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Analysis of the European Strategy for Critical Raw Materials as Defined in the CRMA: Focusing on Social, Circularity, and Governance Aspects

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Abstract

Many new technologies in strategic sectors depend on using critical raw materials. This is one of the reasons why the European Union (EU) wants to ensure a sustainable and risk-free supply of these resources. In this context, the Critical Raw Materials Act (CRMA) was created. This study provides a comprehensive analysis of the EU's strategy for critical raw materials, focusing on sustainability-related aspects. It follows a qualitative research approach and uses semi-structured interviews with experts to gather insights and perspectives on the CRMA as well as on more specific themes such as strategic partnerships, governance, and social aspects.

The findings indicate that stakeholders are generally satisfied with the legislation, despite the ambitious nature of its goals. The interviews underline the success of strategic project procedures and the crucial role of Member States in their implementation, while also noting the potentially negative impact on non-critical materials and protected areas. In terms of circularity, the overemphasis on recycling is criticized. A lot of other challenges also remain like the CRMA's interdependence with other legislation and the absence of demand reduction scenarios.

On the social front, public perception presents a major challenge that could negatively impact the CRMA. In addition, indigenous communities express dissatisfaction with the absence of the term FPIC, which could have detrimental consequences for them. Moreover, while the CRMA has the potential to create jobs, these must be quality jobs that meet clear and well-defined criteria. Concerning the governance aspect, the importance of the Board, the European Commission, and certification schemes is emphasized. Still, an over-dependence on certification schemes is noted.

Furthermore, strategic partnerships lack concreteness, and their win-win nature depends on the EU's ability to enable partner countries to develop their value chains, and meet their needs for technologies, investments, and infrastructure, while also influencing the sustainability and monitoring of these partnerships. Lastly, some terminology must be clarified further to reduce ambiguity or eliminated to reduce danger.

In conclusion, these results enable readers of this thesis to comprehend the context of the CRMA and its repercussions, as well as provide insightful viewpoints for future legislation on this topic.

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Part 1: Background and Literature review

1 Introduction

1.1 Research Context

To maintain the quality of life on Earth, global warming must be kept to less than 2°C (Fendt & Ivanova, 2021). The main cause of this temperature increase is the greenhouse gases, such as CO2, that humans release into the atmosphere. (European Commission, 2024a). Therefore, it is imperative to facilitate the shift to a zero-carbon economy, of which the energy transition is a critical element (IRENA, 2023a). Nevertheless, renewable energy technologies and associated fields require advanced technologies that heavily depend on the properties of critical materials (IEA, 2022a). In addition, the need for those key materials is expected to develop exponentially due to the growing needs of strategic industries such as defense, space (Fangueiro & Rana, 2020), mobility (Schmid, 2020), and digital technologies (Lewicka et al., 2021).

Because of their importance, CRMs are strategically and economically significant for the EU, whose goal is to provide a steady, secure, and sustainable supply (European Parliament, 2023). For now, the EU is dependent on imports partly due to the geographical concentration of these minerals which raises the possibility of supply chain interruptions. For instance, for rare earth metals, the EU relies nearly totally on one third nation (Findeisen & Wernert, 2023).

Therefore, within the framework of the green industrial plan, the EU developed the Critical Raw Materials Act (CRMA), which came into effect on May 23, 2024 (European Parliament, 2024). This legislation strives to strengthen the European value chain of critical raw materials by establishing thresholds for a subgroup of materials deemed strategic. Specifically, the CRMA stipulates that 10% of the EU's annual consumption for extraction, 40% for processing, and 25% for recycling must be ensured domestically. In addition, the legislation seeks to diversify supply sources by forming strategic partnerships to prevent 65% of the EU's consumption of each strategic material from coming from a single third country (Tröster et al., 2024).

The environmental and social components are intrinsically linked to the CRMA, particularly through the types of activities it promotes with strategic projects, especially in extraction. Indeed, extraction is cited as the industry with the highest levels of corruption (OECD, 2014), the highest greenhouse gas emissions (Carbon Majors, 2022), and the least respect for human rights (World Benchmarking Alliance, 2023). Thus, the CRMA may have negative effects on workers, local communities, Indigenous people, wildlife and flora. To allay these worries, the CRMA introduces measures on circularity, certification schemes, governance, and references to pre-existing laws (Council of the EU, 2023).

Despite these initiatives, questions may remain about the practicality of its goals, the legislation’s overall impact, and possible weaknesses in both the legislation and its

implementation. Indeed, some challenges may emerge in relation to various dimensions of the CRMA, including social, environmental, and geopolitical aspects. These issues might counteract the benefits of the legislation and result in negative externalities (Hool et al., 2023).

1.2 Research Aims and Objectives

The theme of this study is “Analysis of the European Strategy for Critical Raw Materials as Defined in the CRMA: Focusing on Social, Circularity, and Governance Aspects” which raises the research question as follows: “How can the EU's strategy for critical raw materials, as outlined in the CRMA, be improved to enhance governance, social aspects, and comprehensive circularity practices?”

This research strives to provide a comprehensive analysis of the CRMA, focusing on themes such as circularity, certification systems, strategic partnerships, and the social dimension, exploring these from the perspectives of sustainability and governance. This study focuses on these key points and thereby intends to create a better understanding of the current challenges related to CRMA, alongside recommendations that could significantly complement future policy design regarding critical raw materials.

The scope of the study was limited to attain this objective. In fact, the specificities of the defense sector will not be addressed, as they require a distinct and specialized approach. Further, the processing and treatment aspect associated with the value chain of CRM is not explored. The latter decision was made in response to input from more stakeholders who were most worried about extraction, recycling and resource diversification targets. Moreover, though there is not a specific chapter about the environment as such, this topic is addressed repeatedly throughout the work.

1.3 Significance and Originality of the Study

The CRMA is a new concern so there are few studies on this topic, specifically with connotation to sustainability. This legislation has generated a lot of enthusiasm about critical raw materials. But, even in the narrow group of specialists who have followed and contributed to its development, many questions arise. Therefore, understanding the CRMA is important since associated projects could, directly and indirectly, affect hundreds of millions of people in just a few years because of the targets established for 2030 and the strategic projects. That’s why it is necessary to delve into the CRMA and identify any gaps or areas of improvement, which could help to shape future EU legislation on CRM and associated themes. During the discussions I had with stakeholders part of NGOs, EU Institutions, and International companies, they showed a strong interest in the results of this thesis and supported this initiative.

1.4 Research Outlines

Chapter 2 explores the literature review pertinent to this thesis. Then chapter 3 details the methodology employed in the study. Afterward, chapter 4 presents the results and connects them to relevant CRMA articles. Next, chapter 5 offers recommendations based on the findings of the previous chapters. Finally, chapter 6 thoroughly examines the study's limitations and proposes avenues for future research.

2. Literature review

2.1 Introduction

As the topic is recent, there are few scientific articles and reports on the CRMA. Thus, the objective of this literature review is to understand the context associated with this legislation and explain in more detail the themes related with this law. It will then be useful for understanding Chapter 4.

2.2 Circularity

The circular economy is a sustainable framework that adopts creative and profitable economic models with the goals of minimizing waste and optimizing resources (Figge et al., 2023). Also, its objectives are to increase the lifespan of natural resources, lessen the negative effects of raw materials of activities like extraction and processing, and cut down on pollution caused by resource usage and end-of-life issues. (Ekins et al., 2019).

The 3Rs (Reduce, Reuse, Recycle) are the fundamental concept behind the circular economy. To reduce its negative effects on the environment, this idea incorporates these principles into both production and consumption. In fact, “reduce” entails using fewer resources for waste management, consumption, and production. Meanwhile, “reuse” encourages to increase in the lifespan of goods, materials, and resources. Lastly, recycling entails processing waste to turn it into final goods or raw materials, bringing them back into the manufacturing cycle, and closing the life cycle of the material (Nowicki & Kafel).

The 9R model is the result of expanding the 3R framework to accommodate more complex hierarchies (Khaw-ngern et al., 2020). The 9R prioritizes actions based on their capacity to promote a circular economy. Besides, "Refuse" (R0) is the metric that comes closest to this ideal and "Recover" (R9) is the most in line with the linear model. These 9R can be divided into three main categories. "Refuse" (R0), "Rethink" (R1), and "Reduce" (R2) are among the items in the first category, which intends for optimal product consumption and manufacturing. The second category, "Reuse" (R3), "Repair" (R4), "Refurbish" (R5), "Remanufacture" (R6), and "Repurpose" (R7), is concerned with prolonging the life of items and their components. The last category includes "Recycle" (R8) and "Recover" (R9) which focus on effective material application (Okorie et al.).

2.2 Defining Critical and Strategic Materials

2.2.1 Critical Materials and the List of Critical Materials

The manufacturing of a large array of products and services that are essential to the operation of the world economy depends on raw materials. They act as catalysts for technological advancement and help to create value for society (Ferro & Bonollo, 2019). Some materials are considered critical, and for the EU, this designation is assigned following a methodology based on two criteria: economic importance and supply chain risk level. When these materials meet the thresholds for being critical, they are included in the corresponding list (European Commission, 2024f).

The first list of CRMs was created in 2011 because of the 2008 Raw Materials Initiative. In fact, this list attempts to catalog these raw materials to assist stakeholders including governments and businesses, in developing their strategies while making more informed decisions. This list is updated triennially (IEA, 2022b). In 2023, the European Union published the fifth list of Critical Raw Materials, comprising 34 materials, an increase of 20 materials since the first edition (European Commission et al., 2023).

The composition of the lists of materials deemed critical has varied over time, reflecting the dynamics of their strategic importance. For example, in the 19th century, even if the list of critical materials didn't exist yet at that time, sulfur was considered crucial due to its high demand for manufacturing chemicals used in different industries, which is no longer the case nowadays (Månberger, 2023). The lists' composition differs across nations and areas due to socioeconomic, geopolitical, cultural, climatic, and geological factors (Zhang et al., 2023).

2.2.2 Strategic Materials

17 raw elements are classified as strategic for the EU. These strategic raw materials are a subgroup of the CRM (Conseil européen, 2024c). The EU's economy and security depend on these resources for several industries and technologies. It includes technologies in digital, aerospace, defense, and renewable energy fields (Righetti & Rizos, 2023). Appendix 3 represents a diagram of the strategic and critical materials.

2.3 The Value Chain of Critical Materials

As Appendix 2 shows schematically, the value chain of key materials involves a multi-stage, intricate process. Finding economically feasible mineral resources and figuring out their characteristics are the main goals of the first stage, known as mineral exploration. Mapping, drilling, and the use of different technology, such as satellites, sensors, and modeling systems, are some of these efforts (Geological Survey Ireland, 2024). Even with the most sophisticated equipment, mineral exploration still has difficulties like those in extraction, especially when it comes to obtaining exploitation permits, which is frequently a difficult and drawn-out procedure. Furthermore, exploration projects have a very low success rate. Indeed, only 1% of them end up in the development of a mine. Therefore, it increases the likelihood of a poor return on investment (Resources Victoria, 2024).

The development stage starts after deposits are located. In order to assess if a mining project is feasible, this stage entails thorough investigations of the technical, economic, legal, and environmental factors (Natural Resources Canada, 2024). Following these studies, the planning, design, and construction of the necessary mining infrastructure to support these activities take place (Eggert, 2010). Large amounts of rock must then be removed to extract the materials that have been identified. Besides, the kind of deposit and mine, whether open-pit or underground, determines the specific equipment and safety precautions. After that, the materials are shipped to a processing plant (Brusseau et al., 2004).

A key step in the value chain is mineral processing, which involves a range of physical,

chemical, and biological procedures to remove waste rock from the desired components (Haldar, 2018). During this phase, the rock is crushed to a smaller size, it is ground to produce finer particles, and separation methods including flotation and gravity concentration are used. Then, the materials are refined to eliminate any remaining impurities (RDA Group, 2024) and this step employs several technologies, including electrolytic refining, zone refining, and vacuum distillation (Yu et al., 2021). Purification, the last phase of this intricate process, involves further refining the components to the appropriate purity levels so they are ready for use (Lark-Horovitz & Johnson, 1959). After being refined, these materials are made into semi-finished goods that are the building blocks for the creation of more intricate parts. These components are then put together to create completed goods for a range of applications (Ayuk et al., 2020).

Finally, it is crucial to consider recycling, which is further broken down into primary and secondary recycling. Primary recycling involves pre-consumer waste collected during the purification, semi-finished product production, and component stages. At the refining stage, these materials are reprocessed and reincorporated into the manufacturing cycle without materially changing from their initial qualities. On the other hand, waste from completed items that are no longer useful in their current form is recovered and processed in secondary recycling (Mwanza, 2021). A value chain that depends on minerals or metals is schematically shown in Appendix 2.

2.4 The Current Global Situation Regarding Critical Materials

2.4.1 COVID-19

The COVID-19 pandemic has had a major influence on the market for key materials in the European Union, increasing supply chain vulnerabilities and causing substantial disruptions. Lockdown procedures and the temporary worldwide cessation of mining and production activity left the European Union with acute shortages of essential resources. The fluctuations in raw material prices exposed other economic problems for European industry because of changes in supply and demand. These disruptions also revealed the EU member states' reliance on imports from other nations, underscoring the need to increase the resilience of the domestic supply chain and diversify its sources of supply (Zanoletti et al., 2021).

2.4.2 Geopolitical Events

The market for crucial commodities has been greatly impacted by several geopolitical developments in recent years. For instance, Indonesia banned the export of raw nickel ore in 2020 to move away from the export of raw materials and toward becoming a significant participant in the global value chain (Cantyani et al., 2023). As a result, this policy caused the price of nickel to rise significantly worldwide, which put a great deal of pressure on European businesses, especially the steel industry. In addition, the restriction had a detrimental effect on the energy transition and the Comprehensive Economic Partnership Agreement negotiations (Basri & Ismiyatun, 2024). Besides, Indonesia's essential materials policy kept changing in 2023, with additional prohibitions targeting minerals like bauxite (Reuters, 2023).

The conflict between Russia and Ukraine is another significant geopolitical event that has an

impact on the CRM value chain. Indeed, the ongoing war has resulted in notable disturbances to the worldwide market for essential raw commodities, uncovering profound weaknesses within supply systems. In fact, Russia supplies the EU with a significant amount of these resources, including nickel, titanium, and vanadium (OECD, 2022). Consequently, the conflict's aftereffects have exacerbated the shortage of these raw materials and raised the price of commodities on international markets (Khurshid et al., 2023).

2.4.3 Dependence on China

In the critical materials value chain, China is omnipresent. To begin with, when it comes to raw minerals like nickel, copper, lithium, cobalt, and rare earths, it is the biggest importer. For example, the world's greatest producer of cobalt, the Democratic Republic of the Congo, exports 99 percent of its cobalt. Then, the extraction of CRM is geographically concentrated in a small number of countries where China controls a significant portion of the production notably for rare earth and graphite. Subsequently, China is the country that produces 100% of the refined natural graphite and dysprosium, and significant majorities of cobalt, lithium, and manganese. Next, China is a leader in the production of intermediate and final goods in various sectors, including technologies enabling the energy transition (IRENA, 2023b). This nation has frequently used its dominant position in critical materials, particularly rare earths, as a geopolitical lever. For instance, the Chinese government requested the release of a Chinese captain who had been detained in 2010, and when Japan refused, it halted supplies of rare earth minerals to Japan. This incident made the world aware of the strategic importance of rare earths and the vulnerability of companies that rely on these commodities (Wilson, 2017). More recently, in 2023, China imposed export restrictions on germanium and gallium, two elements needed for military, semiconductor, and solar cell uses. This choice highlighted the EU's reliance on China and affected security (Dempsey & Hancock, 2023).

2.5 Demand for Critical Materials

Several technologies will be crucial to achieving the decarbonization of the energy system, such as solar, wind, and electric vehicles (Nivard et al., 2024). For instance, an electric car and an onshore wind turbine require six times and nine times more critical materials than their conventional counterparts, respectively. Additionally, several strategic sectors also depend on technologies requiring critical materials. Therefore, the demand for critical materials is expected to increase in the coming years (IEA, 2022a). Appendix 3 and Appendix 4 provide two Sankey diagrams illustrating the applications and sectors where critical materials are used and their importance.

Depending on the energy scenarios considered and the underlying assumptions, projections regarding the impact on the demand for these essential commodities differ significantly. The Sustainable Development Scenario (SDS) from the International Energy Agency is one such scenario. This scenario, which would keep temperature increases to 1.8°C, is in line with the Paris Agreement and aspires to reach net-zero CO2 emissions by 2070 (IEA, 2020).

Using 2020 as the base year, the SDS indicates that by 2050, there might be a 2109% increase in the demand for lithium, a necessary component in the production of batteries for energy

storage and electric cars. In a similar vein, further instances are scandium (+100%), cobalt (+403%), and dysprosium (+433%). Within the context of the energy transition, these anticipated trends show a significant and quick change in the mineral markets due partly to technical advancements (Gregoir et al., 2022).

2.6 Legislative Framework of the CRMA

2.6.1 Paris Agreement

The Paris Agreement, which was adopted on December 12, 2015, during COP21, is a legally binding international treaty focused on combating climate change and its negative effects. It targets the integration of sustainable development and poverty eradication (UNFCCC, 2024). To meet their objectives, the 196 signatory countries pledged to limit global warming to less than well below 2°C relative to pre-industrial levels and pursue efforts for a target of 1.5°C (Gillett et al., 2019). Additionally, the agreement seeks to enhance adaptive capacity to unfavorable climate impacts and to reduce GHG emissions (UNFCCC, 2023).

2.6.2 European Green Deal

The EU launched the European Green Deal in 2019 to fulfil the objectives of the Paris Agreement by turning its economy into a sustainable one with net-zero greenhouse gas emissions by 2050. This entails keeping up economic growth while reducing the use of natural resources and ensuring that everyone is treated equally (Baicu et al., 2022). Consequently, the countries impacted by this Green Deal aim for a 55% reduction in their greenhouse gas emissions by 2030. If efforts continue, this initiative could make Europe the first carbon-neutral continent by 2050.

Among its key elements, the European Green Deal includes biodiversity protection, the promotion of a circular economy, and the transition to clean energy sources. It strongly accentuates reducing waste, utilizing resources efficiently, and developing sustainable energy technology (European Commission, 2024b). Moreover, its goal is to align financial and economic policies with climate targets. The European Green Deal also promotes aspirations for "zero pollution," ecosystem preservation, a sustainable food system, and intelligent, environmentally friendly mobility (Commission Européenne, 2019). The European Climate Law, the EU Strategy on Adaptation to Climate Change, the Fit for 55 packages, the European Industrial Strategy, the Circular Economy Action Plan, and new regulations on batteries and their waste are just a few of the initiatives that have been developed to meet these goals (Conseil européen, 2024a).

2.6.3 Green Industrial Plan

The European Green Deal seeks to work not only against climate change but for economic growth. It is proof that green actions can also bring economic performance. In that regard, the Green Industrial Plan is strengthening the competitiveness of European industry, striving to achieve a zero-emission economy and accelerating the climate-neutral transition (European Commission, 2024c).

Furthermore, the Green Industrial Plan was formulated to establish a conducive environment for augmenting the European Union's manufacturing capabilities, namely for technology and commodities that are indispensable for accomplishing the climate objectives of the European Union. The Critical Raw Materials Act, the Net Zero Industry Act, and the redesign of the power market are some of the main projects included in this strategy (European Commission, 2024d).

2.6.4 Net-Zero Industry Act (NZIA)

The Net-Zero Industry Act is designed to simplify this legal framework for it to boost investments into technologies that are needed by the EU if carbon neutrality is targeted. In doing so, it makes the European technology sector's net-zero economy more competitive and resilient by laying a foundation for a sustainable energy system which people can depend upon (European Commission, 2024e).

The objective is to locally develop 40% of the strategic technologies necessary for Europe by 2030. The act involves measures to ensure that strategic projects are given more importance, streamline the authorization process, make it easier for essential technology to enter the market, and promote innovation while enhancing worker skills (Conseil européen, 2024b).

2.6.5 Development of Critical Materials Policies in the EU

Decades of changes in the worldwide market for CRM have shaped the European Commission's policies regarding the supply of those materials (European Commission, 2023). In fact, the markets experienced price hikes and fluctuations in the 1970s, which had significant political and economic ramifications (Sparenberg, 2020). To address problems with raw material supply in Europe, the Raw Materials Supply Group was established (IndustriAll, 2021).

Then, in response to growing commodity prices and resource limitations, the EU created the Raw Materials Initiative in 2008. The project aimed to guarantee the European Union equitable and sustainable access to raw materials, while simultaneously encouraging recycling and optimizing resource utilization (Wu, 2013). This initiative is based on three main dimensions. Firstly, facilitating access to raw materials on global markets. Secondly, promoting sustainable supply from within the EU with better conditions for the extractive industry, easier land access, and simplified administrative procedures. Thirdly, reducing the demand for critical raw materials in the EU through better resource efficiency, recycling, substitution, and the use of secondary raw materials (European Commission, 2008).

To ensure that these resources would be available to the EU, they created a Critical Materials Action Plan in 2020. The original goal of this strategy was to reduce reliance on main critical raw resources while building strong value chains for the industrial sectors of the European Union. It did this by encouraging technical developments, sustainability, and circularity (Talapin & Braun, 2020). This strategy also seeks to diversify supply sources from non-EU nations while enhancing the use of resources from EU member states (ERMA, 2022).

Even though the 2008 Raw Materials Initiative and the 2020 Critical Raw Materials Action Plan have laid down non-regulatory mechanisms in place this has not sufficiently improved EU's access to CRMs. That led to the European Union, in 2023, developing the CRM Act, a legally binding legislation with more weight (European Commission, 2023).

2.6.6 Brief Introduction to the CRMA

The main objective of the CRMA is to ensure a secure and stable supply of CRMs for the EU. This includes promoting efficiency and circularity throughout the value chain. To mitigate supply risks and strengthen the CRM value chain, the legislation supports strategic projects and encourages innovation. It also intends to increase supply chain surveillance for better risk prediction and response. In addition, the law guarantees the unrestricted flow of these resources throughout the EU market while upholding strict environmental standards (Council of the EU, 2023).

One particular aspect of the NZIA and CRMA's development is that they were created simultaneously to solve interrelated issues that are crucial to accomplishing the EU's economic and climate ambitions. By increasing the availability of green technology and the CRMs needed to produce them, they hope to meet the Union's aggressive climate goals while also boosting economic resilience (ASG, 2023).

2.7 Understanding the Key Components of the CRMA

2.7.1 Strategic Projects

2.7.1.1 Overview and Qualification Criteria

To secure the EU's supply chain of strategic raw materials, strategic projects are necessary. In order for a project to be considered strategic, it must strengthen this supply chain and substantially improve EU security. Technical viability within a reasonable timescale and the implementation of procedures targeted at reducing its impact on the environment and society, while upholding established norms and emphasizing transparency, are further requirements. As well, member states must ensure that these projects involve local communities and uphold social standards, thereby guaranteeing their social acceptability. Lastly, when these projects are based in third countries, they must offer mutual benefits and contribute to local value creation. It is also important to recognize that, under certain conditions, strategic projects may present an overriding public interest that could lead to negative consequences (Council of the EU, 2023).

2.7.1.2 Conventional Timelines for the Permitting Process

The CRMA establishes a maximum schedule of 27 months for extraction operations and 15 months for processing or recycling projects for new strategic initiatives. The remaining stages of an established project cannot last longer than 24 months for extraction projects and 12 months for processing or recycling projects if the project is expanding or going through the permitting process after gaining strategic status. Further, member states have the option to extend the granted timeline by 3 months for a processing and recycling project and by 6 months

for an extraction project. Importantly, environmental impact assessments are not included in this period (Council of the EU, 2023).

2.7.1.3 Benefits of Having Strategic Project Status

A strategic project's status permits streamlined administrative processes, facilitating faster and more effective implementation without sacrificing the assessment process. Legal matters can be resolved more quickly because of this classification, which allows member states to expedite procedures. A single point of contact is also allocated to each project to help project promoters with any administrative inquiries. In terms of funding, the European Commission oversees luring private investments for these initiatives in coordination with the member states. Private investment, foreign and EU financial institutions, member state resources, and certain EU initiatives are examples of possible funding sources (Council of the EU, 2023).

2.7.1.4 Targets Set in the CRMA

The CRMA has set three targets to be achieved by 2030 regarding strategic materials, linked to strategic projects. Firstly, 10% of the EU's annual needs must be extracted within member states' territories, if material reserves are available. Secondly, the plan targets to increase the capacities of processing facilities to cover at least 40% of the annual consumption of these materials within the Union. Thirdly, initiatives must be implemented to recycle at least 25% of the Union's annual consumption of strategic materials, with a particular focus on increasing recycling rates for each specific material (Council of the EU, 2023).

2.7.2 Strategic Partnerships

The EU hopes to reduce its dependence on any single non-member nation by ensuring that no country can offer more than 65% of an important raw material in a given year. That’s why the EU seeks to establish strategic partnerships with resource-rich countries to enhance cooperation in the raw materials value chain. Furthermore, projects in these partner countries must adhere to the same social and environmental sustainability standards while ensuring mutual value creation (Council of the EU, 2023).

2.7.3 Circularity

Member states are obliged to implement national programs aimed at improving the circularity of critical raw materials. These programs are designed to promote innovation, resource efficiency, and prolong the lifespan of products through waste prevention, reuse, and repair, while increasing the recovery and recycling of materials. The programs will include measures to encourage the adoption of secondary raw materials through public procurement criteria and financial incentives, improve recycling technologies, support workforce skill development for circular practices, and enforce extended producer responsibility to include secondary materials in new products. Beyond that, they must create a public digital database mapping waste sites that may contain recoverable materials. Waste management operators are required to conduct economic assessments of the recoverability of critical raw materials from existing and newly generated extraction waste. The Commission, for its part, must identify and list products and waste streams with significant recovery potential (Council of the EU, 2023).

Specific measures aimed towards permanent magnets are also included in the CRMA, especially about labeling. Products using permanent magnets, with a few exceptions, have to be labeled with a product passport that includes information about the type, quantity, and properties of the magnets. By improving transparency and the sustainability of the supply chain, this information supports ethical practices during the sales process and is crucial for recycling. Therefore, by making permanent magnets identifiable and recyclable and by striking a balance between industrial needs and recyclability targets, these measures seek to increase resource efficiency and sustainability (Council of the EU, 2023).

2.7.4 Certifications

Stakeholders owning certifications can request their recognition if they meet specific criteria outlined in Annex IV, such as requirements to ensure sustainable environmental practices, verifier independence, and multi-stakeholder governance. Afterward, the EU Commission will formalize the validity of these certifications, conducting reviews every three years to ensure compliance (Council of the EU, 2023).

2.7.5 European Critical Raw Materials Board

The European Critical Raw Materials Board is made up of expert representatives from all EU member states and collaborates with the European Commission, which presides over it. To support its various tasks, such as proposing guidelines to accelerate permitting procedures and recommending strategic projects and circularity initiatives, the board meets regularly and can form specialized sub-groups focused on specific areas like financing, public awareness, and resource coordination. Additionally, the board ensures confidentiality and aims to reach a consensus in its decisions (Council of the EU, 2023).

The board is also essential for the continuous assessment of current strategic partnerships with third countries, looking at how these partnerships impact the socio-economic development of partner nations as well as the supply security of the EU. They pay special attention to human rights and sustainable practices. In addition, the board provides advice to the commission on how to integrate these strategic partnerships with other EU policies as well as with member-state bilateral activities (Council of the EU, 2023).

2.7.6 Exploration

National exploration programs for essential critical raw materials must be developed by member states. The aim is to enhance comprehension of events involving CRMs. In order to ensure transparency and promote constructive talks among member states, these programs must also be submitted to the Commission and include measures for online public access to exploration data (Council of the EU, 2023).

2.7.7 Joint Purchasing System

The European Commission needs to organize a system of joint purchasing to facilitate collective purchasing power. All EU enterprises will have unrestricted access to this system,

which will rigorously abide by European competition regulations (Council of the EU, 2023).

2.6.8 Strategic Stocks

The European Commission must be informed by member states of any strategic raw material stock levels they may have, giving a thorough picture of the raw material reserves held by the EU. The confidentiality of sensitive information is another point the Commission underlines when it comes to potential threats to national security or defense. In order to advise member states accordingly and define stock levels for these key raw materials, an analysis will be carried out every two years (Council of the EU, 2023).

2.7 Indigenous Peoples

Because of their strong ties to their ancestral lands and environs, indigenous peoples create distinctive cultural and social communities. To their identities, customs, well-being, and everyday lives, these lands and the resources they relate to are vital (World Bank Group, 2023). Nevertheless, prejudice, losing their territory, and being uprooted are only a few of the major difficulties that indigenous peoples must deal with. Besides, they have a lower life expectancy and a higher rate of poverty than non-indigenous people, with a 20-year difference (Sobrevila, 2008). As 54% of the transition's necessary minerals are found on their territory, they could become more vulnerable to exploration and extraction efforts, making the situation worse (Owen et al.,2023).

Therefore, the strategic projects mentioned in the CRMA could undermine a just transition with their potential negative effects, which include biodiversity loss, increasing violence against vulnerable populations, environmental pollution, and disrespect for human rights (Earthworks, 2022). Furthermore, mining firms frequently exhibit a lack of openness and dedication to the local, indigenous labor force and communities. Besides, a lot of mining companies are unable to demonstrate that they notify and include these stakeholders (RMI, 2022).

As a response to these issues, some laws and policies have been made in which the rights of Indigenous peoples are protected, while at the same time incorporating them into the decision-making process. For instance, in 2007 the United Nations passed the Declaration on the Rights of Indigenous Peoples (UNDRIP), which outlined the essential conditions for their existence, respect, and welfare (United Nations, 2007). The free, prior, and informed consent (FPIC) principle is a part of UNDRIP. "Informed" means giving full information; "free" consists in not being subjected to compulsion; "prior" denotes consent before any activity; and "consent" explains the concept of having the freedom to grant or withhold assent (United Nations Human Rights, 2013).

Part 2: Empirical Research

3 Methodology

3.1 Introduction

The objective of this chapter is to set out the methodological approach used in a comprehensive examination of CRMA framework. This section will begin with an explanation of the methodological approach adopted and will then be followed by a data collection procedure description, concluding with a brief overview of data analysis.

3.2 Qualitative Approach

The qualitative approach is centered on investigating the nature of a subject in detail. Therefore, understanding their characteristics, the circumstances surrounding their occurrence, and the various viewpoints from which they can be understood (Eze, 2023). This kind of research emphasizes the examination of study participants' experiences, perceptions, and views, emphasizing the qualitative rather than the quantitative components of the topic under investigation. Qualitative research also frequently employs a non-random sample technique that permits an in-depth examination of subject areas and comprehensive viewpoints from participants (Bazen Et al, 2021). One common approach in the qualitative is to utilize the method of inductive reasoning, which involves discerning generalizations and larger ideas from observations of specific examples by identifying recurring themes found within initial data (Soifeman, 2010). Moreover, qualitative analysis makes it possible to gather excellent data on understudied subjects (Streefkerk, 2019).

Therefore, this method allows for a thorough understanding of stakeholders' views and attitudes regarding the CRMA legislation, which makes it a good fit for this research. It also makes it easier to identify the important features and challenges related to the CRMA. In addition, it offers a thorough examination of the possible effects on certification schemes and sustainability. Lastly, this methodology, which makes use of non-random samples and inductive approaches, provides rich and contextualized insights that are essential for suggesting pertinent changes to the legislation.

3.3 Semi-structured Interviews

Semi-structured interviews were done to get the information required for this thesis. It is a technique which is frequently employed in qualitative research since it permits an organized approach while retaining flexibility for unstructured inquiry based on how the interview progress (Magaldi & Berler, 2020). This methodology facilitates the acquisition of viewpoints from participants and individualizes the interviewing process (Dejonckheere & Vaughn, 2020). Because it enables a better understanding through more impromptu questions that adjust to the conversation, it is especially helpful for complex issues (Wilson, 2014). As a result, it is particularly well fitted for this work as it is a complex subject related to multiple topics. Therefore, semi-structured interviews enhance some viewpoints depending on the interviewees' expertise and offer previously unanticipated insights.

3.4 Selection of Participants

Purpose sampling, a non-probabilistic sampling method, is particularly relevant for research relying on experts (Dolores & Tongco, 2007). Although this selection method has drawbacks, notably the subjectivity in choosing interviewees, it allows for the collection of highly reliable data despite the potentially small sample size, especially when randomization is not possible (Etikan et al., 2015). Moreover, purpose sampling ensures rigor in data collection for the research (Nurs, 2020).

Participants were first contacted via LinkedIn, emails, and events related to critical materials and the CRMA. Initially, individuals who had written articles on the subject were contacted, followed by those who specialized in specific themes such as indigenous populations and workers. Afterward, recommendations from interviewees were followed up. This process enabled the exploration of perspectives from experts familiar with or involved in the drafting of this new legislation. The goal was to interview representatives from the different stakeholder groups mentioned in Appendix 5. Hence, 24 interviews averaging 51 minutes were conducted, with 22 in English, 1 in French, and 1 in Spanish, between May 7, 2024, and June 10, 2024.

3.5 Data Analysis

One of the most important aspects of analyzing qualitative data is coding, which is looking at a section of the text and labeling it according to what the data signifies (Linneberg & Korsgaard, 2019). This approach facilitates data organizing and structuring by enabling the identification and grouping of comparable or related parts while also giving the data shape and meaning (Berthet et al., 2023). This process also reduces the data quantity while increasing analysis quality. It simplifies interpretation and reveals insights (Illinois University, 2024). After transcribing the interviews, important elements of the text were grouped into themes for each interview on Miro. Comparing all interviews on Notion allowed for the identification of the most recurring elements and themes. Subsequently, coding was applied to the CRMA based on the themes identified in the interviews to combine the legislative insights with those from the interviews.

4. Results

4.1 Introduction

This chapter aims to present and analyze the results obtained from the conducted interviews. A detailed interpretation of the information gathered will be provided to offer an in-depth understanding of the explored perspectives. This interpretation will be combined with the articles and recitals of the CRMA that correspond to the highlighted insights.

Through the coding process, recurrent patterns in the CRMA study were found, and these themes are connected to the following inquiries:

1. What general opinions do stakeholders have about the goals and execution of the CRMA?
2. Considering the unique requirements of member states, protected regions, and non-critical materials, how does the designation of strategic projects affect the permitting procedures inside the CRMA framework?
3. In the framework of the circular economy, how does the CRMA approach circularity? What are the primary obstacles and suggestions for its enhancement?
4. What actions are suggested to enhance the conditions and acceptability of the stakeholders, and how are public opinions, the concerns of indigenous communities, and worker-related issues considered in the CRMA?
5. How are certification schemes integrated into this framework, and what organizations and mechanisms are incorporated into the CRMA to guarantee the supervision and management of this law?
6. How do strategic partnerships impact the infrastructure requirements, partner country sustainability criteria, and value chain in the CRMA?

4.2 Objectives

In this section, the defined extraction, processing, and recycling thresholds are analyzed together with the interviewees' perspectives on the overall CRMA.

It is clear from the events attended and the interviews that most respondents were, overall, satisfied with the CRMA and thought it met its goals, albeit there were a few outliers. For example, P9 questioned the CRMA for failing to take mining exploration into account, while P22 expressed worries about the disregard for indigenous peoples.

Notwithstanding its shortcomings, P10 and P14 agreed that the CRMA shows investors and the sector that lawmakers are committed to making changes. P4, P6, and P10 saw the CRMA as only a first step, indicating that to fully realize the impact of this initial framework, additional legislation is required to complement and reinforce it. But P7, P8, and P10 complained that there were not enough financial resources or clear implementation procedures, arguing that the CRMA was more of a vision than a workable strategy. P4, P6, P7, and P11 agreed, stressing the critical nature of the law's execution and the need for constant adaptation to unanticipated obstacles that would compromise its goals. P3 emphasized that the dynamic nature of the contemporary environment, which is marked by a period of learning about and comprehending the new laws, makes their application even more difficult.

Given the current situation, P2 and P6 explained that achieving these objectives will be particularly challenging due to certain difficulties mentioned in the following sections of this thesis. They also noted that while some goals may be achievable for specific strategic materials, for others, they are practically unattainable. Nevertheless, P11 and P12 pointed out that although the CRMA's objectives are not binding, they nonetheless indicate the direction the EU intends to take.

Rec 6, Rec 7, Art 4.1.a and 4.1.b of the CRMA precisely define the EU's ambitions regarding strategic critical materials. P11 expressed skepticism about the feasibility of these objectives, particularly concerning extraction. It was highlighted that although the EU represents between 20% and 25% of the global demand for critical materials, it extracts less than 5% (European Committee of the Regions, 2021), and demographically, it accounts for only 6% of the world's population (Worldometer, 2024). These figures indicate that, given its disproportionate demand, it is improbable that the EU will be able to supply 10% of its consumption. This opinion was expressed by P3 and P7, who said that these goals are rather lofty given that the development of a mining project can take up to 17 years (Statista, 2024). These goals underscore the enormous task it will be for the EU to meet these standards in such a short amount of time, given that they are set for 2030. Furthermore, P7 deemed it unrealistic to expect the EU to develop enough processing capacity to produce at least 40% of its annual consumption. They expressed doubts about this ability. P11 had qualms about this as well, albeit with less certainty.

P2 and P4 underlined that the CRMA focuses on the supply of raw materials, emphasizing the need to strike a balance by taking sustainability into account. In addition, P7 and P11 both pointed out that the recycling objective was increased from 15% to 25%, which they see as a sign that the EU is serious about encouraging circularity. Nevertheless, they also consider this target to be difficult to achieve. It was noted during discussions that these objectives were not established on a solid scientific basis, which from the outset could compromise their realization. P12 shares this analysis but believes that ambition is necessary to push the limits of what is possible.

It is important to note that this research did not directly address the diversification objective, which tries to restrict dependence to 65% on a third nation for each strategic material at the yearly consumption level. Nonetheless, this goal is directly tied to strategic partnerships, which this thesis will address in more detail in a later section. This link shows how different components of the CRMA are interrelated and how crucial a comprehensive strategy is to achieve the objectives of the framework.

4.3 Strategic Projects

This section explores the advantages of strategic projects under the CRMA, including reduced permitting timelines and simplified procedures. It discusses flexibility and specific exclusions related to the strategic project process. Thereafter, it analyzes the essential role of member states in implementing measures, the challenges faced, controversies related to mining activities in protected areas, and the impact on non-critical materials.

4.3.1 Advantages of Strategic Projects for Permitting

P4, P14, P16, P18, and P20 observed that previously, projects associated with critical materials faced significant uncertainty due to long and laborious procedures, particularly concerning permitting. Therefore, many companies and countries supported the development of the CRMA to obtain shorter permitting timelines for projects related to the CRM value chain, as described

in Rec 9. Further, P2, P3, and P9 explained that the new procedure for strategic projects is seen positively, and it is advantageous for a project to be designated as strategic, even though few projects will benefit from this designation. However, P3 emphasized that for it to be truly beneficial, it is crucial that the CRMA measures are well-implemented and that the needs of the projects are correctly identified and supported, requiring effective coordination among the various stakeholders involved.

4.3.2 The Strategic Project Procedure

P4 and P14 highlighted that one of the advantages of the strategic project procedure is its flexibility in submitting information, allowing for the suspension of the process to gather more data if necessary. Moreover, P4, P7, and P14 added that environmental impact is not included in the maximum timeline for the strategic project procedure, preventing errors or omissions that could negatively impact the environment. This exclusion of the environmental impact is detailed in Rec 23. Nonetheless, P11 mentioned that the social aspect is included within the timelines, and P7 expressed doubts about whether this timeframe is sufficient to address social acceptance, potentially leading to numerous lawsuits. Furthermore, P3 and P12 explained that a positive aspect of the CRMA is that the goal of strategic projects is to make the system more efficient by accelerating procedures and reducing bureaucracy without bypassing existing legislation, which could have adverse social and environmental effects. This is supported by Rec 17, Rec 24, and Art 9.1.

4.3.3 Implementation by Member States

P10 and P12 explained the pivotal role of the member states in the implementation of strategic projects, particularly in terms of implementation and permitting. Nevertheless, P7 indicated that it represents a significant burden for them due to the complexity of the system. In addition, P10 added that the resources linked with the permitting process depend on the context of each country, with some currently having lengthy processes, posing additional challenges for reducing timelines. P4 also pointed out that there could be environmental risks if member states do not meet their obligations, as failing to meet deadlines can be considered implicit approval. P2 and P4 further stressed the need to improve the regulatory authorities' capacities by stating that if the responsible organizations lack sufficient capacity, the consequences and hazards related to these projects may not be appropriately addressed.

P14 described that the success of meeting deadlines depends also on the Point of Contact (POC). Rec 20 and Art 8.2.a explain that the single point of contact is responsible for facilitating and coordinating the entire permitting process. If this POC is qualified and well-staffed, it could be effective, but proper coordination and effective management are essential.

4.3.4 Protected Areas and Non-Critical Materials

P7 mentioned that it is possible to conduct mining activities in protected areas such as Natura 2000. However, P17 indicated that there is a lack of clarity regarding the feasibility of carrying out strategic projects in these zones. According to P9, permitting procedures should be consistent and conducted within the same timelines, regardless of location, especially since a

significant proportion of deposits are in protected areas. On the other hand, P5 argued that projects should not be undertaken in areas crucial for biodiversity and ecosystems. P4 acknowledged that, while sometimes there is no other choice but to operate in such areas, this must be justified by valid reasons and accompanied by strict conditions to ensure ecological viability and integrity. This approach is preferred in the CRMA, where Recital 12a explains that alternative options must first be evaluated, and their feasibility described in plans.

Furthermore, P11 and P19 explained that strategic projects would be able to obtain overriding public interest status, as described in Rec 16 and Rec 19. However, this could, in some cases, lead to negative social and environmental consequences, including mining in sensitive areas. P22 added that this term is often interpreted as giving the government the ability to launch a project even in the absence of community consensus, making this tool potentially undemocratic. Consequently, many NGOs and organizations, such as the United Nations, advise against its use.

Additionally, P14 and P21 pointed out that the current focus on critical materials leaves industries using non-critical materials feeling neglected. This prioritization could put pressure on other materials, delaying permits for projects not related to critical materials. Moreover, non-critical materials could become critical in the future, making it necessary to adopt a more comprehensive approach that also includes those not currently classified as such.

4.4 Circularity

This section's goal is to investigate how circularity is incorporated into the CRMA. The study is divided into three main sections: the first covers the overall CRMA integration of circularity, the second tackles recycling and related issues, and the third looks at potential ways to lower the demand for essential materials. This framework makes it possible to fully comprehend the various aspects of circularity as defined by the law.

4.4.1 Overview

Rec 41 emphasizes how important raw materials are to the development of a circular economy, which is essential for the green transition and a fundamental component of the CRMA is circularity. This law presents efforts to advance circularity and improve the sustainability of essential raw materials utilized in the EU, as stated in Rec 3 and Art 1.1. Rec 55 further states that a subcommittee of the European Critical Raw Materials Board will be formed to handle circularity-related matters.

Despite these initiatives, P7 expressed worries about the inadequacies of the CRMA's circularity-encouraging provisions, seeing the legislation as a lost chance to enhance circularity and establish the EU as a leader in this field. Although repair and reuse are mentioned in passing in Art 25.1.a and the need to incorporate measures to encourage these activities in national programs is acknowledged in Art 25.2, P7 argues that these provisions are still too narrow to be helpful.

Furthermore, P5, P7, and P20 noted that the CRMA placed an undue priority on recycling, which is merely one aspect of circularity and not the best, as the literature review makes clear. They contend that to more sustainably satisfy the need for CRMs, it would be wiser to vary circularity approaches:

"*So the circular economy approach as a, as a, like, in general, is really weak, it's not really put there, it's really like they put it there in terms of naming, but it's actually only talking about recycling.*" (P7).

P1 and P3, on the other hand, explain that the CRMA follows the market trends that support recycling since consumers are drawn to more technologically sophisticated products. They went on to say that the consumer cultures of the various nations will have a significant impact on the acceptance of other circularity principles, like reuse and refurbishing.

P6 added that the substitution rate of strategic materials is currently low due to the lack of efficient alternatives. Therefore, innovation becomes crucial to developing viable substitutes, but this must be economically sustainable. Art 25.1.d stipulates that member states should develop national programs including measures to encourage the substitution of critical raw materials, thus emphasizing the importance of adequate institutional support.

4.4.2 Legislative Support

P1 and P20 underlined the need for increased legislative support for designing products that are easily disassemblable, repairable, and recyclable to foster a circular economy. However, P2, P4, and P12 clarified that this responsibility falls under other legislative texts, such as eco-design regulations. They argued that while the CRMA can include certain aspects, it is unnecessary to duplicate them since they already exist in other regulatory frameworks. Indeed, this legislation doesn't replace pre-existing laws but fills certain gaps, for example, specific provisions for permanent magnets absent in eco-design legislation. This approach aims to ensure coherence among various legislations while potentially enhancing the overall effectiveness of the legislative framework.

Nevertheless, the CRMA's interdependence with other legislations could also present risks. P11 illustrated this point using the example of the CSDDD and the EU battery regulation. The CSDDD aims to ensure that companies identify and mitigate negative social and environmental impacts in their operations and value chains but does not directly include SMEs and micro-enterprises (European Commission, 2024). According to P11, the CSDDD is watered down, and the EU battery regulation focuses only on four materials:

"*So now you have a lot of other materials that are not included in the battery regulation and you have a lot of companies not included in the CSDDD, they have a perfect mix of non-regulation when it comes to the fact that now you need a lot of these materials.*" (p11).

P7 also emphasized the necessity of increased coherence between the several laws to guarantee

systemic efficiency. The construction of a cohesive approach is hampered by the lack of coherence P7, P8, and P22 saw in these laws, which were written by various groups and cross-referenced without genuine integration. P10 supports this claim by bringing up the potential for disputes between the CRMA and national laws. P4, P12, and P14, on the other hand, disagreed with this viewpoint, claiming that the CRMA integrates flawlessly with current national and European laws.

4.4.3 Recycling

4.4.3.1 Recycling Process

Recycling is a component of circularity that the CRMA has particularly focused on, but several challenges remain in recycling critical raw materials. The first obstacle lies in the recycling process's dependence on available raw materials. As P2, P3, P6, P13, and P24 noted, recycling alone cannot meet the growing demand for critical materials primarily because these resources have not yet been sufficiently extracted:

"*If you do not have primary production, you will also never have recycling*." (P3).

However, as indicated in Rec 6 and 41, recycling is envisaged to play a more significant role in meeting the EU's strategic raw material needs in the long term, contributing to an increasing proportion of their consumption.

P6 and P24 noted that products, such as wind turbines, must reach the end of their useful life before being decommissioned, a process that can take years. Following this, it is necessary to collect these materials for recycling if other circularity steps, such as reuse and repair, cannot be carried out. This collection phase constitutes a major bottleneck, as noted by P1, P5, P11, P12, and P20. Indeed, collection systems are often inefficient and dependent on consumer engagement, which leads to a significant loss of potential recyclable resources.

Rec 42 addresses this problem by stating that member states possess significant circularity skills that they can use to increase waste collection rates. Financial incentives and the implementation of national initiatives, as described in Art 5.1.b., may help this progress. Furthermore, according to P20, forming strategic partnerships may be crucial to assuring the flow of critical raw materials required for recycling operations and enhancing process effectiveness.

4.4.3.2 Permanent Magnets and Labeling

Another issue was mentioned by P20 regarding the recycling of permanent magnets. Recyclers struggle to identify their precise composition, especially the percentage of metals they contain. This lack of knowledge requires additional investment in time, resources, and analytical techniques to determine these essential parameters. That's why, according to Article 27, two years after the implementation of the act, products equipped with permanent magnets will have to include a label specifying the type of magnet and data support detailing their weight, location, chemical composition, and safe removal instructions. This initiative aims to provide recyclers with the necessary information for efficient and profitable recycling while improving the

transparency and traceability of critical materials. P5, P6, P12, and P20 perceive these measures as beneficial:

"*It will be really helpful for us metal recyclers, because we will know in advance what's in there and we don't need to spend time of analysing them or to develop a technique to analyse the product*." (P20).

Moreover, P20 indicated that this precision could also improve the sorting and processing of materials, thus optimizing the overall efficiency of the circular economy by targeting only the materials that need recycling. P5 reinforced this idea by stressing the importance of being able to differentiate products effectively:

"*You should be able to differentiate, because sometimes we recycle a lot of products that could be easily repairable, or just simply they are fine*" (P5).

4.4.4.3 Recycling Rates, Concentration, and Costs

There are other recycling-related difficulties, especially with recycling rates, concentration rates, and process expenses. According to P5, P6, and P20, there is a very low recycling rate for these materials. Moreover, these substances are frequently present in low concentrations, which makes it challenging to remove them from completed goods. P20 went on to say that as secondary materials' basic properties don't change, employing them has no significant technical restrictions. However, the cost and complexity of the process, which requires multiple treatment stages, are significant determining factors. Sometimes, despite technical feasibility, recycling may not be economically viable.

To address these challenges, P3, P6, P11, P12, and P20 underscored the role of innovation and R&D in improving the extraction and recycling rates of these materials. Rec 41 and Art 5.1.d of the CRMA highlight the importance of innovation and technology in enhancing the circularity of strategic materials, underscoring the need to invest in these areas to overcome current recycling obstacles. Nevertheless, the economic viability of recycling solutions is crucial to achieving the EU's ambitious targets, particularly the goal of meeting 25% of EU consumption through recycling, as stipulated in Rec 6 and Art 4.a.1iii.

Furthermore, P5 and P19 noted that without a solid economic foundation, these initiatives cannot be sustainably implemented. Indeed, P1, P5, P6, and P20 insisted on the necessity of strengthening financial support mechanisms to achieve these goals:

"*There is just one problem remaining, which is proper funding, proper finance tools to support the reaching of the targets when it comes to recycling*. " (P6).

4.4.4.4 Market Dynamics and Business Model

It is essential to comprehend the market dynamics and recycling companies' business models to meet the EU's recycling targets. P20 outlined the two primary strategies in this field. The

first type of recycling model is called a closed-loop model, in which the recycling company processes the waste and by-products of its clients and returns them in a modified form or purity. In this instance, processing fees for conversion, washing, and purification generate income. The waste owner does not attempt to recover the materials under the second model, which is based on open-market sales. The recycling business then makes money by selling the recycled material to a different party.

P16 raised a concern with the first model, noting that recycled materials do not necessarily remain in the EU. They can be imported from outside Europe and must then be sent back, which could compromise the CRMA objectives' effectiveness. Indeed, if recycling does not support European consumption, it questions the relevance of these objectives regarding European economic autonomy and resilience. In the second model, P16 and P20 mentioned that if recyclers receive better offers from non-European companies, the materials can be sold to them, which would have the same consequences as the first model by not contributing to the EU's self-sufficiency.

Nonetheless, P1, P16, and P20 emphasized the importance of considering international market dynamics, where there is competition with global counterparts. These counterparts can often offer more advantageous sales conditions for a similar quality product, thus influencing European companies' purchasing decisions. Moreover, these competitors often have larger material volumes and more robust recycling processes, capable of handling various material types to achieve the same quality. As P20 indicated, this ability to achieve economies of scale gives them a significant competitive advantage in the market if there are no financial incentives.

4.4.4.5 Reducing Demand

P3, P5, P7, P11, and P19 questioned the continuous growth model, underscoring the need to reduce the demand for critical materials. So far, the scenarios considered only account for increased demand. Even though Rec 8 mentions the term demand moderation, P11 suggested that developing a scenario focused on reducing demand, especially in sectors not directly contributing to the energy transition but consuming many critical materials, would be beneficial. By reducing demand, the EU could alleviate the pressure on critical material resources, currently consumed disproportionately. This approach would also have the advantage of not depending on external actors to the EU. However, as P2 and P3 pointed out, reducing the consumption of these materials is challenging due to consumer behaviors and business practices. They recommended that innovation and technological advancements play a key role in reducing the need for critical materials, an idea echoed in Rec 6 and Rec 41.

4.5 Social aspects

There are three sections to this section. The first discusses issues with how the public views mining projects covered under the CRMA and potential ways to increase acceptance. The second section, which addresses consultation concerns and upholds the FPIC concept, focuses on indigenous populations. The final section looks at concerns about workers, highlighting how crucial it is to provide high-quality jobs and offer sufficient training.

4.5.1 Public Perception

4.5.1.1 Introduction

It was discovered through interviews and events that the goals of the CRMA are seriously hampered by public opinion, especially about mining projects. A significant danger of public opposition and protests was indicated by P3, P9, P12, and P20 which could lead to project cancellation or permit revocation. The NIMBY phenomenon wherein locals object to industrial ventures near their homes was also mentioned by P2, P4, and P10. P16, P3, and P9 all underscored how Europe's high population density exacerbates this problem.

Nonetheless, P14 pointed out that the pandemic, current geopolitical developments, and the Paris Agreements have improved public opinion of mining operations. Meanwhile, P19 noted that a generational transition has diminished demonstrations in mining-heavy areas since younger people regard mining as the standard because of their extensive exposure to the sector. But P3 and P6 pointed out that the industry's bad image is furthered by regional worries about social and environmental dangers as well as the industry's bad reputation in third-world nations. Furthermore, P16 and P19 showed that operations about the critical materials value chain may have an adverse effect on already-established enterprises, which are not well received by local populations.

4.5.1.2 Disinformation

P9 and P18 identified disinformation as a key factor negatively influencing public perception of the mining industry. They noted that this is often propagated by media and anti-mining groups, who present outdated or alarmist practices that are not representative of the current industry in the European Union. This disinformation can severely hinder project development:

"*A Canadian group that spent $1.5 million on exploration. And what we ended up with, after six years, the license had to be renewed. And when it was published for renewal, we had 7,500 objections and the minister refused to attend it. That was five years ago. That license is still not renewed*. " (P9).

To address disinformation, P18 emphasized the need to correct media perceptions and re-educate the public with reliable information. This should be accompanied by building trustful relationships with local communities and establishing effective communication platforms.

4.5.1.3 Education

Education has a critical role in enhancing public awareness of the mining business. P3 and P10 underscored how important it is to inform the European public about innovative sustainable mining practices as well as the homegrown production of critical materials. P14 recommended teaching these ideas to youth via interactive resources, such as a pedagogical Minecraft version. P10 also highlighted efforts by EIT Raw Materials and advocated for better educational programs that better show mining's sustainability.

4.5.1.4 Engagement

As P3, P4, P12, P11, and P18 illustrate, community engagement is essential to the CRMA's success, particularly in an unpredictable environment. P3 stresses how crucial it is to work morally and publicly to get support. Furthermore, P4 and P12 suggested recognizing local populations as real stakeholders and involving them from the start of initiatives. P18 also recommended enlisting locals to foster collaboration and lessen opposition. Lastly, P11 preferred genuine consultation to forceful tactics.

4.5.1.5 Communication

It is possible to influence the public perception of the mining industry if the communication is effective. Besides, P2, P3, P12, and P14 described the importance of communicating transparently and showing the good practices of the sectors, as they can participate in the establishment of a trustful relationship with the public. P14 also found it very effective to clarify the reasons for the need for critical raw materials, the dependence of the EU on other nations, and the origin of the sourcing of those resources. Further, P14, P18, and P21 emphasized the importance of communicating the direct benefits of CRM-related projects as it could increase public support. Finally, P3 expects broader and more frequent awareness campaigns to effectively reach people and increase support for mining initiatives.

4.5.2 Indigenous Communities

4.5.2.1 Introduction

This section discusses some issues about Indigenous peoples' rights, accentuating the significance of their right to self-determination, meaningful consultation, and governance difficulties. It goes on to detail how the CRMA takes these factors into account.

4.5.2.2 Acceptance of Projects by Indigenous Communities

To begin with, P8 noted that one of the challenges for the EU's critical materials strategy is the acceptance of these projects by indigenous communities. P22 added that failing to respect FPIC and Indigenous peoples' rights can lead to conflicts and resistance, posing risks to businesses, investors, and shareholders. Therefore, P23 reinforced the importance of including Indigenous peoples in the decision-making process to reduce tensions and foster positive relationships.

4.5.2.3 Avoiding Green Colonialism

P22 and P23 discussed the necessity to avoid green colonialism and to make sure that everyone benefits from the energy transition and critical materials, which is not the case for now for Indigenous groups now. According to P22, those communities are right holders as well as stakeholders. Therefore, it is essential to respect their right to self-determination by recognizing that they have the authority to have control over their lands and what impacts their well-being.

4.5.2.4 Absence of the FPIC Term in the CRMA

P5, P7, P17, and P22 mentioned that the absence of the FPIC term in the CRMA is a recurring issue that could threaten Indigenous communities' existence and rights. In contrast, P4, P11,

and P14 disagreed with this view, stating that FPIC is integrated into UNDRIP, as mentioned in Annex III 4.f of the CRMA. However, P22 considered this reference weak and a missed opportunity to ensure indigenous peoples' rights. An explicit mention of FPIC would have limited interpretations and potential neglect:

"*The United Nations Declaration and FPIC under the United Nations Declaration is a soft law, and if they put FPIC in the CRMA, it's a step to bringing into hard law*" (P22).

4.5.2.5 Examples of Non-Respect of FPIC

P22 provided several examples where FPIC was not respected in the past and might not be respected in the future. These include engaging communities through violence and coercion, particularly against community leaders, and forced displacements, as underlined by P23. There are also cases of selective consultation, where companies consult only a small number of communities impacted by these projects, creating divisions and undermining the process's legitimacy. Thus, a non-consulted community could oppose the project without access to information, a say in the matter, or a chance to define the benefits. Even if consultation appears positive on paper, it can be ineffective in practice. For example, environmental impact assessments, often lengthy, technical, and in English, are difficult for communities to understand, and lack resources to respond effectively. It is also essential that consultation is an ongoing process, with communities having the right to withdraw their consent.

4.5.2.6 Consultation Issues

P22 also reported several issues related to consulting indigenous communities on critical materials projects. Consequently, consultations can be inadequate, non-existent, or corrupted, contrary to Rec 11 of the CRMA, which stipulates good faith engagement and full and fair stakeholder consultations. To address consultation issues, Rec 12 and Art 6 (1da) of the CRMA mention that projects impacting Indigenous peoples must include a "meaningful consultation" plan. However, this term is not defined in the CRMA, which can lead to confusion and repeat past issues. The same applies to the term "meaningful engagement" mentioned in Art 5 (1c) and Art 35a (1cii).

4.5.2.7 Other Challenges

According to P22, the governance system also has major flaws. Generally, companies turn to governments to handle indigenous peoples' rights over their territories. Nevertheless, these governments can be corrupt and fail to effectively guarantee these rights. Therefore, it is crucial that Indigenous peoples are included in governance schemes at all levels and consulted at every stage of the process, an argument supported by P23. This inclusion would ensure better representation and protection of indigenous rights. Besides, P22 and P23 emphasized that the benefits from projects should be independently determined for each community since each community has specific and diverse needs. Rec 12 and Art 6 (1da) address this by mentioning "Fair compensation," but without providing detailed practical implementation guidelines.

4.5.3 Workers

According to Rec 6, creating quality jobs, developing skills, and facilitating professional transitions will reduce labor market risks in CRM-related sectors while ensuring the EU's competitiveness.

4.5.3.1 Job Creation

P21 underlined that a just transition must consider the workers affected. Ignoring this consideration could lead citizens to perceive that the EU disregards their concerns, compromising legislative objectives and resulting in negative political repercussions. P3, P18, P19, and P21 indicated that this regulation could create jobs, although it is essential to consider the impact on other industries. P14 noted that this regulation could help preserve millions of downstream jobs in Europe, particularly in the automotive industry, which could be threatened by supply chain disruptions. Nonetheless, P21 specified that CRM-related industries often require a lot of machinery, potentially leading to an overestimation of the number of jobs created, even though it improves safety by reducing exposure to toxic environments.

4.5.3.2 Quality Jobs

P21 emphasized that creating jobs in the critical materials value chain must aim for quality jobs to ensure a just transition. The CRMA represents an opportunity to improve working conditions, which could provide a competitive advantage for the EU in the critical materials race.

Art 5.1.c stipulates that one of the criteria for the Commission to recognize a strategic project is its sustainable implementation and potential to create quality jobs. Art 6.1.g specifies that the application for strategic project status must include the potential for quality job creation, the need for skilled labor, and a plan to support skill development and professional retraining while promoting inclusive workforce representation. Nevertheless, P21 noted the absence of a concrete definition of quality jobs, which can lead to various interpretations. Although too detailed criteria can be restrictive, this is why some terms in the CRMA are vague. P21 added that there is a lack of concrete measures to ensure effective implementation and monitor the achievement of quality job objectives.

Regarding remuneration, P21 mentioned that extraction jobs in the EU are well-paid, but the work-life balance is often challenging, making these sectors unattractive. For example, in the Kiruna mine in Sweden, although wages are high, it is necessary to recruit from abroad as few people wish to work there. P21 added that there is also a tendency to relocate projects to countries with less stringent national regulations, such as Hungary, where working conditions may be neglected, necessitating the hiring of third-country workers.

In addition, P21 indicated that there is an attractiveness problem for CRM value chain jobs due to the negative perception associated with them. There are also significant gender and diversity issues in these sectors, with many inequalities still to be addressed. This shows that despite intentions to reindustrialize Europe by creating quality jobs, the reality can be different. P21 insisted on the need for concrete actions and not just rhetoric, as well as the importance of work-

life balance. P7 and P21 also stressed the necessity of unionizing jobs, as an effective social dialogue between unions, worker representatives, and employers typically ensures good working conditions. P1 added that additional staff are needed to manage compliance effectively.

4.5.3.3 Skills, Retraining, and Training

P10 and P21 emphasized the crucial importance of improving worker skills, especially in declining sectors that could provide a labor pool. For example, in some regions of Europe where coal mining is being phased out, retraining plans are needed to enable workers to contribute to the energy transition and the critical materials value chain. It is therefore imperative to ensure that workers are qualified for these new jobs, requiring a structured framework for retraining and professional development. P21 also indicated that it is essential to give workers the right to training due to the lack of skills and development opportunities, combined with a lack of time and resources to attend training programs. P1 added that training reduces safety risks while increasing earning potential, as companies want to retain skilled workers.

P21 mentioned that when companies initiate mining projects, they announce job creation. However, local communities do not always have the necessary skills to work in the CRM value chain, complicating the provision of quality jobs. Training local community members for quality jobs requires time and resources. Member states and companies must therefore ensure a social ecosystem and regional training plans. Besides, Art 25.1e stipulates that within two years of the CRMA's entry into force, member states must include in their programs measures to equip their workforce with the skills needed to support the CRM value chain's circularity, as well as retraining measures.

4.6 Governance and Oversight

This section examines the main bodies and surveillance systems established in the CRMA, covering both the legislation as a whole and specific strategic projects. It is divided into three sections so that each important component can be thoroughly examined. First, the European Critical Raw Materials Board is discussed. The European Commission is the focus of the second section, which explains how it was directly involved in the CRMA's implementation. The third and final section discusses certification systems and the difficulties in incorporating them into the CRMA. It is significant to remember that when it comes to particular subjects like strategic partnerships, the question of governance and the board will come up in other portions of this thesis.

4.6.1 European Critical Raw Materials Board

P12 highlighted the critical role that the European Critical Raw Materials Board, also known as "the board," plays in the governance of the CRMA. P4 went on to say that the board's efficient operation might both help ensure that the law is properly implemented and increase its efficacy. P12 clarified that by Rec. 55 and Art. 35.1, the board's objective is to establish an operational framework made up of specialists chosen by the Commission and EU member states. This framework would facilitate well-informed deliberations and choices while overseeing the

execution of this legislation and synchronizing endeavors throughout the European Union. In addition, the board is essential in coordinating national initiatives and aligning EU goals, preventing overlaps, and advancing a cogent strategy.

P11 is satisfied by the ad hoc sessions' inclusion of industry and civil society viewpoints, as required by Article 35.2b. moreovermore, as mentioned in Rec 55 and Art 35.6, P7 and P12 pointed out that there are sub-groups devoted to particular subjects, such as public acceptability, which is an important step in resolving certain concerns.

P17 and P21 added that the board could play a pivotal role in limiting the social and environmental impacts of the CRMA, provided it exercises high-quality oversight, particularly by ensuring compliance with the certification promises of strategic projects. This capacity is reinforced by their role in identifying and monitoring strategic projects, as mentioned in Rec 9, Rec 55, Art 6.1, and Art 6.8. Nevertheless, risks remain with the functionality of this board. P7 showcased that variations in administrative systems among EU member states could create confusion, particularly regarding the selection of board members, who could come from regional or federal levels. Further, P17 raised the risk of conflicts of interest and tensions, as some members might favor the interests of the countries they represent, thus attempting to prioritize projects beneficial to their national industries.

4.6.2 European Commission

P4 accentuated that the effectiveness of the CRMA relies heavily on the European Commission and the member states responsible for its implementation. The Commission plays a central role, as evidenced by its numerous mentions in 33 recitals and 32 articles of the CRMA. It assumes various crucial functions, including recognizing reliable certification schemes (Rec 49 and Art 29.1) and identifying strategic projects (Rec and Art 6). P4 added that the Commission also has responsibilities in control (Rec 35) and evaluation of the CRMA's outcomes (Rec 56 and Rec 62). Additionally, P12 noted that participating in the realization of strategic partnerships (Rec 54 and Art 35a.3.b) is part of the Commission's duties, involving DG INTPA, DG GROW, and DG Trade.

P12 also indicated the significant workload this represents for the Commission, particularly DG GROW, which oversees the CRMA's implementation. Although this unit receives support from other directorates-general, it remains to be seen if they can effectively manage this responsibility. P12 mentioned that the European Critical Raw Materials Board will play an important advisory role, assisting and supporting the Commission in some of its tasks (Rec 55 and Art 34.2), thus facilitating the management and optimization of efforts to achieve the CRMA's objectives.

4.6.3 Certification Schemes

The CRMA's reliance on certification schemes is examined in this section first. The requirement of implementing a multi-stakeholder governance criterion for these schemes is next analyzed, and the openness of audits carried out in this regard is covered. The analysis aims to shed light

on how certification schemes are incorporated into the CRMA rather than focusing on their shortcomings and difficulties.

4.6.3.1 Over-Reliance on Certification Schemes

P4, P13, and P17 showcased the crucial role of certification systems in ensuring the compliance of strategic projects with sustainability criteria, particularly those located outside the EU, where environmental and social protection standards may be less stringent. However, they criticized the CRMA's excessive reliance on these certification systems. According to Rec 11, it is suggested that a certification scheme could replace the role of legislation, stating:

"*To provide project promoters with a clear and efficient way of complying with this criterion, compliance with relevant Union or national legislation, international standards, guidelines and principles, as relevant, or participation in a certification scheme recognised under this Regulation should be considered sufficient*".

Moreover, P17 drew attention to the terminology used in the CRMA, which can be confusing, particularly the term "attest compliance" found in Annex III 4.ib. P17 criticized this wording, suggesting that certification schemes are in themselves sufficient to prove regulatory compliance.

"*It suggests that certification schemes can work as a way to attest compliance, whereas they should only be actually supportive, you know, a support to compliance or a complement to compliance because companies must respect the law and a certification scheme is not a proxy for respecting the law.*" (P17).

Several participants, such as P12 and P22, suggested that certification schemes should be integrated into a broader set of verification tools and considered as a complement rather than a replacement for other compliance measures and existing legislation. This approach is also supported by P7, who emphasized that corporate due diligence should not rely solely on these schemes. Additionally, certification schemes are not perfect. For instance, P11 and P17 noted that audits conducted under certification schemes are often sporadic, which can lead to a biased representation of actual corporate practices. Thus, companies might adjust their operations just before these audits to meet requirements, rather than maintaining constant compliance standards. This phenomenon underscores the need for continuous monitoring and engagement and strengthens the argument that certification schemes should not substitute laws or other risk mitigation and control mechanisms.

P17 further explained that, in addition to the excessive reliance on certification schemes, the regulation permits companies managing strategic projects to promise future compliance with a certification scheme, as outlined in Annex III 4.b. This means projects can be designated as strategic without needing immediate certification, potentially delaying the adoption of genuinely sustainable and compliant practices.

4.6.3.2 Multi-Stakeholder Governance

P7, P11, and P17 illustrated the diversity of existing certification schemes, each with its constraints, specificities, and criteria, as confirmed in Rec 49. They noted the importance of establishing detailed criteria in Annex IV, such as multi-stakeholder governance, for the approval of usable certification schemes.

P17 specified that the requirement for multi-stakeholder governance is defined in Art 2.62.a is essential in certification systems as it promotes involvement and gives a voice to a wide range of stakeholders, including those directly affected by projects. This approach helps minimize conflicts of interest and improve the certification system's quality. A notable advantage of multi-stakeholder governance is that, when integrated from the beginning, it allows for the development of stronger and fairer standards. Nonetheless, P17 also noted that risks remain in applying this criterion. It is possible that stakeholders will have only a consultative role, without real decision-making power, and that the company in charge of the project will not fully implement the criterion. It is therefore crucial to ensure that all stakeholders' contributions are effectively considered in decisions. Besides, P17 emphasized that it would have been beneficial to explicitly include the term "equal" in the definition of multi-stakeholder governance to ensure that all stakeholders have an equivalent voice in the governance process. This would have reduced the risk of one specific group dominating decisions, thus promoting a more balanced and fair certification process.

4.6.3.3 Transparency of Audits

P7 and P19 raised concerns about conflicts of interest and corruption during audit processes, which can undermine the reliability of these evaluations. However, the criteria established for certification schemes in the CRMA aim to mitigate these risks. Indeed, the CRMA emphasizes the importance of independence, objectivity, and accuracy in audits conducted for strategic projects, as specified in Annex IV.c, IV.d, and IV.da.

Despite these measures, there is potential to further enhance transparency and accountability. P17 suggested that publishing audit results could significantly strengthen stakeholder trust. This approach would not only increase transparency but also encourage greater corporate accountability:

"*As civil society we would have liked to see when we were doing the advocacy there was that the audit would have been publicly available… that provides such a good way of of interaction and of understanding what's going on and how to improve it and how to address it.*" (P17).

4.7 Strategic Partnerships

The CRMA heavily relies on strategic partnerships, a subject that is regularly covered in interviews and events. Strategic partnerships are analyzed in this section, with special attention to the CRM value chain and partner country requirements. After that, it looks at how the EU might affect sustainability standards. It also considers how the EU might be competing with other nations for these partnerships by considering how it oversees and monitors strategic

initiatives in these nations. Rec. 7 and Art. 4.1.b show that by 2030, the EU wants to depend no more than 65% on one nation for essential material supplies. Strategic partnerships are vital to the EU's strategy because they facilitate supplier diversification.

4.7.1 Overview of Strategic Partnerships

P12 underlined that factors including resource potential, current European presence, and interest from European businesses are taken into consideration when choosing nations for strategic collaborations. P21 did, however, draw attention to the fact that these partnerships are frequently signed quickly and in a non-transparent way, lacking a democratic process or adequate stakeholder participation. The legitimacy and transparency of the process are undermined by this procedure.

The definition of strategic partnerships, as stated in Art 2.62, reveals that they are inherently non-binding and aimed at mutual benefits. This creates some uncertainty, as showcased by P4, P8, and P24, who criticized the lack of firm commitments and binding power. They emphasized the need to demonstrate tangible benefits for partner countries. Nevertheless, P23 noted that these initiatives are still in their early stages, requiring additional development and effective implementation. P21 also mentioned the need to be cautious, as strategic partnerships allow projects to have the same advantages in third countries as in EU member states, but with lower costs and less restrictive laws. Consequently, this could incentivize companies to prefer investing outside Europe, hindering the EU's industrialization.

In addition, P23 and P24 explained that each partnership is tailor-made to suit the specific needs of third countries, highlighting the personalized approach of these collaborations. While P13 viewed this flexibility positively, seeing it as a significant advantage, P7 and P15 pointed to a lack of clarity from the EU regarding the benefits offered by these partnerships, their implementation, and the associated support measures.

4.7.2 Value Chain

Strategic partnerships are evaluated based on various criteria, all aimed at creating positive value for both the EU and partner countries. According to Rec 10 and Art 5.1.e, these partnerships must be "mutually beneficial" and provide "added value" in third countries. This value can come from the project itself as well as the socio-economic benefits it generates. P4 noted that while the term "added value" is intentionally broad in the CRMA, this flexibility helps avoid exclusions. However, P4 suggested that a slightly more precise definition, while still maintaining some flexibility, could be beneficial as it would foster a common understanding and facilitate the effective implementation of these strategic partnerships.

P11 questioned the real effectiveness of strategic partnerships, expressing concerns about their genuinely win-win nature. To achieve such a balance, P12 and P13 reinforced the need to address the aspirations of resource-rich countries, which aim to move beyond merely extracting and exporting minerals. These countries seek to advance up the value chain to occupy more strategic and rewarding positions. P15 added that the concept of added value goes beyond

simple mineral processing, highlighting the opportunities for engagement throughout the mining industry's value chain, including upstream, downstream, and related activities, all of which can benefit from innovations and improvements.

Furthermore, P13 believes that strategic partnerships and projects associated with the mining industry have the potential to act as a lever for broader economic growth in third countries:

"*We need to use the mining industry as an engine of, let's say, broader economic growth and development*" (P13).

This vision was reinforced by P15 and P23, who argued that developing new industrial capacities while respecting sustainability principles could profoundly transform the economy. This strategic shift would offer countries like those in Africa and South America an opportunity to reduce their dependency on mining extraction and move towards a more knowledge and technology-rich economy, thus increasing their overall added value.

4.7.3 Needs of Partner Countries

Partner countries have diverse needs, particularly in terms of infrastructure, technology, and investments.

4.7.4 Infrastructure

P7, P8, P12, P13, and P23 discussed the potential of EU strategic partnerships to develop essential infrastructure in partner countries. P23 pointed out that African countries are not yet ready for the circular economy to fully replace sustainable extraction. Transitioning too quickly to recycling without continued extraction could impede the industrialization of many African nations, which currently lack the infrastructure needed to diversify their economic activities. Strengthening infrastructure through these partnerships could therefore support a gradual shift towards more sustainable practices.

P7 and P12 added that mineral extraction, being a very energy-intensive activity, raises sustainability issues, especially when the required energy primarily comes from coal plants in these countries. They pointed out the environmental challenges associated with these energy practices. In this context, P23 suggested that the EU could play a key role in helping these countries develop renewable energy systems. This would not only support efforts to reduce the carbon footprint associated with industrial activities, including extraction, but also promote a shift towards a greener and more sustainable economy.

4.7.5 Technology

P8, P12, and P13 emphasized that the EU is highly advanced in industrial technologies and possesses extensive expertise. P10 and P23 noted that partner countries urgently need this knowledge, experience, and technology, creating an opportunity for the transfer of European know-how to resource-rich nations. Such a transfer would promote the development of their critical materials value chain activities, particularly in processing and recycling, and encourage

responsible mining practices. Additionally, it is crucial for the EU to train local personnel to master these technologies, ensuring sustainable growth and self-sufficiency.

P12 illustrated the interest of these countries in European innovations and their desire to participate in technological development projects that they could then adopt at home. On the other hand, P8, P11, and P15 revealed that the EU might be reluctant to relinquish its technological competitive advantage by helping partner countries progress up the value chain. P15 also explained that while the EU is willing to share its expertise in extracting CRMs or building infrastructure, this does not necessarily guarantee the development of a robust economy in partner countries. There is a paradox where infrastructure can be improved without necessarily strengthening the local economy sustainably because it would require development through the partner country's expertise. P15 added that processing CRM is not the only way to generate value. Partner countries could also specialize in manufacturing specific technological components, facilitating their gradual integration into sectors such as robotics and waste processing while reducing the risks of competition with the EU.

Despite concerns about losing competitive advantages, P14 acknowledged that the growing demand for strategic materials creates opportunities for all countries to benefit from this expansion. Besides, P14 argued that adopting a more ethical and sustainable approach, along with increased support for resource-rich countries, can lead to shared prosperity and enhanced geopolitical stability. Article 35.a.1ii mentions that the Critical Raw Materials Board will examine how to improve cooperation throughout the CRM value chain and technology transfer programs, with a focus on enhancing collaboration among all parties involved. In this context, P3, P11, and P21 urged the EU to avoid an approach resembling "green colonialism" and to use this collaboration around critical raw materials to genuinely contribute to the development of resource-rich countries.

4.7.6 Investment

P3, P7, P8, P12, P13, and P23 brought to light the urgent need for sustainable investments in partner countries. Currently, the EU, through its strategic partnerships, does not provide sufficient funding for these initiatives to be effectively implemented. P8 and P12 suggested that the Global Gateway program could become a significant source of funding for these efforts. Article 15.1b supports this possibility, citing Global Gateway along with several international financial institutions and the European Investment Bank as key players in funding strategic partnerships. Rec 27 mentions that funds such as the European Fund for Sustainable Development Plus could be used to support these projects. To further stimulate investment in partner countries, P10 indicated that it is necessary to create additional financial instruments to attract private investors.

4.7.7 EU Influences on Sustainability

P7 and P22 showcased that strategic partnerships offer the EU an opportunity to benefit the environment and improve practices in partner countries. P12 and P13 added that the EU can help these countries develop and implement national development strategies based on its

expertise. It can also help establish more sustainable environmental standards. Nevertheless, it is important to recognize that since partner countries are sovereign states, the EU's influence might sometimes be overestimated, as revealed by some past experiences. Art 35.a.1cii specifies that the board will evaluate the potential impact of the EU on sustainability in third countries. Nonetheless, it would have been beneficial to include clearer and more specific measures to ensure the adoption of sustainable practices.

In addition, the CRMA also considers that some countries are not governed by European legislation, as illustrated by Rec 12 and Art 6.1ga, which require project promoters to provide a plan to improve the environmental condition of the site after extraction, in cases where the country is not covered by Directive 2006/21/EC. During various events I attended, it was emphasized that the strict European sustainability standards are a positive differentiating advantage. However, P15 noted that it is essential to determine if these standards genuinely add value. Additionally, P15 pointed out that multinational corporations already adhere to high standards due to their internal policies and investor requirements.

Rec 10 specifies that projects, both within the EU and in third countries, must meet the same levels of social and environmental sustainability. Nevertheless, P4 and P13 stressed the importance of not decoupling ESG criteria from economic development. They questioned the relevance of maintaining extremely high sustainability standards for strategic projects in third countries, as this could deter some investors who find them too restrictive in these specific contexts. This reluctance could negate the potential benefits in terms of investment and sustainable practices. As a result, it would be wise to adopt a more pragmatic approach and gradually improve sustainability conditions in these countries, reconciling the EU's high demands with local realities for a beneficial and sustainable impact.

4.7.8 Monitoring and Oversight

P11 and P13 explained that although the EU can designate a project as strategic, it does not exercise direct jurisdiction in resource-rich countries. This limitation creates uncertainty about the ability to ensure compliance with sustainability criteria and the effective monitoring of these projects. P13 and P23 clarified that the responsibility for overseeing projects typically falls on local governments, which must ensure that projects are carried out responsibly.

Nonetheless, P3 pointed out that the challenge lies in the fact that some countries lack the necessary capabilities to implement effective monitoring systems. Local experts, while competent, are often concentrated in capital cities and have limited means to travel to remote areas where mining activities occur. Moreover, these experts may be attracted to the private sector, where remuneration is higher. P15 added that it is insufficient to simply provide funds to local governments without ensuring that they possess the skills and capabilities to manage these resources. Without proper management, there is a real risk of corruption. A potentially effective solution would be to strengthen the capacities of local communities, enabling them to monitor and understand mining activities that directly affect them.

Enhancing stakeholder capacities to address knowledge and skill gaps is crucial for facilitating more informed and effective exchanges. P12 mentioned that designated large companies must conduct a risk preparedness assessment by analyzing their value chain, according to Art 23.2 requirements. This approach is essential for ensuring traceability and identifying potential deviations, and vulnerabilities. P23 highlighted the importance of this approach by pointing out the risks of conflicts arising from non-compliance with environmental laws and regulations. Therefore, it is vital to ensure that these standards are effectively applied to guarantee a tangible and measurable impact.

4.7.9 Competition

P8 explained that resource-rich countries are aware of the competitive nature of international markets and often receive competing proposals from various nations. These offers can surpass those of the EU, providing more attractive investment packages:

"*We know for a fact that, well, whatever the Europeans might come up with, the Chinese will just counter that with a higher price or with even more investments or a bigger package deal.*" (P8).

Furthermore, P3, P7, and P12 noted that the EU must consider the increased competition from nations that quickly offer multiple investments and incentives to resource-rich countries. P10 also explained that the EU lags behind the United States and China in this area. P15 added that the Americans, with the IRA, present clearer and more comprehensible requirements and benefits for third countries compared to those of the EU. Additionally, P12, P13, and P15 described that China also offers a clearer and more effective implementation and financing offer. P13 and P24 explained that this is partly because China requires less information, especially on sustainability, before investing.

However, P24 underlined that the EU's strategy to differentiate itself from other investors does not rely on price competitiveness but on the long-term impact of projects. The EU seeks to attract partner countries by offering better ESG standards. It aims to create projects that not only minimize risks but also actively and positively contribute to the environment while addressing the urgent needs of these countries. This strategy could bring mutual long-term benefits.

5. Recommendations

5.1 Introduction

Most of the stakeholders who provided input for this study had a positive opinion about the CRMA. However, several areas have been noted for improvement to develop and improve this legislation and the next ones. Nine recommendations are explained in this section, each with a risk mentioned. These suggestions are the result of a careful analysis of the study's earlier chapter.

5.2 Overview of Recommendations

The first recommendation pertains to the thresholds set by the CRMA for strategic materials by 2030. Although these thresholds are not binding and aim to demonstrate the EU's ambitions, they can become counterproductive if perceived as unrealistic. It is crucial to set ambitious yet achievable goals to maintain stakeholder motivation. Overly ambitious objectives could discourage the involved parties, ultimately being counterproductive. Additionally, failing to meet these targets could have detrimental consequences on stakeholders and negatively influence their future behavior (Ordóñez et al., 2009). Participants in this study expressed reservations about the feasibility of achieving the CRMA's thresholds, particularly the extraction target. It seems unlikely, if not impossible, to meet these goals within such a short timeframe. Regarding the recycling target, participants questioned the rationale behind the 25% threshold. Therefore, setting the objectives for the EU's strategy for critical materials based on scientific research is recommended. This approach will motivate stakeholders both in the short and long term by establishing realistic goals. Nonetheless, if the objectives rely solely on scientific data and adopt a too-conservative approach, there is a risk that the EU's political ambitions may be perceived as less bold, reducing the initial momentum and investor engagement.

Focusing on strategic projects, the second suggestion emphasizes the need for effective implementation of the measures outlined in this legislation, which largely depends on the Member States. The situation, however, varies across countries. For instance, Nordic European countries are considered to have a high government efficiency index compared to Eastern European countries (The World Bank, 2022). Given these disparities, it is recommended to develop training programs to help Member States adapt to this legislation and enhance their efficiency. In addition, improving capacities on several levels, such as financial, administrative, and legislative is necessary to ensure effective management of these projects. Establishing a robust auditing procedure with independent auditors periodically reviewing compliance with CRMA guidelines is also essential. To reinforce this, clear sanctions should be established for Member States that do not comply with CRMA requirements. A potential risk associated with this approach is that training programs and robust audits could slow down the implementation of strategic projects, causing delays in achieving CRMA objectives.

The third suggestion is centered on providing definitions for terms that are used in the CRMA. To avoid interpretations that can have unfavorable effects, precise definitions are necessary. For example, the terms "meaningful engagement" and "significant consultation" are still ambiguous, leading to uneven consultation procedures throughout projects and geographical areas. "Quality jobs" is also not well defined and requires a more precise definition. It is advised to define these concepts gradually without being too strict. Furthermore, definitions of phrases like "adding value" and "mutually beneficial" in strategic partnerships are necessary. Additionally, the CRMA should not include the phrase "overriding public interest," since it could permit authorities to move on with projects despite community opposition and social and environmental dangers. Clarifying these words is critical, but it's just as important to keep the flexibility necessary to modify initiatives to fit regional settings. Excessively strict criteria may

render certain initiatives unworkable or prohibitively costly to execute, thereby diminishing their overall efficacy and influence.

The fourth recommendation highlights the current focus on recycling within circularity, with insufficient mention of other dimensions such as repair and reuse, which can compromise the overall effectiveness of the CRMA's circular approach. Although other legislation referenced by the CRMA may address these aspects of circularity, they may have loopholes that could affect the referencing legislation, leading to potentially severe consequences for the CRMA. Additionally, there is a lack of coherence among some pieces of legislation, which could diminish the CRMA's effectiveness. To enhance the sustainability of critical material sources, expanding the scope of circularity beyond mere recycling is recommended. Explicitly mentioning the other "R"s in the CRMA, even if this results in some partial duplication, would limit the risks associated with referencing. Additionally, developing the use of AI in the legislative creation process to improve coherence among laws and their referencing might be worthwhile (Sheeba, 2023). However, legislative complexity risk must be considered. Adding multiple dimensions of circularity to the CRMA could make the legislation too complex and difficult for stakeholders to understand. This could lead to misinterpretations and inconsistent implementation of the new rules. Moreover, the lack of coherence and coordination among existing legislation could be exacerbated by introducing new requirements.

The fifth suggestion concerns reducing the demand for critical materials. While current scenarios primarily focus on increasing demand, integrating demand moderation strategies is crucial, particularly in sectors not directly related to the energy transition but that consume large amounts of critical materials. Such an approach would allow the EU to reduce pressure on its critical material resources, currently used disproportionately, while reducing dependence on external actors. Nevertheless, moderating demand carries the risk of slowing technological innovation, as some industries might reduce their investments in research and development for technologies requiring critical materials. Besides, industries not related to the energy transition but using critical materials might resist these demand reduction strategies, fearing a decrease in their competitiveness and additional costs related to finding substitutes.

The sixth proposal concerns indigenous communities, for whom the failure to specifically mention FPIC may have negative consequences. Although the CRMA refers to "soft laws" containing that term, specifically mentioning the FPIC in the CRMA would offer a more precise legal framework guaranteeing the rights of Indigenous communities, lowering the likelihood of conflicts, and building trust between these communities and project promoters. However, requiring FPIC explicitly could cause major delays in project approval and execution because it may involve lengthy talks and consultations with native populations to gain their approval. There can also be a rise in court cases and disagreements.

The seventh recommendation relates to the European Critical Raw Materials Board, which is pivotal to the governance of the CRMA. In fact, the tools and resources necessary for this board to exercise its role efficiently must be provided. Therefore, it is necessary to set stringent requirements for board members, including a dedication to impartiality, technical proficiency,

and experience in environmental and social governance. It would also be advantageous to provide ethics and governance training that covers the best ways to avoid conflicts of interest. Besides these steps, holding frequent public consultation hearings with local community members, non-governmental organizations, industry representatives, academic experts, and other interested parties will enhance the decision-making process and reinforce the legitimacy of the board.

The eighth suggestion pertains to certification schemes and involves several aspects. To begin with, there is an excessive dependence on certification systems, particularly with terms like "attest compliance." Therefore, the CRMA should explicitly state that these certifications support rather than substitute legal obligations. Besides, allowing strategic project managers to promise future compliance with a certification system, as is currently permitted, is not advisable, as it could delay the adoption of sustainable practices. Including the term "equal" in the definition of multi-stakeholder governance would further ensure that stakeholders' opinions are equally considered. Moreover, making the audits associated with certifications public would increase transparency and potentially reduce public opposition. Nevertheless, there are several risks associated with these suggestions. For example, they could complicate decision-making processes and prolong discussions, thus delaying project implementation. There could also be confusion about the scope and value of these certifications.

The ninth and final proposal concerns strategic partnerships. These partnerships should be more detailed to be tangible, allowing for easier visualization of their potential to be win-win and more influential against competitors. Additionally, analyzing in greater detail whether strategic projects benefit from the same advantages in third countries as in the EU is important, as this could impact EU industrialization. Nonetheless, the need to further detail strategic partnerships could complicate their negotiation and implementation, thereby delaying their execution and increasing administrative costs.

6. Limitations of the studies, Future research & AI usage

6.1 Limitations

First and foremost, it is imperative to keep in mind that the CRMA is a relatively recent law with limited scientific analysis currently available. Consequently, the perspectives and experiences of the individuals interviewed were crucial in shaping the findings and recommendations of this study. However, because the situation was changing quickly, stakeholders found it challenging to fully comprehend the CRMA. This could have, in some situations, influenced the data collected and negatively impacted on its accuracy. Furthermore, the short time frame for which this law was developed as well as the CRMs setting may restrict the long-term application of this study. Therefore, continuous studies are essential to monitoring the situation and the effects of the CRMA.

Then, it is necessary to understand that due to the nature of its subject and objectives, this legislation touches on a multitude of themes and sectors. Although it focuses on critical materials, its scope remains broad. Nonetheless, I was limited in the number of pages I could

write, making it impossible to conduct an exhaustive study of the entire legislation. As a result, the scope of this thesis had to be restricted, even though several unaddressed themes indirectly impact the dimensions targeted by this study. This limitation causes a loss of insights, which may reduce the precision of the conclusions and the overall comprehension of the effects of the CRMA.

Due to the topic's complexity and the wide range of consequences it raises in this thesis, subjectivity and biases may also be introduced into the analysis. For instance, disagreements on a few issues like mining proposals might lead to inconsistencies in the conclusions.

In conclusion, this study provides valuable information about the CRMA but research is still needed to investigate the shortcomings that have been identified. For this legislation to be more understood and successful, more research, frequent updates, and a deeper examination of unexplored subjects are required.

6.2 Future Research

To begin with, it would be beneficial to investigate subjects not fully examined in this study. For example, the topic of financing and investment which was brought up by P3, P4, P7, P10, P11, P12, P14, P21, and P24, was debated during the 3 events I attended. Alongside, P2, P14, P23, and P24, discussed the exploration steps of the value chain of CRMs, and it would be interesting to dive deep into that topic. P8, P14, P16, and P20 explained that inspecting geopolitical issues, competition, and trade, would also be beneficial as these subjects can significantly influence CRMA measures. Similarly, stockpiling, discussed by P8 and P16, is another critical aspect that needs attention, as is joint purchasing, mentioned by P12, P13, and P16.

Then, as CRMA is a new legislation, studying its implementation and analyzing its long-term impacts would be beneficial. That's why a retrospective analysis of its effectiveness would then help identify areas for improvement and propose adjustments based on solid empirical data, ultimately enhancing future legislation. Further, updating the recommendations from this study in response to the evolving context will ensure greater efficiency of those proposals.

Finally, evaluating the CRMA's interdependence with other EU and international legislation could be interesting. Besides, this research should focus on how the CRMA integrates with existing regulations, such as the battery regulation and the CSDDD, and the implications of these interactions for overall policy effectiveness as well as coherency. Likewise, analyzing how different international approaches can be integrated or adapted would probably strengthen the European strategy for critical materials.

6.3 AI Usage

This thesis did not use artificial intelligence to create content but rather used it as a supporting tool. As an illustration, Notion made taking notes more effective. Alongside, Turboscribe was helpful in transcribing interviews with greater ease. Miro also contributed significantly by helping to organize my thoughts and codify the interviews. ChatGPT served as a spell-checker,

aid refine sentence structures, and acted as a translator. Complementing this, DeepL was also employed for translation tasks.

6.4 Conclusion

In conclusion, this study carried out a thorough examination of the CRMA with a particular emphasis on sustainability elements including social dimension, governance, and circularity. The goal was to offer suggestions for improving upcoming laws associated with CRMs. Despite the CRMA's favorable response, it became clear through qualitative analysis, data gathering from the legislation itself, and twenty-four semi-structured expert interviews that some of its provisions need to be improved. Nine recommendations emerged, which include setting more realistic yet ambitious targets, implementing measures to ensure the effective application of the legislation, and clarifying some terms and definitions to avoid misinterpretation. Adopting a broader approach to circularity, integrating a demand moderation strategy for critical raw materials, and including the FPIC principle were also suggested. Then, ensuring an efficient and ethical operational structure for the board, reducing dependency on certification systems by specifying related criteria, and making strategic partnerships more tangible were recommended. This research provided a clear understanding of the context, and challenges associated with some aspects of this legislation. It also offered solutions to improve future critical materials legislation, while considering the limitations of this study.

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