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Labour regime changes and workers' social protection

A study of the 3Ts small-scale mining sector formalisation process in Rwanda

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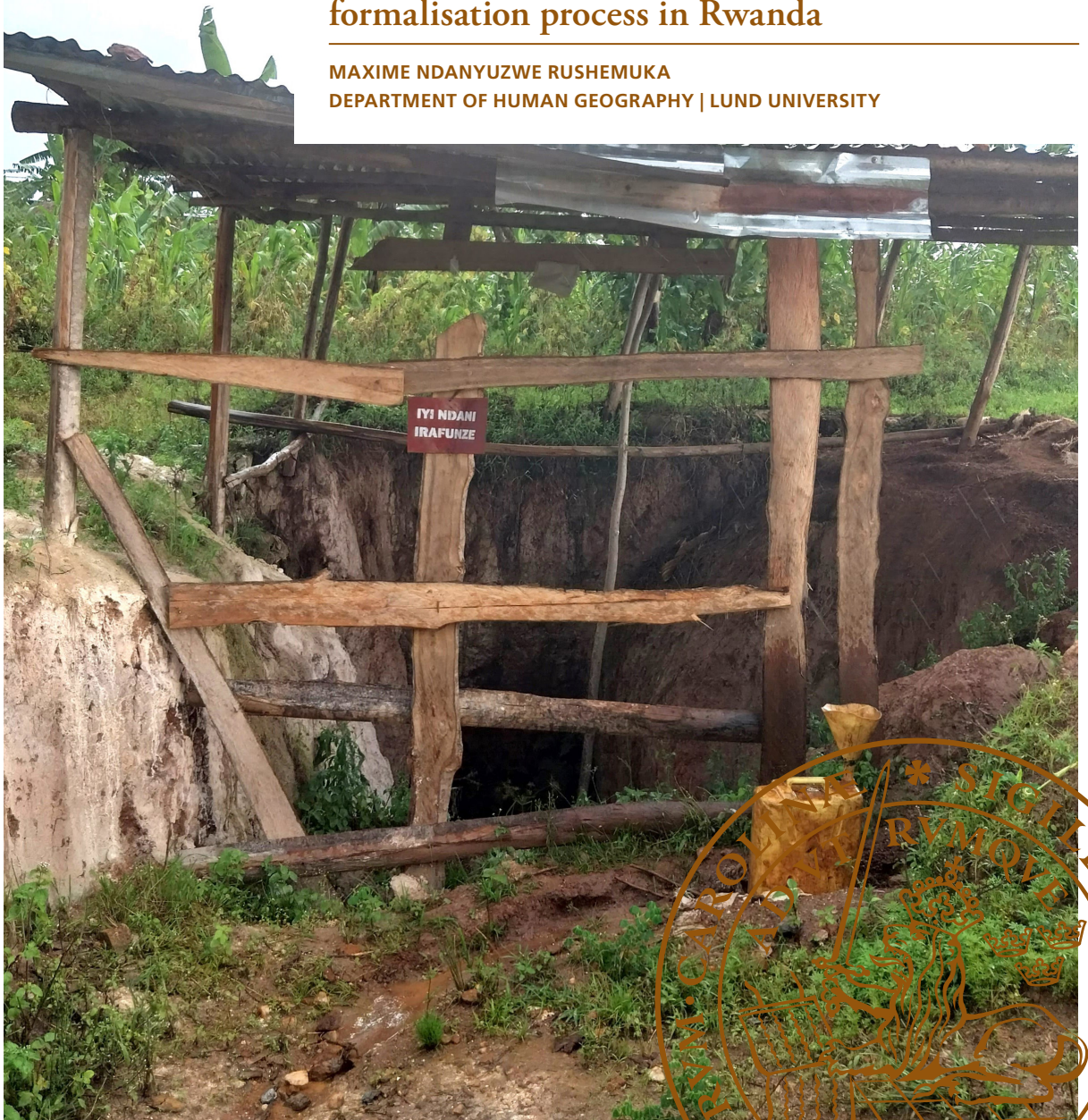
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Labour regime changes and workers' social protection

A study of the 3Ts small-scale mining sector formalisation process in Rwanda

MAXIME NDANYUZWE RUSHEMUKA

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Maxime Ndanyuzwe Rushemuka



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Title and subtitle: Labour regime changes and workers' social protection: A study of the 3Ts small-scale mining sector formalisation process in Rwanda.

Abstract: This study explores a common issue in developing countries – the persistence of informal labour relations when the artisanal and small-scale mining (ASM) sector is brought under state control. It investigates this through a study of formalisation reforms in Rwanda's 3Ts (tin, tantalum, tungsten) small-scale mining sector, which intensified from 2010. The research aims to explain the role that labour, as both a social category and an economic factor, plays in shaping the formalisation process, and how the incorporation of informal labour affects access to social protection, a benefit typically entailed in the state regulation of economic sectors.

The study finds that Rwanda's formalisation efforts have primarily focused on controlling the mineral production process by establishing and regulating investors' cooperatives and companies, while largely leaving the workforce informal. Grounded in analytical frameworks from the literature on informal economy regulation, labour regime analysis, and social protection in development policy, the study offers a novel analysis of these findings. Contrary to the prevailing view in ASM literature – that informal labour in formalised sectors reflects policy failure or incomplete reform – this research shows that, in Rwanda, workforce informality has played a facilitative role in achieving the country's high rate of formalisation.

In Rwanda, while formalisation has brought some benefits to miners, such as improved workplace safety standards and a general sense of operational security, access to legally mandated social protections, such as accident insurance, remains limited due to persistent labour informality, ultimately disadvantaging miners. Conceptually, this study contributes to ASM research by highlighting the link between state regulation of production and social protection – thus, the intersection of economic and social policy. Methodologically, it advances a politicised analysis of formalisation, moving beyond “institutional (in)effectiveness” explanations to show how ASM regulation entails trade-offs with economic profitability and sectoral growth.

Key words: Labour relations, informal economy, artisanal and small-scale mining sector, social protection, Rwanda.

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Cover photo: A sealed tunnel from a small-scale tin mine in Rukoma, Rwanda. The sign reads, “This tunnel is closed,” indicating closure due to concerns over structural instability or the potential presence of hazardous gases. Photo by Maxime Rushemuka.

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To Raphaella and Buriza

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List of Papers

Paper I

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Paper II

Rushemuka, M. N. (2024). The role of flexible labour arrangements in the formalization of artisanal and small -scale mining: the case of Rwanda. In A. Bashizi, A. Jamar, D. A. Samnick, & V. C. Alinirhu (Eds.), *Conjonctures de l’ Afrique centrale* (pp. 259 -286). Paris, France: L’ Harmattan.

Paper III

Rushemuka, M., “I am also under pressure” : the challenges of labour social protection in Rwanda's formalised small-scale mining sector. Under review in a journal.

1 Introduction

1.1 Problem statement

In various regions of mineral-rich countries in the Global South, artisanal and small-scale mining (ASM) is one of the most important sectors after agriculture, both in terms of employment and as a source of livelihood for local populations. Despite its socio-economic significance, an estimated 70–80% of ASM activities in many countries remain informal, that is, operating outside state regulatory and financial administrative frameworks (IGF, 2018). This informality is widely viewed as problematic, as a growing number of socio-environmental issues are believed to stem from it.

In countries such as Ghana, ASM has become unpopular among the general public due to its contribution to agricultural land degradation and water pollution (Aziabah & Ayelazuno, 2024). In Zimbabwe, it has been linked to insecurity and violence, with associations made between ASM and machete gangs (Mkodzongi, 2020), elevating it to a political concern. Even in contexts where ASM is not locally controversial, it is often associated with broader regional problems. For example, gold mining in Sahel countries has been linked to terrorism (Lanzano et al., 2021), while the exploitation and trade of 3T minerals (tin, tantalum, and tungsten) in the eastern Democratic Republic of the Congo (DRC) has been tied to the financing of armed conflict (Cuvelier, Vlassenroot, et al., 2014). Although these associations are contested, there is a prevailing belief among different actors that formalising ASM – bringing it under state control – is necessary, if not to resolve all its challenges, then at least as a prerequisite step towards doing so (Martinez et al., 2023; Siegel & Veiga, 2009).

In 2022, Morante-Carballo et al. (2022) conducted a bibliometric analysis of scientific research on ASM. They highlight that interest in ASM research began to grow significantly in the early 2000s, often focusing on the issue of informality and the policies aimed at addressing it. However, informality has been a policy concern since the 1970s, when ASM first entered the international development agenda (Hilson & McQuilken, 2014; UNDESA, 1972). The persistence of informality in ASM – despite a long-standing “will to formalise” – has been explained in various ways. Most explanations point to the reasons why artisanal miners either reject or are unable to integrate into state-formalised ASM frameworks. A key factor is that formalisation often allocates less productive and less attractive mining sites to

artisanal miners, while the most valuable deposits are granted to large-scale mining companies, frequently foreign-owned. As a result, artisanal miners are forced to compete for resources illegally, since the legal processes associated with formalisation place them at a disadvantage (Ayelazuno & Mawuko-Yevugah, 2019; Geenen, 2014). Another major barrier, as reported by empirical studies across different regions, is the high cost and complexity of obtaining formal mining permits. These often involve burdensome environmental regulations and long processing times, making formalisation economically unfeasible for many miners (Aziabah & Ayelazuno, 2024; Barreto, 2011; Marshall & Veiga, 2017).

While researchers continue to explore more effective ways to implement formalisation, several studies using a political economy lens argue that it is shaped by factors beyond technical policy design and implementation. These perspectives call for a more critical and politicised understanding of formalisation processes. In response to persistent challenges, scholars have proposed various strategies to help policymakers and development actors bring ASM under state regulation. A widely recommended approach is to reduce the costs and bureaucratic complexity of obtaining mining permits (Marshall & Veiga, 2017; Salo et al., 2016). This acknowledges the economic vulnerability of artisanal miners and emphasises the need for training and support to help them transition into the formal sector (Mutemeri et al., 2016; Veiga & Marshall, 2019). In settings where traditional governance, such as local chieftaincies, remains influential, strengthening these institutions can enable more effective hybrid and proximity-based governance models (Ouedraogo & Mundler, 2019; Persaud et al., 2017; Sangaré et al., 2017).

However, critical studies, such as Verbrugge (2015) on artisanal and small-scale gold mining (ASGM) in the southern Philippines, reveal a sector where powerful actors deliberately remain in small-scale operations to exploit cheap, unprotected labour. At a broader level, Verbrugge and Geenen (2020) link ASM informality to the global mining industry's demand for flexible labour. This is reflected in practices like mixing ASM and large-scale mining (LSM) minerals along supply chains (Fold et al., 2014) and in on-the-ground dynamics where LSM firms temporarily tolerate artisanal miners on concessions – using them as pathfinders – only to evict them once sites prove profitable (Luning & Pijpers, 2017). These studies highlight the power relations embedded in formalisation and question how and under what conditions it is actually constructed.

Critical perspectives on formalisation policies show that without addressing the underlying structures of inequality in ASM, formalisation often fails to improve miners' conditions and may even institutionalise their marginalisation. This occurs when formalisation benefits a small elite with capital and political connections who acquire mining rights, exploiting a largely powerless workforce (Fisher, 2007). It also happens when legal permitting favours male actors, rendering the women in ASM quasi-invisible (Furniss, 2022). Such critiques help explain why formalisation often stalls: miners are unmotivated, reluctant to join, or leave shortly after enrolling

(Marshall & Veiga, 2017; Martinez et al., 2023). Yet little research explores the experiences of those who remain in formalised ASM – either by choice or necessity – perhaps due to the scarcity of long-standing formalised sectors suitable for study. In this study, I use the case of Rwanda’s formalised ASM sector to explore the experience of working in formalised ASM. This is important since few existing studies of formalised ASM, like Robles et al. (2022) on ASGM in the Philippines, show that lower-level workers still face informal hiring practices and prefer traditional payment methods, such as shares of production rather than fixed salaries, which are traditionally believed to be typical in formalised production. Similarly, preliminary research on Rwanda’s formalised ASM shows that it retains informal and diverse labour arrangements without contracts (Cook & Mitchell, 2014).

These insights, although limited, reveal that formalisation is not a uniform process and produces varied outcomes depending on context, as has been demonstrated in other sectors beyond the mining economy (Gallien & van den Boogaard, 2023). It is in this context that this study moves beyond a critique of the formalisation process that has characterised much of ASM research to explore how formalisation emerges and how the processes of its emergence shape its socio-economic impacts. It pays particular attention to this apparent integration of an informal workforce in formalised production, and assesses through which mechanisms this takes place, and how these informal labour relations themselves contribute to shaping the nature of the formal ASM sector in the country.

1.2 The case of Rwanda’s 3Ts mining sector formalisation

The term 3Ts – referring to tin, tantalum, and tungsten – is a political-ecological construct used to describe minerals closely associated with the conflict minerals debate in Africa’s Great Lakes region. This designation reflects both the geopolitical significance of these resources and their natural co-occurrence in the area. The prominence of the 3Ts has been largely driven by Central Africa’s importance in global tantalum production. In 2022, 64% of global tantalum originated from Central Africa, with Rwanda alone accounting for 17% (USGS, 2023, p. 157). Much of this production comes from artisanal or small-scale mining operations (Schütte & Näher, 2020). In contrast, Rwanda produced only 0.7% of global tin and 1.2% of global tungsten in the same year (USGS, 2023). The 3Ts are increasingly significant to the global energy transition, with markets for these minerals projected to grow by at least 2.59% by the end of 2030 (IndustryArc, 2025; Mordor Intelligence, 2025; TechNavio, 2025). This growth is driven by rising demand across various sectors: tin is crucial for the automotive industry, particularly in car body components; tantalum plays a vital role in digitalisation, especially in the manufacture of circuit

boards; and tungsten, used in the production of hard metals, is essential for equipment in the expanding mining industry.

Rwanda faces allegations from watchdogs and multiple NGOs that it serves as an illegal transit point for minerals from the DRC, casting doubt on its status as a top exporter – particularly of tantalum (coltan) (Global Witness, 2017). These suspicions persist and have largely overshadowed broader discussions about the country’s mining sector. A dominant “single story” has emerged: that of conflict minerals (Perks, 2013). This study differs from many previous studies on Rwanda’s mining sector in scope, as it does not focus on the veracity of these allegations or on proposed solutions (Cuvelier, Vlassenroot, et al., 2014). Instead, it examines how governance – shaped by broad geopolitical discourses and contestations – unfolds at the local level, particularly in the structuring of activities and outcomes for small actors such as miners. From this perspective, Rwanda has often been portrayed by commentators, scholars, and international organisations as a “successful” case of ASM formalisation (Barreto et al., 2018; IGF, 2017; Munir, 2023; Perks, 2016b; Postma et al., 2021). Given the rarity of advanced formalised ASM sectors, Rwanda represents a critical case with the potential to shed new light on the dynamics of formalisation policies.

Since 2010, Rwanda has liberalised and formalised its mining sector, which primarily exploits 3T minerals. These reforms were largely driven by international market pressures – particularly Section 1502 of the Dodd-Frank Act – which requires companies based in the United States of America and sourcing minerals from the DRC and neighbouring countries, including Rwanda, to conduct due diligence to avoid financing conflict (U.S. Securities and Exchange Commission, 2017). In response, Rwanda undertook major reforms to “clean” its mining sector and maintain access to global markets (E. Uwizeyimana, 2015). While the reforms have not necessarily dispelled suspicions of Rwanda’s involvement in the illicit trafficking of 3T minerals and gold from eastern DRC, the transformation of its ASM sector governance is still considered a success by many commentators (Perks, 2016b). This is characterised not only by the recovery of mining output – now at levels last seen in the early 1970s before the sector’s collapse in the 1980s and 1990s (Behuria, 2015b)– but also by the state’s tight control over production.

These achievements have been attributed to increased capital mobilisation, the introduction of new technologies, and techniques, through the training of mining engineers, who are now employed in the ASM (E. Uwizeyimana, 2015). Notably, about 80% of production now comes from ASM (Barreto et al., 2018). Yet this growth and institutional overhaul have not significantly improved conditions for artisanal miners, who form the sector’s core workforce. While formalisation has emphasised licensing and mineral traceability, labour conditions remain largely unchanged: incomes are stagnant, and labour relations informal, resulting in a formalised sector built on an informal workforce (Cook & Mitchell, 2014).

The case of ASM formalisation in Rwanda speaks to two central questions in ASM research and offers a distinct perspective on how to approach them: the effectiveness of formalisation policies and their impact on labour. Formalisation is a complex policy process that can take different forms. In some contexts, like Peru, the focus is on individual formalisation – certifying miners as legally permitted to operate (Martinez et al., 2023). In others, such as the Philippines, the emphasis is on licensing mining sites and regulating operations (Robles et al., 2022). Rwanda appears to have adopted the latter approach. This raises important questions about the various models of formalisation in ASM: which approach is followed, through what mechanisms, and with what intended outcomes?

The second issue, labour outcomes, is closely tied to the first. If a formalisation approach, like the one adopted by Rwanda, is not primarily about labour organisation and regulation reforms, what role do prevailing labour relations play in shaping the nature of the formalised ASM sector, and what forms of agency can miners exercise under such legal structures and relational contexts? These questions invite us to move beyond a narrow rights-based approach to labour protection and instead examine the broader relationships between labour, economic regulation, and market actors (Alfers et al., 2017). Rwanda’s experience offers a valuable opportunity to rethink how formalisation is shaped and implemented, particularly regarding how informal labour is integrated into a formalised mining economy – and with what consequences.

1.3 Research aims and questions

This study takes a critical approach to the formalisation of ASM by examining how labour relations shaped the formalisation process in Rwanda’s 3T mining sector. By a “critical approach”, I refer to two key departures from mainstream literature. First, this study shifts from a policy performance perspective to a relational assessment of how formalisation is designed and implemented. Rather than evaluating whether formalisation policies achieve their stated goals or improve miners’ livelihoods, I focus on how these policies are structured to enable ASM production to continue, and how they reflect and are shaped by the relations that make such production possible. Existing scholarship has made important contributions by comparing different formalisation models and assessing their effectiveness. However, I align with Rubbers’ (2024) critique that research on the informal economy has disproportionately focused on the so-called “formalisation gap”. This narrow focus risks obscuring the broader nature of state regulation – particularly how it is constructed and enacted through interactions among actors across the state, market, and society. These interactions captured in the concept of “labour relations” in turn shape the rules and practices of production (Taylor & Rioux, 2018).

Second, this study approaches formalisation as a dynamic concept – one whose logic and application are shaped by how different actors perceive and engage with it, often beyond the scope of official formalisation programmes. Scholars on formalisation beyond the ASM sector have argued that the so-called “failure” of formalisation is often rooted in the concept itself. They highlight several underlying fallacies: the assumption of a dual economy (formal vs informal), the failure to recognise the diversity of informal actors and institutions, and the overestimation of the positive externalities formalisation is expected to generate (Gallien & van den Boogaard, 2023). In light of these critiques, I find it more productive to investigate how the formalisation project is co-constructed through the interactions of various actors, rather than to assess whether it succeeds or fails according to stated goals or benchmarks specified in global frameworks such as the internal labour organisation’s decent work agenda (Bikubanya & Geenen, 2023).

This critical framing informs the overall objective of the study, which is to understand what the case of Rwanda’s ASM sector can reveal about how labour relations shape the formalisation process. To address this aim, the study is guided by three research questions, each explored through a corresponding sub-study, that collectively form the foundation of this research.

- Q1. How does a “labour perspective” help consolidate a research agenda on the challenges experienced by workers under the ASM formalisation context?
- Q2. What role did labour relations play in the formalisation of the 3Ts small-scale mining sector in Rwanda?
- Q3. How does the informality of labour relations influence access to social protection in the formalised Rwandan ASM?

1.4 Structure of the dissertation

This dissertation consists of a “Kappa” and three research papers. The Kappa, presented first, includes six chapters, followed by the papers at the end. After this introductory chapter, Chapter Two reviews literature on ASM and the broader informal economy, focusing on how previous studies have examined the relationship between ASM policy, governance, and miners’ socio-economic outcomes. Chapter Three outlines the theoretical framework that guided the study, serving both as a foundation for analysis and a guide for research design.

Chapter Four provides historical and political-economic context on Rwanda, with a focus on its mining sector. Although placing this chapter before the methodology is unconventional, it is necessary to establish the institutional background that informs the study’s methodological choices. Chapter Five details the methodology,

including the research motivations – both academic and personal – along with reflections on researcher positionality. It also describes field access, data collection methods, and the analytical process. Chapter Six presents the study’s key findings, addresses the research questions, and highlights the main contributions. The final chapter discusses the policy implications of the findings, suggests directions for future research, and offers concluding reflections.

2 ASM formalisation and the inclusive turn in development policies

It is widely accepted in policy and academic literature that much needs to be done to realise ASM as a sustainable and inclusive sector, but whether and how formalisation leads to this is contested. In this chapter, I review the literature to examine why formalisation is considered so important, and why, in contexts where it has been implemented, it has often produced mixed or disappointing results relative to expectations. While the literature identifies various barriers to inclusive formalisation, many of these stem from the fact that policy reforms under the formalisation paradigm often fail to transform the labour relations underlying ASM production. As a result, formalisation programmes tend to perpetuate structural inequalities and lack sufficient incentives to encourage the adoption of socially and environmentally sustainable practices – particularly among ASM workers, i.e. miners.

Political economy perspectives interpret this shortcoming as intentional, driven by powerful coalitions of capital and political elites who benefit from an informal, cheap, and flexible labour force. These insights – especially regarding the political nature of formalisation programmes – highlight the need to pay closer attention to how labour relations shape the design and implementation of ASM formalisation policies. Doing this is particularly important in order to push back against research that limits its analysis to institutional and implementation shortcomings as explanations for how ASM formalisation unfolds in developing countries. Before engaging with the main debate on informality and labour regulation, this chapter begins with a brief background section (2.1) that outlines the contested nature of the ASM sector, providing context for the discussion to follow.

2.1 Introduction to the ASM sector

2.1.1 Difficulties in defining ASM

The type of mining I examine in this research has been referred to by various terms, including “small-scale mining”, “artisanal mining”, “artisanal and small-scale mining”, and “small- and medium-scale mining” by various organisations and authors. These terms have evolved over time and sometimes appear interchangeably within the same document (ILO, 2016, 2020; World Bank, 2023a). National regulations also define this sector differently across countries and have revised definitions over time (World Bank, 2019). In the 1980s, attempts were made to establish a universal definition to distinguish this activity from medium- and large-scale mining. The aim was to develop a common framework to support international collaboration in governing the sector. Although criteria such as concession size, production levels, productivity, and investment were considered, disagreements over definitions hindered progress (Hilson & McQuilken, 2014). A turning point came in 1993 during a United Nations seminar on small- and medium-scale mining in Harare, where participants resolved that countries could retain their own classifications to accommodate diverse contexts and regulatory needs (Labonne, 1994).

Although different terms are still used interchangeably, there is a common understanding that artisanal mining, small-scale mining, artisanal and small-scale mining (ASM), and other variants all depict a socio-economic field that, while heterogeneous, is characterised by traditional methods, modest technology, and labour-intensive means of mineral production and processing (Hilson, 2013). This apparent consensus appears to have resulted in the differentiation of these activities from large-scale mining (IGF, 2018). However, the introduction of affordable, portable technology has enabled ASM to achieve production levels comparable to large-scale mining in some cases (Bikubanya & Radley, 2022). Additionally, some mining concessions classified as large-scale still rely on artisanal methods, either through direct employment or subcontracting. These variations make mining classifications not just a technical distinction but also a political issue, as definitions determine eligibility for mining permits, whether for foreigners or locals, cooperatives or individuals, private actors, or specific communities (Bolay, 2014; J. de Haan & Geenen, 2016). While recognising this complexity, this study adopts the term artisanal and small-scale mining (ASM), now widely used in academia to unify discussions on the sector. Throughout this report, “artisanal miners” refers to workers within this diverse and evolving industry.

In many mineral-rich countries, ASM is considered one of the most important sources of livelihood after agriculture. However, its informal nature makes reliable data scarce. Scholars and researchers often depend on rough and outdated estimates.

A 2019 World Bank report highlighted the issue of “data recycling” in ASM research, defined as “the process by which data is re-used without complete and explicit reference to the original source and context, and full attention paid to its relevance and reliability” (World Bank, 2019, p. 2). The lack of reliable ASM data stems from several factors. Diverse classifications of ASM across countries complicate data collection, while the secretive nature of the mining industry, at all levels, exacerbates the issue. Since the early years of international cooperation on mining governance, governments have been reluctant to share mining statistics, as noted in a 1989 United Nations economic and social council report (ECOSOC, 1989). This secrecy is also reflected in the culture of miners themselves (Peluso, 2018). As a result, figures cited in ASM literature – including those referenced in this dissertation – should be understood within the context in which they were produced and treated with caution, as rough estimates at best.

2.1.2 ASM sustainability and social challenges

The World Bank estimates that ASM employs at least 44.75 million people across 80 countries (World Bank, 2020, p. 1). However, its significance varies by country, as seen in the proportion of the population that depends on it. In Burkina Faso, 20% of the population relies on ASM (Medinilla et al., 2020), compared to 10% in Ghana (Bansah, 2023) and just 1.5% in Rwanda (Cook & Mitchell, 2014). The minerals extracted through ASM range from low-value quarry stones to high-value commodities like diamonds, with production serving both local markets and international exports. Some minerals, such as tanzanite, are primarily mined on a large scale, with minimal ASM involvement (Huggins & Kinyondo, 2019). In contrast, ASM plays a major role in global gold production, contributing an estimated 17–20% (Seccatore et al., 2014). This variation underscores that the importance of ASM depends not only on the country but also on the specific mineral involved.

For over five decades, international efforts have aimed to govern ASM and address the socio-economic issues both caused by and affecting artisanal miners and surrounding communities (Hilson & McQuilken, 2014). Paradoxically, however, as international mechanisms to address these problems have increased, the problems themselves have not only intensified but also evolved. In the early stages of ASM governance, concerns typically focused on tax losses to the state, water pollution, land degradation, mining accidents, and the sector’s failure to scale up or contribute to development (Noetstaller, 1987; UNDESA, 1972). Today, ASM is increasingly associated with a broader range of complex social issues, including conflict minerals, money laundering, organised crime, prostitution, and child labour (Bohbot, 2017; Bryceson et al., 2013; Gatsinzi & Hilson, 2022; Lanzano et al., 2021).

Responses to ASM sustainability challenges have varied across countries and over time, with some governments imposing outright bans. For instance, the DRC banned ASM in 2010–11 (Cuvelier, Van Bockstael, et al., 2014), and Ghana followed in 2017–18 (Aziabah & Ayelazuno, 2024). These bans have been criticised for exaggerating ASM’s role in socio-environmental issues and for using these concerns to justify injustices against ASM operators, often favouring foreign large-scale mining companies (Ayelazuno & Mawuko-Yevugah, 2019; Veltmeyer, 2013; Vogel & Raeymaekers, 2016). Moreover, banning ASM is viewed by some as unrealistic and counterproductive, since many rely on it due to a lack of viable alternatives or because alternative livelihoods are less attractive, making populations willing to engage in ASM at any cost (Banchirigah & Hilson, 2010; Davidson, 1993).

Despite increased policy attention to ASM over the past two decades – evident in the rise of sustainability initiatives since the early 2000s (Van Bockstael, 2018), the sector remains contested in two key ways. First, while a community of actors has coalesced around a definition of ASM, the sector remains complex and entangled with large-scale mining (LSM). In Ghana, for example, ASM is legally reserved for Ghanaian nationals, yet it is increasingly shaped by dominant Chinese capital. This dynamic challenges the sector’s image as locally driven and further blurs the boundary between ASM and LSM (Kwao, 2024; Loubere et al., 2019; Verbrugge & Geenen, 2020). Second, the framing of ASM’s sustainability challenges is highly political and often reductive. For instance, narratives around “conflict minerals” commonly attribute violence to the greed of armed groups, simplifying complex socio-political dynamics rooted in colonial legacies (Lanzano et al., 2021; Vogel, 2022). Such framings often serve institutional and political agendas, acting as self-justifying rationales for governance interventions. From this critical perspective, growing attention to ASM’s social and environmental impacts – and the associated sustainability initiatives – is frequently viewed as part of a broader corporate strategy that deflects scrutiny from the harms caused by LSM operations (Fisher et al., 2021).

2.2 Informality as the main culprit?

Informality is widely recognised as a key factor contributing to the sustainability challenges in the ASM sector in general and to the vulnerability of artisanal miners in particular. It is also broadly accepted that addressing informality is a prerequisite for any initiative – whether led by the state or private actors – to effectively tackle the sector’s socio-environmental problems (Hilson et al., 2017; Maconachie & Hilson, 2011; Siegel & Veiga, 2009). Although the meaning of ASM informality is complex and often contested, it generally refers to the fact that most ASM activities operate outside the legal and administrative frameworks of the state (Siegel &

Veiga, 2009). This is not typically due to a lack of regulation – as most countries have some form of legal framework – but rather due to weak enforcement and poor implementation. The ASM literature offers a wealth of country-specific studies and multi-country reviews that explore why informality persists, despite more than five decades of donor-supported formalisation policies and capacity-building initiatives in developing countries (Morante-Carballo et al., 2022).

Studies on informality in ASM draw on wider debates in the literature on the informal sector, which has an extensive and long-standing tradition in development studies. The concept of the “informal sector” is widely attributed to Keith Hart, who introduced it in 1971, while studying the economic activities of the low-income section of the labour force in Accra (Chen, 2012). At the time, the concept was considered highly valuable because it helped describe a segment of the economy that, until then, was left outside the focus of the newly independent African governments’ bureaucrats and their development partners. These actors tended to view the economy as comprising two distinct sectors: traditional agriculture and modern, industrial or state bureaucracy employment (Breman, 1976). The informal sector, by contrast, captured a growing segment of the urban population engaged in diverse economic activities, in the service sector (such as cooks, hairdressers, security guards, etc.), or involved in petty commodity production and trade that lay outside these two types of economy, which were the primary focus of state oversight (Hart, 1973). The International Labour Organization’s 1972 report on employment in Kenya expanded on Hart’s concept and is widely believed to have played a significant role in its rising prominence in the decades that followed (Chen, 2009).

In recent years, the concept of the informal sector has been widely used in both policy and academic circles – often in ways that blur the lines between the two. Initially, development actors viewed it as a transitional phase, assuming that industrialisation would eventually absorb informal labour into formal employment (Breman, 1976). However, the economic crises and failed industrialisation efforts across Africa in the 1980s and 1990s challenged this view, as the informal sector not only persisted but expanded. Over time, the concept also broadened both geographically and thematically, extending beyond the urban employment focus of Keith Hart to include contexts in Latin America, India, and even industrialised countries (Breman, 1999; Portes, 1983; Portes & Sassen-Koob, 1987). The ILO responded by adopting a more dynamic understanding, revising its definitions and statistical tools as knowledge of the sector evolved (Chen, 2009). Influence also moved in the opposite direction: policy frameworks began shaping academic discourse. Key figures such as Hernando de Soto and Keith Hart collaborated with the UN, and Martha Chen led activism through WIEGO – Women in Informal Employment: Globalizing and Organizing. While this synergy enabled broader global engagement, it also constrained the analytical development of the concept, as academic inquiry became increasingly aligned with policy agendas (Rubbers, 2024). Hart later acknowledged that, in making his conceptualisation of the informal sector

more accessible to policymakers, he sometimes sacrificed the nuances present in his ethnographic studies, which contributed to the oversimplification of informality in policy discourse and frameworks (Hart, 2005).

Within ASM research, scholarly analyses of informality differ in their focus and methodological approaches. Two influential perspectives stand out, mirroring wider debates on informality in development studies: the institutional or property rights-based approach and the structural or political economy approach. The property rights-based approach attributes informality in ASM to institutional weaknesses. Research from this perspective highlights that although ASM may be informal, it is far from unorganised. It is often governed by informal but structured norms that emerge from interactions between customary land use systems, mining cultures – frequently shaped by migrant labour – and varying degrees of state legality (Persaud et al., 2017; Sangaré et al., 2017). State-led formalisation is seen as essential for the governance of the sector – both to generate tax revenue and to enforce socio-environmental protections (Hilson, 2020). Moreover, in many countries, it is constitutionally mandated that mineral resources are state-owned (Clausen et al., 2011; Siegel & Veiga, 2009). However, from this perspective, formalisation efforts frequently fail to establish clear, legally recognised, and enforceable property rights for artisanal and small-scale miners. According to the economic theory of property rights underpinning this view, without secure tenure, miners lack the incentive to invest in their operations or comply with environmental and social standards (Clausen et al., 2011; Salo et al., 2016).

In the broader debate on informality in development studies, the property-rights-focused understanding of formalisation reflects a neoliberal perspective, prominently represented by Hernando de Soto. This view frames informality as a problem and a primary cause of economic underdevelopment. De Soto's influential work, mainly associated with the legalist school of thought on informality, argues that the absence of formal property rights traps assets as “dead capital”, preventing the poor from using their property as collateral to access credit and investment (Siegel & Veiga, 2009). His proposed solution centres on simplifying administrative procedures, enforcing the rule of law, and legalising property rights for the poor (Chen, 2009, 2012). This approach closely aligns with World Bank policies and structural adjustment programmes, which emphasise reducing bureaucratic barriers and limiting state intervention. According to de Soto, inequality and legal obstacles are the main barriers to economic inclusion and growth. By securing formal property rights, he contends, actors in the informal sector can transition into the formal economy and unlock broader development opportunities (Siegel & Veiga, 2009).

In contrast to this view, political economy perspectives interpret ASM informality as a symptom of deeper structural inequalities and labour exploitation within the global mining economy. Scholars such as Verbrugge and Geenen (2019, 2020) argue that the rise of ASM in developing countries since the 1980s represents a response by global mining capital to mounting constraints – such as environmental

protests and rising labour costs in traditional mining hubs like Canada, the USA, and Australia. From this perspective, the growth of ASM is part of a broader trend of labour informalisation in the Global South, designed to reduce labour costs and enhance flexibility. Informality, in this view, is not an accident or policy failure but an intentional feature of a system that allows capital – often with the support of national elites – to benefit from an unprotected and easily exploitable workforce. However, the exact forms of labour exploitation and governance vary depending on local institutions and ecological contexts (Mwanderingana & Ye, 2023; Verbrugge & Geenen, 2020).

This perspective within ASM literature draws on broader neo-Marxist approaches in development studies on informality, which have strongly challenged the neoliberal framing of the informal sector. These scholars argue that the liberal perspective rests on a flawed assumption: that the informal sector is primarily composed of self-employed individuals acting as entrepreneurial agents (Breman, 1976; Moser, 1978). While some neoliberal scholars have since refined this view, persistent confusion remains over what exactly the “informal sector” refers to: whether it denotes (a) a set of economic units, individuals, and enterprises; (b) a segment of the economically active population; or (c) a socio-economic stratum (Portes, 1983). Structuralist and critical researchers shift the focus to how informality is politically produced rather than naturally occurring. They argue that informal work is not beyond state reach but is governed through selective enforcement, where legal protections are strategically withheld. From this view, informality results from policies and institutional practices that exclude certain workers and activities from formal recognition, creating zones of legal ambiguity and vulnerability (Rubbers, 2024). Marxist scholars contend that the neoliberal view obscures the underlying exploitation embedded in informal labour. They emphasise that the persistence of informality reflects the existence of an exploited labouring class, whether self-employed or working for others, whose cheap goods and services effectively subsidise capitalist accumulation (Portes, 1983).

Despite their differing emphases, both perspectives converge on a key insight: the persistence of informality in the ASM sector stems from the marginalisation of artisanal miners, and state actors play an important role in this dynamic. The property rights-based view highlights the state’s failure to recognise the value of artisanal miners or to integrate their locally developed practices into formal legal frameworks. These practices – shaped through years of experience and social interaction – are often ignored or undermined by formal systems that clash with local norms (Persaud et al., 2017). Additionally, formalisation processes are frequently bureaucratic, costly, and difficult for miners to navigate. They are also challenging for states to implement, rendering many regulations ineffective in practice (Aziabah & Ayelazuno, 2024; Salo et al., 2016; Veiga & Marshall, 2019). In contrast, the structural or political economy approach emphasises the role of power and vested interests. From this perspective, informality is not a policy failure

but a deliberate outcome that benefits influential national and international actors. It reflects an economic order shaped by a capital-political elite control over the mining sector (Verbrugge, 2015). Together, these perspectives underscore the need to understand who the miners are and how the regulation of their work intersects with programmes embedded in formalisation policies such as waves of legal, structural, and governance reforms (Béland et al., 2021; Campbell, 2004; Van Bockstael, 2018). The rest of the sections in this chapter explore how ASM research addresses these issues and what remains to be explored.

2.3 A recent and diverse focus on labour dynamics in ASM

One key shortcoming in approaches to formalisation is that it has considered ASM as a homogeneous sector, whereas recent work has shown that within this sector, labour and capital must be differentiated (Verbrugge, 2015). In its early inclusion within international development discourse, ASM was typically framed in two dominant ways: as a livelihood strategy – where mining is combined with other income-generating activities to reduce socio-economic vulnerability – or as a form of small-scale entrepreneurship within the mining sector (Noetstaller, 1987; UNDESA, 1972). Despite these contrasting views, both framings of ASM portrayed miners as a homogeneous group, either as poor farmers seeking survival or as an emerging class of ambitious – sometimes rogue – entrepreneurs (Hilson & McQuilken, 2014). In the decades since, academic research has moved beyond these simplified narratives to explore the deeper dynamics that shape the lived realities of working in ASM. While the literature on ASM is vast, this section highlights two key strands: first, research that unpacks the socio-economic differences within ASM as an occupational field; and second, studies that examine labour organisation and its political-economic implications.

Several researchers have examined ASM as a distinct occupational field. Notably, the work of Tilo Grätz (2002, 2004, 2009, 2013) draws on the concept of the “frontier” to study artisanal mining in sub-Saharan Africa. Based on research in Francophone West Africa, Grätz describes ASM as a field of work characterised by unique cultural norms, labour structures, and skillsets. Adapting Frederick Turner’s frontier thesis, he argues that ASM has expanded through mobile populations – such as miners from Burkina Faso’s Mossi communities – who migrate between sites, in the pursuit of new minerals reserves and using their mining knowledge to access them. This expansion is shaped by relationships among migrant miners, host communities, and the state, leading to the emergence of localised mining economies. Building on this view, Bryceson and Geenen (2016) frame ASM as a space of economic and social entrepreneurship, though they shift the emphasis from

group migration to individual professionalisation. Drawing on historical and ethnographic research in Tanzania and the DRC, they conceptualise ASM as a dynamic process of occupational formation – marked by informal apprenticeships, skill development, economic exchange, and social reorientation. Many who train to be miners have transitioned from an agricultural background over time, and come to identify with mining as part of their social identity (Bryceson & Geenen, 2016; Bryceson & Jönsson, 2010). Both perspectives underline that ASM is distinct from agrarian livelihoods: it follows market logics and entrepreneurial dynamics yet remains embedded in local norms of reciprocity and kinship (Bryceson & Geenen, 2016; Grätz, 2013).

There is a small but growing body of literature focusing on labour organisation and production relations in the ASM sector. A recurring theme in these studies is the high heterogeneity of labour structures, which vary according to the socio-ecological context of production. For example, Ferring et al. (2016), in a study of gold mining in a rural community in Ghana's Upper Denkyira East Municipal District, identified seven distinct production systems within just one kilometre of a village. These systems differed in labour organisation, technology use, and mining method – all influenced by the physical characteristics of the gold deposits. This diversity is also emphasised by Libassi (2020) in the Indonesian informal gold mining sector. He noted that the type of labour arrangement workers enter determines their chance of success, while the labour arrangements available depend on both a miner's skills and the capital they can invest. The same author later argued that, although this heterogeneity allows broad participation – even for those with little more than their labour to offer – it also creates differentiation and potential exploitation, reinforcing class divides between labour and capital, as well as within labour categories themselves (Libassi, 2023).

Overall, research on ASM production and its underlying labour dynamics has contributed to reframing our understanding of the sector beyond simplistic binaries of survivalist livelihood and informal entrepreneurship. It reveals ASM as a complex field of work shaped by artisanal miners' own conceptions of mining as a viable and meaningful way of life (Fisher et al., 2021). This includes elements of professionalisation, career progression, and the formation of necessary – though often contested – labour relations (Bryceson & Geenen, 2016; Bryceson & Jönsson, 2010; Libassi, 2020). The sector encompasses a diverse range of actors, technologies, and social dynamics, including both collaboration and conflict, such as tensions between large-scale mining companies and informal or illegal miners (Bolay, 2014; Verbrugge, 2014).

While ASM is widely recognised for its low barriers to entry, requiring relatively little capital or formal skills, scholars adopting a labour perspective have shown that it is also a site of capital accumulation and labour exploitation (Mwanderingana & Ye, 2023; Verbrugge, 2015). In Ghana, Kwao (2024) highlights how a capitalist-political elite exploits labour through pre-existing social and cultural hierarchies,

including gender norms. Similarly, Radley (2022) and Geenen and Bikubanya (2024) show how formalisation in the DRC's ASGM sector is entangled with inequality, capital, and identity politics, particularly through claims of autochthony. Building on extensive post-2000s research on ASM, Lahiri-Dutt (2018) calls for a reconceptualisation of the sector that situates artisanal mining within broader rural informal economies, while also accounting for its intersections with global mining capital and state regulation. These insights encourage a shift in focus towards understanding the persistence of informality, not as a failure of governance or transition, but as a product of broader structural dynamics. In the following section, I review how this problem of “perpetual informality” has been analysed in the existing literature, particularly in relation to the governance of the global mining industry.

2.4 ASM formalisation and the governance of global mineral supply chains

Since the early 2000s, a wave of transnational initiatives has reshaped the governance of the ASM sector, linking it to broader debates and mechanisms in global mineral supply chain governance (Le Billon & Spiegel, 2021). The launch of the Kimberley Process Certification Scheme (KPCS) in 2003 – a “voluntary” initiative certifying diamonds as conflict-free – appears to have triggered the emergence of other certification-based, transnational governance schemes, such as Fairmined and the International Tin Supply Chain Initiative ITSCI certification. Today, certification schemes cover a wide range of socio-environmental criteria, including conflict-free sourcing, fair pricing (free from labour exploitation), mercury-free gold, child-labour-free production, and gender equality (McQuilken, 2016; Van Bockstael, 2018). These schemes, while often portrayed as voluntary and privately governed by NGOs or corporate actors, they are embedded in a broader dynamic in which formal legal regulation and voluntary governance co-evolve and are co-produced (B. Turner, 2016). Certifications such as ITSCI, while portrayed as non-state, are largely grounded in state-driven frameworks like OECD due diligence guidelines and the US Dodd-Frank Act (Postma et al., 2021).

The rise of transnational governance schemes is part of a broader “inclusive turn” in the development sector, which recognises the interconnectedness of the global economy and the need for growth that is inclusive and addresses inequality (Hujo, 2021). This paradigm is now embedded in the UN's development policy approach, which promotes ethical and socially responsible corporate behaviour, as well as multi-actor engagement involving both state and non-state actors (Esquivel, 2016). In the context of ASM, Fisher and Childs describe an “ethical turn”, highlighting the increasing importance of ethical considerations in governance (Fisher & Childs,

2013). These considerations influence not only mining regulation but also the value of minerals; certified minerals can command a price premium or guarantee access to specific markets. This development reflects the logic of global value chain governance, in which consumer preferences shape supply chain standards and governance structures (Gereffi & Lee, 2016). In this way, buyers in Western countries contribute to the sustainability of ASM in developing regions, fostering a form of transnational solidarity (Fisher, 2018)

While transnational governance schemes have introduced new actors, norms, and standards that have reshaped ASM governance, little attention has been given to how these changes influence state-led formalisation efforts. These dynamics are often treated as background context rather than as central to understanding formalisation. The concept of formalisation remains largely framed within a static, state-centric model rooted in 1970s thinking, when the state was seen as the sole authority over socio-economic governance. However, in the 1980s and 1990s with deregulation agendas driven by Bretton Woods institutions, which promoted a reduced role for the state, state socio-economic regulation in developing countries are largely dependent on policy paradigms and their implementation approaches of the multilateral institutions and actors (Adesina, 2011). Subsequently, the rise of “good governance” approaches – emphasising public-private partnerships and governance beyond the state – further reconfigured the policy landscape. In light of these shifts, a more nuanced understanding of formalisation is needed – one that recognises the influence of transnational actors and the governance structures they generate on state practices in regulating the mining industry (Béland et al., 2021).

Understanding ASM formalisation within the broader context of global governance shifts requires, for example, examining the influence of globalised discourses of inclusion. The “inclusive turn” and the broader democratisation of mining governance (Bryceson & Jönsson, 2013) suggest that, although states remain central actors, they now operate in policy environments where the inclusion of marginalised groups must be strategically justified (Deacon, 1999; Deacon & Stubbs, 2013). Similar patterns are evident in other sectors, such as social protection, where international institution-led initiatives – like direct cash transfers to the poorest – are deeply entangled with local politics, questions of state legitimacy, and the maintenance of political power (A. de Haan, 2014). In the mining sector, inclusion is advanced through policies such as “local content” requirements, the creation of designated ASM zones, and the promotion of cooperatives, as advocated in the Africa Mining Vision (African Union, 2009). However, the outcomes of these efforts have been mixed. In some cases, large-scale mining companies have formed partnerships with artisanal miners, yet these collaborations are often fragile and marked by significant power imbalances that favour large-scale actors (Bolay, 2014; Geenen, 2019).

To conclude, the literature reviewed in this chapter demonstrates the evolution of scholarly understandings of artisanal miners, their systems of work organisation,

and the logics underpinning their engagement in the informal mining economy. Theorisation of the sector has expanded significantly, shifting from early conceptions of ASM as a form of livelihood diversification to recognising it as a politically mediated economic activity embedded within global mining capital dynamics. These insights have emerged from various disciplinary perspectives – from governance studies concerned with institutional arrangements and modes of societal steering (Ouedraogo & Mundler, 2019; Persaud et al., 2017), to political economy analyses highlighting class differentiation and structural inequalities (Libassi, 2023; Radley, 2022; Verbrugge, 2015), and, more recently, to commodity chain approaches focusing on the connectivity of actors and materials (Deberdt & Le Billon, 2021; Fisher, 2018; Verbrugge & Geenen, 2020). While these perspectives have deepened our understanding of the ASM sector and the structural factors that shape it, there remains a gap in connecting these multidisciplinary insights to the everyday politics of labour regulation and the strategies miners use to navigate and adapt to shifting governance regimes. There is a need for frameworks that draw on the strengths of these perspectives while keeping labour concerns central, and in the following chapter, I propose how such an analytical framework can be developed.

3 Conceptualising ASM labour relations

In Rwanda, as in other countries where ASM formalisation is relatively advanced, it has often failed to improve workers' conditions. As discussed in the previous chapter, scholars interpret this failure in two main ways. Some attribute it to flawed institutional design that excludes poor, often uneducated miners from formal systems (Hilson et al., 2017; Salo et al., 2016; Siegel & Veiga, 2009). Others argue that structural inequality is the cause, with formalisation benefitting wealthier actors – those with capital and political connections – who exploit cheap, unprotected labour (Fisher, 2007; Verbrugge, 2015).

What is less frequently examined, however, is the role of labour relations in shaping the form that formalisation takes in specific contexts. By labour relations, I refer to the system of interactions between employers and employees, as mediated by cultural norms, state institutions, and political dynamics (Taylor & Rioux, 2018). In this study, I propose an analysis that moves beyond explanations that focus solely on why formalisation fails or proves ineffective, to explore how the nature of the state, capital, and labour in specific contexts conditions sectoral regulation and shapes working conditions. The objective of this chapter, therefore, is to develop an analytical framework that enables the investigation of formalisation policies through the lens of labour relations – an area that remains underexplored in ASM research.

This chapter is structured into three sections, each explaining different pieces of the theoretical framework used to study labour relations and their dynamics within the context of ASM formalisation. Following this introduction, the first section conceptualises ASM as a labour regime. A labour regime refers to the specific configuration of institutions, norms, and practices that govern labour use within a particular historical, geographical, and economic context (Mouzelis, 1986). Here, I discuss how formalised ASM represents a particular type of labour regime and what analytical and methodological insights we gain by considering it as such. In the second section, I propose conceptualising formalisation as an “infrastructure of inclusion”, an analytical framework proposed by Meagher (2021) and others. This allows analysing formalisation reforms as taking a variety of forms, but as part of a wider policy turn towards the inclusion of workers in the capitalist economy – both in terms of integrating labour into productive enterprises and incorporating workers into social protection systems. The final section addresses the notion of agency,

assessing how labour relations are negotiated, infrastructures of inclusion reworked, and the labour regime co-constructed, and for what purpose, which I posit here is improvement of social protection.

3.1 Formalised ASM as a labour regime

3.1.1 The theory of labour regime

The concept of a labour regime, though used in varied ways across contexts and to describe different phenomena, fundamentally refers to a set of formal and informal rules that shape the conditions under which people work and the extent of their agency to influence those conditions (Baglioni et al., 2022; Li, 2017). More specifically, a labour regime denotes the historically and geographically specific configuration of institutions and norms that govern the organisation and control of labour within a given production system. It also shapes workers' opportunities, constraints, and behavioural patterns (Taylor & Rioux, 2018). Labour regime analysis examines these dynamics within particular political and economic contexts, with a dual aim: to understand how systems of work enable the exploitation of labour for capital accumulation, and how workers, through their agency, may reshape these systems to improve their socio-economic conditions (Baglioni et al., 2022). Defined this way, a broad range of studies in political economy, development, and labour sociology contribute to labour regime analysis. While many do not use the term explicitly, they share an analytical focus on power, exploitation, and transformation, often using anthropological perspectives that emphasise territorial dynamics. In essence, labour regime research explores how work is structured and governed under capitalism (Yeung & Coe, 2015), how labour is mobilised and disciplined (Lund-Thomsen, 2013), and how workers experience and respond to these conditions across systems of production – all while attempting to meet their reproduction needs and navigating migration pressures and environmental constraints (Rogaly, 2009).

In many ways, Michael Burawoy's work pioneered the study of labour in capitalist production through a relational and political lens. In his 1985 work, he positions his research as a challenge to earlier labour sociology, particularly Braverman's (1998) account of the labour process, which he critiques for treating production as governed solely by economic laws while neglecting the political and ideological dimensions of work. Burawoy (1985) argues that classical Marxism tends to sideline worker subjectivity, relegating ideologies, struggles, and agency to the superstructure – domains like culture and politics – rather than recognising them as integral to the sphere of production itself. To counter this, he introduces the concept of "factory regimes", referring to the institutional arrangements that govern labour relations at

the point of production. He shows that these regimes vary across time and space not only due to the internal organisation of the labour process, but also in response to broader market forces, systems of labour reproduction, and state structures. This perspective laid important groundwork for what would later be expanded into labour regime analysis.

His concept of the factory regime captures the integration of the labour process (the technical and economic design of production) with its political and ideological dimensions – what he calls the “politics of production”. His thesis has two major implications for analysing labour and its struggles for improvement. First, Burawoy (1985) demonstrates that workers’ subjectivities – experiences, ideologies, and forms of resistance – are not external to the labour process but are shaped within it. This allows him to link micro-level workplace dynamics with macro-level structures, offering a relational and expanded understanding of labour regimes. The factory becomes a contested terrain where power, consent, control, and resistance are continually negotiated. Second, he calls for a revised understanding of the state’s role in shaping workplace institutions. He critiques earlier labour studies for collapsing the state into the economic logic of production, overlooking its autonomous influence through legal frameworks, welfare policies, and ideological interventions. Contrary to views that treat the state as a passive follower of capitalist imperatives, Burawoy argues that it actively mediates the capital–labour relation. At the same time, he challenges “policist” approaches in state theory, which emphasise state intervention but neglect its functional relationship to capitalist development (Burawoy, 1983; Mouzelis, 1986). For Burawoy, analysing labour regimes requires understanding the state’s dynamic and relational role in shaping both exploitation and the everyday experiences of workers.

Contemporary labour regime analysis has expanded well beyond Burawoy’s focus on the factory floor. Today, it encompasses studies across multiple scales – workplace, national, and transnational – and diverse contexts, including the informal economy. Scholars now examine how labour regimes are shaped through mechanisms such as gendering, racialisation, and migration (Baglioni et al., 2022). While each regime is historically and geographically specific, they tend to share “common elements that furnish grounds for comparative analysis” (Wickramasingha, 2022). Collectively, this literature offers an analytical framework broad enough to interrogate workers’ conditions across varied settings (a point I expand on in Paper 1 of this study). Baglioni et al. (2022) propose a comprehensive framework for analysing labour regimes through four interconnected spheres of exploitation. Production remains the central site of value extraction, often privileging capital over labour. Circulation captures how supply chain dynamics – such as credit, pricing, and risk – disadvantage producers. Social reproduction refers to how social divisions (e.g. gender, race, kinship) shape labour value and reinforce inequality. Finally, ecology highlights how environmental conditions both constrain and enable productivity and labour reproduction. These spheres are shaped by

constant struggles between capital's efforts to control labour and workers' resistance. This multidimensional framework offers critical insight into how exploitation is organised – and how potential solidarities and resistance may emerge across different labour contexts.

3.1.2 Labour regime analysis of ASM

Labour regime analysis allows us to focus on the specificities of work regulation while also linking workers' diverse conditions to broader debates on exploitation and the potential for change. When formalised ASM is approached as a distinct form of labour regime, it becomes possible to examine how labour is organised and experienced within particular institutional and political contexts. In most countries, formalised ASM refers to miners working on legally recognised artisanal or small-scale mining sites. However, despite the formal status of these sites, labour relations often remain informal – typically lacking written contracts, legal protections, or basic employment standards. This does not mean that formalised ASM is uniform across contexts, nor that workers' experiences within it are the same. Instead, formalisation emerges through a combination of historical legacies, national policy frameworks, and global market dynamics. Compared to existing ASM research, a labour regime framework sharpens our analytical tools for understanding the complexity of ASM labour by offering three key contributions.

First, a labour regime perspective helps overcome the analytical impasse created by the commonly cited “heterogeneity of labour” in ASM research. It is now widely accepted that labour arrangements and conditions in ASM are highly diverse (Ferring et al., 2016; Libassi, 2020). While this recognition is valuable in avoiding overgeneralisation – especially in a sector so closely tied to development studies and practice – it often reinforces a livelihood narrative that portrays ASM as a patchwork of informal, subsistence-oriented survival strategies. A labour regime perspective shifts the analytical focus by treating mining primarily as a domain of work, rather than simply livelihood. This allows for the identification of processes of professionalisation (Bryceson & Geenen, 2016) and acknowledges how miners increasingly see themselves as workers. Moreover, rather than locating ASM entirely within the informal economy, this approach foregrounds the structural conditions that regulate labour under state-led formalisation. It enables a more grounded understanding of how formalisation takes shape across national contexts – not in terms of policy diffusion or best practices, but through examining how state regulation intersects with local employment and power relations.

Second, labour regime analysis anchors the study of economic production in the actual conditions of labour. Recent ASM research has increasingly recognised that ASM is not a separate or marginal sector, but is closely linked to large-scale mining (LSM) – through overlapping concessions, competition over mineral deposits, and shared labour markets. This has shifted analysis beyond the traditional binary

between ASM and LSM, towards understanding both to be part of an integrated global mineral production system dominated by transnational capital (Verbrugge & Geenen, 2019). While this framework rightly highlights how global mining interests are mediated by local institutions and ecological contexts, it tends to reduce labour to a generic feature of the “local context” (Verbrugge & Geenen, 2020). As with other global production models (e.g. global commodity chains, global value chains), there is a risk of downplaying labour’s agency in shaping production and resisting exploitation. Labour regime analysis addresses this limitation by conceptualising local labour regimes as relational formations – shaped simultaneously by national political economies and transnational capital demands. It also draws attention to how the state mediates relations between artisanal miners, local communities, and large-scale mining actors in response to shifting global market dynamics.

Finally, a labour regime perspective is valuable for situating labour conditions within broader multiscale and multitemporal developments. ASM is often treated as a disconnected or exceptional sector, isolated from the wider field of state social and economic policy. This analytical isolation is not unique to ASM. Scholars such as Adesina and Mkandawire have long critiqued development discourses that advocate for “social inclusion” while failing to acknowledge the historical and structural constraints that shape policymaking in the Global South. A labour regime approach offers a corrective by foregrounding the interconnections, contradictions, and potential synergies across different policy domains – economic, social, environmental, and labour (Alfers et al., 2018). It also brings attention to the historical and uneven development of capitalist labour relations – inequalities that are not only foundational to capitalist expansion but also sources of tension and potential resistance. In this way, the labour regime framework allows us to understand not only the structural constraints shaping artisanal miners’ conditions, but also the openings through which social reproduction and resistance can emerge.

3.2 Formalisation as an infrastructure of inclusion?

Recently, the concept of formalisation has been criticised for being based on flawed assumptions and for its limited analytical power in capturing and explaining the contemporary organisation of labour in global commodity production (Gallien & van den Boogaard, 2023; Harriss-White, 2010a; Rubbers, 2024). Nevertheless, the issue it aims to address – the vast share of the global workforce excluded from stable, protected employment – remains of significant theoretical and political relevance (Chen, 2009, p. 19). It is therefore crucial to examine how state institutions and regulatory frameworks shape informal work, and to develop new analytical approaches capable of capturing these dynamics (Harriss-White, 2010b; Rubbers, 2024).

Critical development scholars such as James Ferguson, Tania Li, and Barbara Harriss-White have challenged both institutionalist and structuralist views of formalisation (discussed in the previous chapter) for their narrow focus on formality in analysing the politics and regulation of informal labour. Barbara Harriss-White argues that both perspectives reduce informal workers to either failed entrepreneurs or exploited labourers. She stresses that many are in fact petty producers who engage with the state in varied ways to pursue their livelihoods, and that ignoring these interactions limits the scope of effective labour politics (Harriss-White, 2010a, 2014). Similarly, Ferguson and Li (2018) critique the notion of the “proper job” upheld by both traditions, which they argue distorts analysis by focusing on what informal work lacks, rather than what it is. Drawing on these critiques, this section proposes that formalised ASM labour relations can be better understood through an infrastructure lens, because it enables an analysis of how informal labour is included in global commodity production without reproducing the conceptual and historical biases that have shaped traditional formalisation debates.

The concept of infrastructure, as developed in Science and Technology Studies (STS), refers not only to physical systems but also to “a complex fabric of interrelated social, technological, and organizational components” (B. Turner, 2016, p. 389) – a web of relations connecting knowledge regimes, institutions, technologies, bureaucracies, human and non-human actors, and resources into an enabling framework. Conventionally, infrastructure has been understood in terms of roads, railways, or pipelines, with the state playing a central role in provision. Indeed, some argue that one of the postcolonial state’s major failures lies in not delivering adequate infrastructure (Elyachar, 2012). Development economists like Hernando de Soto have similarly argued that these states failed to provide the necessary institutional infrastructure for economic growth – particularly through the formalisation of large informal sectors via legal property rights (Chen, 2012; Portes, 1996).

When interpreted more broadly through STS and anthropology, infrastructure is not limited to formal, state-led systems. People themselves can be seen as infrastructure; their everyday collaborations and informal networks underpin systems of production and distribution (Simone, 2004). In this sense, infrastructure links people, territories, and resources into dynamic assemblages that combine structured regularities with provisional, shifting connections. Formalisation, therefore, can be rethought not merely as securing property rights – as often emphasised in ASM policy – but as part of a broader infrastructure embedded in global commodity production. It entails not just legal reforms, but the emergence of new actors, norms, responsibilities, and expectations that create flexible yet structured systems enabling economic activity.

Empirically, the infrastructure lens has been especially useful for examining how poor and informal workers involved in natural resource production are integrated into global commodity chain governance (Lindquist, 2017; Meagher, 2021; B.

Turner, 2016). In an otherwise broad field that applies an infrastructure analytical lens, this strand of research particularly engages with the so-called inclusive turn in development policy, which advocates for inclusion in globalised production and trade, in state social protection, and in a growing field of philanthropic and entrepreneurial intervention (Meagher, 2021). Three key insights from this body of work offer a valuable framework for understanding ASM formalisation as an attempt to incorporate informal miners into the governance structures of the global mining industry (Verbrugge & Geenen, 2020).

First, an infrastructure lens draws attention to the politics of rendering poor populations legible through inclusion discourse. Programmes linking informal workers to formal markets often define the problem in ways that frame them as objects of intervention, while presupposing specific solutions. What is made visible – and what is left out – matters. In ASM formalisation, the emphasis is frequently on property rights over labour relations, and this is a defining feature of the global mineral chain governance (Bebbington et al., 2018). These choices are not merely technical but reflect political and ideological preferences regarding how workers' rights are secured – whether through corporate social responsibility initiatives, labour laws, or market mechanisms (Alfers et al., 2017). In some cases, it is proposed that the state only needs to formalise workers to make them visible, after which NGOs and corporate actors can work with them or support them via bottom-of-the-pyramid schemes (Elyachar, 2012). However, questions of who bears responsibility also implicate questions of who holds power to define problems and design interventions – an issue deeply contested in development policymaking (Devereux & Sabates-Wheeler, 2007).

A second way the infrastructure lens proves useful is by problematising the assumed “positive” social outcomes of the inclusive turn in global commodity governance. Specifically, this approach enables analysis of how integration affects informal workers' social protection – defined by Barrientos (2005, p. 113) as “the set of public actions taken in response to levels of vulnerability, risk, and deprivation which are deemed socially unacceptable within a given polity or society”. In the Global South, social protection emerged in the 1980s as a response to the social consequences of economic liberalisation and neoliberal reforms, framed within an inclusive development paradigm aimed at “humanising economic production” (Riisgaard et al., 2021). Recently, social protection has gained renewed attention as an essential component of state policy that complements economic strategies to reduce poverty and promote development, and formalisation policies have been often situated within this broader discourse (Chen, 2009; Deacon, 2005; Harriss-White, 2010b; Hulme & Barrientos, 2008).

However, research also shows that inclusion can result in adverse incorporation, where informal workers become more vulnerable through integration, challenging the social protection goals of inclusive development policies (Baglioni et al., 2022; Barrientos & Barrientos, 2002; du Toit, 2009; Meagher, 2019). Not all connections

to global capitalism are beneficial; they may cause loss of traditional livelihoods, dependency on monocropping, or exposure to unstable income flows. In ASM literature, although the infrastructure lens is seldom applied, formalisation is often understood as a form of adverse inclusion that ignores miners' priorities (Marshall & Veiga, 2017; Persaud et al., 2017; Salo et al., 2016). The infrastructures of inclusion framework move beyond a simple inclusion/exclusion binary to examine how inclusion operates in practice. One such mechanism, "formalisation through contracts" (Carodenuto et al., 2025), raises questions about how contracts alter distributional outcomes for informal workers. Since contracts are rare in ASM, it is crucial to investigate how miners are mobilised to work on formalised sites – whether participation is coerced or incentivised, voluntary or forced – as these dynamics shape the labour regime and ultimately determine formalisation's outcomes (Taylor & Rioux, 2018).

Lastly, while infrastructures of inclusion aim to connect actors into functional production systems, they are not seamless. They are marked by friction, breakdowns, and unstable linkages that require constant repair and renegotiation (Meagher, 2021). In ASM, a major challenge is that formalisation is rarely linear or sustained. It waxes and wanes, and in countries where it was once relatively advanced – such as Ghana and Zimbabwe – it has often regressed (Hilson, 2013; Spiegel, 2015). These failures illustrate the fragility of inclusion infrastructures and are directly relevant to ASM policy. Importantly, the literature also emphasises the agency of informal workers to rework or resist failing systems or renegotiate their terms of engagement (Meagher, 2021; B. Turner, 2016). Recognising this agency helps identify the alternatives that emerge in response to disconnection and offers insights for more responsive, bottom-up policy design. Since ASM research has tended to emphasise the victimisation of miners rather than their agency, this analytical angle requires further development – an issue I take up in the following section.

3.3 Informal workers' agency for own social protection

Pushing back against dominant political-economic analyses of global production that emphasised capital's role, Herod (1997) introduced labour geography as a sub-discipline of economic geography. His aim was to reconceptualise workers not as passive components of economic systems but as active geographical agents capable of shaping economic landscapes (Grenzdörffer, 2021). Since then, labour geography has focused on how working people exert spatial power to influence economic processes, improve material conditions, and sustain social life, placing labour agency at its centre (Tufts & Savage, 2009; Warren, 2019). Yet, labour agency remains underexplored in frameworks like GCC, GVC, and GPN (Coe & Jordhus-Lier, 2011). As Tufts and Savage (2009) note, this is partly due to the lack of tools

to empirically analyse worker agency beyond abstract theorisation and outside forms rooted in advanced Western economies, such as trade unionism. In this section, I review broader frameworks of labour agency and explore their relevance to ASM research.

The concept of human agency – the capacity of individuals to act independently and make choices – entered sociology and anthropology through the structure–agency debate of the 1950s to 1980s (Emirbayer & Mische, 1998). Structuralists, such as Althusser, viewed power structures – like capitalism, the state, or ideology – as having an internal logic that operates independently of individual intentions or actions (Fletcher & Büscher, 2019). In contrast, actor-oriented perspectives, notably Anthony Giddens’ structuration theory published in 1984, challenged this view (Dickie-Clark, 1986). Structuration theory rejects both structural determinism and the tendency to romanticise or fetishise local agency by interpreting everyday acts as profound political resistance. Giddens emphasises the mutual constitution of structure and agency: structures shape human actions, but those actions in turn reproduce or transform structures. He conceptualises individuals as reflexive agents who operate within existing structures while also having the capacity to reshape them (*ibid.*).

The analysis of agency is now a diverse field, including frameworks such as Actor-Network Theory. Here, I focus on agency within development interventions like formalisation and ASM governance. Norman Long’s actor-oriented approach is particularly useful. He argues that development is not just a top-down process but the outcome of multiple, interacting social projects. His fieldwork-based methodology emphasises how local actors interpret, negotiate, and reshape policy interventions (Long, 1990). This perspective is especially relevant to ASM, where formalisation is often analysed through policy design, technical barriers, or institutional capacity – overlooking the role of actors, including state officials, NGOs, and miners themselves. This risks treating formalisation as an autonomous process, disconnected from the stakeholders involved. Shifting attention to the interaction of actors allows for a better understanding of formalisation as a contested and negotiated process shaped by diverse interests and strategies, rather than as a linear, state-led policy script (Ferguson & Lohmann, 1990; Mosse, 2017).

The agency of artisanal miners is widely recognised as crucial when designing effective policies to improve conditions in the ASM sector. However, agency is often conceptualised simply as miners acting as agents of their own lives through their work and lifestyle (Bryceson & Geenen, 2016; Fisher et al., 2021). To move beyond this broad understanding and develop a more dynamic, practical concept, Emirbayer and Mische’s (1998) framework offers a useful methodological approach. They define agency as a temporally embedded process of social engagement, shaped by past experiences and habits, oriented towards future possibilities, and grounded in present practical-evaluative decisions that adapt to current contingencies.

Applying this framework to ASM research allows for a more policy-relevant analysis of how miners' agency influences their pursuit of social protection – that is, improving the stability of their socio-economic conditions. This involves examining how artisanal miners engage with state protective policies, either as citizens or workers, particularly considering how the informality of their labour relations affects this engagement. Moreover, engaging with miners' agency might be useful in uncovering informal social protection mechanisms that miners rely on when public protections fail.

4 ASM formalisation within the Rwandan mining sector

In this chapter, I offer a concise overview of Rwanda's political-administrative system, the historical management of land and labour, and the organisation and evolution of the mining sector. Interpreting Rwanda's socio-political structures and history is inherently complex and often contentious, giving rise to divergent perspectives among Rwandans, and frequently leading to scholars and commentators being categorised as either pro- or anti-government (S. Turner, 2013). The background to Rwandan society presented here is necessarily selective for the sake of brevity and may omit certain details that some readers could find controversial, given the complexity of the country's history and politics. However, the aim is not to provide a comprehensive or definitive narrative, but rather to supply the socio-political context needed to better understand the debates and practices surrounding labour regulation in the ASM sector examined in this study.

4.1 Background on Rwanda's socio-political organisation

Rwanda covers a relatively small territory of 26,338 square kilometres, making it the second most densely populated country in Africa after the island nation of Mauritius (Government of Rwanda, 2025). The country has a population of approximately 13.2 million, with nearly 50% under the age of 20 (NISR, 2023). Power is highly centralised, with most policies and regulations formulated by the executive and legislative branches based in the capital, Kigali. Although the country has a decentralised government structure that is organised into 30 districts covering the entire national territory, these primarily serve administrative and implementation functions. In recent years, the central government has promoted revenue generation at the local level, for example by devolving property tax collection to districts. However, in practice, decision-making and resource allocation remain largely centralised, with the Ministry of Finance and Economic Planning playing a dominant role (Chemouni, 2019; Nshimiyimana & Niyongabo, 2023). Despite this centralisation of political and financial power, local

administrations are relatively well resourced. In 2011–12, they managed over 25% of the domestic budget and employed around half of the national civil service (Chemouni, 2014). As Chemouni (2014) notes, Rwanda’s decentralisation is “characterised by the heavy role of the centre, and the promotion of tightly monitored, technocratic and depoliticised local governments” (p. 246).

Since 1994, following the genocide, Rwanda has been governed by one dominant political party, the Rwandan Patriotic Front (RPF), led by President Paul Kagame. The RPF faces no significant opposition; other political parties function largely in support of the ruling party, forming a coalition based on a model of “consensus politics” rather than confrontation. This political approach is often justified as appropriate for Rwandan society, given its traumatic history of genocide and civil war (1990–1994) (Løvgren & Turner, 2019). The genocide and civil war in Rwanda occurred within the broader context of post-La Baule democratisation. At the 1990 La Baule conference in France, then-President François Mitterrand announced that in the future, “North” countries’ financial and political support to African countries would be conditional on their commitment to democratic reforms – ending the Cold War-era policy of overlooking African states’ internal human rights issues. In response to this pressure, Rwanda’s president Juvénal Habyarimana allowed the creation of new political parties in 1991, breaking the monopoly held by his party, the Mouvement Révolutionnaire National pour le Développement (MRND), since 1978 (Ndushabandi, 2013). However, many of these new parties mobilised around the “Hutu Power” populism, politics routed in racial divisions – on which I elaborate in the following section – and played a key role in promoting the ideology and organising the logistics that led to the 1994 genocide against the Tutsi (Newbury, 1998).

The post-genocide (1994) socio-political context in Rwanda has shaped not only the policies and approaches of the ruling elite but also the political agency of the population. Rwanda’s consensus politics is understood to rest on two main foundations (Chemouni, 2014). First, it is a deliberate strategy to reject the confrontational, multi-party politics that previously gave rise to populism, extremism, and ultimately, the civil war and genocide. Second, beyond historical justification, the consensus model is defended from a performance-based perspective: leaders argue that, unlike some African states with more “open” democracies – both in the region and beyond – Rwanda has achieved greater stability and development. As a result, performance becomes the central criterion used by the government to legitimise its political system (S. Turner, 2013). Critics, however, view this model as a means to limit political freedoms and suppress dissent (Saltnes, 2017). The politics of consensus in Rwanda extends beyond formal political parties; citizens are expected to express their views in ways that do not disrupt national unity or order. This is reflected in laws that criminalise demonstrations not approved by the state. Consequently, policies’ resistance in Rwanda tends to be subtle, often taking forms other than public protest.

Rwanda's "pragmatic" developmental and political approach – prioritising strong development performance over democratic ideals – has resulted in a complex and often contradictory relationship with international donors (Porte, 2021). Backed by a relatively disciplined and well-trained technocratic class, Rwanda is known for effectively seizing development opportunities and delivering results, making it a favoured partner for donor-driven success stories (Hasselskog, 2023). One notable example is its substantial contribution to UN peacekeeping missions. However, Rwanda's relations with international partners, including the European Union, have at times been strained. Periodic sanctions and aid suspensions have been imposed due to allegations of Rwanda's involvement in conflicts in the DRC, as well as concerns over restrictions on political freedoms at home (Saltnes, 2017).

This duality also appears in the mining sector. While Rwanda is often praised for its governance of ASM, it has also faced accusations of involvement in the illicit trade of minerals originating from the DRC (Global Witness, 2017; IGF, 2017; World Bank, 2023b). As a result, Rwanda maintains both cooperative and contentious relationships with donors, making it susceptible to shifts in international political sentiment. In response to this vulnerability – particularly to Western donors' ethical expectations and use of sanctions – Rwanda has sought to build resilience by designing economic policies that reduce dependency on external actors (Behuria, 2015b). In this perspective, many programmes that begin with donor funding are eventually absorbed into domestic governance and financing structures. A prominent example is the community-based health insurance scheme, *Mutuelle de Santé* (Chemouni, 2016). However, Rwanda's ambition for political and economic self-reliance remains a complex challenge. The country faces significant constraints, including limited natural resources, high unemployment – an annual rate of 20.5% (NISR, 2023, p. iii) – and a long-standing energy shortage. The latter has significantly hindered the development of its manufacturing sector (Short, 2008).

4.2 People, land, and labour-related conflicts

Land and its management – both in precolonial and contemporary Rwanda – have played a transformative role in shaping the country's political and social landscape. Unlike many African countries, Rwanda is not a colonial creation. Prior to the arrival of German colonisers in the late 19th century, Rwanda had already developed a relatively centralised political system and functioning administration for over two centuries. The Kingdom of Rwanda governed a territory roughly equivalent to the country's present-day borders. This long-standing statehood means that while many of Rwanda's current issues are certainly influenced by colonial legacies, they are also deeply rooted in its precolonial history. The origins of the Rwandan kingdom date back to at least the 14th century, with some claims suggesting even earlier beginnings. However, it is the 17th century that holds particular historical

significance. Events from this period onwards are considered more reliably dated and documented by historians, in contrast to earlier centuries, which remain largely speculative (Vansina, 2005).

There are two competing interpretations of Rwanda's socio-political organisation from the 17th to 19th centuries and earlier. The first portrays Rwandan society as divided into two hierarchical classes: the Tutsi, primarily herders and members of the aristocracy, and the Hutu, peasant farmers subjected to their authority. According to this view, the Tutsi held *ibikingi* (large land holdings) and cattle, which allowed them to dominate Hutu labourers through the *ubuhake* system. This patronage arrangement offered Hutu peasants limited access to land and cattle (e.g. milk) in exchange for labour and is often likened to a form of serfdom. The second interpretation challenges this exploitation thesis. It argues that precolonial Rwanda was characterised by centralised governance under the king, with a triadic structure of local authority: the land chief (*umutware w'ubutaka*), who managed agricultural land and resolved land disputes; the pastures chief (*umutware w'umukenke*), who oversaw cattle stocks management and its redistribution; and the military chief (*umutware w'ingabo/w'umuheto*), responsible for the kingdom's defence and local security. All were appointed by the king and worked in overlapping spheres of influence, contributing to a relatively cohesive and functional society (Ndizera et al., 2022).

While both perspectives simplify a complex history, the first is particularly problematic. Social relations between Tutsi and Hutu were more fluid than rigid: some Tutsi farmed, and some Hutu owned cattle. As Newbury (1998) explains, these categories did not exist or mean the same thing across the whole kingdom, they were relative and situational identities that were later institutionalized by Belgian colonial authorities (1916–1962) into fixed, “racial” categories of Hutu and Tutsi. While King Mutara III Rudahigwa abolished the *ubuhake* feudal system in 1954, towards the end of the Belgian rule, in the decolonisation process, land tenure and social class became increasingly politicised. Colonial authorities exacerbated social divisions and eventually turned against the Tutsi aristocracy, who had begun advocating for independence. Meanwhile, Hutu political elites – often from peasant backgrounds – revived narratives of historical marginalisation under Tutsi rule and transformed them into a populist political ideology steeped in resentment. This ideological shift contributed to the 1959 massacres of Tutsi and mass exile, and laid the groundwork for the 1994 genocide against the Tutsi (Newbury, 1998).

When the Rwandan Patriotic Front (RPF) took power in 1994, it implemented strict land control policies, recognising land as central to national unity, political stability, and economic development (Musahara & Huggins, 2005). One of its earliest priorities was land redistribution, framed as a gesture of reconciliation and post-genocide reconstruction. Many Tutsis who had fled during the 1959 violence and returned after 1994 did not reclaim their ancestral *ibikingi*; instead, they were allocated new plots by the state or received portions of their former land where

available. Between 2009 and 2013, Rwanda undertook a nationwide land registration campaign, marking a major shift in land governance. Land was reframed as an engine of economic growth, tenure security, and strategic planning. Policies such as expropriation, land-use consolidation, zoning, and *villagisation* were introduced. Land titles enabled credit access and facilitated land transactions, contributing to rising land values – but also to vulnerabilities like displacement and gentrification, and the population resistance to these reforms (Hahirwa, 2014; Nkubito, 2022). Although land has been under state control since independence in 1962, these recent reforms have shifted public perceptions. Land is increasingly viewed not as a permanent, lineage-based inheritance but as a conditional asset subject to state approval and market logic. The understanding that land can be expropriated for public interest at any time has reshaped its social and economic value. It is within this evolving governance context that Rwanda’s mining sector now operates.

4.3 The Rwandan mining sector

4.3.1 Rwanda and the production of the 3Ts minerals

The 50th (tin), 73rd (tantalum), and 74th (tungsten) elements of the periodic table are commonly referred to as the 3Ts minerals, a term popularised after the 2000s due to their co-occurrence in the Central African Great Lakes (CAGL) region and their association with the debate on conflict minerals (Cuvelier, Vlassenroot, et al., 2014). Rwanda is located in the northeastern part of the Kibara Belt geological formation, a mineralisation zone associated with granitic intrusions (Heizmann & Liebetrau, 2017). The Kibara Belt has traditionally been considered to share a common primary mineralisation. However, Tack et al. (2010) challenged this view and proposed a subdivision into two distinct segments: the Karagwe-Ankole Belt (KAB) – comprising Rwanda, Burundi, and Kivu in the DRC – and the Kibara Belt (KIB) – mainly encompassing the Katanga region in the DRC. In this study, they argue that the two belts are separated by the Palaeoproterozoic Rusizian Terrane, an extension of the NW–SE trending Palaeoproterozoic Ubende Belt in Tanzania, as depicted in figure 1. This geological boundary is a probable explanation of the divergence in mineral types; copper and cobalt dominate in Katanga, while the 3Ts are prevalent in the KAB region (Kivu, Rwanda, and Burundi).

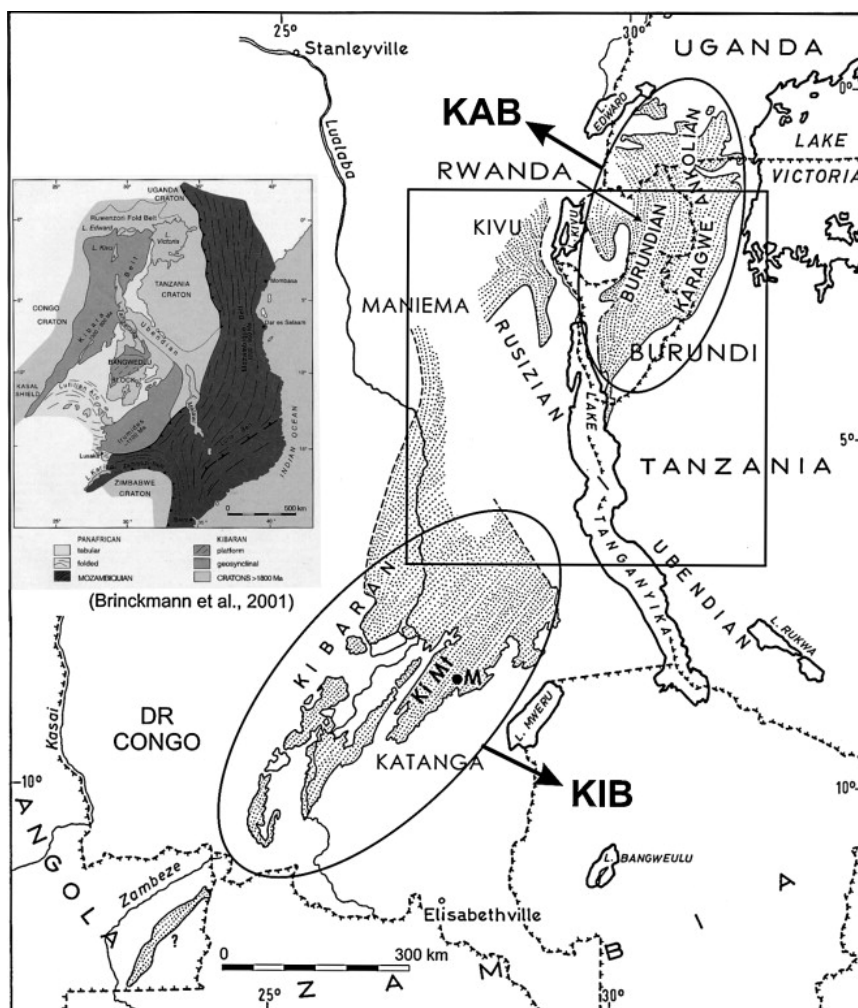


Figure 1. Sketch map of the two distinct “Karagwe-Ankole belt” (KAB) and the “Kibara belt” (KIB).
Source: (Tack et al., 2010, p. 65)

While the socio-political and policy context contributed to the association of the 3Ts with the CAGL region, in reality – apart from tantalum – the majority of global production of tin and tungsten comes from outside this region. In 2022, 64% of global tantalum production originated from the CAGL region – specifically the DRC, Rwanda, Uganda, and Burundi (USGS, 2023, p. 175). In contrast, the region accounted for only 7% of global tin production and 1.2% of tungsten (USGS, 2023). Tantalum is a heat-resistant powder capable of holding a high electric charge, making it essential for manufacturing electronic capacitors. These capacitors are

critical components in products such as mobile phones, computer hard drives, and implantable medical devices like pacemakers (USGS, 2017).

The global demand for the 3Ts is expected to grow in the context of the energy transition agenda, as these minerals are required in nearly all emerging technologies, including electric vehicle batteries, wind turbines, and more. This rising demand presents a significant governance challenge for ensuring the sustainable global production of these minerals in the coming years (ITRI, 2012). This challenge is amplified by the fact that 60% of tantalum and 40% of tin come from ASM (Schütte & Näher, 2020), which makes the two minerals highly artisanal in comparison for instance with gold, of which 16–20% is of ASM origin (Seccatore et al., 2014), and 12% for diamond (Schütte & Näher, 2020).

In 2022, Rwanda contributed 17.5% of global tantalum production (ranking 3rd worldwide), 0.7% of tin (12th), and 1.3% of tungsten (6th) (USGS, 2023). While these figures do not necessarily position Rwanda as a dominant global source of 3Ts minerals, the mining sector holds significant national importance. Approximately 80% of mining in Rwanda is classified as small-scale, and the sector contributes around 3% to the country's GDP (Rwanda Development Board, 2015). Mining has consistently been one of Rwanda's top three sources of foreign exchange earnings over the past fifteen years, playing a key role in reducing the country's trade deficit (World Bank, 2023b). The sector directly employs around 34,000 people, and when including their dependents, it supports an estimated 1.5% of the total population (Barreto et al., 2018, p. iv). Although mining activities occur across most districts, only a small proportion of sites are economically viable when exploited through legal and regulated means, due to factors such as taxes and operational costs. This economic reality complicates legal ASM, especially in a context where widespread poverty and proximity to mineral resources foster conditions conducive to illegal mining practices.

4.3.2 History of the mining sector governance in Rwanda.

Recent Rwandan history is generally divided into four periods: the colonial era (1890s–1962), the First Republic or Kayibanda regime (1962–1973), the Second Republic or Habyarimana regime (1973–1994), and the current post-genocide RPF-led regime (1994–present). Historical evidence shows that mining in Rwanda began as early as the 8th century with artisanal iron production for local tools such as hoes and for regional exchange, while internationally oriented mining only started in the early 1930s under Belgian colonial rule (L. Uwizeyimana, 1988). Under this regime, a few large-scale mines were opened across the country, but the majority of production came from small, artisanal operations. Entrepreneurs – mostly Belgians and a few Rwandan elites – did not invest in technology or the development of new mines, instead focusing on commercialisation. They relied on cheap labour and adapted to the complex mineralogy, which made it economically unviable to employ

heavy machinery. This meant that even in the so-called large-scale mines, production remained highly artisanal (Perks, 2016a).

From 1962, when Rwanda gained independence from Belgium, until 1994, the first two independent regimes managed to open a few large-scale mines, with the Habyarimana regime performing better than Kayibanda's in this regard (Behuria, 2015a). However, the Habyarimana regime also experienced periods of crisis and bankruptcy of national mining companies, due to a combination of challenges such as mismanagement, corruption, and fluctuating mineral prices on the international market. During these crises, the government adopted an approach of governing the mining sector by controlling the commercialisation of minerals, while production was left to be informally conducted by independent communities or loosely organised local entrepreneurs (Behuria, 2015b).

In 1994, a new regime took power in the aftermath of the Tutsi genocide and civil war. Restoring security, statehood, and other critical sectors was more urgent than developing the mining sector. However, in 1997, the state began liberalising the trading side of the mining sector, and in the early 2000s, in line with the structural adjustment programme (SAP) and conditionalities, it started liberalising production within the industry itself (Perks, 2014). Behuria (2015a) notes that by 2007 the sector had already transformed, and from 2004 onwards it appeared to have been re-established, reaching – and even surpassing – the production levels of the Habyarimana era. Although few large-scale mines opened, the rise in production was largely due to restored efficiency in a handful of mines inherited from previous regimes, combined with numerous small-scale operations. It is also important to note that the strong performance in the 2000s has been suspected to result partly from the trafficking of minerals from eastern DRC into Rwanda (Cuvelier & Marysse, 2003; Tebello & Solomon, 2016). The RPF's management of the mining sector until around 2009 closely resembled that of previous regimes, characterised by a series of institutional adjustments and attempts to develop a few large-scale mines – either national or joint ventures with international investors – followed by periods of disillusionment and reliance on the commercialisation of more or less self-organised small-scale miners across the country (Behuria, 2015b).

The break from previous regimes, which I explore as reforms in this study, began in 2010. From that year, Rwanda initiated strict formalisation and reform of its ASM sector, ensuring that ASM exploitation and mineral trading comply with legal requirements. The state's increased control over ASM production processes was largely triggered by the 2010 United States Dodd-Frank Act (Section 1502), which mandated that American companies report on their due diligence to ensure their mineral sources are free from conflict minerals linked to the Congo (Postma et al., 2021). Given persistent allegations over the past two decades that Rwanda might be a principal transit point for minerals illicitly imported from the conflict-affected eastern DRC, American companies became reluctant to source minerals from Rwanda. This pressured the Government of Rwanda (GoR) to comply with

international mineral traceability programmes to maintain access to the global market (E. Uwizeyimana, 2015). This study focuses on the process and outcomes of this extensive overhaul of mining governance triggered by this regulation, as outlined in the following paragraph, going beyond the traceability mechanisms mandated by the Dodd-Frank Act.

4.3.3 RPF “successful” transformation of the ASM sector

The current study examines the reforms of the 3Ts ASM sector in Rwanda, portrayed by various commentators as “successful”, and carried out by the post-1994 genocide government (IGF, 2017; Munir, 2023). In ASM literature, cases of successful reform remain rare, and two extensive PhD studies (Behuria, 2015b; Perks, 2014) – and possibly others – have already engaged with Rwanda’s “exceptional” case of effective governance. These works provide valuable insights into the historical evolution of mining policy and the national-level political-economic strategies that have driven sectoral change. Building on this body of research, the current study approaches the Rwandan case from a labour perspective, focusing on how labour relations have shaped, and been shaped by, these reforms. However, both “reforms” and “success” are contextual and political notions. It is therefore necessary to clarify how I approach and understand these changes within the specific context of Rwanda’s mining sector.

The history of Rwanda’s mining sector across the four periods of governance that have marked the country’s political landscape since the 1890s is characterised by both continuity and change. Perks (2016b) and Behuria (2015a), drawing on archival research and interviews with key informants involved in national-level reforms of the mining sector, note that initiatives and narratives from earlier regimes often closely resemble those of the current government. Behuria (2015b), who has studied mining reforms under the Rwandan Patriotic Front (RPF) alongside broader governance changes in other sectors, suggests that the government’s portrayal of doing things differently may reflect exaggeration, limited awareness of past policy trajectories, or a form of policy amnesia. Similarly, Løvgren and Turner (2019, p. 29) observe that the RPF tends to build its legitimacy by asserting a sharp policy break from previous regimes, which it blames for having “produced the genocide”. In the mining sector, however, Perks (2016b) argues that it is difficult to clearly identify what is genuinely new – what represents a substantive departure from the approaches of earlier governments – and what merely continues past practices. This raises important questions about whether these changes constitute true reforms, and whether current sector performance can be objectively attributed to the effectiveness of recent policy shifts or to other underlying factors.

Despite difficulties associated with defining reforms, from 2010, a series of legal, organisational, and political changes transformed the governance of Rwanda’s mining sector, driven not only by international market demands but also by the

country's developmental agenda (Behuria, 2015b; Postma et al., 2021). Central to these reforms, and explored extensively in this study, is the formalisation of ASM production. From 2010, the government mobilised entrepreneurs to form cooperatives and companies, encouraging investment in mining. A new Mining Law was enacted in 2018, outlining operational and socio-environmental requirements for ASM operators. The Rwanda Mining Board (RMB), a government agency with representatives at district level, oversees ASM activities, and policy implementation has been operational since 2016. The Rwanda Investigation Bureau (RIB), established in 2017, joined mining governance by conducting inspections of mining operations and trade, as well as criminal investigations.

In 2015, Rwanda graduated its first cohort of mining engineers from the Integrated Polytechnic Regional College (IPRC) and established the School of Mining and Geology at the University of Rwanda. As the Mining Law requires companies and cooperatives to employ mining engineers, these professionals have increasingly joined the ASM sector, contributing to technological improvements. While certain elements of reform are not entirely new – for example, mining cooperatives date back to 1953 (Musahara, 2012) – this study focuses on the intensified and more detailed state control of the mining sector initiated in 2010. Although these reforms reflect both continuity and change, as other scholars have noted, the current RPF-led government is distinct from its predecessors in its governance style, which is characterised by a strong emphasis on national security and advanced forms of social engineering (Ansoms, 2009; Løvgren & Turner, 2019). In this study, I situate ASM sector reforms within this broader context of heightened state control. I adopt a relational approach to examine how control over mining sites, population management, regulation of the entrepreneurial class, and the wider political-bureaucratic system are interconnected and work together to enable and structure ASM production in Rwanda.

While Rwanda's reforms of the ASM sector are often regarded as largely successful, defining what constitutes a successful policy in development studies is itself contentious, given the politics involved in framing and measuring success (Cornwall & Fujita, 2012; Mosse, 2017). In this context, what is commonly referred to as "success" often centres on the high rates of formalisation – specifically, the significant proportion of ASM sites operating legally, and the remarkable level of state control over the mineral value chain and administrative aspects of the sector (Barreto et al., 2018; IGF, 2017; Postma & Geenen, 2020). However, the sector continues to face critical challenges, particularly in terms of low levels of capital and inadequate technology (Perks, 2016a). The Rwandan state's sustained reliance on ASM appears to be a pragmatic strategy. After the RPF attempted to industrialise the mining sector beginning in 2006, it encountered resistance from unruly international mining capital (Behuria, 2015a). As a result, investing in ASM became a way to retain control over national capital, profit from a cheap labour force, and generate employment and economic growth domestically.

Reliable statistics on the mining sector are notoriously difficult to obtain, and Rwanda is no exception. Nevertheless, available data indicate that the country primarily relies on national actors. Barreto et al., (2018) identified only five companies as either fully foreign-owned or operating through joint ventures with the government in 2017, in contrast to 213 active mining entities (companies and cooperatives) in total. There is little available data on the breakdown of mining concession categories – whether large-scale, medium, or small-scale. However, in terms of labour, the sector is known to be labour-intensive across all categories, largely due to the mineralogical characteristics of deposits (Cook & Mitchell, 2014). A common practice involves subcontracting, where owners of large-scale concessions sublease parts of their sites to smaller operators – cooperatives or private companies – who extract the minerals using artisanal methods. Although technically prohibited by law, this system remains widespread (Perks, 2014).

The Rwandan mining sector's heavy reliance on an informal labour makes it a particularly compelling case. Despite widely celebrated efforts to formalise the sector, labour conditions have remained largely unchanged – both in terms of wages and the persistence of informal labour relations (Barreto et al., 2018; Cook & Mitchell, 2014). The sector directly employs approximately 34,000 people (Barreto et al., 2018). These artisanal miners can be broadly divided into two relatively equal categories, commonly observed across mining sites in Rwanda. The first group comprises migrant miners, most of whom are highly mobile, moving across the country in search of higher-yield sites and employers who may treat them “better”. It is likely that over 95% of this group are men. The second group consists of local residents who combine mining with other subsistence or small-scale economic activities and household responsibilities. This group clearly includes a higher proportion of women than the first. Nonetheless, overall female participation in the ASM sector remains low – estimated at around 10–20%, based on my observations. This study therefore seeks to examine how Rwanda has achieved such high levels of formalisation – a task considered highly challenging in many countries (IGF, 2018) – despite only minimal improvements in the working conditions of its labour force.

5 Methodology

In this chapter, I outline the research process followed in this study – from its initial conception to the presentation of findings. The focus is on the empirical component of the research, as presented in Papers 2 and 3. The methodology adopted in Paper 1, which is based on a literature review, is discussed separately in Chapter 5, along with the paper summary. This chapter expands on methodological aspects that could not be fully addressed within the papers due to space constraints. It also provides a broader account of the scientific procedures underlying the study, which are not typically included in paper-style writing. Specifically, the chapter discusses the philosophical foundations of the research, details the study design and its implementation, and explains how I approached fieldwork – including reflections on researcher positionality and ethical considerations. It also outlines the types of data collected and the analytical procedures employed. I conclude the chapter with a discussion of the study's main limitation.

5.1 Philosophical underpinning

The subjective nature of the phenomenon assessed in this study led to the adoption of a relativist ontology. As outlined in the introductory chapter, this study contributes to understanding how the formalisation process in the ASM sector relates to miners' social protection. Referring to social protection also implies consideration of social security, often seen as an intended outcome of protective policies – of which formalisation is believed to be a part. In this context, social security is a subjective concept. This implies that the reality being assessed is not fixed or objective but rather perceived and embedded within social practices (Lee, 2012). The challenge in studying social protection lies not only in the multiple meanings it holds for different individuals but also in its abstract and sometimes artificial nature. As a result, researchers often rely on translatable concepts to make it operational, such as vulnerability (lack of security) or well-being (presence of security) (Chambers, 1997) – a debate elaborated on further in the literature review chapter. While frameworks like the ILO's Decent Work Agenda attempt to define and quantify social protection, these definitions often come with caveats specifying that they must be adapted to local contexts to ensure meaningful application (ILO, 2013). In summary, both the complexity of the notion of social protection and the

lack of consolidated knowledge on its dynamics in ASM justify the ontological stance taken in this study.

This study is grounded in constructionism as a general theory of knowledge acquisition, or epistemological paradigm, in the traditional philosophical sense (Gergen, 1985). The description of this study as constructionist is based on the fact that its findings – insights into both the historical process of formalisation in Rwanda and the influence of related policy reforms on artisanal miners’ social protection – represent my own synthesis and interpretation of information provided by those involved in the formalisation process, whether as policymakers, implementers, miners, or investors.

In other words, the knowledge produced through this study is a co-construction, emerging from the contextual interaction between the researcher (the knower) and the participants (the subjects) (Lee, 2012). The social constructionist tradition encompasses a wide and often imprecise range of approaches (Gergen, 1985). As Grand et al., (2015) note, *constructionism* and *constructivism* are related but distinct paradigms that are often used interchangeably, which can lead to confusion. Both challenge the notion of an objective foundation for knowledge and instead focus on how knowledge is constructed. However, *social constructivism* – also referred to as *radical constructivism* – places greater emphasis on the individual’s cognitive processes and meaning-making activities, highlighting how knowledge is formed within the mind of the individual.

Social constructionism, the approach adopted in this study, emphasises “shared intersubjectivity and the social construction of meaning and knowledge” (Grand et al., 2015, p. 3). It focuses on the collective generation of meaning, including scientific knowledge, which is shaped by language conventions and other social processes. As such, it assumes a subjective epistemology (Lee, 2012). Constructionism is grounded in a relativist ontology, acknowledging that the only alternative is absolutism, which aligns with a realist ontology (Guba, 1990). However, it is important to clarify that social constructionists do not necessarily deny the existence of reality. Rather, the core argument is that any description of reality is made from a particular standpoint or tradition of understanding (Gergen, 1985). In other words, every attempt to define or describe something inevitably draws upon existing frameworks of meaning. It is through our relationships with others that our understandings of reality are formed, negotiated, and continually reshaped (Gergen, 1985).

5.2 Rwanda's formal ASM sector as qualitative case study

The continued exposure and vulnerability of artisanal miners to environmental, social, and economic challenges – even after the formalisation of the ASM sector – is puzzling, as discussed at length in Chapter 2. Existing propositions in ASM research that seek to explain why social protection does not visibly improve with formalisation, as theories on informality might predict, often point to persistent structural inequalities. These inequalities are embedded in labour relations that remain largely unchanged by formalisation reforms. Gaining insight into these dynamics requires a detailed and multidimensional inquiry into both the historical processes of formalisation and the lived realities of working in the formal ASM sector. This motivates the choice of a case study approach for this research, as it allows for an in-depth investigation of a phenomenon within its real-life context (Rogo, 2024; Yin, 2003). In the remainder of this section, I explain how the study was conducted practically using this approach.

Due to the exploratory nature of this study, I adopted a qualitative case study approach, applying a combination of procedures and methods to explore and capture individuals' thoughts and feelings as they interpret reality and construct meaning (Rogo, 2024). The study is grounded in a relativist ontology and a constructionist epistemology, which support the idea that knowledge about reality is created through meaning-making and emerges from purposeful interactions. Qualitative approaches are particularly well suited to incorporate these principles into their methodology (Lee, 2012). As a methodology rooted in interpretive practices, qualitative research also allows for the integration of various methods – such as document analysis, interviews, and field observations – which are valuable in this study for developing a broad understanding of the formalisation process and for ensuring information triangulation (*ibid*).

The case study of the Rwandan formal ASM sector is a “critical case” in the sense that it holds strategic importance in relation to the broader problem assessed in this study (Flyvbjerg, 2004). From the early stages of this research, I was interested in how governance reforms in the mining sector – often framed as formalisation – affect the social protection of miners, and why miners choose to engage with or resist working within formalised ASM structures. Rwanda reports one of the highest levels of ASM formalisation in sub-Saharan Africa. Due to this “extremeness”, the case provides an opportunity to examine what happens when formalisation is pushed to its highest level, particularly in a context where state control over the mining sector is considered strong – unlike what is typical of ASM sectors in many other countries. This makes Rwanda a compelling setting to explore the actual outcomes of formalisation for miners' social protection.

The design of this case study was shaped by two main factors: (1) the nature of the research questions, and (2) the theoretical framework adopted, as discussed in Chapter 3 (Yin, 2009). While it was essential to treat the Rwandan ASM sector as a single case, I needed a focused strategy for implementing the empirical inquiry – given the complexity of the mining sector and the diversity it presents even within a relatively small country.

For the two empirical studies presented in Papers 2 and 3, the case study design was structured around the following research questions (first introduced in the introductory chapter):

- Research Question 2: What role did labour relations play in the formalisation of the 3Ts small-scale mining sector in Rwanda?
- Research Question 3: How does the informality of labour relations influence access to social protection in the formalised Rwandan ASM?

Following the nature of these questions, the next methodological challenge was to define the appropriate unit of analysis – whether it should be a mining site, an administrative locality, or another level. However, it quickly became evident that regardless of the unit selected, the dynamics shaping it extended beyond that specific scale. Drawing on labour regime theory, which highlights that the institutional regulation of work is shaped by a mix of factors – such as the labour process, the enterprise’s relationship to the market and the state, and the mode of reproduction of labour power – it became clear that labour regulation in this context is influenced by multi-scalar dynamics (Burawoy, 1985).

This difficulty in isolating a single unit of analysis, while recognising that phenomena are embedded in broader systemic processes, is a common challenge in qualitative case study research (Yin, 1982). To address it, I adopted an embedded single-case design – also known as a single case with multiple units of analysis (Yin, 2009). This approach allowed me to examine formalisation in Rwanda as a holistic and interconnected phenomenon, requiring analysis at multiple levels – from local mining sites to national political-economic structures.

At the national level, the inquiry involved the analysis of policy documents and interviews with national-level stakeholders. At the local level, I selected Rukoma¹ Sector of Kamonyi District, as the primary field site (refer to figure 2 below). Rukoma was chosen for its diverse range of mining site types: it hosts all three 3Ts minerals, includes operations run by both cooperatives and private companies, and features varied labour arrangements. It is also one of the oldest mining regions in

¹ Rukoma Sector is located in Muhanga District, within the Southern Province. A sector is an administrative sub-entity of a district; the country has a total of 416 sectors. Above the sector level is the district (Rwanda has 30 districts), followed by the province (four in total, plus the City of Kigali).

the country, with both long-standing and more recent mining operations. This provided greater opportunities to engage with respondents capable of offering historical insights into the evolution of labour dynamics in the sector. In line with the embedded case study logic, the research extended beyond mining sites; I also conducted interviews and document analysis at the district level (Kamonyi) to better understand the local governance dynamics shaping the implementation of formalisation policies.

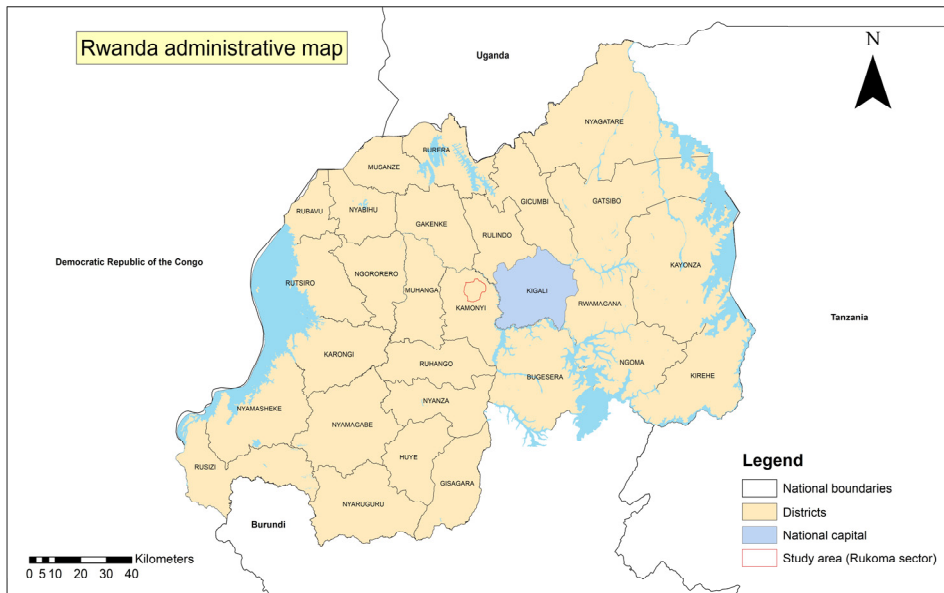


Figure 2. Rwanda administrative districts and the study area

5.3 On entering the field and ethical considerations

The researcher is often regarded as the primary instrument of inquiry, and all scientific research involves navigating practical challenges while leveraging available opportunities to gain access to the field (Flyvbjerg, 2004; Narayan, 2012). This section reflects on how my positionality influenced the types of data I was able to collect, shaped my overall approach to fieldwork, and ultimately informed the analysis presented in this study. It also addresses key ethical considerations, particularly those related to interactions with research participants and the broader conduct of the fieldwork.

At the beginning of this study, I had a relatively good knowledge of Rwanda, having been raised there and having worked as a data collector – a role that involved extensive travel across the country, including approaching local populations as potential study participants. However, mining sites are what Martín (2017) describes as “places of exception”, and I needed to develop specific knowledge about them. Before my first field visit, I consulted the literature to better understand the mining context, including its challenges, site locations, and mineral types.

For the actual fieldwork, Kigali was my first stop. There, I applied for research permits and met with a key informant involved in supervising mining activities at the national level. He initially recommended well-known mining regions such as Gakenke and Nyakabingo. However, based on my prior reading of both academic and grey literature on Rwanda’s ASM sector, I was aware that these sites are often shown to foreign researchers – likely because they are easier to access or help project a particular image of the country’s mining sector. In that sense, they have been frequently visited more for their accessibility than for being representative of Rwanda’s ASM sector.

However, I explained my interest in exploring something different – sites that reflected a range of operations – and we discussed various options. Based on practical considerations, such as access to local informants and, importantly, the diversity of the area – including different types of minerals, both advanced and modest cooperatives/companies, and the presence of informal mining, which I was particularly interested in observing – we jointly selected Kamonyi District in central Rwanda, specifically the Rukoma sector. From my side, I ultimately chose this site because it offered a “typical” case – not in a strictly statistical sense, but in terms of representing the common dynamics found within Rwanda’s ASM sector.

Once in Rukoma, I drew on my prior experience as a data collector, where I had learned that making quick and less suspicious contact with potential participants requires the use of referrals – but not in the traditional sense of gatekeepers, as that can create the impression that you are associated with authorities. This experience proved helpful, especially given the miners’ general suspicion towards anyone they perceive to be connected to government or employers. They often fear that inquiries may relate to illegal practices or could result in consequences at work.

While scientific procedures aim for respondent behaviour to be as minimally influenced by the researcher as possible, this is difficult in sensitive and secretive sectors such as mining. No matter how much I tried to adapt to the local environment or emphasised that I was affiliated with a university, many miners made little distinction. They often referred to me as *muyobozi* (authority) or would say things like, “You who speak to the authorities, maybe tell them this or that...” In these situations, I explained the nature of my research and how a research visit differs from an official one. At the same time, I did not insist too strongly – presuming that

it is not a lack of understanding, but rather a tendency to conflate researchers and authorities as belonging to the same social class – and they are not wrong about that.

Establishing trust with miners took time, but repeated visits and growing familiarity helped. Over time, miners began to share anecdotes – for example, how their employers would rush them to put on personal protective equipment when authorities were expected, or how they had a system in place to know when authorities were visiting. These comments subtly indicated that I was still seen as an outsider, but at least not as an authority figure. Some miners went further, confiding that they sometimes stole minerals from their employers, whom they described as greedy and neglectful. This kind of information suggested they were reasonably convinced I was not affiliated with their employers. Of course, I had assured them of the anonymity of their responses as part of the pre-interview consent process, in accordance with the research clearance issued by the Swedish Ethical Review Authority (decision number 2023-01127-01). However, I believe their openness was due less to the formal promise of anonymity than to the familiarity they developed with me over time – as someone who came regularly, not looking for minerals, but interested in the kind of work they did and the lives they led.

For other participants at the district and national levels – that is, non-miners – while I cannot claim that our interactions were entirely free from social mediation based on how they perceived me, it was generally not difficult for them to understand the scope and purpose of a research interview once we had agreed to proceed. The “research visa” issued by the National Council for Science and Technology in Rwanda (NCST/482/411/2023), and the fact that my fieldwork was supervised by the Rwanda Mining Board, helped to build credibility and trust with these participants. It is worth noting that Rwandan research regulations require foreign university researchers to be affiliated with a local institution or supervisor; in my case, this institutional affiliation was provided by the Rwanda Mining Board.

Respondents who did not wish to be cited have not been mentioned anywhere in this study, in accordance with the research ethics protocols of both Rwanda and Sweden, which guided this work. For others who expressed no concerns about identification – such as individuals speaking on behalf of their companies or organisations – these institutions’ names have been included where relevant. I believe doing so may help orient future research and assist in contextualising the findings of the current study. However, in cases where quotations or specific arguments were potentially sensitive, I chose to anonymise the institution in the written analysis while still preserving the substance of the point. As for individual participants, including miners and other informants, no personal names are disclosed; all were anonymised to protect their identities.

5.4 Data collection and material

5.4.1 The data collection process

Data collection was carried out in two phases: the first between March and May, and the second between November and December, both in 2023. During these periods, I was primarily based in the mining region of Rukoma, making regular trips to Kigali to meet national-level study participants by appointment. At the national level, all interviews took place in Kigali. I interviewed the leader of REWU (Rwanda Extractive Industry Workers Union), a representative of the Federation of Mining Cooperatives (Fecomirwa), and two representatives from non-governmental organisations – one focused on labour issues, and the other involved in mineral supply chain governance in Rwanda. In addition, I interviewed two officials from the Rwanda Mining Board (RMB), the government agency overseeing the mining sector. These national-level stakeholders were considered key informants due to their extensive experience working in the ASM sector. Most had been directly involved in sector reforms since 2010 and were therefore able to offer valuable historical insights. Their input was also instrumental in helping me contextualise and interpret observations made in the field by linking them to broader national-level dynamics.

The mining sites-based study was conducted in the Rukoma region of Muhanga District. At the district office – which represents the decentralised arm of the government and hosts various policy-implementing agencies – I interviewed local agents of the RMB and the district labour inspector. These actors are directly involved in the day-to-day implementation of state policies pertaining to the mining sector. The mining sites are located in the administrative sector of Rukoma (one of 12 sectors within Muhanga District), which is among the oldest mining regions in the country. This region has a concentration of diverse types of small-scale mining sites, including those operated by cooperatives, private companies, and informal or illegal operations – making it a rich site for observation and analysis.

During my fieldwork in 2023, approximately a dozen mining entities – both cooperatives and private companies – were actively operating in the Rukoma Sector. At the start of the first phase of fieldwork in March 2023, I visited the majority of these active sites. After spending several weeks familiarising myself with the mining operations and local actors at different sites, I selected four mining sites to serve as the primary focus for data collection and subsequent analysis. The selection was informed by my observation that labour relations are shaped by several interrelated factors, including the size of the site, type of mineral extracted, the materiality of the deposit (hard rock vs. soft rock), and the types of labour arrangements in place. I therefore chose four sites that reflected the greatest diversity across these dimensions, providing a basis for comparing different labour

dynamics, as further elaborated in Paper 2. These sites represented a range of social and organisational structures. For instance, at one site, miners worked collectively in a flexible arrangement, without a clear division of labour, and shared production equally at the end of the work process. At another site, work was more specialised and hierarchical, with a clear division of tasks and an earning structure based on work intensity or skill level.

Of the four selected sites, two are operated by companies and two by cooperatives. In the Rwandan context, a mining cooperative refers to a group of at least ten investors, as defined by national cooperative law. This differs from the conventional understanding of a cooperative as a collective of workers; in practice, Rwandan mining cooperatives are ownership-based rather than worker-run. Mining companies, on the other hand, function similarly to cooperatives in terms of operations, but typically involve a smaller number of owners. The selected sites are operated by the following entities: Rukoma Mining Cooperative (RMC), Coopérative Minière du Rwanda (COMIRWA), FX Tugirane Ubumwe Mining Company, and ETS Kalinda.

At these sites, I interviewed different categories of miners, reflecting the diverse roles and labour arrangements within small-scale mining operations, as summarised in Table 1 below. For example, I spoke with workers performing less skilled tasks – such as digging, transporting sand from tunnels, or heavy lifting – commonly referred to as *abadeyi*. These workers typically receive lower wages compared to those engaged in more technical tasks, such as digging for mineral veins (*abatitsi*). I also interviewed miners with specialised roles, including jackhammer operators (locally known as *umu maritopiki*, derived from the French *marteau-piqueur*) and timber-support carpenters (*umu paneur*), both of whom are among the highest-paid workers on the sites. Including a variety of site types and a wide range of miner categories in the study was essential to uncovering the diverse production logics and the differentiated relationships that miners establish – both among themselves and between miners and their employers.

All interviewed miners were manual labourers, and the vast majority were men. At each site, there was a small number of female miners, typically engaged in lower-skilled tasks, such as moving mineral-containing sand outside the tunnels or washing minerals (called *abapenyezi*). I tried to include women in the study to incorporate a gender perspective on artisanal mining work. I also attempted to interview mining site owners but was only successful in one case. This limited access was largely due to the subcontracting system, in which site owners are typically investors with mining operations spread across the country and in other sectors of the economy. As a result, they are rarely present on site. Instead, I interviewed their local representatives who oversee daily operations.

Table 1. Sites studied and types of labour arrangements

Site	Number of Workers	Type of Minerals	Payment System	Rock Type	Labour Organisation
1. ETS Kalinda (Rubare site)	250–300 people	Tin	Fixed wage	Soft rock (requires timber support system)	Hierarchical and complex
2. FX Tugirane Ubumwe	15–20 people	Tin and tungsten	Mixed payment: fixed wage and piece rate (share of minerals produced)	Soft rock (requires timber support system)	Worker hierarchy present
3. RMC (Karumba site)	15–30 people	Tin and tantalum	Piece rate (share of minerals produced)	Hard rock (no structural support needed)	Teamwork, no clear hierarchy
4. COMIRWA (Murambi site)	15–30 people	Tin	Fixed wage	Still under development	Hierarchical and complex

5.4.2 The data corpus

The resulting overall data corpus includes interviews with different categories of research participants, documents obtained both online and in the field, and field notes from direct observation (as detailed below). While I present these categories separately here for the sake of clarity, it is important to note that their collection and analysis were iterative – consistent with the logic of case study research (Yin, 2009). For instance, during interviews, respondents would often refer to specific documents, prompting me to seek them out. Conversely, reviewing documents would sometimes suggest additional categories of respondents to interview or activities to observe. Below, I provide a detailed account of the types of data collected.

Documents

After Rwanda was decided as the case study, I began a relatively systematic review of literature on the country's mining sector. Webpages and online newspapers – mostly written in Kinyarwanda – provided a wealth of information, particularly useful for tracing the evolution of mining sector governance over the past decades and highlighting recurring socio-environmental challenges. Policy documents, mining regulations, and various project implementation reports offered a broad overview of the sector, including its initiatives, key actors, and persistent issues. This initial review was instrumental in refining the guiding questions for the interviews and also influenced my decisions regarding the selection of mining site locations and the specific processes to observe during fieldwork.

Later, during the first fieldwork, I encountered additional written materials such as safety guidelines and concession contracts. These documents revealed the emergence of various programmes forming part of the evolving social protection framework linking the Rwandan government, mine operators, and workers. This led to a second round of document collection, focusing on programmes such as *Mutuelle de Santé* (community-based health insurance), *Ibimina* (informal savings groups), and *EjoHeza* (a national pension scheme). Alongside these, I also consulted a number of academic sources on Rwanda, including three PhD dissertations: Pritish Behuria (2015b) – particularly Chapter 7 – Rachel Perks (2014), and Laurien Uwizeyimana (1988). While I cite their analytical insights alongside other scholarly literature, these works also contain descriptive sections that provided valuable contextual information for this research. Finally, it is important to note that not all the documents I consulted are explicitly cited in the findings. However, they nonetheless contributed – sometimes subconsciously – to shaping my understanding of the research problem within the Rwandan context.

Interviews

The majority of my interviews were conducted with artisanal miners. I carried out a total of 65 individual interviews with miners across two different fieldwork periods, at four different mining sites. These miners performed a variety of tasks, but all were engaged in manual labour. In the first phase, interviews focused on life histories and work organisation, to gain insights into changes in working and living conditions following formalisation reforms. In the second phase, I explored government programmes aimed at legitimising formal ASM, the state’s approach to well-being provision, and how these are perceived and adopted by miners (as reported in Paper 3). Because the interviews aimed to explore changes occurring over several years, I relied on semi-structured questions designed to prompt miners to reflect on different periods – specifically, before and after formalisation – and to help “trigger their memories” (Silverman, 2017). For more details, refer to Appendix A.

At every mining site, I interviewed a manager or site engineer to gain an overview of site operations and mineral production more generally. I also asked questions related to labour availability and control. In addition, I conducted interviews with ten experts and key informants: two representatives from NGOs, three district-level civil servants, two national-level civil servants working on mining sector policy, a manager at a private insurance company, a representative from the mining cooperatives’ trade union, and a representative of the miners’ trade union. These key informant interviews were intended to provide insight into broader structural changes and to help link miners’ perspectives with the wider national political-economic and policy context.

Field notes

Before going to the field in Rwanda, I had already read extensively about the sector and was privileged to have access to some of the most knowledgeable people on ASM in Rwanda. This meant that I had mental images of what to expect in the field. During my fieldwork, this prior information proved helpful in preparing me for the realities I would encounter. While I did not conduct an ethnographic study in the traditional sense, I employed ethnographic methods of observation to collect data based on “what I have seen, heard, and experienced in the field” (Emerson et al., 2011, p. 21). These ethnographic methods added significant value to the interviews and documents in three key ways.

First, using the “go-along” approach (Kusenbach, 2003), I immersed myself in the geographical context where mining takes place. By frequently walking to and from the mining sites and the accommodation I rented in the mining town of Rukoma, I developed a nuanced sense of being both close to – and yet distant from – the authorities. From some mining sites, it was possible to see the nearby hill where local government offices, including a police station, were located. However, the sites themselves are in difficult, hilly terrain, giving miners ample time to spot visitors and evade them if they deemed it necessary. Second, observation allowed me to contrast what miners said was important with what was actually practised. For example, although miners possessed new personal protective equipment such as helmets and acknowledged their importance during interviews, many chose not to wear them while working.

Third, observing interactions among actors in real life – both at the mining sites and other venues – revealed tensions that might have remained hidden otherwise, especially given the challenges of building trust with research participants. Two notable moments where these tensions surfaced were during the Rwanda Mining Week national event in Kigali in December 2023 (discussed in Paper 3) and a field inspection of mining sites by state agents from the Rwanda Investigation Bureau in April 2023 (covered in Paper 2).

5.5 Analysis

As in any qualitative study, analysis began before data collection was completed (Yin, 2009). My research focus and the types of questions I asked participants evolved alongside my growing understanding of the field context, perceptions of the studied phenomenon (formalisation), and engagement with theoretical propositions. However, the main phase of data analysis started once I had gathered the core materials: audio-recorded interviews, written notes from interviews where recording was not permitted or appropriate, fieldnotes, and selected documents. These sources were analysed either independently or used for triangulation –

defined as “the combination of methodologies in the study of the same phenomenon” (Bowen, 2009, p. 28). The final dataset included information on labour processes, ASM sector governance, and the implementation of various social policies in the ASM sector. I conducted iterative evaluations of these three data sources to identify the factors and processes that shaped the labour arrangements and working conditions I observed in Rwanda’s formalised ASM sector.

The analysis started with the interviews. I did not systematically transcribe all interviews. Instead, I listened to the recorded interviews and identified sections particularly relevant to the studied phenomena, which I then transcribed for detailed analysis (Loubere, 2017). Following this, I conducted a content analysis of documents, linking the content to themes already coded from the interviews, while also refining and adjusting these themes in the process (Bowen, 2009).

As shown in Papers 2 and 3, I interpreted and reported interview data by situating responses within the broader context of interviewees’ behaviours. By combining interviews with field notes, I treated the data as emerging from an active process – where what is said is analysed in relation to how, where, when, and by whom it is said, and for what purpose (Silverman, 2017). This is an important methodological point for this study. When I say that the study adopts a labour perspective, I refer to an academic and analytical approach to labour – not a claim to present an unfiltered account of miners’ viewpoints. While this analytical project does have a political stance – being concerned with dynamics of labour exploitation – it aims to foreground labour experiences through theoretical interpretation rather than through an unmediated or purely descriptive representation of miners’ perspectives (Kathryn, 2013).

5.6 Study limitations

What I consider the most important limitation of this study was my limited access to mining site owners. These actors are central to the governance of the ASM sector in Rwanda, particularly because many of them invested in mining before the formalisation reforms and now hold formal licences. These licensed sites serve as the infrastructure of inclusion (see Paper 3) – the platforms through which the state promotes production while attempting to ensure the socio-environmental protection of artisanal miners. I was able to conduct only one interview with a mining site owner, who, somewhat teasingly, told me he doubted I would manage to speak with others, as they are notoriously difficult to access. He turned out to be right; despite repeated efforts, I was unable to secure further interviews with site owners.

This, in itself, is revealing of the power dynamics within the ASM sector – particularly within the labour–capital–state triangle, as explored in detail in Paper 2. However, I was fortunate to secure an interview, on the last day of my fieldwork,

with a representative from the Federation of Mining Cooperatives (FECOMIRWA). This participant provided valuable insights into the perspectives and interests of investors in ASM, which have been integrated into the study and helped to partially address this important gap.

That said, I do not believe it is entirely impossible to gain access to mining site owners for research purposes. However, doing so would likely require a different fieldwork strategy than the one I was able to pursue. For example, a longer-term stay in the country might provide more opportunities to encounter these investors in various social or professional settings and gradually build the trust and familiarity needed to access their perspectives.

It is also worth noting that access to elite actors may be more easily granted to foreign researchers than to nationals like me. As Kayumba (2021) argues, “Rwandan elites tend to be more open with outsiders – whether journalists or academics”, partly because they are perceived as non-threatening in terms of local power dynamics. Information is closely tied to power and influence, and sharing it with a local researcher may be seen as enabling potential competition. In contrast, foreign researchers are less likely to be viewed as rivals in the struggle over knowledge and status, making elite actors more willing to engage with them.

6 Findings and contributions

This study is situated within broader efforts to understand the challenges faced by ASM miners and the role of state regulation in addressing them. While much existing research has focused on the limitations of state-led formalisation in delivering benefits to miners, this study offers a novel perspective by examining the role of workers – their relationships with capital and the state (referred to throughout this dissertation as “labour relations”) – in shaping the conditions under which they participate in formalised production. Rather than viewing regulation as a top-down imposition disconnected from miners’ realities, this study approaches formalisation as a process shaped by both institutional design and the interactions among mining communities, capital, and state actors. As the findings from the Rwandan case illustrate, even when labour concerns are not explicitly addressed, labour remains a relevant consideration in regulatory reform processes.

Beyond Rwanda, the broader objective of this research is to explore how labour relations influence the regulation of work in the ASM sector and the conditions under which ASM production occurs. The research process that led to these findings was non-linear, requiring a continual re-engagement with research questions, and ongoing adaptation to evolving theoretical perspectives and empirical insights. However, to provide coherence and clarity for the reader, this chapter presents the findings and key contributions of this study according to each of the three research papers that comprise it. The discussion is organised to show how each paper contributes to the overall research objective and to the wider field of ASM scholarship. After briefly summarising each paper, I highlight its theoretical, empirical, and methodological contributions.

6.1 Shining a light on exploitation and the value of labour regime analysis in ASM research

The first paper (Rushemuka & Côte, 2024) is a conceptual review of literature on ASM published roughly over the past two decades. Its primary aim is to map how workers’ experiences in ASM have been conceptualised – focusing on the causes of ASM expansion, the challenges it poses, and the solutions typically proposed. A secondary goal is to explore how integrating labour studies perspectives into ASM

research can offer a more nuanced understanding of these issues. The need for this review emerged from our noticing that ASM literature often frames informality as the core challenge to workers in the ASM sector, while assumptions about problems this poses for labour conditions are not always left clear or explicit.

Informality – defined as ASM’s development outside formal state regulation – is frequently attributed to weak state capacity or a lack of appreciation for ASM’s potential. These explanations, often summarised as “institutional mismatch”, appear to be overly simplified. They minimise the complex, multi-actor nature of the sector and the political dynamics shaping development policy and formalisation reforms. Moving beyond the assumption that labour-related problems stem merely from policymakers’ ignorance or incapacity to address workers’ concerns, we set out to identify existing frameworks that provide detailed accounts of the challenges involved in regulating ASM labour.

The study identified that various conceptual frameworks are used to understand ASM as a socio-economic field. Not all studies problematise the ASM sector in relation to policymaking; some are primarily concerned with theoretical and epistemological development. Concepts such as the *frontier* (Byrceson & Jönsson, 2010; Grätz, 2013) have been particularly useful in analysing the organisation of work, prevailing norms, the nature of the profession, and the agency of actors within ASM. In this context, I focus on two key narratives that link state policy to labour outcomes in ASM: the livelihoods perspective and the global mining sector governance lens. These narratives differ in emphasis; the former attributes workers’ challenges to national institutional factors, while the latter situates the problems of artisanal miners within a broader global political-economic framework.

The concept of livelihoods has a hybrid nature, bridging perspectives across various strands of rural development scholarship and practice (Scoones, 2009). In development contexts, referring to ASM as a livelihood often implies that it is poverty-driven. Although people engage in it in diverse ways, it is commonly characterised as a rural diversification strategy undertaken by unskilled and inadequately resourced populations, rather than a form of specialised activity aimed at capital accumulation (Hentschel et al., 2002). Since the early 2000s, this concept has had a significant influence on practice, shaping mining policy approaches to the ASM sector and forming the basis for numerous projects that link ASM to community development and sustainable livelihoods. Its adoption by development actors is often seen as a sign of progress. Prior to the 2000s, artisanal miners received little focused attention in development discourse. When they did appear, they were typically portrayed either as trespassers encroaching on large-scale mining concessions (i.e. illegal miners) or, more sympathetically, as entrepreneurs (Hilson & McQuilken, 2014).

Academic analyses of ASM through a livelihoods perspective have examined the strategies and motivations behind rural populations’ engagement in artisanal mining

(Hilson & Van Bockstael, 2012; Maconachie & Binns, 2007). These studies emphasise the interdependence between farming and mining, challenging claims that ASM necessarily harms agriculture – either by degrading land or drawing labour away from farms (Banchirigah & Hilson, 2010). Rather than a complete shift from agriculture to mining, many miners adopt a diversification strategy. Income from mining is often reinvested into farming, while agricultural production supports mining by sustaining household labour, as seen in rural Liberia (Hilson & Van Bockstael, 2012). Other research, often using mixed methods, focuses on the socio-economic impacts of ASM, underscoring the variability and context-specific nature of ASM's socio-economic outcomes. Brugger and Zanetti (2020), in a study of gold miners in Burkina Faso, found that outcomes vary by degree of involvement. Full-time miners tend to abandon agriculture for more productive sites, potentially improving their livelihoods. Part-time miners, however, combine ASM with farming, remain closer to home, and typically work less productive sites, often resulting in lower income and increased vulnerability. Also in Burkina Faso, Pokorny et al. (2019) show that broader economic and environmental conditions – such as low education, drought, and poor market access – can constrain the otherwise positive impacts of ASM on local livelihoods.

Despite differing methods and findings, these studies largely converge on one point: there is a pressing need for the formalisation of ASM. However, they also warn that such efforts will likely fail if they do not deliver clear benefits to miners or fail to account for the social norms and informal systems that have emerged within ASM communities (Maconachie & Hilson, 2011). Thus, livelihoods-oriented research often formulates ASM's labour challenges as stemming from regulatory exclusion and legal barriers, reflecting a legalist view of informality (Salo et al., 2016; Siegel & Veiga, 2009).

The second perspective – grounded in political economy – offers a more critical reading of ASM regulation. Rather than emphasising regulatory absence or state failure, this approach highlights how power relations within the sector shape labour outcomes. Scholars such as Verbrugge (2015) argue that ASM is not a homogenous space but one marked by class differentiation, where poor workers often operate alongside or under wealthier entrepreneurs. Formalisation policies, in many cases, benefit capital-rich actors – those able to navigate bureaucratic systems – while further marginalising working-class miners. This suggests that formalisation is not necessarily inclusive or equitable but can instead reinforce existing inequalities within the sector (Fisher, 2007).

Recent contributions extend this analysis by incorporating global political-economic dynamics. Using a Global Production Network (GPN) framework, scholars such as Verbrugge and Geenen (2019, 2020) argue that ASM and large-scale mining are interconnected within a single global mining industry. Minerals from both streams enter the same commodity chains, and linkages also emerge through flows of labour and capital. Artisanal workers may be informally employed

at large-scale sites, while formal-sector capital is sometimes invested in informal ASM ventures (Loubere et al., 2019; Perks, 2016a). From this perspective, the growth of ASM reflects broader trends of labour informalisation across global commodity production (Harriss-White, 2012). The GPN lens also draws attention to the influence of international actors, development agencies, and governance paradigms in shaping national ASM policy (Béland et al., 2021; Le Billon & Spiegel, 2021). Its key contribution lies in breaking the analytical divide between ASM and large-scale mining, offering a more integrated view of the political economy of mineral production and its structural inequalities.

The GPN approach highlights how global capital operates in local terrains, adapting to and reshaping conditions for actors like artisanal miners. It identifies structural drivers – rising labour costs and stricter environmental regulations in the Global North – as catalysts for the gold industry’s spatial shift in the 1980s towards new territories, relying increasingly on artisanal labour to absorb socio-ecological risk. While useful in tracing capital’s strategies, GPN shares a common limitation with other global economy frameworks: it underplays labour agency (Yeung & Coe, 2015). Verbrugge and Geenen package the politics of integrating artisanal labour into global production within a “black box” of institutional context. Their concept of “crystallisation” lacks attention to how these enabling conditions – land, labour, capital, and technology – are produced, contested, or negotiated. This study seeks to address that gap by engaging ASM research in dialogue with labour studies.

Labour studies examine work within its broader social context – that is, the relationships linking production, circulation, and consumption – and analyse their implications for actors at various stages (Taylor & Rioux, 2018). ASM research, along with its diverse analytical frameworks (some discussed above), has engaged with similar concerns. However, by introducing labour studies into ASM research, this study aims to make two key contributions.

First, it highlights a major analytical gap: the lack of engagement with the concept of exploitation. While ASM research is broadly sympathetic to artisanal miners – often adopting a social justice lens (Childs, 2014) – it rarely theorises injustice as intrinsic to the organisation of mineral production. Instead, injustice is typically framed as a problem to be resolved through better policy or non-state initiatives (Fisher & Childs, 2013; McQuilken, 2016; Van Bockstael, 2018). However, as Marxist political economy argues, the starting point for analysing labour problems is exploitation (Brenner, 1977). Drawing on Ricardo’s labour theory of value, Marx contended that capitalist production depends on the extraction of surplus value – workers, dispossessed of the means of production, work beyond their own needs, and the surplus they produce is appropriated by capital (Daya, 1956).

ASM research has not adequately grounded labour problems as struggles over surplus value. This issue has also been noted in informal economy studies. Harriss-White (2014) points out that informal workers, petty producers, and labourers are

often treated as analytically similar – despite being exploited through different mechanisms, such as control over capital, circulation, or property rights. This blurs who exploits whom, and how. In ASM, the focus remains largely on policy shortcomings rather than power and exploitation.

Second, this study underscores the value of labour regime analysis, which examines how surplus value is extracted through mechanisms such as labour control, social reproduction, mobilisation, and resistance, while also attending to intersecting factors like class, gender, race, ecology, and state-market dynamics (Baglioni et al., 2022). In the context of ASM, these processes – and the role of state regulations and policies in shaping them – remain largely underexplored. A labour regime lens challenges the dominant view of formalisation as merely the granting and securing of mineral property rights. Instead, it reframes formalisation as a political, contested, and value-producing process – one that embeds exploitation within the organisation of production itself.

6.2 Informal labour and power plays shaping formalisation

The second paper comprising this doctoral dissertation (Rushemuka, 2024) reports on a study that assessed the role of labour relations in shaping the formalisation process in Rwanda. ASM formalisation advanced relatively quickly in Rwanda beginning in 2010. Before these reforms, ASM was largely informal, with weakly enforced regulations. The sector was dominated by local entrepreneurs – some registered, others not – who organised labour, advanced funds for food and equipment, and bought minerals at predetermined prices. Alternatively, groups of miners with their own resources would form small operations and sell output to local buyers. Starting in 2007, the Rwandan government launched a major liberalisation and promotion of its mining sector to revive it after the genocide. This process accelerated in 2010 in response to geopolitical pressures, particularly compliance with international regulations such as the US Dodd-Frank Act (2010) and the EU’s 2017 supply chain due diligence regulation (2017/821). Rwanda implemented a mineral certification scheme with the UK-based International Tin Association (formerly ITRI) and the Washington-based NGO Pact. Formalisation, however, extended beyond mineral traceability to include tight state control of production, regulation of mining sites, and broader administrative compliance.

The study shows that Rwandan state-led ASM formalisation, while retaining an informal labour system, relied on two key mechanisms. First was the creation of enclosures through concessions: the government granted licences to companies and registered cooperatives in areas formerly exploited by informal miners, drastically reducing their options. Miners had to either operate illegally – risking up to six

months' imprisonment – or join the new formal regime. Although illegal operations persist, most 3T mineral supply chains now pass through official channels, with around 60% of artisanal miners working under registered cooperatives or companies (Barreto et al., 2018, p. 30). Second was the attraction of miners to licensed sites that offer improved safety, accident insurance, protection from production grabs, and on-site security. Most miners who participated in this study reported better working conditions, although incomes have often remained static – or have even declined.

The case of Rwanda contributes to existing research by better understanding how ASM labour relations shape formalisation processes in two key ways. First, it highlights that integrating informal labour into formal enterprises is itself a form of state-led formalisation. The limited improvement in labour conditions – observed in Rwanda and elsewhere (Martinez et al., 2023; Robles et al., 2022) – has often been interpreted as failed or partial reform (Marshall & Veiga, 2017), or as a reflection of accumulation dynamics that subordinate informal labour (Fisher, 2007; Verbrugge, 2015). However, building a formalised sector – regardless of labour's legal status – is a complex political project requiring intent, investment, and negotiation. As Rwanda's case illustrates, this ambition is not always shared or achieved. Rwanda, the DRC, and neighbouring states faced the same international market demands under the Dodd-Frank Act, but Rwanda's response was unique in its swiftness and effectiveness (Postma et al., 2021). This was partly due to the structure of its mining economy: around 80% of Rwanda's mineral exports come from small-scale operations, making reform economically vital. Additionally, the government's tight control over its capitalist elite allowed it to mobilise domestic investment into formalised ventures (Behuria, 2015a). Technical reforms, such as land registration and the national cadastral system (2009–2013), enabled rapid implementation. The case of Rwanda's perceived success can be understood through the formalisation of ASM via the absorption of its informal labour, which is shaped by national political and economic priorities.

The second contribution of this study is its demonstration that the labour rights afforded through formalisation are the result of the state's mediation of economic and political objectives. Labour regime analysis complicates labour as not merely economic, but also as a social and political process shaped by both conflict and cooperation (Burawoy, 1985; Taylor & Rioux, 2018). Applying this lens, the study found that Rwanda's ASM sector features formal mineral rights held by cooperatives and companies, with sites integrated into state regulatory and financial systems. Beneath these formal structures, however, exists an informal labour regime. Cooperative and company owners organise labour and play central roles in traceability schemes. The state's acceptance of informal labour within licensed sites has been instrumental to formalisation. These arrangements reduce risk for investors and encourage private sector involvement, making them essential yet often overlooked in ASM governance. At the same time, these informal arrangements

leave workers vulnerable, with limited access to legal remedies in cases of mistreatment. Labour disputes are left to the market to resolve. These findings suggest that labour informality should not be seen as regulatory failure (Siegel & Veiga, 2009) or the “lack of political will” (Labonne, 2014), but as a product of a broader socio-political context, where rights and responsibilities are allocated according to the perceived power of actors to disrupt production.

6.3 Centring social protection in ASM labour relations

The last paper (Rushemuka, *under review*) presents the findings of a study that explores how labour informality affects artisanal miners’ access to state protective policies in Rwanda’s formalised 3Ts ASM sector. The study identifies a range of public policy schemes aimed at improving miners’ well-being and analyses the ways in which artisanal miners engage with them. These schemes fall into two main categories. The first is work-based protection, including safety standards at mining sites and mandatory accident insurance, required by national mining law and purchased by the site owner. The second category consists of citizen-based social protection policies available to all Rwandan citizens, not just miners. These include the national public health insurance scheme (Mutuelle de Santé) and a voluntary pension plan (EjoHeza, meaning “bright future”).

In line with the broader objective of understanding how informality shapes miners’ conditions, this study’s findings on social protection policies in Rwanda show that, similarly to what Harriss-White (2010) observed in India’s informal economy, the rights miners are able to access are often too weakly enforced to be considered as “rights”. In Rwanda’s ASM sector, the informal nature of labour relations means that access to social protection is typically mediated by social institutions – personalised and individually negotiated – rather than being upheld as formal entitlements. For example, while the mining law obliges site operators to ensure workplace safety, miners often have to negotiate basic protections themselves, such as securing wood to stabilise tunnels, since cost-cutting owners frequently neglect their responsibilities. This leaves miners with the dilemma of abandoning unsafe sites and forgoing income, or continuing to work in hazardous conditions. Accident insurance, though legally mandated, is rarely explained to workers, and compensation claims are time-consuming and costly. The EjoHeza pension scheme is poorly trusted and largely unused due to administrative shortcomings and its long-term savings model, which does not meet miners’ immediate needs. In contrast, Mutuelle de Santé is widely trusted and commonly used, with nearly all miners reporting enrolment and reliance on it for healthcare.

More broadly, labour rights in the Rwandan ASM tend to be politically negotiated at the workplace rather than protected through legal mechanisms. The outcomes of

this bargaining are shaped by broader labour market dynamics – particularly high unemployment – which gives site operators significant leverage over miners. Furthermore, as Kelsall et al. (2022) argue, beyond the mining sector, the state’s willingness to enforce its own regulations plays a critical role in shaping the space for workplace bargaining and workers’ capacity to claim protections. This enforcement, however, depends heavily on how policymakers perceive the sector’s economic and political importance, and the extent to which labour protection is seen as supporting or threatening production goals.

These findings offer an important empirical contribution to ASM research by documenting a rare case of social protection policy implementation in the sector. While interest in social protection has grown within development studies – and more recently in ASM research – it is often cited only to highlight its absence (Moretti & Garret, 2018; Mutemeri et al., 2016; Nacishali Nteranya & Mukulia, 2023; Ofei-Aboagye et al., 2004; World Bank, 2023a). Rwanda’s experience prompts important questions: are these policies unique to Rwanda, or have similar initiatives been overlooked elsewhere in ASM research? As Mkandawire (2007) notes, despite its rising visibility in development discourse, social protection is still often treated narrowly – primarily as redistribution and social reproduction, and frequently viewed in opposition to economic or productive policy. However, scholars have challenged this divide (Adesina, 2011; Mkandawire, 2001), calling for a broader understanding of social protection as social policy – defined as “state intervention that directly affects social welfare, social institutions, and social relations”, including redistribution, production, reproduction, and protection (UNRISD, 2006, p. 1).

The case of Rwanda suggests that ASM research, which has largely concentrated on formalisation policy, can broaden its analytical scope. Improving the conditions of miners cannot be seen solely as a matter of sector-specific regulation. Miners are not only workers in an informal sector – they are also citizens whose lives are shaped by the wider framework of state social policy. Therefore, research on ASM should pay closer attention to how broader social policy – beyond mining regulation – affects informal workers’ welfare, and restructure power between workers and employers.

In Rwanda, while ASM formalisation appears primarily oriented towards boosting mineral production and attracting investment, it also incorporates a social protection dimension – embedded within the standards and requirements of operating in the formalised sector. Recognising this dual function of social policy – positioned at the intersection of production and protection – reveals alternative state approaches to social protection that go beyond conventional programmes such as cash transfers or safety nets that have dominated in the donor circle in recent years (A. de Haan, 2014). Using the infrastructure of inclusion analytical framework (Meagher, 2021), this study was able to unpack how mining sector reforms introduced by the

Rwandan government simultaneously pursue economic growth and address social protection.

However, the alignment between these two objectives – economic growth and social protection – often fails to materialise for miners, largely due to the informality of their labour relations. The concept of *reworking* sheds light on how miners respond to this gap by turning to informal mechanisms of social protection. In Rwanda’s ASM sector, this is most evident in the use of *Ibimina* – community-based savings groups that nearly all miners rely on, either to invest in long-term projects or to cope with unexpected shocks. Overall, the infrastructure of inclusion framework proves valuable for mapping how miners exercise agency within and against structural constraints – navigating existing opportunities while reworking those that fall short. It also has the potential to guide the design of bottom-up, worker-centred interventions for improving social protection in ASM, grounded in the lived realities of miners themselves.

7 Conclusion and outlooks for research and policy

In this chapter, I move beyond the individual contributions of each paper to present cross-cutting insights that emerged in relation to the overall research objective. These reflections offer broader lessons that can be considered for future ASM research and serve as a preamble to the concluding discussion on research and policy implications.

7.1 Politicising the analysis of formalisation in ASM research

Decades of formalisation efforts and research on these policies across various sectors have revealed flawed assumptions underpinning these policies – particularly the idea that formalisation is inherently beneficial for all actors (Gallien & van den Boogaard, 2023). Some scholars have challenged this view, noting that states may actually benefit from informality. It offers mass employment, especially for those excluded from formal education systems, and reduces state responsibilities such as infrastructure provision and social security (Harriss-White, 2010b). This perspective stands in contrast to dominant narratives in ASM research, which often portray governments in the Global South as failing to recognise the sector's development potential – one that could supposedly be unlocked through better-designed and more effectively implemented formalisation policies (Hilson, 2020; Hilson & McQuilken, 2014; Siegel & Veiga, 2009). These tensions, apparent from the outset of my research, prompted a deeper interrogation of formalisation as a process shaped by diverging ambitions among various actors, particularly through labour dynamics at the grassroots level, which play a central role in shaping both regulatory design and outcomes.

Existing literature typically explains the persistence of informality in two ways: first, through an institutional lens, pointing to the lack of appropriate inclusion of ASM in policy and regulatory frameworks (Hilson & McQuilken, 2014; Siegel & Veiga, 2009); second, through a political lens, attributing it to a lack of political will (Labonne, 2014). The institutional view has been critiqued for being apolitical,

neglecting the contested nature of institutional reform (Portes, 1983). Meanwhile, the political will argument is analytically weak; it prematurely closes off debate and overlooks the complexities of resource and population management. Gaps between policy and implementation – frequently noted in ASM studies – are not unique to this sector. Development anthropology has long shown that these gaps stem not just from weak capacity but from competing policy objectives, actor interests, and the inherently political character of development (Ferguson & Lohmann, 1990; Mosse, 2017).

In this study, I draw on the analytical framework of the labour regime – which situates workers’ experiences within multiple interacting spheres and temporal moments (Baglioni et al., 2022; Taylor & Rioux, 2018) – as well as Burawoy’s (1985) concept of the politics of production, which frames labour regulation at the intersection of political and productive imperatives necessary for the reproduction of economic systems. Together, these concepts guided my analysis of formalisation as both a policy of production management and a mode of population governance. Using the case of Rwanda, I show that formalisation involves negotiating competing pressures: meeting international market expectations, ensuring profitability for cooperatives and investors, and managing or controlling informal labour on formalised sites.

The Rwandan state’s selective enforcement capacity – for example, its swift and effective implementation of the plastic bag ban in 2008 (Behuria, 2021) – illustrates what Hickey (2023) describes as “pockets of effectiveness”, where strong state capacity is mobilised to pursue strategic political and economic objectives. Methodologically, such insights suggest that ASM research needs to move beyond institutionalist approaches and engage more deeply with the politics of development policy (Hickey, 2013). This requires moving past general acknowledgements that “politics matter” towards actively employing political science frameworks such as political settlements analysis, which examines how ruling coalitions – including politicians and bureaucrats – shape policy design and implementation (Kelsall et al., 2022). Such an approach enables closer examination of how power relations and the distribution of interests within production systems shape the trajectory and outcomes of formalisation.

While scholars have already highlighted the role of unequal power dynamics and interest distribution in shaping ASM formalisation (Fisher, 2007; Verbrugge, 2015), ASM research could build on these insights and move beyond the broad tropes of labour exploitation and inequalities in this sector. A labour relations approach could help to politicise formalisation by centring the socio-political dynamics through which it is shaped. It connects formalisation to the strategies of ruling political and economic elites, who govern the mining economy not only to pursue growth but also to secure legitimacy. As Bebbington et al. (2018) argue, the governance of extractive industries often involves managing this balance – advancing economic ambitions while selectively addressing social concerns to legitimise prevailing

modes of production. In this sense, formalisation becomes both a tool of economic coordination and a mechanism of political control.

7.2 A relational approach to the analysis of ASM sector challenges

Another important lesson from this study is that the persistence of labour informality in the ASM sector can be better understood through a relational perspective. As Mosse (2010) argues in the context of persistent poverty, “a relational approach views such conditions as the result of historically embedded economic and political relationships, and highlights the role of social categorisation and identity in producing inequality” (p. 1156). In this study, this relationality has been specifically captured through the concept of “infrastructure of inclusion” (Meagher, 2021). From this perspective, this study has shown that the Rwandan government – responding to both international market demands and global governance norms, as well as domestic socio-political priorities – has introduced measures to improve miners’ working conditions. These include the establishment of workplace safety standards and the extension of social protection schemes to the broader population. However, the uneven implementation of these measures – particularly in relation to safety enforcement and access to accident insurance – reveals the enduring structural challenges of building a sustainable and equitable ASM sector.

The state struggles to balance formalisation with the provision of adequate social protection. This dilemma is not new. Historically, Rwanda has faced recurring difficulties in formalising small-scale mining. Between independence in 1962 and the mid-2000s, successive governments relied on large state-owned mining operations, while allowing small-scale mining to operate semi-formally or informally – often via cooperatives or local entrepreneurs, with fluctuating levels of state support (Behuria, 2015b; L. Uwizeyimana, 1988). The systematic formalisation and liberalisation of ASM after 2010 aimed to attract private investment to the sector. However, this new class of investors faces major obstacles – including limited access to technology and finance – despite their central role in labour organisation and the delivery of miners’ welfare. The state’s capacity to enforce social protection is therefore constrained by the financial fragility of these investors. Formalisation policies, in this context, unfold within a broader landscape shaped by a struggling sector, a willing but resource-limited state, and a workforce with few viable alternatives.

From the miners’ perspective, agency is exercised strategically. They selectively engage with state policies based on perceived costs, benefits, and programme credibility. For instance, the *Mutuelle de Santé* community health insurance scheme – introduced in 2006 – is mandatory and difficult to avoid, as non-compliance can

lead to sanctions by local authorities. In contrast, EjoHeza, a pension scheme initially launched as compulsory, has become effectively voluntary due to widespread resistance among miners, who cite affordability and relevance concerns. This contrast illustrates how policy implementation strategies and perceptions of effectiveness significantly affect acceptance and participation. Miners, acutely aware of the limitations of formal social protection programmes, often develop their own welfare strategies. One of the most prominent is participation in informal savings groups known as *Ibimina*, to which nearly all miners belong. These groups support savings for state-mandated contributions (such as Mutuelle de Santé or EjoHeza) and also facilitate long-term planning. Members invest in farmland, livestock, or small businesses – often for their spouses – as a way to prepare for life after mining, a physically demanding occupation seen as unsustainable over the long term.

Finally, a relational analysis must also attend to the specific types of agency that emerge in developing contexts. Instead of open protest or overt resistance, informal adaptation is often the dominant mode of response. As Emirbayer and Mische (1998) argue, agency is temporally embedded: shaped by past experience, present conditions, and future expectations. In public policy analysis, this means recognising and mapping both formal and informal forms of social protection, acknowledging how they are produced not just by the state, but also by non-state actors and the everyday practices of workers themselves.

7.3 Outlooks for research and policy

ASM research has traditionally focused on the performance of formalisation policies, particularly their limited success in attracting miners into formal production regimes. This focus has been useful in explaining why informality persists in many countries. However, it has contributed far less to understanding how informality in the ASM sector is produced in the first place. In this sense, ASM informal economy research has often become a study of formalisation, rather than of informality itself. This emphasis is perhaps understandable, given that most ASM globally remains informal and that there is strong policy pressure to increase the rate of formalisation (IGF, 2018). Yet, as the Rwandan case shows, even when ASM is formally regulated, labour often remains informal, and miners continue to face many of the same challenges experienced by informal workers elsewhere.

This reality calls for a reorientation in ASM research – away from how to integrate workers into formal operations, and towards the nature of work and the labour conditions that formalised ASM actually produces. It highlights the need to move beyond a narrow focus on formalisation as a legal status and instead interrogate the structural conditions of the sector, particularly its failure to guarantee labour rights

and social welfare. Central to this is the question of job quality – what kind of employment ASM creates or fails to create, and why. Answering this requires a deeper analysis of how production regimes are governed, with particular attention to the role of the state – not only as a regulator but also as a coordinator of economic sectors and a mediator between labour and capital.

In Rwanda, ASM formalisation has taken place through state mobilisation of the organisational infrastructures such as cooperatives and private companies. These entities play a central role in structuring labour and enabling state oversight of production processes, including the technologies used, production levels, and the actors involved in mineral extraction and circulation. In this context, research concerned with labour welfare may begin by asking: who are the enterprises driving formalisation, and how do they operate? This includes examining how they access capital, manage risk, and respond to market and political pressures. These factors – and others that might be identified – are likely to shape the character of formalisation enterprises and, ultimately, determine the labour arrangements and job quality that emerge under formalised regimes.

Findings from this study on social protection for artisanal miners in formalised Rwandan ASM also offer new ways to think about worker struggles and the role of public policy in supporting them. While the benefits received fall short of the rights typically associated with formal employment – such as those defined by ILO labour standards – miners still benefit from certain regulations, especially regarding workplace safety, which improve their sense of security. This underscores the need to move beyond the ideal of “proper” work – an increasingly rare condition globally, and one that has never been the norm in many developing countries (Ferguson & Li, 2018). Instead, the focus should be on identifying what protections can realistically be secured through capital-labour relations, what the state can provide through social protection policies, and what can be achieved through informal mechanisms. As this study shows, such informal arrangements remain crucial in compensating for the limited reach of formal social protection systems.

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Appendices

This section is included to provide readers with insights into the researcher's approach to data collection, and to support both transparency and methodological reflection. Appendix A contains two questionnaire guides used during interviews with artisanal miners, conducted at two different stages of the study. Appendix B presents two questionnaire guides used with key informants. These are intended as illustrative examples, as each guide for key informants was tailored to suit the expertise and background of the individual interviewee. All interviews were conducted in Kinyarwanda, and the questionnaire guides presented below are the researcher's own translations into English.

Appendix A: Sample interview guides for artisanal miners

Questionnaire guide 1 – used during the first data collection period (March–May 2023)

About you:

1. When and where were you born?
2. How many years of education did you have?
3. What was your parents occupation? How many siblings? Anyone was a miner in your fam?
4. Are you married? How many children? Where do they live?
5. Your job before mining.
6. The mining journey: When did you start mining/ by who and how were you introduced to mining?
7. Before cooperatives and companies (before 2011)
8. How would you form teams and what was your specific role?

9. How was your production day? How did you sell minerals?
10. How much was your pay/ income? – which other kind of service did you get from your employer? (how would you spend it)
11. Which dangers/risk in working on those sites did you encounter
12. Which benefits did you perceive in working in those settings?
13. Here- on site:
14. How were you recruited? when, by who, coming from where and why, why specifically on this site?
15. The site you work on (who is the owner)?
16. which tasks do you perform here?
17. how and how much do you get paid? – how do you spend it?
18. What makes your family live (income sources)?
19. Social relation with employer: In case of conflicts with employer, which institutions do you refer to? How do you deal with it?
20. What is your relationship with other workers? – association?
21. Which advantages do you perceive working under a cooperative/company?
22. Why don't you stick with one company/cooperative? Any disadvantages?
23. To conclude, how did the profession of mining change for you and others over years?

Questionnaire guide 2 – used during the second data collection period (November–December 2023)

EjoHeza Pension Scheme

1. Have you ever heard of the EjoHeza scheme?
2. What does EjoHeza mean to you?
3. Do you currently contribute to EjoHeza, or have you done so in the past?
(Yes / No)

4. What motivated you to start contributing to EjoHeza? How did you become involved?

5. How are the contributions made? (e.g. how much, how often, where)

6. What are the challenges or barriers that prevent you from joining EjoHeza?
7. What would motivate you to start contributing to EjoHeza?

Mutuelle de Santé (Community-based Health Insurance)

8. Do you currently have *mutuelle de santé*?
9. At your current workplace, or in any previous job, have you been required to show proof of *mutuelle de santé* in order to be hired?
10. Is it difficult for you to afford the *mutuelle* contribution?
11. Apart from work, are there other places or situations where you are required to present your *mutuelle* card?

Workplace Safety in Mining (Accident Prevention and Protection)

12. How do you perceive the issue of accidents in the mines?
13. What measures are in place to prevent accidents at your current workplace, or in other mines where you have worked?
14. What protective equipment do you use to guard against accidents? Where do you obtain it?
15. Have you ever had an accident at work?
16. Have any of your co-workers experienced serious accidents that prevented them from continuing to work? What happened, and what caused the accident?
17. Do you know what happened to the person or their family after the accident?

Accident Insurance

18. At your current workplace, or in other places you've worked, was there any form of accident insurance?

19. In your opinion, is it important for a mine to have accident insurance?
20. Do you know how much compensation is provided through insurance in the event of an accident?

Savings and Informal Financial Support (e.g. *Ikimina*)

21. Do you have any way of saving money on the side?
22. Are you a member of an *ikimina* (informal savings group) here or elsewhere?
23. What do you see as the benefits of being in an *ikimina*?
24. And what are the challenges or drawbacks?

Appendix B: Sample interview guides for key informants

Questionnaire guide used for an interview with a representative of the Rwanda extractive industry workers' union (REWU)

1. When and in which context was your organisation created?
2. Who are your key stakeholders?
3. And who are your members? detailed categories, condition of adhesion, services provided to them.
4. What are the main challenges faced by miners, any reports, and studies?!
5. Which approaches do you use for labour rights promotion?
6. I learnt that you participated to the minimum wage in mining negotiations, how were these initiated and how did they evolve?
7. What difference do you perceive between cooperatives and companies in organising labour and labour conditions?
8. What changes do you perceive in terms of labour after ASM liberalisation (after cooperatives and companies increase)?

9. In your opinion and from your experience, why many miners still operate illegally?
10. What are the key regulatory frameworks (formal and informal) which protect miners rights?
11. As a labour rights promotion organisation, which challenges do you face in your work?

Questionnaire guide used for an interview with a representative of the fédération de coopératives minières au Rwanda (FECOMIRWA)

1. How was Fecomirwa created and how is it related to Copimar?
2. What is the mission of Fecomirwa?
3. How do you perceive your role as an actor in the Rwandan mining sector?
4. How did the cooperative membership evolve over the last years (before 2006, how many currently)?
5. Which key challenges do your members face in their activities?
6. Why some cooperatives are not members of Fecomirwa (how many)?
7. Who are your main stakeholders?
8. What have cooperatives changed in labour organisation and conditions of workers?
9. Do your members face any challenges in assuring workers' rights?

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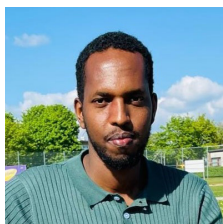
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Taking Rwanda as case study, this dissertation examines the causes and implications of the persistence of informal labour relations when the artisanal and small-scale mining (ASM) sector in developing countries is brought under state control — that is, formalised. Drawing on insights from labour studies and informal economy regulation theories, the study shifts the focus of ASM research from assessing the causes of the low rates of formalised ASM activities — which have dominated the field — to exploring the relationship between artisanal miners' access to social protection and formalisation reforms in the ASM sector.



MAXIME RUSHEMUKA is a PhD candidate in the Department of Human Geography. His research focuses on natural resource-related policies and governance, with particular attention to their social outcomes. His doctoral research examined protective policies in the artisanal and small-scale mining sector, and how their implementation is influenced by labour informality. Prior to his PhD, he worked as a civil servant in Rwanda, within the local government office for land-use management. He holds a master's degree in environmental governance from the University of Freiburg in Germany.