



Entrepreneurship and innovation in Africa's artisanal and small-scale mining sector: Developments and trajectories

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ABSTRACT

This paper explores how artisanal and small-scale mining (ASM) – low-tech, labour-intensive mineral processing and extraction – has evolved in sub-Saharan Africa in recent decades. The analysis focuses specifically on the types of entrepreneurs who pursue work at, and innovation that occurs in, the region's ASM sites, using ideas debated heavily in the management literature, as well as complementary theories and concepts from other disciplines, including development studies, anthropology and human geography. Drawing on findings from ongoing research in Sierra Leone and Liberia, the locations of two of the largest and most complex ASM economies in sub-Saharan Africa, it is argued that legal and policy frameworks implemented for the sector are not aligned with the needs and capabilities of operators, and have therefore impeded efforts to formalize activities. In both countries, these frameworks have created and subsequently galvanized the boundary between two very different 'worlds': on the one hand, that of a burgeoning semi-formal artisanal group with limited capacity to mechanize, and on the other hand, that of a small number of individuals who have managed to overcome crippling financial barriers to secure titles to mine using more advanced technology.

1. Introduction

This paper explores how artisanal and small-scale mining (ASM) – low-tech, labour-intensive mineral processing and extraction – has evolved and innovated in sub-Saharan Africa in recent decades. Despite its largely informal state, ASM provides direct employment to tens of millions of people in the region (Table 1), spawns ancillary trades that create jobs for millions of others, and generates finance which helps to sustain family-oriented subsistence and smallholder agriculture (Maconachie and Binns, 2007; Kamlongera, 2011; Hilson, 2016; Siwale and Siwale, 2017). But whilst most governments in sub-Saharan Africa routinely acknowledge ASM's economic importance, few have committed, beyond rhetoric, to fully formalizing the sector's activities completely.

Yet, despite lacking the requisite permits, and the titles and paper-work needed to access support, many people now engaged in ASM across sub-Saharan Africa have managed to generate earnings and reinvest sums into their operations. The paper begins by studying more closely these developments and speculating on how groups of individuals working in the sector have adapted and innovated. The discussion is guided, throughout, by the crude – albeit informative – typology which today, is frequently used by management scholars as a point of reference

for contextualizing entrepreneurial behaviour. Evolving from ideas first articulated by Kirzner (1973), the typology features, at the one extreme, necessity-based types, and at the other extreme, opportunistic groups and individuals (Stoner and Fry, 1982; Bhawe, 1994; Sahasranamam and Sud, 2016). Scholars have since disaggregated the two different categories of entrepreneurial activities even further, drawing on case study analysis from across a range of industrial sectors. They have used this typology as a framework for diagnosing and broadening understanding of the challenges faced by the world's entrepreneurs, their needs and struggles, and capacity to innovate.

Guided by this framework, the next section of the paper draws heavily on ideas at the heart of the legalist school on informality and Schumpeter's views on economic development. The former help to explain how state bureaucracies stifle regulatory compliance and have ultimately 'created' the sizable informal segments of sectors such as ASM. They also very importantly provide a lens through which to better understand how, despite being deprived of the opportunities afforded to their formal counterparts, individual entrepreneurs respond to, and innovate within, their confined spaces, and operate in the boundaries of their – at times, restrictive – environments. The latter are used to contextualize the connection between the entrepreneurship and innovation on display at

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Table 1
Estimated ASM employment in selected countries in sub-Saharan Africa.

Country	Directly Working in ASM	Estimated Number of Dependents	Main minerals mined on a small and artisanal scale
Angola	150,000	900,000	Diamonds
Burkina Faso	200,000	1,000,000	Gold
Burundi	13,000	52,000	Tin, cassiterite, tantalite
Central African Republic	400,000	2,400,000	Gold, diamonds
Chad	100,000	600,000	Gold
Côte d'Ivoire	100,000	600,000	Gold, diamonds
Democratic Republic of the Congo	200,000	1,200,000	Diamonds, gold, coltan
Eritrea	400,000	2,400,000	Gold
Ethiopia	500,000	3,000,000	Gold
Ghana	1,100,000	4,400,000	Gold, diamonds, sand
Guinea	300,000	1,500,000	Gold, diamonds
Liberia	100,000	600,000	Gold, diamonds
Madagascar	500,000	2,500,000	Coloured gemstones, gold
Malawi	40,000	240,000	Coloured gemstones, gold
Mali	400,000	2,400,000	Gold
Mozambique	100,000	1,200,000	Coloured gemstones, gold
Niger	450,000	2,700,000	Gold
Nigeria	500,000	2,500,000	Gold
Rwanda	24,000	100,000	Tin, cassiterite, tantalite
Senegal	67,000	300,000	Gold
South Africa	20,000	120,000	Gold
Sierra Leone	300,000	1,800,000	Gold, diamonds, coltan
South Sudan	200,000	1,200,000	Gold
Tanzania	1,500,000	9,000,000	Coloured gemstones, gold, diamonds
Uganda	150,000	900,000	Gold
Zimbabwe	500,000	3,000,000	Gold, diamonds, coloured gemstones

Sources: Data extracted from International Labour Organization (ILO) (1999), Dreschler (2001), Mutemeri and Petersen (2002), Hinton (2005); 'DELVE' (<https://delvedatabase.org/>); and Persaud et al. (2017).

many ASM sites in sub-Saharan Africa. Schumpeter's ideas continue to be relied upon heavily by scholars, particularly in the management discipline, to examine 'the unique connection between the "entrepreneur" and innovation' (Thomas, 1987, p. 173). Schumpeterian arguments have frequently been used to validate claims such as 'opportunistic entrepreneurs [who] invest in new technology and commercialisation and, for a limited time, through innovation, achieve a position of market leadership' (Roper and Hewitt-Dundas, 2017, p. 559), and 'innovative entrepreneurs often operate in emerging markets or challenge existing firms in established markets' (Block et al., 2017, p. 64). When referring back to the typology on entrepreneurship, many ASM sites in sub-Saharan Africa today appear to be more *hybrid* in their composition: an eclectic mixture of necessity-driven and opportunity-based activities, both of which have a unique temporal dimension and generally attract particular groups of individuals. If, however, an 'entrepreneurial innovation' is taken to mean *anything* 'new undertaken by an entrepreneur that enhances the competitive advantage of his/her enterprise' (Manimala, 1992, p. 47), then these sites are also broadly evolving and innovating in ways which Schumpeterian arguments help to explain. Specifically, despite being heavily wedded to, and conditioned by their experiences in, the informal economy, the region's ASM operators should also be seen as creative and resilient: they are examples of entrepreneurs who may not be "innovative" in the traditionally recognized areas' but at the same time, 'no one can deny that they are eminently innovative entrepreneurs' (Manimala, 1992, p. 47).

In Section 3 of the paper, the livelihoods of the 'eminently innovative entrepreneurs' working at artisanal gold mining sites in Sierra Leone and

Liberia are examined more closely. Both countries are the locations of two of the more dynamic ASM economies in sub-Saharan Africa. The conceptual framework developed in Section 2 will be used to explain how, in both cases, policies have 'created' and perpetuated the growth of informal artisanal gold mining activities, and to illustrate how individual operators adapt and innovate in these settings. The analysis draws on findings from research conducted over a seven-month period across six major artisanal gold mine sites in the two neighbouring countries. Section 4 briefly revisits ideas introduced here, reflecting more critically on the importance of this study for scholarship on sub-Saharan Africa, particularly that which focuses on the region's entrepreneurship, and its implications for policy more broadly.

2. Framing debates on entrepreneurship at ASM sites in sub-Saharan Africa

Before examining the dynamics of ASM in sub-Saharan more closely, it is instructive to situate this analysis in broader work on entrepreneurship and innovation. This requires engaging with the management literature, where both subjects have been hotly debated and analyzed for decades. The problem, however, is that whilst extensive, this body of scholarship has yet to explore, comprehensively, how core ideas at the heart of theories on, and conceptualizations of, entrepreneurship and innovation apply to sub-Saharan Africa. This is a significant shortcoming because of the collection of economic activities found here, and the unique political, social and cultural context in which they occur. Specifically, as Spring and McDade (1998) summed up over two decades ago, 'Much of the productive entrepreneurial activity in developing countries in Africa and elsewhere is in the informal sector' (p. 10). This remains largely-unchanged and applies to the ASM found in most sections of sub-Saharan Africa today.

2.1. Making sense of entrepreneurship and innovation in sub-Saharan Africa

Most analysis of entrepreneurship and innovation in small firms leads back to the pioneering work of Schumpeter (1934, 1950), irrespective of the context. One of the first scholars to articulate explicitly the relationships between entrepreneurship, innovation and small enterprises (Sahut and Peris-Ortiz, 2014), Schumpeter has garnered a cult-like following in the wider literature on entrepreneurship and innovation. Proponents have embraced and attempted to advance understanding of the three ideas at the core of his paradigm: 1) that long-term growth relies on innovations; 2) that these innovations are triggered by investments, such as funding for research and development, and the diversification of a firm's skill-base; and 3) 'creative destruction', or the idea that industrial mutation revolutionizes the economic structure from within, in the process creating a new one (Aghion and Festré, 2017). The emerging field of 'economics of technology and innovation', which has become a primary area of focus in the management discipline over the past three decades, has been instrumental in revitalizing scholarly interest – galvanizing a group fittingly referred to as 'neo-Schumpeterians' – in these ideas (Evangelista, 2017).

When applied to sub-Saharan Africa, however, Schumpeter's ideas, as well the entrepreneurship typology more generally, require further refinement. Whilst informative pieces that weigh in on entrepreneurship and innovation in the region have emerged in the management literature in recent years (e.g. Chaarmes et al., 2018; Mendu and Mudida, 2018), collectively, this body of analysis fails to inspire. This is principally because it broaches points – at times, uncritically – that have been explored by scholars in the fields of anthropology, geography and development studies for decades. On the one hand and importantly, management scholars appear to recognize the shortcomings of the discipline's work when it comes to advancing debates on sub-Saharan Africa and the obvious limitations its existing theories and ideas have in explaining various phenomena in the region. More specific to

entrepreneurship, Spring and McDade (1998) cautioned early on that ‘It may not be appropriate or desirable for developing countries to import entrepreneurial techniques wholesale from developed countries’ (p. 7), experiences from which have mostly been used to inform the design of and subsequently refine the entrepreneurship typology. To their credit, many management scholars have questioned the level of generalizability of concepts and theories formulated about entrepreneurship and innovation, particularly the extent to which ideas conceived through a Western ‘lens’ can be applied to developing countries (see e.g. Hofstede and Bond, 1988; Thomas and Mueller, 2000; Gupta and Fernandez, 2009). The broad consensus across the discipline today is that these ideas are often too formulaic, and have limited application, wholesale, in settings with very different social and cultural histories.

On the other hand, despite repeated pushes by a small group of management scholars to galvanize disciplinary interest in sub-Saharan Africa and the entrepreneurship found here more specifically, the response has been lukewarm at best. This is crucial because of the radically different context in question: as Spring and McDade (1998) further pointed out, although the ‘functions of the entrepreneur, which are to coordinate resources and increase economic output, are the same [everywhere]’ the ‘Visible evidence of entrepreneurship is not the same in Silicon Valley, California, as it is in Sekondi-Takoradi, Ghana’ (p. 8). Making the necessity-opportunistic typology of entrepreneurship *speaks* more clearly to sub-Saharan Africa, however, requires careful examination and analysis of this ‘visible evidence’. This will ultimately require studying more in-depth the region’s unique attributes, including its ‘issues of poor governance’ and ‘resulting patterns of corruption’, and the ‘complex institutional layers that seem to be specific to the continent, at least to some extent’ (Rivera-Santos et al., 2015, p. 78), and subsequently adapting core ideas and theories accordingly.

This paper is concerned specifically with entrepreneurship and innovation at ASM sites in rural sub-Saharan Africa, analysis of which has important implications for policy, foremost that linked to the Sustainable Development Goals (SDGs).¹ Recent scholarship in development studies in particular has captured, through detailed case studies, from Ghana (e.g. Ferring et al., 2016), through Tanzania and DR Congo (Fisher, 2007; Geenen, 2012; Geenen and Cuvelier, 2019), to Liberia and Sierra Leone (e.g. Maconachie and Hilson, 2018; Van Bockstael, 2014), the two countries profiled in this paper, how, in sub-Saharan Africa, ASM helps to safeguard livelihoods and stimulates rural economic development (Hilson and Maconachie, 2020). Although failing to feature prominently in the design and development phases of the SDGs (Hilson et al., 2018), a formalized ASM sector, it can be argued, could directly address objectives linked to SDG 1 (No Poverty), SDG 2 (End Hunger), SDG 8 (Decent Work and Economic Growth) and SDG 10 (Reduce Inequality). Moreover, it would lead to reduced environmental impacts, in the process helping countries meet targets set under SDG 6 (Promoting Clean Water and Sanitation for All), SDG 12 (Responsible Consumption and Production), SDG 14 (Life below Water) and SDG 15 (Protect, Restore and Promote the Sustainable use of Terrestrial Ecosystems and Halt Biodiversity Loss).

In the management discipline, where again, academic debates on innovation and entrepreneurship have gestated, a commitment to better understanding how a formalized ASM sector with the capacity to innovate freely can stimulate economic development and in the process, help contribute to the SDGs, in sub-Saharan Africa, will require scholars to engage more heavily with two subjects they have generally – and admittedly – struggled to analyze. The first is poverty, particularly its connection to entrepreneurship, a limited understanding of which Sutter et al. (2019) imply is reflective in prior reviews on the subject. Previous

critiques, argue the authors, ‘have relied on a limited number of journals over a limited time, resulting in a failure to highlight the implications of distinct perspectives that underpin articles’. This, they further explain, is the outcome of management scholars’ ‘extant research embrac[ing] distinct assumptions and perspectives regarding the role of entrepreneurship in poverty alleviation’ whilst ‘fail[ing] to appreciate or build on other perspectives’ (p. 198). Bruton et al. (2013) does not go as far as to condemn the discipline’s work in this area entirely but does acknowledge that ‘the entrepreneurship literature has shied away from issues involving poverty’ (p. 684).

There are obvious limitations when analyzing the dynamics of ASM in sub-Saharan Africa using strictly the work on entrepreneurship that has burgeoned in the management literature. It begins with the complexities of the location itself, where even the discipline’s gurus concede there is ‘A prevalence of visible poverty, stemming from a combination of high absolute levels of poverty and inequality’ (Rivera-Santos et al., 2015, p. 78). The arguments formulated around existing ideas in the management literature fall short of explaining these dynamics adequately. Not being able to articulate clearly how poverty shapes entrepreneurship is particularly significant in the context of region’s ASM, large segments of which are populated by otherwise-jobless people in areas generally devoid of other economic opportunities. This has, rather fittingly, earned the sector the label ‘poverty-driven activity’ (Barry, 1996; Hentschel et al., 2002). Over the past two decades, several studies have been carried out in the region which reinforce this claim (e.g. Hilson and Garforth, 2013; Van Bockstael, 2014).

The second subject is informality, which, as already indicated, is widespread across sub-Saharan Africa. According to the International Labour Organization (ILO), an estimated 89.7 percent and 82.7 percent of the region’s women and men, respectively, are employed in the informal sector, as well as 94.9 percent of its youth (International Labour Organization (ILO), 2018). The region’s ASM sector is no exception: over 95 percent of its activities are found – many of them embedded – in the informal economy, carried out by individuals who are not in possession of a license (Hilson, 2016). Management scholars do appear to recognize that sub-Saharan Africa features a unique blend of entrepreneurship, the dynamics of which the theories and ideas they have developed and/or routinely rely upon can only partly explain. Spring and McDade (1998) provided the discipline with a detailed picture of the salient features of entrepreneurship in the region, a list that includes ‘ease of entry, unregulated and competitive markets, reliance on indigenous resources, family ownership, small-scale operation, labor-intensive adoptive technology, and skills acquired outside of the formal education system’ (p. 10). Management scholars have since grappled with several of these ideas, and do seem to concede that entrepreneurship in sub-Saharan Africa is in many ways linked to poverty and informality but admittedly, remain unclear about how, exactly, this is the case:

Like poverty, informality ... is also particularly prevalent in sub-Saharan Africa due to typically weaker or less efficient formal governments ... [The] implications of the prevalence of informality in a venture’s environment are not so easy to assess given the link between informality and poverty ... (Rivera-Santos et al., 2015, p. 79).

For the discipline on the whole, it is, as George et al. (2016) recently put it, in the case of sub-Saharan Africa specifically, ‘the idiosyncratic practices and organizational challenges involved in competing, operating, and surviving in such [informal] markets that have been relatively understudied’ (p. 385).

The position taken in this paper is that the necessity-opportunistic typology and allied concepts developed and refined by management scholars over the years do have some application when it comes to explaining the dynamics of entrepreneurship in ASM in sub-Saharan Africa but require further refinement, given the unique attributes of the informal economy it is a part of (Hilson et al., 2018). The discussion

¹ The 17 SDGs are at the heart of the 2030 Agenda for Sustainable Development, adopted by all UN Member States in 2015. See ‘Sustainable Development Goals’, www.un.org/sustainabledevelopment/sustainable-development-goals/ (Accessed 12 August 2019).

that follows, therefore, draws on analysis that has surfaced in the anthropology, geography and development studies literature to help bridge the crucial gaps needed to better understand why, in sub-Saharan Africa, ASM is so deeply-rooted in the informal sector. It also further examines the entrepreneurial spirit found and innovation that takes place in the sector, both of which are shaped heavily by its largely-informal status and resulting policy treatment.

2.2. Contextualizing entrepreneurship at ASM sites in sub-Saharan Africa

It is claims made by [Acs et al. \(2013\)](#), who stressed that ‘While it is important not to romanticize “penniless entrepreneurs” ..., there is an equal risk in ignoring, marginalizing and dismissing them as unimportant’ (p. 220), which sum up fairly accurately the state of ASM in sub-Saharan Africa today and ultimately set the stage for the discussion that follows. As indicated, the ASM sector is populated mostly by people who work plots of land informally – that is, without a license. The workplaces of these miners, therefore, are heavily disconnected from regulators but nevertheless evolve their own rules and come under the control of groups of local-level actors such as chiefs, various middlemen, landlords, and occasionally, policemen and military officers ([International Labour Organization \(ILO\), 1999](#); [Hentschel et al., 2002](#); [Fritz et al., 2018](#)).

The motivations underpinning peoples’ movement into ASM have been conceptualized, at a very general level, as follows: at the one extreme, there are ‘poverty-driven’ groups or individuals whose primary motivation for entering the sector is to alleviate personal hardships, and at the other extreme, those who are looking to ‘get rich quick’ or aspiring businesspeople whose reasons for engaging in this work are purely profit-driven. When mapped on to the general entrepreneurship typology developed in the management literature, which [Hilson et al. \(2018\)](#) began doing for sub-Saharan Africa, the ‘poverty-driven’ and ‘get rich quick’ narratives correspond very closely to the necessity and opportunistic categories of activities, respectively. Those who fall into the ‘get rich quick’ category of ASM are the individuals who tend to be armed with licenses, assumed to have security of tenure, have financial support and are very much embedded in the *formal* economy. The individuals found in the category of ‘poverty-driven’ in the region, however, require some disaggregation.

In sub-Saharan Africa, perhaps more so than any other region of the developing world, a causal relationship seems to exist between poverty and ASM’s rapid growth. This is best epitomized by cases which [Hilson and Garforth \(2012\)](#) describe as ‘agricultural poverty’, or the inability of subsistence farming to sustain the livelihoods of rural families. This, in turn, has led many people to ‘branch out’ into ASM in a desperate bid to generate supplementary income. When the stories of individuals who claim to be driven to work in ASM because of hardship are considered, the relationship between poverty and the sector’s growth – at least in the case of sub-Saharan Africa – becomes even more obvious. Development studies scholars have articulated this quite effectively using a range of examples: the so-called child labourers panning gold on weekends and during holidays to pay for their school fees; the teenagers engaging in arduous lifting and hauling in order to generate enough income to cover their university tuition; the women undertaking similar backbreaking work to cover household expenses; accounts of semi-skilled labourers who, after being made redundant at large-scale mines, are desperately searching for new employment; and the aforementioned farm families looking to escape ‘agricultural poverty’. These experiences paint an exceptionally-dynamic tapestry of necessity entrepreneurship at ASM sites across sub-Saharan Africa.

When these experiences are grafted on to the necessity-opportunistic entrepreneurship typology, after factoring in time (i.e., a temporal dimension), the ‘poverty-driven’ narrative becomes substantially more credible as an explanation for ASM’s continued growth in sub-Saharan Africa. What accounting for time does is provide a basis for identifying a much-needed *third* category of individuals: people referred to here as *hybrid* entrepreneurs. These can be considered people who,

despite claiming to have initially moved into ASM because of poverty, attribute their decision to remain in the sector for prolonged periods to it continuing to present the best income-earning option available, despite the obvious hazards they face and lack of protection afforded to them in the informal economy. A ‘platform for wealth creation’ is the corresponding label given here to this third category into which these hybrid types, who generally accept their fates as artisanal and small-scale miners and work with the goal of generating incomes to cover their household needs, and at times use the sector strategically to pay for children’s school fees and invest in other ventures, fall ([Fig. 1](#)).

The focus here is the entrepreneurial energy and associated innovation on display in the ASM sector in sub-Saharan Africa. This first requires some understanding of why there are distinguishable pockets of licensed small-scale miners and a much larger category of informal operators, and such a visible division between the two, throughout the region. Innovation takes place in both segments, which the work of [Hernando De Soto \(1989, 2001\)](#) helps to contextualize. De Soto and others who make up the ‘legalist’ school see ‘the informal sector as comprised of “plucky” micro-entrepreneurs who choose to operate informally in order to avoid the costs, time and effort of formal registration and who need property rights to convert their assets into legally recognized assets’ ([Chen, 2012](#), p. 5). The limitations of De Soto’s legalist approach have been rightly singled out by critics (e.g. [Van Der Molen, 2012](#); [Fontana, 2016](#)). The exhaustive list includes its inability to adequately reconcile competing property rights and land titling, and effectively convert, in practice, what is referred to as ‘dead capital’ into assets. It is, however, as [Hilson et al. \(2017\)](#) explain, rather De Soto’s ancillary ideas, including how bureaucratic regulatory apparatuses effectively ‘create’ informal sectors, spur them into becoming functional autonomous economies with their own rules and transactions, and fortify their boundaries, which have application to ASM in sub-Saharan Africa. These points will be revisited throughout this discussion.

It is now widely known that numerous developing world governments have stifled the legalization of ASM by designing and implementing bureaucratic policies and regulations. Officials at the International Labour Organization (ILO) were among the first to weigh in on the issue very explicitly, stating, in the organization’s landmark publication, *Social and Labour Issues in Small-Scale Mines* ([International Labour Organization \(ILO\), 1999](#)), that ‘Small-scale mining is bedevilled with too many regulations that are mostly designed to constrain it and too few inspectors to ensure that they do’ which is why there is ‘little incentive for small-scale mines to conform, particularly if the risks of being caught and of sanctions being applied are minimal’ (np). The problem, however, has been particularly visible in sub-Saharan Africa. Ghana and Zimbabwe, with their lengthy ASM formalization programs,

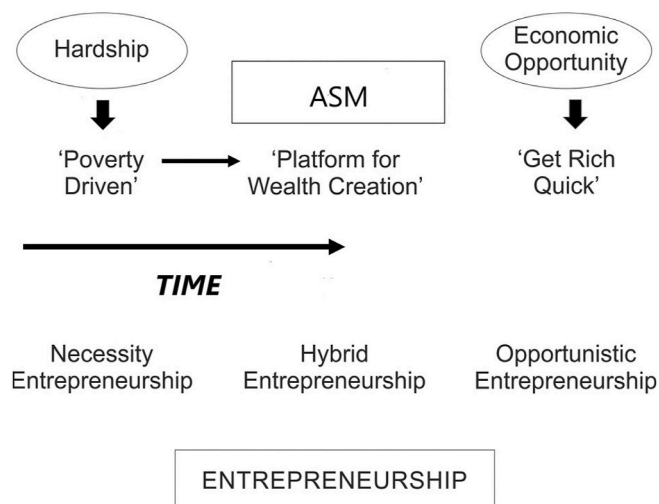


Fig. 1. Categories of entrepreneurial activity in ASM.

have been routinely showcased as examples of how the costs linked to getting a license and bureaucratic procedures that must be followed in order to obtain it discourage titling and the acquisition of permits (see e.g. Hilson et al., 2014; Spiegel, 2015, 2017). But similar phenomena have been reported in the likes of Guinea (Huntington and Marple-Cantrall, 2016), Tanzania (Merket, 2018), Uganda (Crawford et al., 2015), the Central African Republic (Hinton and Levin, 2010), Niger (Hilson et al., 2019) and DR Congo (Geenen, 2012). Continued implementation of licensing schemes which are burdensome, financially and logistically, for miners is even more inexplicable given the growing acceptance in academic, donor and policymaking circles that the sector is largely ‘poverty-driven’, particularly in sub-Saharan Africa.

Why, despite a growing body of evidence which points to the regulatory and licensing strategies in place in sub-Saharan Africa fuelling the growth of informal ASM activities in the region, have more user-friendly frameworks not materialized? One likely explanation is what Hilson (2019) refers to as a large-scale mining ‘bias’. This is the idea that rent-seeking governments become heavily preoccupied with attracting foreign investment to develop and expand capital-intensive large-scale mining and mineral exploration activities because of the quantities of revenue that can be obtained fairly easily by doing so, including permit fees, duties, various taxes and eventually, royalties. One direct consequence of this ‘bias’, however, is a diminished interest in ASM, including any drive to make permits more accessible to the prospective licensee. Calls for governments in these settings to implement more comprehensive ASM policy frameworks and support-related interventions for operators, therefore, are now routinely ignored in favour of more simplistic formalization strategies, beginning with a recategorization of the sector’s activities according to levels of production and mechanization, and a corresponding streamlining of permits. This approach is now being seriously considered in a number of countries in sub-Saharan Africa, including Tanzania, Ghana and Malawi, in many cases under the guidance of donors such as the World Bank.

In Sierra Leone and neighbouring Liberia, the two case study countries profiled in the next section of the paper, this approach already features. Experiences from both countries, however, reveal that recategorizing ASM activities is not a particularly effective formalization strategy. It has rather cemented even further the division between more subsistence ASM groups on the one hand, and on the other hand, the small band of individuals who have more advanced operations. As will be explained in the next section of the paper, a licensing strategy emphasizing the segregation of ASM activities and the policy treatment this has spawned has, in both countries, confined the former, who number in the hundreds of thousands in both countries, to a semi-formal state at best. Whilst many operate legally, this group struggles to mobilize finance and mechanize their operations because of the rules they must follow and restrictions imposed upon them. The latter, who, in the eyes of both governments, are in possession of a more ‘acceptable’ license, are afforded the privileges of any typical registered small business owner. The ‘worlds’ of each operator is associated with its own innovation strategy, paths which have been heavily shaped by the prevailing policy environment.

3. Two worlds, two development trajectories, two innovation pathways: ASM in Sierra Leone and Liberia

The recent histories of Sierra Leone and neighbouring Liberia are deeply intertwined, shaped heavily by extended periods of cross-border civil violence: in the former, a war which lasted a decade (1991–2002), and in the latter, two near-consecutive periods of conflict (1989–1997 and 1999–2003). Mineral resources, particularly diamonds, played a major role in financing and perpetuating this civil violence, the scars from which are still very visible in both countries. Several scholars in anthropology, geography and development studies (e.g. Maconachie and Binns, 2007; Pijpers, 2011; Van Bockstael, 2014, 2019; Sauerwein, 2020) have since studied in depth the dynamics of the ASM sector in

both countries, as well as the broader Mano River Region (Liberia, Sierra Leone, Guinea and Côte d’Ivoire). This body of work has examined the potential role mining can play in the reconstruction of these countries and more broadly, developmentally; revenue capture from natural resource extraction; and mineral smuggling and associated local distribution and financial networks.

The latter provided the impetus for the present investigation. But whilst most studies of transborder networks linked to ASM in Sierra Leone and Liberia centre on diamonds, gold is the focus here. This section of the paper shares findings from research conducted on the production of gold on an artisanal scale across both countries over a seven-month period between 2018 and 2019. Data were collected using an innovative, interdisciplinary, mixed-methods research approach at three sites (Nyamudu, Salima and Sandaru) in Sierra Leone and three sites (Butter Hills, Weaju Village and Reeve Village) in Liberia where transborder interactions within the artisanal gold mining sector are reportedly flourishing (Fig. 2). The main research activity during the fieldwork – the compilation of ‘financial diaries’ for 73 artisanal miners and supporters over a period of seven months – deepened understanding of the socially-embedded micro-financial circuits of individuals living and working in gold mining communities. Data were collected biweekly and entered into smart phones, and generated information in two main areas: 1) the financial dynamics of respondents’ livelihoods; and 2) broader life histories, which contextualized financial diaries and illuminated how changes in the financial landscape were impacting respondents’ livelihoods and wellbeing, as well as their ability to innovate. Rather than simply using the diaries as a conventional tool to understand the financial management of households, the methodology was adapted to generate data that provided insight into a range of detailed livelihood dynamics, how these were socially-embedded in informal networks, and how the local circuits of exchange were interlinked with global value chains. Alongside this work, semi-structured interviews were conducted with policymakers in both country capitals of Monrovia (Liberia) and Freetown (Sierra Leone).

In this paper, the first crucial output from this research, the dynamics of the two categories of ASM in Sierra Leone and Liberia are examined, with special emphasis on how policy has nurtured both, the types of entrepreneur found in each, and how individuals have innovated in the spaces which they populate. Gold was the focus here for two reasons, the first being that in both countries, there are likely more people now mining the metal than any other commodity, a development that often goes unnoticed. The second reason is that in both countries, mineral policy and export frameworks – at least those in place for ASM – are oriented around diamonds, which has likely made it easier to move gold across borders. The analysis presented here builds on points raised in previous sections of the paper. It begins by exploring how, in both countries, the policy and regulatory environment has shaped both branches of the sector. Both ‘worlds’ are then examined in turn, using De Soto and Schumpeter throughout to contextualize the ways in which operators found each adapt and innovate, and how their spaces evolve in the first place.

3.1. Mining regulations and policies in Sierra Leone and Liberia

In both Sierra Leone and Liberia, the recovery from extended periods of civil violence has been slow. The Ebola epidemic which gripped West Africa between 2013 and 2016 has caused further setback (Maconachie and Hilson, 2018): in addition to claiming 4810 and 3956 lives in Liberia and Sierra Leone, respectively,² it wreaked havoc economically, causing, in the former, US\$300 million and in the latter, US\$1.9 billion, in damages (World Bank, 2016). Liberia and Sierra Leone perform poorly on most economic and social indicators (Table 2), and continue to hover at the bottom of the UN Human Development Index. Both

² ‘2014–2016 Ebola Outbreak in West Africa’, www.cdc.gov/vhf/ebola/history/2014-2016-outbreak/index.html (Accessed 3 August 2019).

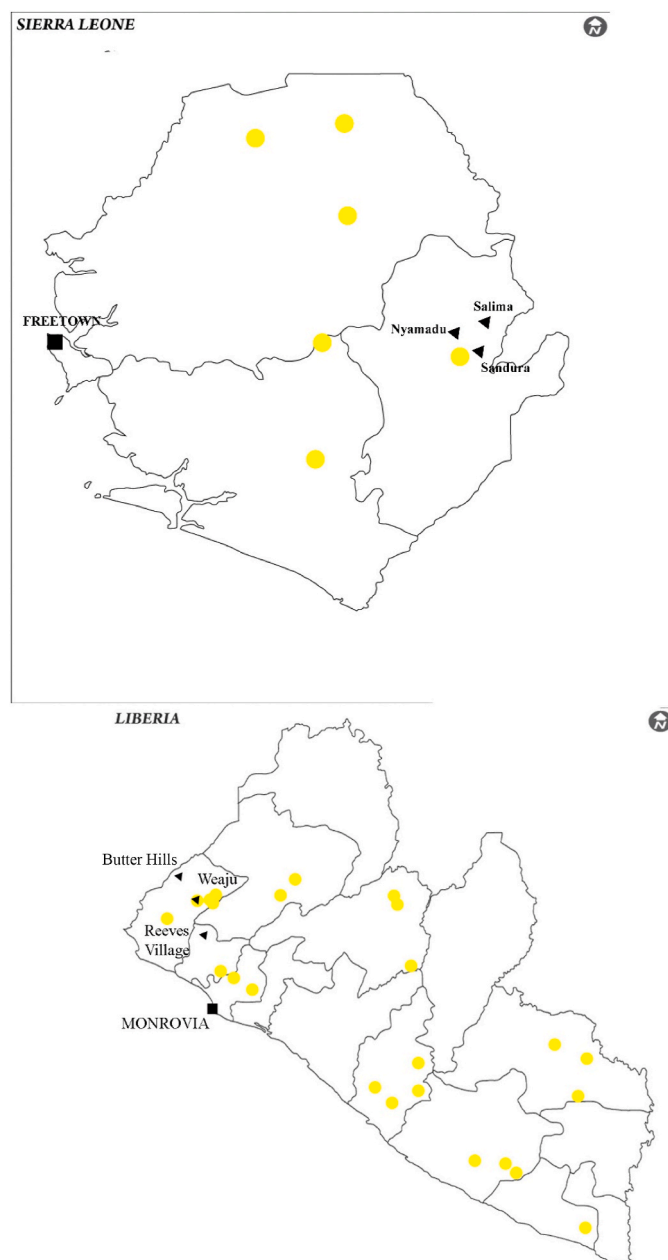


Fig. 2. Study locations, Sierra Leone and Liberia, and locations of major gold deposits (yellow). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

countries, however, are endowed with vast mineral wealth, which presents an opportunity to jumpstart economic development.

Each country has comprehensive pieces of mining legislation which empower particular government agencies to award different categories of mining licenses for this very purpose. In Sierra Leone, there is the *Mines and Minerals Act, 2009*, which outlines the different categories of mining licenses and the procedures that must be followed to obtain them, and the *National Minerals Agency Act, 2012*, a move that established the Nationals Minerals Agency (NMA), an organization conceived specifically to ensure better management of the mining sector. In Liberia, it is the Ministry of Lands, Mines and Energy which is the principal government agency responsible for granting mining titles and regulating the sector. The two main pieces of legislation in place for mining in the country are the *Mining and Minerals Law* of 2000 and the *Exploration Regulations* of 2010. The governments of both countries, however, have shown a preference for large-scale mining, perhaps even

Table 2

Key development indicators in Liberia and Sierra.^a

Indicator	Sierra Leone	Liberia
Rank (out of 190 countries)	184	181
Working poor at US\$3.10/day	74.8	68.7
GDP per capita (US\$)	1,390 (2011)	753 (2011)
Rural population's access to electricity (%)	2.5	1.3
Health	52.2 - Life expectancy at birth	63 - Life expectancy at birth
Education (years of schooling)	9.8	10
Skilled labour force (% of labour force)	16.3	19.8

^a 'Liberia', <http://hdr.undp.org/en/countries/profiles/LBR> (Accessed 16 August 2019); 'Sierra Leone', <http://hdr.undp.org/en/countries/profiles/SLE> (Accessed 16 August 2019).

more so than some of the most mineral-dependent countries in sub-Saharan Africa. This 'bias' has impacted policy treatment of ASM in both countries and sets the stage for a more in-depth examination of entrepreneurship and innovation in this sector.

The 'bias' in Liberia has been pointed out by several donors. Officers at the United Nations Economic Commission for Africa, for example, have concluded, based on its current policy orientation, that 'Liberia is actively promoting the industrialization of diamond and gold mining making ASM a low priority in its mining code and policies'.³ Officials at the World Bank have been more vocal about Liberia's extractive industries-led development strategy, stating that 'the Ministry of Lands and Energy focuses on large-scale mines, viewing artisanal mining as an impediment to progress in the mining sector' (World Bank, 2012, p. 13). But whilst several alluvial placer belts have been identified in the country, including Bea Mountain, Bopolu-Wuesua-Tawalata, Masawo-Zolowo-Zorzor, Mano River-Wologizi Range, St. John River-Kokoya, Cestos River, Putu Range-Zwedru and Bukon Jedeh, according to the British Geological Survey, 'it is generally considered that major placers amenable to large-scale modern mining methods are unlikely to be found in Liberia' (British Geological Survey, 2016, p. 4). The strength of the 'bias', however, is even more surprising when considering that even the government concedes there is 'limited large-scale industrial mining' (Government of Liberia, 2016, p. 10). The concession data suggest the same because at the time of writing, the country had only five active 'Class A' (large-scale mining) licenses: 1) Putu Iron Ore Mining Inc.; 2) China Union (Hong Kong) Mining Co.; 3) MNG Gold Exploration Inc.; 4) Bea Mountain Mining Corporation; and 5) Mittal Steel (Liberia) Holdings Ltd.⁴ A sixth is likely to be issued to London-based Hummingbird Resources for its Dugbe Gold Project in the southeast of the country, where feasibility studies and prospecting have been carried out under exploration licenses since 2011.

Nevertheless, the sums of money that such a poor country has managed to attract by orienting itself in this way are significant. According to the data that have been declared, large-scale mining generated, for the Government of Liberia, US\$144.4 million in 2013, US\$97.3 million in 2014 and US\$74.1 million in 2015, monies which include everything from permit fees to various taxes levied on activities.⁵ The formula for mine taxation in the country mirrors that in place in many of its neighbours: a corporation tax payable at 25 percent, a tax on goods and services at 7 percent, royalties on gold at 3 percent, and the government reserving the right to receive an equity interest in any Class A

³ 'Liberia ASM Profile', <https://knowledge.uneca.org/ASM/Liberia> (Accessed 3 August 2019).

⁴ 'Ministry of Mines and Energy, Liberia – Online Repository – All Workspaces', <https://portal.mme.gov.lr/license> (Accessed 19 August 2019).

⁵ 'LEITI Liberia', <https://eti.org/liberia> (Accessed 3 August 2019).

mining license holder of between 10 and 15 percent.⁶ The Government of Liberia's commitment to large-scale mine development is further underscored by its Mineral Development Agreements (MDAs), comprehensive plans hatched with individual companies that set out the basis for acquiring a Class A License (Wilson et al., 2017). As Table 3 indicates through case studies of Hummingbird Resources and Mittal, these development programs are likely seen by the government as sources of long-term financial stability.

In Sierra Leone, it was through communications with policymakers which revealed the extent of the country's large-scale mining 'bias'. Here, the tax on goods and services is payable at a rate of 15 percent, corporate income tax is 30 percent and the royalty rate on gold is 5 percent.⁷ Despite at the time of writing having only 11 active large-scale mining licenses, Sierra Leone has still earned huge sums of money by opening its doors to foreign investors to explore and develop mineral deposits. Between 2014 and 2016, it earned US\$105.88 million in taxes, permit fees and other rents linked to large-scale mining and mineral exploration.⁸ The sizable revenues gained by demarcating most of the country's lands to large-scale mining and mineral exploration companies likely explains why this 'bias' is so entrenched, to the point where policymakers do not even make an effort to conceal their intentions when interviewed:

Of course [our policy is leaning towards large-scale mining] ... It is not just a bias ... even artisanal mining helps in improving the geological information [for large-scale mining]. Any company that is positive ... we will encourage you ...⁹

Whilst policymakers consulted in Liberia seemed genuinely unaware of how awarding reconnaissance licenses, prospecting licenses and exploration licenses makes it challenging for artisanal miners to formalize, the same cannot be said about the Government of Sierra Leone. The impression conveyed by officials during interviews was that 'growing' large-scale mineral exploration and mining activities is the goal and something that is heavily prioritized over artisanal operations. One senior government official attempted to qualify why, downplaying

the latter's economic importance, in particular its ability to alleviate poverty through employment generation, on the grounds that 'artisanal mining is a seasonal thing annually'. This is why, the official further explained, 'if the area is free, government gives an exploration license' to large-scale operators.¹⁰ But even if the 'area is free', including sections of the country which the government has 'blocked out' for licensed artisanal miners to work, as another official explained in an interview, 'You are allowed [to work here] if you want to engage in artisanal mining, [and] you can mine in these areas' but this does not prevent the NMA from awarding exploration licenses here for large-scale operators, in which case, 'if they are owned by a mineral right holder, you need to consult him and get his consent'.¹¹

The 'bias' has affected policy treatment of ASM in both Sierra Leone and Liberia in similar ways. Both have elected to create separate 'artisanal' and 'small-scale' categories of mine licenses. In Sierra Leone, the names of the licenses correspond to these names precisely – 'Artisanal Mining License' and 'Small-Scale Mining License' – whilst in Liberia, the categories are 'Class C License' and 'Class B License', respectively. In doing so, these countries have followed, prescriptively, instructions contained in *A Strategy for African Mining* (World Bank, 1992), the World Bank's largely-outdated blueprint for mining sector reform in sub-Saharan Africa: that 'With the possible exception of special provisions for artisanal miners, new policy frameworks should eliminate distinctions between small and large-scale mining so as to encourage all potential interested parties' (p. 22). The 'special provisions' in these countries include prohibiting those in possession of a Class C License and Artisanal Mining License from using machinery, whilst the move to 'eliminate distinctions between small and large-scale mining' can be seen as the requirement placed on holders of Small-Scale Mining Licenses in Sierra Leone and Class B Licenses in Liberia to complete Environmental Impact Assessments and to pay hefty permit fees much like their large-scale counterparts.

Referring back once again to the 'two worlds' theme, there is now a sharp division between holders of Class C Licenses (Liberia) and Artisanal Mining Licenses (Sierra Leone) on the one hand, and Class B Licenses (Liberia) and Small-Scale Mining Licenses (Sierra Leone) on the other hand. As will be explained, and reinforced by De Soto (1989, 2001), the small group of individuals who have managed to obtain the latter, preside over operations which exhibit many of the hallmarks of the typical small and medium-sized businesses found in the formal economy, and innovate in ways which resonate powerfully with Schumpeter. But the former, who again are prohibited from mechanizing, find themselves confined to a semi-formal space, where survival depends heavily on adaptation to working in restrictive environments.

3.2. Small-scale mining

The story of 'two worlds' begins with what the Government of Liberia and Government of Sierra Leone consider a 'small-scale miner'. This is, again, a category which both countries have created through their Class B License and Small-Scale License schemes, respectively. Certainly, the rationalization for these governments wanting ASM to mechanize seems sound, at least on the surface: a desire for the sector's operations to make use of more advanced equipment and managerial practices because often, they 'occur on larger mining deposits where the artisanal miners do not have the technology or capital resources to be able to extract all of the minerals that are a part of the [mineral] deposit' (Blackmore et al., 2013, p. 9). The broad view in not only sub-Saharan Africa but in most areas of the globe where ASM activities are found in abundance is that 'Due to very basic mining skills coupled with low or no mechanization, the extraction is commonly unsystematic and ineffective', and that 'miners often cannot overcome simple geological

Table 3
Details of selected MDAs in Liberia.

Feature	Hummingbird	Mittal
Year signed	2019	2005 ^a
Duration	25 years ^b	25 years
Social Development	Community Development ^c	Socioeconomic regeneration, infrastructure development and environmental protection ^d
Finance	To be established	US\$3 million per annum, US\$75 million total

^a Natural Resource Governance Institute, *Mineral Development Agreement Between the Republic of Liberia and Mittal Steel Holdings*. See www.resourcedata.org/dataset/rgi-mineral-development-agreement-between-the-republic-of-liberia-and-mittal-steel-holdings (Accessed 12 August 2019).

^b 'Mineral Development Agreement with Gov of Liberia', www.proactiveinvestors.co.uk/LON:HUM/Hummingbird-Resources-plc/rms/LSE20190501070006_14058404 (Accessed 2 August 2019).

^c 'Hummingbird Resources, Operations Liberia', <https://hummingbirdresources.co.uk/operations-projects/liberia/> (Accessed 12 August 2019).

^d 'ArcelorMittal, Mineral Development Agreement', <https://liberia.arcelormittal.com/who-we-are/mineral-development-agreement.aspx> (Accessed 4 August 2019).

⁶ 'Mining in Sierra Leone and Liberia', www.mayerbrown.com/en/news/2012/11/mining-in-sierra-leone-and-liberia (Accessed 4 August 2019).

⁷ 'Mining in Sierra Leone and Liberia'.

⁸ 'SLEITI: Sierra Leone Extractive Industries Transparency Initiative', <https://eiti.org/sierra-leone> (Accessed 14 August 2019).

⁹ Interview, Government Official, Freetown.

¹⁰ Interview, Government Official, Freetown.

¹¹ Interview, Government Official, Freetown.

constraints or take advantage of scale effects because of their limited financial means' (Carstens, 2017, p. 7). In both Sierra Leone and Liberia, certain government officials became visibly annoyed during interviews when 'artisanal mining' and 'small-scale mining' were used interchangeably. These officials, however, seem oblivious to *how* devising two separate categories of operations, each with its own licensing scheme, is incapable of fixing the acute technological shortcomings of both countries' burgeoning artisanal segment. The rules and regulations attached to the 'Small-scale Mining License' and 'Class B License' have rather stifled innovation across the sector and hindered its development in both countries. When probed further during interviews about why these categories of licenses were created in the first place, policymakers were unable to provide concise answers.

These consultations, however, did prove valuable for two reasons, the first being confirmation that neither the Government of Sierra Leone nor the Government of Liberia has a clear idea of what role they see ASM playing, developmentally, in their respective countries over the long term, and therefore continue to send mixed messages about this. On the one hand, and in line with messages contained in the literature, government officials in both countries repeatedly referenced in interviews how ASM is largely 'poverty-driven', providing employment to hundreds of thousands of otherwise jobless people. As signatories to the Africa Mining Vision (AMV), 'Africa's own response to tackling the paradox of great mineral wealth existing side by side with pervasive poverty',¹² these governments are expected to take stock of this in policy and pursue 'a pluralist, holistic and multi-pronged approach that goes beyond providing technology options' and which 'recognize[s] that ASM is both a poverty-driven and a poverty alleviating, finite activity' (African Union AU, 2009, p. 28). On the other hand, and as will be explained, the policy frameworks implemented in both countries, specifically the decision to individualize 'Small-Scale' and 'Class B', have failed to operationalize these ideas.

To provide greater clarity on how licensing systems are stifling what is referred to here as 'innovation through mechanization' of ASM in both Sierra Leone and Liberia, it is instructive to reengage with Schumpeter. Moves made to establish the 'Small-Scale Mining License' and 'Class B License' categories suggest that, in line with Schumpeter, who 'argued that anyone seeking profits must innovate' (Śledzik, 2013, p. 90), both governments envision the ASM sector becoming a more mechanized entity capable of attracting investment and catalyzing local economic development. This resonates powerfully with the messages enshrined in the AMV, which preaches, *inter alia*, that 'Revenues derived from ASM can increase local purchasing power and have the potential to catalyze SME development and foster local economic multipliers' (African Union AU, 2009, p. 27). But as hinted by Frank (1998), this presupposes that the resources needed to innovate – or, in this instance, for innovation through mechanization – can be accessed by the entrepreneur:

... in order to enact their innovations, entrepreneurs must first have command over the means of production ... Thus, since entrepreneurs must generally begin anew, credit becomes crucial for successful entrepreneurship. Although credit is in effect only the creation of purchasing power, its necessary use by entrepreneurs makes it an essential component of development. [p. 588].

In Sierra Leone and Liberia, whilst holders of Small-Scale Mining Licenses and Class B Licenses do 'have command over the means of production', transitioning to this level is difficult, if not impossible, for most.

From communications with miners in both Sierra Leone and Liberia,¹³ the most significant barrier preventing this move is the license fee. In the former, individuals are required to pay US\$10,000 for a

'Dredging Permit (small-scale mining)' or a 'Small-scale Mining License' at a cost of US\$600/ha, whilst in the latter, US\$10,000 must be paid to secure a Class B License. Moreover, and as confirmed by government officials during interviews, there are no credit, technological support schemes or loans – again, keys to stimulating innovation – in place in either country for ASM, access to which are essential for cash-strapped individuals to 'graduate' to the Small-Scale or Class B level. As captured by the following excerpts from interviews with miners in both countries, this has spawned unique borrowing strategies, including partnerships with middlemen and forming groups out of desperation, both of which are trademarks of the informal economy:

During the rainy season it can be difficult to work alone due to the workload and the finances involved in buying fuel to bail water from the pit ... so when we work in a group, we find it easier to meet such financial obligations.¹⁴

I am a stranger here and getting a piece of land costs money. I do not really have an option but to join friends who are landowners, in order for me to survive.¹⁵

In order for us to work faster and earn a little money, working in a group is easier. When we work in a group it is easier to get access to land and a supporter to provide the group with food and a personal loan. If you work alone it could be difficult.¹⁶

There are brokers in Butter Hills that I can sell to ... At times, when things are tough, I can get credit from them. Sometimes I take rice on credit. When my finger was hurting and I was not working, I got drugs from his store on credit. So, when I get minerals, I sell to him.¹⁷

The low numbers of licensees are a testament to how difficult it is to make the transition. At the time of writing, in Liberia,¹⁸ there were only five Class B License holders (only three of which had been issued for gold), and in Sierra Leone, even fewer (three) were in possession of active Small-scale Mining Licenses. Again, only miners in possession of these licenses are entitled to acquire machinery and mechanize in ways outlined in the AMV. In Schumpeterian terms, these six licensees are, therefore, the only miners across *both* countries who are freely able to take advantage of 'conditions of opportunity and appropriability', capture 'the ease of innovation by would-be innovators' and demonstrate 'the ability of innovators to protect their innovations from imitation, and therefore to reap results and profits from their innovations' (Malerba and Orsenigo, 1995, p. 48). An example of this would be the six licensees acquiring advanced machinery from the few distributors of mine technology based locally, such as Mantrac Sierra Leone and Mantrac Liberia, the sole suppliers of Caterpillar equipment in the two countries. Following Breschi et al. (2000), the license holders of mines that are mechanizing for the first time follow a path akin to *creative destruction* or 'widening', whilst those with operations where innovations have been introduced before follow a pattern referred to as 'deepening'. Ironically, many of the government officials who described ASM as a 'poverty-driven activity' during interviews,¹⁹ when probed about how the costs of 'upgrading' to Small-scale Mining and Class B status were prohibitive and consequently fuelling informality, seemed to disagree, hinting that neither government intended to overhaul policies to reduce license fees as this is not believed to be a barrier to formalization.

This leads to the second reason, and the likely explanation for why:

¹⁴ Interview, Artisanal Miner, Nyamudu.

¹⁵ Interview, Artisanal Miner, Salima.

¹⁶ Interview, Artisanal Miner, Sandaru.

¹⁷ Interview, Artisanal Miner, Butter Hills.

¹⁸ 'GoSL Online Repository' <https://sierraleone.revenuedev.org/dashboard> (Accessed 4 August 2019).

¹⁹ 'Mining in Sierra Leone and Liberia', www.mayerbrown.com/en/news/2012/11/mining-in-sierra-leone-and-liberia (Accessed 13 August 2019).

¹² See 'Africa Mining Vision', www.africaminingvision.org/about.html (Accessed 31 August 2019).

¹³ 'Ministry of Mines and Energy, Online Repository' (Accessed 4 August 2019).

because, in the spirit of *A Strategy for African Mining*, both countries are attempting to push the sector into a large-scale mining space. This, however, should come as no surprise in countries with as visible a large-scale mining ‘bias’ as Sierra Leone and Liberia, where charging exorbitant fees for licenses complements entrenched patterns of rent-seeking behaviour linked to permitting fees for, and taxation of, (large-scale) mineral exploration and extraction projects. But the obvious differences between small-scale mines and large-scale mining operations, and the limitations, developmentally, of the former, make regulating both under the same umbrella a curious decision. Doing so presupposes that access to machinery will yield more efficient and innovative operations; but in both countries, legislation *prevents* this from happening. For example, whilst large-scale mining features a distinctive exploration phase, during which crucial geological knowledge is obtained by world-class engineers and earth scientists, there is no such stage in ASM nor dedicated prospecting permit equivalent linked to either a ‘Small-scale Mining License’ or ‘Class B License’. In Sierra Leone, prospective holders of ‘Large-scale Mining Licenses’ know, when paying the US\$500,000 license fee, that those who held a ‘Reconnaissance license’ and/or ‘Exploration license’ before them carried out the geological work – activity which verified, *inter alia*, the speciation of mineral deposits, the orientation of ore bodies and concentration of gold – needed to determine which technologies were required to facilitate the most efficient mineral extraction and processing. The same applies to prospective ‘Class A License’ holders in Liberia, where work undertaken by those in possession of a ‘Reconnaissance License’, ‘Prospecting License’ and/or ‘Exploration License’ is relied upon to identify the requisite machinery for production. As Endl et al. (2019) et al. explain, in broad terms, innovation across a large-scale mine’s lifecycle, from reconnaissance, through prospecting and exploration, to production, ‘plays a key role in addressing mining challenges’:

There are two different approaches towards the role of innovations: The first ... represents an “inside-out” approach, as it sees the geology (declining grades, deeper and remote ore bodies) and economic viability of an ore body as key, with safety, legislation and the environment seen as major constraints that need to be considered. The focus of innovations is on technology, and their driver is mainly increased profitability. The second approach, representing an “outside-in” approach ..., looks at mining from a broader, sustainability driven, societal perspective, which includes challenges, such as mining’s role in a circular economy, supply security, contribution to climate change, and increased consumer demand for transparency. In this case the typology of innovations focuses not only on technology but also on societal concerns as their key drivers. [p. 2].

Conversely, holders of ‘Small-scale Mining Licenses’ and ‘Class B Licenses’ do not get the equivalent jumpstart in identifying innovative technologies and practices which a lifecycle featuring separate reconnaissance, prospecting and exploration phases affords. Holders of these licenses, therefore, must rely entirely on themselves to gather crucial geological information and identify opportunities to innovate within their own operational spaces.

Requiring holders of Small-scale Mining Licenses and Class B Licenses to abide by the same rules as mining companies also means subjecting them to strict environmental regulations. The *Environmental Protection Agency Act of Liberia* makes it mandatory for all industries to file an Environmental Impact Assessment (EIA) with the country’s Environmental Protection Agency. An EIA declaration format has been specifically designed for mining, and features the following five phases: project screening, scoping, description of the project and environmental baseline, identification of environmental impacts, and environmental management and monitoring (Wilson et al., 2017). In Liberia, the EIA fee for a Class B Mining License holder is US\$32,025. A similar setup exists in Sierra Leone, where the Environmental Protection Agency Sierra Leone is mandated to administer an EIA for mining activities of all

types, the lone exception being artisanal operators. The country’s *Mines and Minerals Act* requires both holders of Small-scale Mining Licenses and Large-scale Mining Licenses to complete an Environmental Impact Assessment in accordance with the *Environmental Protection Act* of 2000. The *Environmental and Social Regulations for the Minerals Sector*, 2012 outlines these comprehensive procedures very clearly. Whilst officials from the NMA do not believe the costs linked to the ‘Small-Scale Mining License’ are prohibitive, the following interview segment suggests that their position on EIA fees may be different:

On average, between US\$40,000 to US\$60,000 ... Active small-scale mining licenses, we have about three or four ... imagine ... Year back, say about four or five years back, we had about 200 small-scale licenses ... But that has fizzled out and part of the reason is the EIA fee. Most of them could not afford to pay the EIA fee.²⁰

But despite these views, the low numbers of licensed small-scale miners in Sierra Leone and Class B holders in Liberia are telling signs that costs – whether registration fees, payments linked to environmental protection or a combination of the two – present significant barriers to obtaining either permit. One often-overlooked reason why the decision to charge exorbitant fees for EIAs in both countries is unnecessary is that it provides neither the holder of the Small-scale Mining License nor the Class B License with much of an advantage when it comes to innovation through mechanization. Specifically, despite being required to complete several laborious steps, including consultations with various stakeholders, in order to secure their EIAs, holders of these licenses are still constrained from innovating and mechanizing completely because they are prohibited from using cyanide, the leach reagent used for gold in large-scale setups across the world. Referring to the typology of entrepreneurship presented earlier, the holders of Small-scale Mining Licenses and Class B Licenses who can access capital fall into the ‘opportunistic’ category of entrepreneurship.

These barriers have fortified the boundaries of a much more populated second group: what both governments consider artisanal miners. The discussion now shifts focus to the worlds of the artisanal miner in Sierra Leone and Liberia.

3.3. Artisanal mining: The other path

Revisiting points raised by De Soto (1989, 2001), in Sierra Leone and neighbouring Liberia, artisanal mining activities are widespread and dynamic but are in many ways the products of red tape and bureaucracy. A segment from an interview with a government official in Sierra Leone casts greater light on why:

I believe the situation would be much more improved if we could see the artisanal and small-scale miners as operating legally in the chain which ... I meant they are hiding to do their work because everyone sees them as illegal ... If you go to Kono, right? I mean ... they [the miners] cannot do small scale because I mean the EIA fees is quite high you know? So, you know, they cannot be scaling up ... So most of the time they forcefully graduate themselves into the small scale.²¹

A more accurate description of artisanal mining in both countries is that it is *semi-formal*: whilst a large share of the sector’s activities is legal, holders of an ‘Artisanal Mining License’ in Sierra Leone and ‘Class C License’ in Liberia cannot access formal support of any kind. This has – to borrow terminology from the same government official – prevented miners from ‘scaling up’ to Small-scale in Sierra Leone and Class B status in Liberia.

All artisanal miners and Class C License holders interviewed in Sierra Leone and Liberia fall into the ‘poverty-driven’ and ‘platform for wealth creation’, or ‘necessity’ and ‘hybrid’ entrepreneurship, categories. The

²⁰ Interview, Government Official, Freetown.

²¹ Interview, Government Official, Freetown.

following excerpts from selected interviews confirm as much:

Because I want to make money to survive, this is the main source of income we only do small farming so we can maintain our lives in rough times.²²

Because of the heavy rains. You know mining is seasonal because we don't have the appropriate equipment to do the mining at this time, I focus more on my farm in order for us to be able to get food to eat and sell some so we can sponsor the mining. If all is well, mining has a bigger revenue than farming if you get the proceeds.²³

It is a means of earning cash to maintain one's home and family. Rice farming here cannot give you much to build a house but gold mining can do that for you ...²⁴

Is where I get cash to solve most of my family needs as farming here is just a means of satisfying our food needs ...²⁵

How, then, have growing numbers of these artisanal miners in both countries adapted to policy environments which inhibit innovation through mechanization? If, as Thomas (1987) suggests, 'innovation and entrepreneurship' are viewed in much broader terms, specifically as 'imaginative, nonstandard practice and acutely perceptive activity by the entrepreneur', the 'worlds' of both countries' artisanal miners, and how their operations are closely synchronized with rules and regulations, become much clearer. It begins with operators skilfully maneuvering to access machinery capable of increasing their gold production. During interviews with policymakers in Monrovia, particularly officials at the Liberia Revenue Authority and Ministry of Mines,²⁶ there was repeated reference made to how Class C Mining Licensees 'forcefully graduate themselves into the small scale', in this case, to Class B status. This was observed during numerous visits to field sites such as Weaju, where both unlicensed miners and holders of Class C Licenses were observed using crushing machines called *kata* purchased in neighbouring Guinea. But whilst the local government officials 'allow' this to take place, by law, again, only those in possession of Class B Mining Licenses are permitted to use equipment of this nature.

Similar patterns of adaptation and innovation have been observed more widely in neighbouring Sierra Leone. Here, World Bank officials have even gone as far as to declare artisanal miners' use of heavy machinery a problem, on the basis of which, they have called for a more comprehensive recategorization of mining licenses:

Refinement of how "small-scale mining" is defined is essential in the current context where illicitly obtained, multiple holdings of artisanal licenses, including by single foreign entities, effectively translates into a small-scale mining operation but is beholden only to artisanal legal (and environmental) requirements, of which there are few. [World Bank, 2017, p. 5]

The same points were made by a government official during an interview, who explained that 'now the problem we are facing because most people could not afford the Small-Scale [Mining License], most of them disguise, the small-scale people disguise under the artisanal because you don't have to pay fees, and most of them, they use machines'.²⁷

Generally, most artisanal gold mining in sub-Saharan Africa is a part of what De Soto (2001) refers to as the 'extralegal economy': a world of informality, in which people are in possession of assets (deeds, titles, land, etc.) that could be valuable for development but are not recognized by law and are therefore 'dead capital' (Von Benda-Beckmann, 2003).

The focus here is not what may constitute 'dead capital' in the context of artisanal gold mining in these countries but rather how, within the boundaries set by laws for their burgeoning pockets of operators, it functions. As mentioned, in the absence of regulators, a host of actors, including various middlemen and traditional leaders, control capital flows in and out of these communities. What makes the cases of Sierra Leone and Liberia somewhat unique in this context, however, is the – mostly, undisguised – role local government officials play in driving the extralegal artisanal gold mining economies in their countries. Most are stationed in the communities where activities take place.

Van Bockstael (2014) provides an overview of the Liberia case. Here, a Class C Mining License, which covers an area of up to 25 acres, costs US \$150 to obtain but the *Mining and Minerals Act* requires lands to be demarcated by a surveyor for an additional US\$150. Whilst nowhere close to the US\$10,000 fee for a Class B License, these fees are still beyond the budgetary means of most Liberians. To overcome this, many miners explained during interviews that they formed groups to help buffer against these costs, and in instances where this was not possible, brokers (buyers of gold), who are also middlemen, are consulted:

Because everybody in this village work on their own and by working on my own I am my own boss, at times we only seek assistance from our brokers when we are in need but I am my own boss. I only pay him what I owe him it is not a joint business. I run my operations, I get my goods, he deduct his money in gold and buy the rest. This is how it operates here.²⁸

I prefer working on my own because it's my claim and I decide who go down and I know comes out, I am the one spending the money, we don't have any argument at all. Everybody knows what they are supposed to get. Working as a group everybody is boss man. When you work on your own you are in control, the only thing when it gets tough and no money you have to credit from brokers to keep up the work but working on your own is better than as a group.²⁹

I am working on my own because I have no support. I work on my own because sharing when working as a group is a problem. People don't want to contribute the same but wants to share proceeds equally. For instance, I have claim and I want us to work as a group, my contribution will be the claim and others will have to invest money or labour. When it comes to sharing, they want all the proceeds and you are left with nothing. They say you have a miner's share but after checking all expenses which will go back to the supporter, you are left with almost nothing, they are the ones to benefit so for this reason I prefer working on my own ...³⁰

Because we all use our labour and out our resources together, so it easier for us to carry on the work. At the end of the day we share equally all the proceeds that we have. Because we don't have enough money to sponsor and no supporter so we out our efforts together.³¹

To clarify, however, those who work individually and are not a part of larger groups still hire labourers. Following a similar strategy employed in the country's alluvial diamond mining sector, and outlined by Hilson and Van Bockstael (2012), 'hired' workers are paid in ore and are supplied food and water by the claimholder.

Holders of Class C Mining Licenses are also required to pay, annually, a US\$150 renewal fee. At the time of writing, there were 544 active Class C Mining Licenses linked to gold, although quite surprisingly, no records of suspension. This leads back to observations made in Weaju, where again, the local government official allows artisanal miners to use heavy machinery. Reflecting on the local-level dynamics of artisanal diamond

²² Interview, Unlicensed Artisanal Miner, Butter Hills, Liberia.

²³ Interview, Class C License Holder, Reeve Village, Liberia.

²⁴ Interview, Artisanal Miner, Sandaru.

²⁵ Interview, Artisanal Miner, Sandaru.

²⁶ Interviews, Government Officials, Monrovia.

²⁷ Interview, Government Official, Freetown.

²⁸ Interview, Class C License Holder, Butter Hills.

²⁹ Interview, Class C License Holder, Butter Hills.

³⁰ Interview, Class C License Holder, Weaju Village.

³¹ Interview, Class C License Holder, Weaju Village.

mining in Liberia, Van Bockstael (2014) explained that at some sites, there was a US\$50 ‘clearance’ fee paid by prospective licensees to the local mining agent, a transaction which guarantees that ‘the claim in question will not be taken over by a third party, while the prospective miner is in Monrovia arranging his Class C mining license’ (p. 13). But as the following passage suggests, this ‘clearance fee’ is what catalyzes action in the extralegal gold mining economy in Liberia:

While a clearance fee is supposedly only valid for three days, enough time for someone to formally start the application process for a mining license, in practice, this is often used as a temporary mining permit, on average valid for three months. Many interviewed miners claimed to be operating using this kind of ‘license’, as it presented them with an alternative to paying for the costly licensing process up front. Using one or more successive clearance fees, they could commence mining, only applying for a license whenever they have recovered the necessary funds to pay for their license ... [p. 13–14].

With decisions on mining licenses, fee payments and most other policy-related decisions in the sector being extremely centralized in Liberia, even for sub-Saharan Africa, it is not surprising that these actions have gone unnoticed.

Similar dynamics persist in Sierra Leone but unlike Liberia, these have emerged because of the sharp and – what appears to be intentional – disconnect between the administration of Artisanal Mining Licenses on the one hand, and that linked to all other mining licenses on the other hand. The former are administered and awarded at the district level by NMA officers, at a cost of 250,000 Leones (approximately US\$40). But the databases for these licenses are, rather curiously, maintained locally and separately from those for Large-scale, Prospecting, Exploration and Small-scale (licenses), which are handled centrally by the NMA office in Freetown. A senior government official described this approach in greater detail and reflected on the types of situations it has given rise to:

We have the area supervisors who issue artisanal mining licenses vis-à-vis the industrial licenses, exploration, small-scale, large-scale ... So if we want to issue an artisanal license because that is done basically in the region, we definitely need to go demarcate to see that the area is not within a licensed area before the regional manager could approve the issuance of any licenses ... though actually of course we have designated areas for artisanal miners but the big challenge we are facing here is that most of the areas that is designated for artisanal miners, I mean, we have exploration licenses in these areas, so we are facing an interface problem with the exploration companies and the artisanal miners ...³²

This ‘interface problem’ to which the official is referring is a direct consequence of this disconnect. The broad consensus among government officials consulted in Freetown was that this separate policy treatment was the result of ‘funding constraints’ because ‘regional offices are not up to the level we want them, you know, in terms of one being capacitated to do the job effectively’.³⁴ The reason this may be the case, however, is, as was explained by yet another Freetown-based government official in an interview, that, ‘For us, we see artisanal miners as a pathfinder for you guys who are doing exploration’,³⁴ an attitude not untypical of policymakers in settings where there is a large-scale ‘bias’. The same government official accused local government officers for causing this problem, explaining that ‘the regional managers have the mineral rights map [and] ... they are aware of that [and therefore] obviously we cannot allow artisanal mining within an exploration license’.

But much like officials in Freetown, who view this setup as a rent-

seeking opportunity, so, too, do local government officers. Two officials explained, during interviews, why, despite having access to the mineral rights map, they continue to award Artisanal Mining Licenses in areas occupied by exploration licenses:

When it comes to artisanal mining areas ... there are people who put in for exploration licenses but the system that we are operating under or to be accepted, it may be locally acceptable perhaps nationally not so ... Like areas where people have what we describe a ‘exploration licenses’, we usually go on and give artisanal miner because that is where the money comes so fast when we put it as artisanal mining licenses so most of the time we ignored this area of exploration licenses existing. Most of the time these people acquire the exploration licenses they are not active in the field ... So when you’re not active, somebody puts in a piece of land to the chief ...³⁵

We have this situation where a lot of people have acquired exploration licenses but some are not even active and some have even been cancelled. Of course, by law you acquire an exploration license where in the space of three months you are not doing any activity on that land I mean your license is supposed to be cancelled or suspended. So, we have a lot of that issue in Kono where almost everywhere have been occupied by people who have acquired an exploration license and have abandoned the place so those places are being mined artisanally so we issue an artisanal mining license there ...³⁶

Both government officials, however, began by explaining how their salaries are extremely low, which suggests that a charge is being levied, similar to the ‘clearance fee’ in Liberia, to compensate for what they believe is a shortfall in their income. They mentioned how they permit many holders of Class C Mining Licenses in their administrative jurisdiction to use machines on their plots, although during interviewing, no miner was seen using equipment. It is these allowances, therefore, that seem to be driving extra-legal artisanal gold mining activities in Sierra Leone.

Yet, whilst these extralegal systems allow miners to work, as well as procure and use the occasional piece of equipment unnoticed, under these circumstances, wholesale changes in operational strategies and innovation more generally are impossible due to the policy and legal frameworks in place for artisanal mining in both countries. On the one hand, the architects of the AMV are calling on governments in sub-Saharan Africa to encourage ASM operators to be innovators and to mechanize their operations. On the other hand, financial and logistical barriers prevent individuals from acquiring a Small-scale Mining License in Sierra Leone and Class B Licence in Liberia. Government officials interviewed in both countries, however, were very confident about newly-conceived national artisanal mining policies being able to facilitate formalization and improve working conditions in the sector. In Liberia, this is the *Regulatory Roadmap for the Artisanal Mining Sector in Liberia* (Government of Sierra Leone, 2018). Its stated purpose is ‘to boost the number of artisanal miners operating in the formal economy, empower mining groups by making them aware of their rights, roles and responsibilities, and create a win-win-win tripartite system whereby the immense potential of the AM [artisanal mining] sector to generate socio-economic benefits for miners, mining communities, and the Government of Liberia is harnessed’. To achieve this, it explains, ‘The MLME has adopted a bottom-up approach to formalize the artisanal mining sector and to design Artisanal Mining Formalization Program interventions’ (p. 11), and ‘presents eight (8) thematic policy areas under which the Artisanal Mining Formalization Program will be implemented’ (p. 7): 1) Decentralization of MLME Governance Structures; 2) Improvement of Accessibility to AM Licenses; 3) Tracing and Reporting of Mineral Production and Sale; 4) Piloting of Artisanal Mining Umbrella Organizations/Cooperatives; 5) Spatial mapping of artisanal mines in

³² Interview, Government Official, Freetown.

³³ Interview, Government Official, Freetown.

³⁴ Interview, Government Official, Freetown.

³⁵ Interview, Government Official, Kono-based.

³⁶ Interview, Government Official, Kono-based.

Liberia; 6) Improvement of AM Environment Management Practices; 7) Enhancement of AM Health, Safety and Security Practices; and 8) Demonstration of Social Responsibility. At the time of writing, however, the Government of Liberia had not invested a single dollar to operationalize these ideas, and of late, only one donor – the German development agency, GIZ – has engaged in any type of project work which focuses on artisanal mining in the country. Even this was a small intervention aimed at organizing cooperatives, the funding for which expired in December 2018. But even more inexplicable than the lack of finance to support artisanal mining is the content of the policy itself, which, rather curiously, fails to even acknowledge how the sector's growth in the country is linked to poverty, nor offer any guidance to those in possession of a Class C license on how to overcome barriers to mechanization. It does, very importantly, acknowledge how fees are preventing individuals from securing a license but whilst pushing to 'Prohibit the practice of levying "clearance fees"', fails to recognize that this situation has arisen because of the constrained position artisanal miners find themselves in and how removing the clearance fee, the catalyst driving the extralegal gold mining economy in Liberia, would have enormous economic consequences at the local level.

The equivalent framework in Sierra Leone is the *Artisanal Mining Policy for Sierra Leone* (Government of Sierra Leone, 2018), the stated goal of which is to 'set out a clear framework that will guide actions leading to the improvement of artisanal mining sector governance and management and promote alternative livelihood skills for miners, improve sustainable artisanal mining practices, enhance environmental protection, community and occupational health and safety safeguards in artisanal mining operations, ensure that miners get a fair deal for their winnings; and strengthen linkages between artisanal mining and other sectors of the economy of Sierra Leone'. Its specific objectives are as follows: 1) to provide legitimate employment for the rural poor and contribute to poverty reduction; 2) to improve AM (artisanal mining) financial benefits for miners and AM communities; 3) to formalize Artisanal Mining operations to be legally compliant; 4) to reduce incentives for illegal AM operations; and 5) introduce and promote the use of modern mine safety and worker health practices for lifecycle of AM operations including the introduction of modern methodologies and technologies to further improve and develop the AM sector. Similar to the *Roadmap* in Liberia, the *Artisanal Mining Policy* has the look of a document that was assembled hastily, fails to connect with the needs of the artisanal miner, and does not seem to recognize that the conditions attached to an Artisanal Mining License are constraining, preventing operators from mechanizing their activities. Curiously, despite describing artisanal mining as 'poverty-driven', the *Artisanal Mining Policy* shies away from discussing the sector's economic importance, electing rather to draw attention to the risks endured by the diggers at the bottom of the sector's labour hierarchy. It then proceeds to discuss alternative livelihoods but offers few viable routes for transitioning people out of artisanal mining.

Although both Sierra Leone and Liberia are signatory to the AMV, it is unclear how either framework speaks to the manifesto's central pillar, *Boosting Artisanal and Small-Scale Mining*. In fact, given the high incidences of poverty in both countries, the blandness of both documents is somewhat surprising even among nations with a significant large-scale mining 'bias'. A strong indication of the lack of imagination put into these policies is the emphasis each places on organizing cooperatives when, in both countries, miners repeatedly visited at the study sites explained that this was not desirable – that working in groups was a last resort. Disconnected from the dynamics of the artisanal mining category, both governments have, unsurprisingly, failed to cultivate viable routes for operators to mechanize, innovate and grow as entrepreneurs. In both Sierra Leone and Liberia, having in place enabling frameworks for this burgeoning and disadvantaged group of miners is essential if they are to 'upscale' to the more efficient, mechanized operations the architects of the AMV believe can provide the foundation for local economic development in sub-Saharan Africa. Failure to do this in both

countries has, thus far, created and subsequently cemented the barrier between two very different worlds: that of the artisanal operator and that of the small-scale miner.

4. Concluding remarks

As a point of departure, it is instructive to revisit the ideas introduced at the beginning of this paper. There is, understandably, considerable intrigue and enthusiasm in the management discipline about sub-Saharan Africa and the research opportunities it presents for its scholars. A series of animated critiques produced in recent years (e.g. Rivera-Santos et al., 2015; Zoogah et al., 2015; George et al., 2016) reveal as much, surveying four decades of work to identify what territory has been covered thus far and where management scholars could contribute theoretically and empirically moving forward. These critiques have emerged at an important time – i.e., during the formative years of the SDGs – and are intended as manifestos for guiding future research conducted on sub-Saharan Africa in the management discipline. There is, however, considerable ground to be covered, although the outlook is not entirely bleak. As confirmed by Kolk and Rivera-Santos (2018), who surveyed work, retrieved through comprehensive literature reviews, produced on Africa in the discipline since 2010, the quantity of research undertaken to date has been disappointing, although at the same time, scholars are well-positioned to make important contributions in several areas. The authors state specifically that the potential of Africa-based research 'has still not been fulfilled'; that many avenues for context-bound, context-specific, and context-free research exist; and that data collection for some topics may be less daunting than it seems at 'first sight' (p. 430–431).

It is the latter point which provided an entry point for this article. Perhaps nowhere have the limitations of theories and frameworks developed in management been exposed more in investigations on sub-Saharan Africa than in the interrelated fields of entrepreneurship and innovation in small business. The hybridity and complexities of the entrepreneurial activities found in the region are true reflections of its unique political, socio-cultural and economic context, broader issues which management scholars have barely interrogated. Sub-Saharan Africa is a landscape scarred by poverty, rampant inequality, weak governance and, as a result, the location of a sprawling yet dynamic informal economy. The core ideas and principles that have long anchored debates on entrepreneurship and been shaped heavily by experiences in the West, therefore, require further nuancing when applied to a geographical setting such as sub-Saharan Africa. Any move to do so must begin with the necessity-opportunistic entrepreneurship typology which, for decades, has been at the heart and very much a focal point – at times, implicitly – of seminal work in the management discipline. Whilst the divide between necessity and opportunistic entrepreneurship is visible in sub-Saharan Africa, the dynamics of each are not always clear. But bridging these sizable gaps will require undertaking comprehensive and often, arduous, field-based empirical research in very challenging political and geographical settings, work which has never been a strength of the discipline. Nearly three decades ago, Diomande (1990) and Takyi-Asiedu (1993) published what should be seen as landmark conceptual analyses on entrepreneurship in sub-Saharan Africa. Both authors very importantly drew attention to the unique political and socio-cultural context of sub-Saharan Africa, offering a glimpse of the 'brand' of entrepreneurship found in the region. Yet, aside from Spring and McDade (1998) and a more recent collection of papers, analysis of entrepreneurship in sub-Saharan Africa in the management discipline remains exceedingly thin.

Are management scholars discouraged from the rigours involved with undertaking empirical field-based investigations in sub-Saharan Africa? The limitations of the management literature in adequately contextualizing entrepreneurship and innovation in sub-Saharan Africa were certainly revealed in the analysis of ASM and cases of Sierra Leone and Liberia profiled in this paper. As explained, ASM is an important

rural nonfarm income-earning activity in sub-Saharan Africa but its rapid growth across the region is linked to informality and poverty, two subjects which management scholars have admittedly struggled to unpack critically. The investigation has also demonstrated the importance of bringing together concepts and fortifying *hitherto* underdeveloped ideas with analysis carried out on sub-Saharan Africa in different disciplines. Drawing on ideas at the heart of debates on informality and livelihoods explored in depth in the anthropology, geography and development studies disciplines, this paper has analyzed at greater length the evolution of different categories of ASM in sub-Saharan Africa, as well as nuanced further the typology of entrepreneurship as it applies to this sector. As experiences from Sierra Leone and Liberia illustrate capture, policy frameworks have created two different ‘worlds’ in the ASM sector: on the one hand, that which is linked to a burgeoning semi-formal branch, and on the other hand, that populated by individuals with more mechanized operations.

To conclude, the management literature could offer valuable complementary analysis in the area of innovation. Management scholars have often been reluctant to stray way from Schumpeter but if a broader definition of entrepreneurial innovation is adopted to include ‘anything new undertaken by an entrepreneur that enhances the competitive advantage of his/her enterprise’ (Ise, 1995, p. 41), many of the challenges faced by ASM operators and the sector’s policy conundrums become much clearer. When ASM in Sierra Leone and Liberia specifically are viewed through such a lens, it become very obvious how the restrictions imposed on holders of Artisanal Mining Licenses and Class C Mining Licenses are impeding innovation through mechanization, and by extension, formalization, of the sector. Making payment a prerequisite to ‘growing’ ASM has put the sector’s operators at a disadvantage. It also assumes that the groups of people pursuing work in ASM in Sierra Leone and Liberia and more broadly, sub-Saharan Africa, are homogeneous – specifically, opportunistic types lured by a desire of ‘getting rich quick’ – when, in fact, it is precisely the opposite: as explained, very different types of entrepreneurs, each with unique backgrounds and particular needs, populate this sector. The large-scale mining ‘bias’ which dominates planning around extractive industries in both countries has stifled the creativity needed to establish a platform capable of stimulating innovation across the broad ASM tapestry. It has rather been responsible for establishing the two ‘worlds’ observed in the ASM sector and described in this paper, and for creating the sharp division between them, in Sierra Leone and Liberia. The first of these ‘worlds’ is populated by a very small number of individuals who run very advanced operations featuring heavy machinery, under Class B Licenses and Small-scale Mining Licenses, and who are subjected to the same rules as capital-intensive large-scale miners but not afforded the same privileges. The second is populated by a burgeoning group of artisanal miners, many of whom are in possession of a Class C License or an Artisanal Mining License but are not permitted to utilize equipment and therefore, prevented from innovating in the conventional sense. They find themselves confined to a semi-formal economy dominated heavily by extra-legal transactions (De Soto, 1989, 2002). What this paper has shown is that the large-scale mining sector requires separate policy treatment to ASM, from the most rudimentary low-tech players to its more advanced operators, and that frameworks must be flexible enough to connect with, and respond to the needs of, an eclectic group of players, and act as an enabling framework for innovation in different ways.

There is, however, an opportunity for scholars to exchange ideas on how to formalize ASM, and to brainstorm ways in which to stimulate innovation across its broad array of operations, in sub-Saharan Africa. The SDGs and AMV provide this rare platform, and for scholars in management, to transcend boundaries to refine ideas mostly formulated using experiences from the West in a bid to better understand the dynamics of a sector which the discipline’s core theories and concepts have limited capacity to explain and contextualize. It is hoped that the attempt made to do so in this paper with ASM will inspire other management scholars to undertake work in sub-Saharan Africa on subjects

which, by their own admission, they have not always felt comfortable investigating.

CRediT authorship contribution statement

Gavin Hilson: Writing - original draft, Writing - review & editing, Visualization, Project administration, Resources, Conceptualization, Investigation, Formal analysis. **Roy Maconachie:** Writing - review & editing, Investigation, Project administration.

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Appendix A. Supplementary data

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