abandoned quarries are restored?**	Yes	Yes	Yes
5.1	*Why?*	Because you appreciate and value the landscape	For environmental reasons, and appreciation of the landscape	Very important to encourage acceptance.
6	**In your opinion, do companies that operate quarries have or should have social responsibility in the locality?**	Yes	Yes	No

	QUESTIONS	LOCAL ASSOCIATIONS		
		Hunting, fishing and shooting club of the Parishes of Alqueidão da Serra and Reguengo do Fetal	***Alecrim e Salva - Civic, Cultural and Environmental Association***	***Association of Portuguese Sidewalk Explorers***
6.1	*In what way?*	Support for communities	Landscaping/environmental issues, vibration and noise. Social programs with hiring assistants for small problems.	
7	**Do you think that sufficient information is available to the population about quarrying operations?**	No	No	No
7.1	*Who considers that is responsible for the information available?*	The company	The population doesn't want to know. Parish Board and local associations	Parish Board
8	**The recovers abandoned quarries (from other companies) in the locality, as a measure to minimize and mitigate environmental impact for opening a new exploration, would you consider this advantageous?**	Yes	No	Yes
	RELEVANT OBSERVATIONS	*4 - Quarries can be considered a good safeguard against wild rabbits, due to the underground galleries created by the disturbed stones. Perdiz also benefits from these quarry conditions*	*1 - They can and should fill the quarries.* *2 - Whoever grants the license is responsible for supervision.* *8 - Contributes to your social and environmental responsibility.*	*1 - Legislation will have to be adapted, since legislation is not going in the right direction.* *2 - Legislation, and therefore political power;* *8 - Agrees, however considers that the determination should not be in area but in volume, due to differences in elevations.*