

Article

Supporting Sustainable Development Goal 5 Gender Equality and Entrepreneurship in the Tanzanite Mine-to-Market

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Abstract: This article analyses how a strategy for Tanzania's tanzanite gemstone mining sector could foster gender equality in the mine-to-market (M2M) supply chain, whilst enhancing opportunities for female entrepreneurship as part of the country's sustainable economic development. In the mining industry, the contemporary concept of mapping artisanal and small-scale mining to the UN Sustainable Development Goals is a newer aspect of sustainability. SDG 5 aims to achieve gender equality and empower all women and girls. However, while there have been initiatives to support gemstone mining in Tanzania and East Africa, to date, the role of women in the lucrative tanzanite M2M supply chain has been less visible and a missed opportunity. This is a concern, as in 2019, pre-COVID-19 pandemic, gemstone and precious metals accounted for an incredible 33.2% of Tanzania's total exports. In contrast, in leading mining countries such as Australia and Canada, the participation of women continues to steadily advance, economically empowering the women involved. This article contributes a critical review of Tanzanian mining regulation and licensing practice in a historical and gender equality context. A qualitative research case study showcases artisanal small-scale (ASM) tanzanite gemstone miner and entrepreneur Pili Hussein, with a view to support the formulation of a Tanzanian regional, female-oriented, M2M tanzanite strategy. The developed world experience of increasing levels of gender participation in mining provides evidence of a reduced gender pay gap and enhanced mine safety practice when women are involved. This research finds that increased investment in supporting women to participate in the tanzanite M2M gemstone supply chain positively impacts SDG 5 in the country. Furthermore, given Tanzania's economic dependence on mining and the exceptional characteristics of rare, single-source tanzanite (a generational gemstones), we conclude that gender equality and female mine-to-market (M2M) entrepreneurship has an undervalued, yet important, role to play in Tanzania's future socio-economic development.

Keywords: Africa; artisanal small-scale mining; gemstone; gender; gender pay gap; SDG 5; sustainable development; tanzanite; Tanzania; entrepreneurship



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1. Introduction

The discovery of tanzanite gemstone in 1967 put Tanzania on the world stage. Tanzania has been blessed with a high-profile, highly desirable unique resource that will be forever associated with the country and merits even greater government attention. Tanzanite is found in the Merelani Mining District in the northern hills of Tanzania, the world's sole commercial source of mesmerising tanzanite, the extremely beautiful variety of zoisite, a gemstone that is a thousand times rarer than diamond. As a single-source, globally unique

young gemstone variety, tanzanite gemstone is an incredible national Tanzanian mineral resource that could have wider benefits than simply as another commonplace gemstone such as diamond or sapphire. Surprisingly, despite tanzanite being one of the rarest and most beautiful gemstones on Earth [1], it is considerably undervalued relative to its rarity and desirability [2]. Not ensuring that women are also able to leverage the economic benefits of the rare tanzanite gemstone would be a missed opportunity for Tanzanian women. Accelerating their participation in the global economy and promoting sustainable economic development is a great challenge for the United Republic of Tanzania as its mining sector undergoes a complex, multidimensional transformation to achieve sustainability.

1.1. Sustainability and Gender

Sustainability emerged as a key world public policy in 1992 [3]. The relationship between gender inequality and economic development is an issue of growing global concern in academic, economic and political spheres [4]. Gender equity is an under-rated economic dimension of the sustainability ethos that challenges Tanzania's mining policy, while at the same time, due to its income generation capacity, holds immense promise for the country's long-term sustainable development. After the tanzanite mine is depleted, the value of existing rare tanzanite is predicted to increase exponentially [5]. As fair distribution of economic opportunity is a central theme of sustainability, this extends to the lucrative gemstone mine-to-market (M2M) sector [6]. Once mining is deemed economically feasible, it leads to either artisanal and small-scale mining (ASM) or large-scale mining (LSM)—tanzanite gemstone mining involves both [7]. Buyers are concerned about both the ethics and origins of gemstones. Rough from Tanzanian ASM production is generally sold shortly after extraction taking place in the mining areas, intermediate markets in neighbouring towns, or regional markets in larger cities. The M2M value chain includes everything from extracting rough tanzanite material to sorting, grading for colour and clarity, cutting, lapidary design followed by polishing to delivering finished luxury tanzanite gemstone to auctions and jewellery products to high-end boutiques around the world [8]. Additional economic value is added from extraction through the market.

1.2. Theoretical Sustainability and ASM Framework to Support Socio-Economic Transformation in Africa and Tanzania

A new Pan-African Agenda 2063 has devised a 50-year strategic development framework for the continent's long-term socio-economic and integrative transformation [9]. African leaders consider gender equality an essential component of its plan to enhance economic growth and social progress for the continent. Tanzania's natural resources and rich heritage of commercially valuable gemstones are the country's leading revenue-generating exports [10]. The gemstone-rich nation also hosts numerous deposits of beryl, diamond, emerald, garnets, sapphire, ruby, spinel, tourmaline and zircon [11]. Tanzanite is now a world-renowned mainstream gem, especially in the United States, and used in high-value jewellery [12].

1.2.1. The African Mining Vision for ASM

The African Mining Vision (AFV) working under the UN Economic Commission for Africa founded in 2009 states that almost all African gemstones, other than diamonds, are produced by ASM [13]. Indeed, ASM provides a livelihood for millions of predominantly Tanzanian men. Although there is no universal definition, the OECD Due Diligence Guidelines define ASM as "formal or informal mining operations with predominantly simplified forms of exploration, extraction, processing and transportation. ASM is normally low capital intensive and uses high labour-intensive technology" [14]. ASM can include individual miners as well as those working in family groups, in partnerships or as members of cooperatives or other types of legal associations and enterprises involving hundreds or even thousands of miners.

1.2.2. ASM, Gender and the M2M Supply Chain

Tanzania has one of the largest ASM sectors in the world with over 500,000 people directly involved [15]. Yet according to the *UN Women Mapping Study on Gender and the Extractive Industries in Mainland Tanzania* (3 March 2017) women are under-represented in the sector and miss economic opportunities to benefit [16]. Buss and Rutherford hold that “... women were largely invisible as miners within the array of initiatives, laws and policies seeking to regulate mining in sub-Saharan Africa” [17]. In addition, a rich literature concerning feminist critiques of mining has since emerged, led by Lahiri-Dutt, whose aim was to see the growth of feminine livelihoods in mining [18]. To alleviate poverty, Tanzania could further develop sources of employment for rural women in tanzanite gemstone ASM and M2M supply chains. Increasing female participation from mining, cutting, polishing, jewellery making, marketing via gem fairs, direct marketing, retail outlets and exclusive jewellery showrooms and online would bolster better and higher-paying employment (when compared with rural labour) for Tanzanian women. Expanding entrepreneurship and small business opportunities for women in the profitable tanzanite gemstone ASM and M2M could play an important role in lessening economic hardship, whilst empowering women in line with Tanzania’s aspiration to achieve UN Sustainable Development Goals and SDG 5 Gender Equality by mainstreaming them in national development frameworks. Equal access to economic opportunities is highly relevant to the economics of post-conflict reconstruction in Tanzania, a country which has in the past experienced protracted civil unrest. Hota and Behera, who studied mining ecosystems and sustainability, note that the growing demand for mineral resources has resulted in many developing countries becoming investment hubs for mineral extraction [19]. The uniquely beautiful tanzanite is a young gemstone, and its history is still being written. This research has identified little evidence of an “operational” gender equity plan to contribute to equal access to and allocation of tanzanite mining licences in this region. The ability to advance economically from profitable and well-paid tanzanite gemstone mining largely depends on the benefits accrued to small-scale miners from participating in various functions along the tanzanite M2M supply chain [20]. Tanzanian women could and should economically benefit from the world-renowned tanzanite gemstone industry more than is presently the case.

According to the Fraser Institute which ranks 76 mining jurisdictions on government policies that either attract or discourage mining investors, in 2019, at the bottom of the least-attractive jurisdictions was Tanzania [21]. In contrast, the top-ranking jurisdiction in the world for investment based on the Investment Attractiveness Index is Western Australia, an Australian state with one of the highest percentages of women in its mining industry in the world. The nature of female participation in Australian mining features in Section 3 below. The author was employed at BHP Billiton’s Mount Newman Iron Mine in the remote Pilbara region of Western Australia as an onsite laboratory analyst in the late 1980s. Gender equality implies equal opportunities for men and women to benefit economically and deploy wealth accrued to become tanzanite entrepreneurs in the M2M sector, directly contributing to achieving UN SDG 5 Gender Equality.

1.3. Literature Review

The topic of sustainable mining in developing countries has generated interest amongst academics for many years, leading to research in various aspects of the subject by a variety of experts and institutions [22]. Porritt defined sustainability as the capacity of continuity in the long-term future and as the ultimate goal and desired destination of all species [23]. From Eggert’s perspective, sustainability in mining does not consist of indefinitely sustaining a community; the benefits of the operation can be extended permanently [24]. While it is acknowledged that mining as an industry is controversial from a sustainable development perspective, and there is a global push for cleaner and greener mining practice, tanzanite is a trusted source of genuine gemstone mined on a small scale with relatively little impact on the environment. Crucially, tanzanite is conflict-free. The same cannot be said of all African states. The Africa Mining Vision espouses

“Transparent, equitable and optimal exploitation of mineral resources to underpin broad-based sustainable growth and socio-economic development” with a view to elevating ASM. Involving female participation in tanzanite M2M journey could be a game changer to contribute to long-term local and regional economic development. Nevertheless, there are wider theoretical and scientific debates on the subject of sustainable mining. Published in 2020, Dr. Bastida’s research considers the key challenges to transition towards lower carbon economies to achieve sustainable mining in many local mining communities where gemstones and minerals serve as the starting point of M2M supply chains for integrated global economies, sophisticated investors and consumers [25].

The carbon footprint of mining activity was raised in the proceedings of the UN Climate Change Conference UK 2021. Key themes included (1) capacity-building in developing countries such as Tanzania to enhance technology access to address environmental issues; and (2) the women and gender agenda whereby an embryonic Gender Action Plan was scheduled for 2023 to increase the full, meaningful and equal participation of women to ensure gender-responsive implementation in local communities [26]. In relation to the former, in the context of mining in Africa, much of the focus has been on large-scale mining (LSM) in the African copper belt, which hosts the largest deposits of copper in the world mined by behemoths such as BHP and Rio Tinto, the largest and second largest global mining firms, respectively [27]. Their impact includes processing plants and refineries where there is clear urgent action needed to reduce the carbon footprint and create circular sustainable mining economies [28]. In contrast, there is less attention, research and literature on the carbon footprint left by small-scale entrepreneurial gemstone miners, especially compared to LSM of copper, nickel, cobalt, lead, zinc, thermal vanadian and coal. A notable exception is Bastian et al.’s paper, “Gender inequality: Entrepreneurship development in the MENA region”, published in 2019 [29]. As agreed at UK COP26, it is important to take into account each developing state’s specific needs and priorities to avert, minimize and address loss and damage in the ecosystem. In Tanzania, a country rich with gemstones, mining activities form part of its traditional economy. Those who live in the communities near or in areas where minerals are discovered, often engage in mining operations as a source of livelihood directly or indirectly. Protecting Tanzania’s ecosystem needs to be balanced with providing employment across the M2M supply chain and alleviating poverty. It is well known that since the Industrial Revolution, the mining industry has played a significant role in the fundamental shift in global living standards [30]. Nonetheless, mining policy makers will also need to carefully evaluate what a functional circular economy-focused sustainable tanzanite mine should be. In order to comply with global sustainable mining norms, a sustainable tanzanite mine might include eliminating waste and pollution, reusing or donating used equipment and a plan for how the land and infrastructure will be used after the mine is closed [31].

In assessing relevant literature for this topic, this research focused on publications relating to ASM, peer-reviewed articles and periodicals that have a broad focus and cover topics of interest to the mining sector. The main themes to categorize the review of the literature under consideration include the legal and institutional framework for tanzanite mining, the tanzanite gemstone value chain, and gender equality literature in an African and more specifically Tanzanian context. The latter is comprehensively documented from a broader perspective in Mutagwaba et al.’s report entitled, “*Artisanal and small-scale mining in Tanzania—Evidence to inform an ‘action dialogue’*” (2018). This publication provides insights into the potential and positive impact that ASM has had for decades in terms of contribution to employment and development, as well as highlighting the existing challenges facing the sector. Quoting the report on page 44,

Although women carry out an important role in the ASM labour force, there is little information on the roles of women in ASM and even fewer accounts describing the living experiences of individual women miners. As women often work part-time at informal mining operations and occupy ‘ancillary roles’ such as cooking and service provision,

there may be significant discrepancies between the estimated and actual numbers of women involved in ASM.

In this article, we add to the existing sustainable mining and gender literature furnished by authors Abrahamsson et al., Monteiro et al., and Hinton discussed above. We focus deeply on the issue of gender equity in ASM tanzanite gemstone M2M context whilst considering the UN SDG Agenda using the research methodology described below.

1.4. Research Methodology

The specific objectives of the paper are to study the challenges of gender equity in the tanzanite M2M sector and assess and recommend government policies and mining licensing practice to support sustainable gender equity strategies to further SDG 5. We use a mixed-methods qualitative approach including a descriptive scope of relevant academic literature, a review of government policy documents as well as traditional analysis of primary sources of law, such as Tanzanian mining legislation, in Section 2 below.

The Pili Hussein Case Study: Account of a Female ASM Tanzanite Miner-Entrepreneur

The Pili Hussein case study and analysis (Section 3) provides an account of the living experience of an individual female miner-entrepreneur, filling the gap identified by Mutagwaba et al. The objective is to positively reframe the debate on ASM in terms of gender and the role of women in extraction and subsequent value-adding economic opportunities in the M2M business model. The case study illustrates ASM gender issues such as the patriarchal social relations and the reality of gender equality and female entrepreneurship in the Tanzanian mining sector. The *Alison Rose Review of Female Entrepreneurship* in 2019 concluded that at almost every stage, women are less likely to pursue entrepreneurship [32]. The public policy proposals discussed are drawn from an interdisciplinary perspective and could serve as a model for other single-source gemstone countries where ASM is practiced in rural areas by largely uneducated individuals with few employment opportunities. We explore how the single-source gemstone industry could evolve to play a more prominent role and become a significant driver for both sustainable M2M and socio-economic development. The panorama of new employment and economic opportunities for women with tanzanite M2M expertise, extending beyond the extractive gemstone mining sector into the retail, creative and cultural heritage industries to enhance Tanzania's cultural and economic development, is explored.

The remainder of the article involves traditional legal research leading to public policy relating to aspects of ASM and human capital in the M2M pathway, which will be integrated into a proposed Tanzanian tanzanite gemstone gender equality strategy to support sustainable development and SDG 5. It is feasible that the findings here may have broader relevance for providing employment and alleviating poverty in countries in Africa at a similar level of development with favourable geological conditions and further afield. The reflections and recommendations could act as a blueprint for Tanzanian policy makers and for other developing countries where rare, single-source, high-value gemstones are located.

2. Legal and Political Framework for Tanzanite ASM

In this section, we introduce the legal and political framework for ASM in Tanzania. It is important to take account of local development needs, regional and national interests as well as institutional capacities. UN Women Africa provides a contextual overview of the development status of Tanzania, a low-income country of 54.2 million people with women constituting 27.7 million (51.9%) and men 26.5 million (48.9%) [33]. As of 30 December 2020, one Tanzanian shilling (TZS) equalled 0.0003 GBP, indicative of the level of economic development in this part of East Africa. The Tanzania Bureau of Statistics in its First Quarter Gross Domestic Product (GDP) 2020 report indicated that 12 million people (47%) living below the poverty line. Tanzania will clearly struggle to achieve SDG 1, which aims to “end all poverty everywhere” [34].

Pre-pandemic, Tanzania was reportedly performing reasonably well as it progressed eight of the 15 UN SDGs namely SDG 2 Zero Hunger, SDG 3 Good Health and Wellbeing, SDG 5 Quality Education, SDG 5 Gender Equality, SDG 6 Clean Water and Sanitation SDG 8 Decent Work and Economic Growth, SDG 10 Reduced Inequalities, and SDG 16 Peace, Justice and Strong Institutions. Tanzania has made progress toward meeting the UN Sustainable Development Goals, with various reports concerning the implementation indicators for the SDGs in Tanzania prepared by Tanzania's Bureau of Statistics. A key priority of Tanzania's Five-Year Development Plan (FYDP II) is to transition into a middle-income status country, and the M2M sector as a key revenue generator and export for the country is highly relevant to equality of economic opportunity [35]. The UNDP 2018 Human Development Report for 2018 ranks Tanzania a lowly 154 out of 189 countries in the Human Development Index, while gender development index was at 0.928 in 2017 [36]. These statistics indicate that providing employment for women is urgent.

2.1. SDG 5 and Tanzanite Gemstone M2M

Tanzania has various revenue-generating streams, including the lucrative extractive industry, currently dominated by gold mining. Although the Tanzanian Bureau of Statistics Report does not identify gender equality expressly in its reports and documentation, we argue that Tanzanian women should be part of the country's effort to capitalize and leverage the economically successful mineral section, especially its single-source tanzanite gemstone ASM and M2M industry. Mining governance and regulation is a crucial part of the country's legal framework. We explain below the legal framework from a historic perspective to provide qualitative evidence of the adverse impact of mining licence practice on gender participation, de-railing female access to economic opportunity in the Tanzanian mining industry.

2.2. Tanzanite Mining Governance: Mining Licences and Lack of Inclusivity

One of the most controversial issues in Africa, both in academic and public discourse, has been large-scale mineral extraction by foreign-owned corporations in African countries with vast oil and mineral resources [15].

The Tanzanian mining town Mererani is in closest proximity to the tanzanite deposit. Arusha is the largest city in the region and the most important centre for the tanzanite gemstone downstream supply chain trade. The industry was nationalised in the late 1960s with the establishment of Tanzania Gemstones Industries (TGI) when the production of the nationalised mines was very modest. However, a small-scale mining community was established and institutionalised in the 1980s. This created a dynamic tanzanite industry concentrated in the town of Mererani. To attract foreign direct investment (FDI), as endorsed by international institutions such as the International Monetary Fund (IMF) and the World Bank, Tanzania updated its mining sector regulations [37]. The government promulgated the 1998 Mining Act to promote more FDI, resulting in a wave of predominantly South African investment in its mineral sector [38]. The review of its mining laws enabled mining operations and ASM activity to be regulated, with local ASM miners having the opportunity to be granted land titles and mining prospecting licences. Tanzanian mining regulation has social objectives in that it aims to reduce crime, violence and smuggling and establish a direct, secure channel for the gemstones to export markets. In 1992, British Samax was granted a licence to operate in the Mererani area. In 2001, AFGEM (later TanzaniteOne) started their production [39]. The emergence of large-scale mining radically changed the dynamic of the industry and threatened the local ASM Mererani mining community. Tanzanite is extracted only in a designated 12-square-kilometer mining site in the Merelani Hills; thus, its environmental impact is relatively low despite both LSM and ASM activities. The Merelani Hills are located approximately 5 km northwest of the Mererani township and 12 km southeast of Kilimanjaro International Airport, which serves the tourist towns of Arusha and Moshi. Mererani is in the Simanjiro district, which has an official population of 141,676 according to the 2002 Tanzanian National Census [40]. Simanjiro is traditionally

associated with pastoralism and is one of the central areas for the indigenous Maasai [41]. Maasai society is strongly patriarchal in nature, with elder men, sometimes joined by retired elders, deciding most major matters for each Maasai group [42]. The Maasai's traditional patriarchal society presents cultural and economic hurdles for women to achieve gender equality in the region, as we discuss in the sections to follow [43]. Sachedina and Trench provide the following vivid description of the area:

When approaching the township of Mererani in the Simanjiro district . . . one immediately becomes aware that this is no ordinary Tanzanian town. Large groups of graphite-stained miners mingle with Maasai dressed in shukas in this township dedicated almost entirely to the mining of the precious gemstone tanzanite (zoisite). Multiple mobile phone towers are visible along streets heavily rutted by numerous trucks and buses; off-road motorcycles are common and pockets of wealth are clearly evidence; ornate houses, walled hotel complexes, and bars bustling in the morning. The facilities were built by mining 'barons'—wealthy brokers or mine owners who are using their recent wealth to influence land use, politics and livelihoods . . . [41]

In Mererani, tanzanite mining is by far the main source of income; otherwise, the district has a very low population density. Hellieson's research outlines in detail the history and governance of mining, highlighting the power imbalance between the small-scale mining (ASM) sector and the foreign private South African-based mining company TanzaniteOne [15]. The tanzanite mines are divided into four blocks, A through D. Of the four, Blocks B and D are mined by independent, small-scale male miners, while Block C is mined at a large scale by TanzaniteOne. A total of 430 plots are available in Blocks B and D. Block A is technically open for foreign investors, but local miners believe it should be worked by independent miners instead to enhance local employability. See also Hamza Kondo's overview of the history of tanzanite mining licences as further mining regulation background [44]. A mining licence grants the holder exclusive rights to obtain access and explore the mining lease area. As part of ensuring adequate growth and development of the mining sector, mineral licences are issued at specific prices as a means of revenue generation for the government. The majority of the region's inhabitants, especially women, are involved in agriculture and livestock keeping, but only rarely mining. While granting mining licences to women is not unlawful, until 2005, women were not permitted to be in the tanzanite mine, allegedly for safety reasons such as intimidation, discrimination, name-calling, sexualised talk, display of body parts, bullying, violence, etc [45]. The lack of inclusivity in tanzanite mining creates an obstacle to women's involvement in the tanzanite mining M2M sector. In the literature and documents reviewed for this research, the author was unable to locate or access data or statistics on the subject of female participation in ASM or large-scale tanzanite mining.

2.3. Tanzanian Property Rights: Mining and Land Legislation

Turning to real property rights in land, men presently form the majority of landholders. In the Tanzanian mainland, 73% of landholders are men, whereas only 27% are women [46]. Khan observes that the fact that the Tanzanian government owns all property rights to subsurface minerals has made mining policies in Tanzania more efficient than in other African states (and perhaps more easily changed to ensure gender inclusivity in the future). He concludes, however, that most mining conflicts in Tanzania have involved tense confrontations between public mining companies (PMCs) and ASM miners over the right to mine and not over the right to the land itself [47]. Lange suggests that the Tanzanian population is in general "extremely resentful of large-scale mining" and appears to feel betrayed by the Tanzanian state government, given their perception of few benefits flowing from the foreign mining companies to the local region [48]. On the other hand, TanzaniteOne Limited, the world's single largest miner and supplier of tanzanite, financially supports several community projects as part of its corporate social responsibility (CSR) programme. These include a reverse osmosis plant which delivers 30,000 L of water per day (with a donation of 6 million Tanzanian shillings), the Naisinayai Police Station

(55 million Tanzanian shillings), free sort-house debris bags and maintenance of the local water supply (45 million Tanzanian shillings [49]). Since 2013, the mining operation is operated as a Joint Venture between the Tanzanian State Mining Corporation (STAMICO), is a state-owned enterprise that currently operates the tanzanite mine located in Block C of the Mererani Area in Simanjiro District, Manyara Region. STAMICO owns 50% of the shares, and TanzaniteOne Mining Ltd. (TML) owns the remaining 50% of the shares [50].

Section 8.3 of the United Republic of Tanzania 2010 Mining Act now provides that “[a] mining licence for mining gemstones shall only be granted to applicants who are Tanzanians”. Gemstone mining may involve non-Tanzanians if the government determines that the development of gemstone resources requires specialised skills, technology or a large level of investment. However, according to the Act, the non-citizen share of a company cannot be more than fifty percent (Section 8). As part of wider reform efforts to make the Tanzanian diversified mining sector more competitive, the government joined the Extractive Industries Transparency Initiative (EITI) in 2009 with its latest validation in 2020, a positive development. Next, we examine the historically limited opportunities for women in tanzanite ASM mining.

2.4. Opportunities for Women in ASM: Blue Fever and Tanzanite Mining Licences

With a historical, legal and geographic overview of Tanzania’s mining sector, next we turn to the subject of female entrepreneurship in the tanzanite gemstone sector to promote gender equality. In developed countries with mining industries such as the USA, Canada and Australia, the number of women in mining has steadily increased. Women work in various roles and capacities on a mine site, e.g., as mine workers, rough sorters, lorry drivers, plant operators, laboratory analysts, engineers and geologists, extending their influence and expertise into their local communities and beyond. However, despite Tanzania being one of the best performing economies in East Africa with sustained economic growth reflected in improved human development, gender inequalities and significant gender lags in both economic participation and income persist. Tanzania’s gender development index (GDI) value is 0.937, while its gender inequality index (GII) value is 0.544, ranking it 129 out of 159 countries studied [51]. In the tanzanite mining industry, gender inequalities persist, as illustrated by the intriguing Pili Hussein case study involving Tanzania’s first female tanzanite miner.

3. Gender Inequality Case Study Narrative of a Living Account: For over a Decade, Tanzania’s First Female Miner Pili Hussein Disguised Herself as a Man

ASM has traditionally been a man’s world due to the physicality and risk of injury involved; however, a curious and inspiring story has come to light. The following account draws on and integrates several published interviews with Pili Hussein, now over sixty years old, a woman who disguised herself as a man to obtain a mining licence (PML 002 892NZ Block 13 Simanjiro Manyara) and worked in the tanzanite mine for 15 years without anyone discovering she was a woman. Hussein stated,

I was good at blending in with men and I would, for example, smoke marijuana and drink konyagi (local gin) with them. I think that made them believe that I was a man just like them. [52]

The tale becomes curiouser given how Hussein’s gender came to was finally exposed in 2017. A local woman reported she had been raped and accused Hussein. Pili revealed her true identity so as to be exonerated. She was the only licensed ASM miner amongst many male miners, who were astounded to learn her true gender. Over the years, Hussein made several finds of high-value tanzanite rough stones and built her own successful mining company which uses modern mining equipment. Hussein is one of 38 children, the daughter of a Maasai livestock keeper with six wives and several farms. Hussein says, “My father treated me like a boy and I was given livestock to take care of, I didn’t like that life at all.” In an unhappy and abusive marriage, when she 31 years she ran away and arrived in Mererani, in the foothills of Mount Kilimanjaro. She explained,

I didn't go to school, so I didn't have many options. I had heard that a few grams tanzanite sold for thousands of shillings. When I arrived in Mererani, I was told that women were not allowed to enter the mines. I didn't know if the law forbid women or the men didn't think women could do the job. I secretly followed some men into a mine and watched them dig and sieve the dirt for raw tanzanite. I thought to myself, I can do this too. Why should it matter that I am a woman? [53]

Reminiscent of a plot device from Shakespeare's *Twelfth Night*, she came up with her plan to disguise herself as a man to find work [54].

Women were not allowed in the mining area, so I entered bravely like a man . . . you take big trousers you cut them into shorts and you appear like a man. That's what I did. I acted like a gorilla—I could fight, my language was bad, I could carry a big knife. I could go 600 m underground into the mine. I would do this more bravely than many other men. I was strong and I was able to deliver what men would expect another man could do. [55]

As part of her new identity, she took a man's name, Mjomba Hussein. Over the years, Pili became known as Uncle Hussein. She worked 10–12 h a day carrying out hard labour in small, ever deeper dark and dusty mine tunnels, digging and sieving hoping to find tanzanite gemstone rough in the seams of graphite rock. The work environment underground is harsh, with little light or ventilation and no toilets or potable water.

With her gender revealed, Pili married in 2001 and began her family. Her son, Hussein Mngoni, joined her mining business. He encouraged Hussein to retire as he was old enough to take her place. As a result of having secured the tanzanite mining licence and her hard work, Pili has become a rare affluent rural woman and a successful M2M entrepreneur. Her successful mining business employs 70 people and owns 150 acres of land, 100 cows, a tractor and other mining equipment. Of her company's 70 employees, she employs three women who work as cooks.

In the case study above, we considered factors and evidence from the perspective of a Tanzanian ASM miner-entrepreneur herself as a means to resolve societal challenges, especially on the subject of gender equality. Pili notes that even today, very few women actually work onsite in the tanzanite mine. Hussein is has risen to become a rich Tanzanian and an inspiration for other women who would seek employment in the tanzanite M2M supply chain. On a social development level, her commercial success has generated income that paid for the education of more than thirty relatives, a further benefit for her family which will have a considerable social impact on the wider community.

Evaluation of the Pili Hussein tanzanite mining case study illustrates that specific strategies are needed to overcome prejudices and to achieve gender equity in the tanzanite extractive industry so that women have the opportunity to economically benefit from tanzanite as a national resource. It should not be necessary to disguise oneself as a man year after year to access the opportunity to mine tanzanite. Table 1 below confirms the economic contribution of the tanzanite gemstone extractive industry to Tanzania's gross domestic product (GDP) and the missed economic opportunities for women.

Table 1. Tanzanian Mining Commission statistics: production and export of tanzanite gemstone.

Type of Mineral	Unit	Unit Price (TZS)	Total (Weight)	Total Value (TZS)
Tanzanite	Carat	22,227,740.62	1188.91	26,426,691,702.68 (Approx. £7,928,007.51 GBP)

Source: The 10th Tanzanian TEITI Report for the Period 1 July 2017–30 June 2018 (April 2020). Mzumbe University, p. xi.

Recognizing its importance, the *Mining Act* was amended in 2010 to protect the interest of Tanzanians and increase the benefits accruing from the mining sector. The royalty rate for diamond and coloured gemstones was increased from five to six percent, improving

the revenue contribution of the mining sector to the national economy [56]. A qualitative analysis and discussion of the Pili Hussein case study follows.

Qualitative Analysis and Discussion: Inclusivity in Tanzanite Mining

Over the centuries, many have argued that women are physically and mentally inferior by nature [57]. Employment in the mining industry, both open-pit and underground, is more dangerous, risky and unhealthy relative to other industries. Pili Hussein's experience in tanzanite ASM industry demonstrates the prejudice facing women who seek to participate in early-stage onsite economic activity at the front end of the tanzanite M2M value chain. Her life story features in the *Mapping Study on Gender & Extractives Report in Mainland Tanzania* study conducted by UN Women Tanzania in collaboration with Global Affairs Canada, a study that revealed systematic structural and cultural barriers faced by women in the extractives sector, including economic exclusion, sexual harassment and discrimination in employment opportunities [16]. Gender inequality is socially constructed through gender roles, particularly in the mining industry, and even more so in less developed countries such as Tanzania. However, Hussein's experience as a tanzanite miner demonstrates that gender should be less important in ASM, and that a more positive framing of gender inclusivity is possible and warranted. The UN's SDG 5 Gender Equality, even in a traditional patriarchal society such as Tanzania, aims to challenge stereotypes and support women to choose the lifestyle they wish to lead—albeit not the typical gender roles—to enhance both work and financial opportunities. In the past two decades, even though the mining industry remains male-dominated, the participation of women in leading mining countries such as Australia has advanced. We discuss here the Australian experience of supporting gender equality in mining and examine several benefits that accrue from increasing female participation in the industry in terms of the narrower gender pay gap and increased safety.

4. Advances in Female Participation in Mining in Australia

Australia is a developed country where mining has been a key primary sector industry since the 1800s, including the mining of precious stones such as diamonds, sapphires and opals that provide export income, royalty payments and employment. Like Tanzania, Australia operates mines across all of its states and territories. Mining is still the most male-dominated industry in Australia according to the Australian Federal Government's Workplace Gender Equality Agency (WGEA). The gender pay gap (GPG) is defined as the difference between women's and men's average weekly full-time equivalent earnings, expressed as a percentage of men's earnings. It is acknowledged that GPGs in favour of men are a common feature of economies worldwide. Australia's national gender pay gap is 14 percent, however the GPG in mining is a significant 7 percent lower than any other Australian industry [58]. Furthermore, WGEA confirms that mining is generally a higher-paying industry and the women working in it benefit from that higher pay [59]. Women now comprise 16.1 percent of all employees—more promising are figures across the sector, whereby women comprise 4.5 percent of technicians, 11.1 percent of machinery operators and drivers and 13 percent of labourers [60]. While traditionally masculine mining sector roles are the norm, perceptions continue to shift. In some Australian mines such as St Barbara (with 990 employees of whom 22% are female and 78% male,) a nil GPG has been maintained since 2013 [61]. Women in Mining and Resources Western Australia (WIMWA) encourages women to increase their presence in the industry, provides a strong network for women (and men) and advocates for the industry to be proactive in attracting and retaining women in the resources sector [62]. In 2016, the world's largest miner, BHP Billiton, set an aspirational goal to achieve gender equality across its worldwide operations, which are often in remote areas, by 2025. BHP reports that its data show that their "most inclusive teams outperform other teams", deliver safety benefits (a 67 percent lower Total Recordable Injury Frequency on mine sites) and are more productive, with up to 11 percent better adherence to work schedules [63]. In other words, women make mining practice better.

Supporting a pathway for women to better access the tanzanite mining sector is highly likely to reduce economic exclusion and the gender pay gap while enabling women to develop the skills and acquire the experience to pursue equal work opportunities across the M2M value chain. In keeping with the maxim “You can’t be what you don’t see”, tackling discrimination and unconscious bias against female involvement in the tanzanite industry by showcasing Pili Hussein’s story and the excellent careers available for women should be prioritised nationally and has led to the creation of women tanzanite miner groups.

5. Women Tanzanite Miner Groups: Addressing Economic Exclusion Post-2005

Although Pili Hussein had to disguise herself to secure a tanzanite mining licence and enter the mine, the situation has improved. For the first time in May 2005 a group from the Tanzanite Women Miners Development Union (TWMDU) tackled gender inequality when their members were finally permitted to enter the tanzanite mines to mine as male miners do [64]. TWMDU members are tanzanite mining licence holders but had previously been forbidden to enter the mines due to safety concerns. TWMDU treasurer Salome Chami advised that to strengthen their unity as female tanzanite miners, the women purchased a joint tanzanite mining plot in Block B for their use as a training tool and for practice in tanzanite mining. The women’s strategy also involved teaching each other how to facet tanzanite rough into a variety of common shapes, e.g., round, rose, princess and pear cut, another step along the M2M supply chain. Members of TWMDU allege that the mining licence system suffers from corruption and that individuals are granted mining licences based on relationships with government officials, or officials themselves own mining plots, yet conceal the fact using the names of small-scale miners. Furthermore, they allege that female tanzanite ASM miners often work outside the regulated mine in piles of mine tailings owned by larger companies, illegally searching for tiny shards of tanzanite, which is considerably less lucrative, an aspect of gender inequality [65].

In contrast, a male tanzanite miner, Saminiu Laizer (52 years), mined two tanzanite stones weighing 9.2 kg and 5.8 kg, selling them at a gemstone trade event in Manyara, northern Tanzania, for GBP 2.6 m, becoming a tanzanite millionaire. The BBC’s Sammy Awami reported that President John Magufuli telephoned to congratulate Laizer on the find, saying, “This is the benefit of small-scale miners and this proves that Tanzania is rich”. President Magufuli was elected in 2015, promising to protect Tanzania’s interests in the mining sector and to increase the government’s revenue from it [66]. In 2017, he ordered the military to build a 24 km (14-mile) perimeter wall around the Merelani mining site in Manyara surrounding the Block A-B-C-D tanzanite mine. The government reported an increase in revenue in the mining sector attributed to the construction of the wall [11]. Once again on his licenced territory, in 2020, Laizer discovered a third high-quality large tanzanite gemstone weighing 6.3 kg, valued at over GBP 1.5 m, which he sold directly to the Tanzanian government [67]. While these tanzanite finds are rare, women without the opportunity to lawfully mine onsite suffer heavily from such missed opportunities. Institutional support is needed to ensure that women have an equal opportunity to participate in the sector, particularly in view of tanzanite being classed as a generational gemstone, the implications of which will be discussed next.

6. Institutional Support for Women in the Tanzanite M2M Sector beyond Depletion

Mining gemstones is an old practice in Tanzania, a locale that has been more blessed with precious gemstone deposits due to favourable geological conditions. From an economic standpoint, tanzanite, along with other coloured gemstones found in Tanzania and East Africa, are subject to increasing demand globally, especially from the growing middle classes in the People’s Republic of China and India [68]. The growing demand creates valuable economic opportunities for Tanzania. According to Stuart Robertson:

Tanzania is host to a vibrant gem trade. The country, like its East African neighbours, is rich with mineral deposits, many of which are relatively recent discoveries. For miners

and traders, the wealth inherent in these finite resources can be as elusive as the gems themselves. [11]

In the jewellery industry, tanzanite is what is known as a “generational gemstone” likely to become extinct in one generation. Geologists estimate that its supply may be entirely depleted within the next 20 years, or possibly even sooner [69]. Many such gems will become even more valuable as they are passed to future generations. Tanzanite is a modern gemstone and one of the rarest on Earth enhancing its economic value. The precious stone’s appeal lies in its variety of hues, including green, red, purple and blue. Its value is determined by rarity—the finer the colour or clarity, the higher the price. Tanzanite gemstones will continue to be traded even after the mine is eventually depleted and will be forever connected to Tanzania. As we have seen, both artisanal and large-scale tanzanite mining are subject to gendered division of labour in terms of the classification and allocation of tasks for women and men due to gender stereotyping. In terms of gender and development, institutional support is needed for women in the commercial tanzanite and other mining sectors to eliminate gender-based discrimination and provide better and equal opportunities to work in ASM, should women choose to do so. It is especially important that women are not economically excluded as demand for the generational gemstone increases over the next decades. Even though tanzanite is a recently discovered “modern” rare gemstone, it now rivals the world’s big four gems (ruby, sapphire, emerald and diamond) in popularity and its value has only ever increased since its discovery.

7. Gender Equity Law in Tanzania

The Republic of Tanzania operates under a dual legal system, consisting of customary and religious laws. The constitution of Tanzania promulgated in 1977, as amended, prohibits discrimination based on gender. Tanzania has also ratified the Convention on the Elimination of all forms of Discrimination Against Women (CEDAW) and the South African Development Community (SADC) Protocol on Gender and Development. Furthermore, at the domestic policy level, Tanzania Development Vision 2025 recognises the importance of gender equality and the empowerment of women [70]. A new Ministry of Health, Community Development, Gender, Seniors and Children was established in 2015 and is responsible for coordinating policies and strategies related to gender equality and the empowerment of women, and monitoring implementation of these policies [71]. Ensuring gender equality and the empowerment of women and girls is one of the key strategies adopted by the Tanzanian government as the country journeys toward achieving sustainable development through its National Plan of Action and National Strategy for Gender Development (2016–2020). The plan and reflects the country’s commitment to global frameworks such as CEDAW, the African Union Gender Policy and Action Plan and the Maputo Protocol. The empowerment of young women is a key development area in the ongoing process of deepening pillars of democracy and good governance in Tanzania. However, gender in the context of the mining industry is not explicitly addressed as an area of policy concern or challenge. Given the economic contribution of mining to the country’s GDP, we argue this should be a prominent priority, especially in light of the facts discussed below.

8. Tanzanite—A Culturally Significant Heritage Gemstone and IPRs

One should not underestimate the popularity and global interest in the rare purple violet tanzanite gemstone sourced only in Tanzania, highly desirable in the gem trade as one of Africa’s “big five gemstones” alongside sapphires, diamonds, spinel and emeralds. Tanzanite is now the most popular blue gemstone in the world after sapphire. In 2002, tanzanite was given the status as a birthstone for December (along with two other blue gems, turquoise and zircon) by the American Gem Trade Association, which created the birthstone list in 1912 [72]. Tanzanite has wildly increased in its global recognition and popularity since being discovered in 1967. The precious gemstone’s direct association with the Tanzanian nation gives it the distinction of being a historic and culturally significant

heritage gemstone, in the same vein as Colombian emeralds, Burmese rubies (Burma is now known as Myanmar) or South Sea pearls—even after the mine is eventually depleted. It is submitted that such global recognition of the unique tanzanite gemstone warrants due prominence on the national gender equality agenda. As a single-source stone, the fortuitously named “tanzanite” creates a pathway for a new gender inclusive policy vision for women in the M2M gem trade. The breadth of gem quality jewellery, ranging from low to high economic value jewellery, is largely the domain of women as consumers. Tanzanian women could increasingly be an important part of the Tanzanite M2M value chain journey from isolated mine sites to design and lapidary, to showrooms, to e-retail platforms and export. Such participation would enable Tanzanian women to share in the economic wealth generated beyond mineral extraction at all levels in the M2M supply chain. Furthermore, in addition to acquiring valuable gemstone trade skills, women could be more active in imparting Tanzania’s highly prized Tanzanite gemstone jewellery with the world. The nation is urged to explicitly leverage the socio-economic and cultural potential of its unique gemstone heritage via a new strategic socio-economic and cultural policy approach. Many countries leverage their geographical association with rare gemstones through cultural tourism and creative endeavours. The Australian Opal Centre is one example [73].

Addressing inequity would enable women to entrepreneurially prosper by sharing fairly in the economic benefits created by the lucrative tanzanite M2M value chain, potentially creating their own M2M enterprises.

8.1. The Tanzanite M2M Gem Trade

The M2M supply chain is important for market access as ASM tanzanite miners in rural settlements have little opportunity to deal directly with buyers or others in the supply chain. Mkubukeli and Tengeh (2016) identified access to markets and lack of financial capital as key challenges preventing ASM entrepreneurs from establishing successful businesses [74]. Other factors include illiteracy and a lack of gemstone industry knowledge, e.g., pricing and value adding.

Furthermore, there are the social capital factors and power relations within the ASM community given the traditional role of the Maasai tribesmen as rough gemstone dealers and middlemen. Tanzanite traders are seen by others in their home villages to possess new forms of capital that carry societal value because they map onto current ideas about success [75]. Women are less visible in the ASM M2M sector both in the mines and in the value-adding path a tanzanite gemstone takes from a mining pit in Arusha, to pre-form cut and polishing, jewellery manufacturers, gem fairs and retailers, and finally, to customers both within Tanzania’s gemstone market and for export.

Until 2010, the majority of tanzanite was exported as rough to countries such as India, where the gemstone processing was carried out. These processing countries earned most of the revenue from Tanzanite sales, whilst Tanzania earned only a small percentage [76]. After heeding local gemstone dealers’ call that the country had the required capacity to cut and polish the blue violet tanzanite stones locally. Thus in 2010 the Tanzanian government extended a provision of its Mining Act, banning the export of rough Tanzanite over 1 g, to increase investment in domestic cutting and polishing and effectively accruing revenue for Tanzania. The Tanzanian government’s export ban has boosted economic benefits for the community, including ASM miners. The past decade has seen a positive impact, with local gemstone dealers developing lapidary (lapidary refers to the engraving, cutting or polishing of stones and gems) and jewellery manufacturing capacity. Other relevant factors include quantity, quality and guarantee of origin (and ethical provenance) of the gemstones.

8.2. The Economic Benefit Accruing to the Tucson Tanzanite Protocols (TTP) 2002

The chain of geographical origin of tanzanite is gemologically transparent as the gemstone has a unique gemological signature or identity. However, unlike some other African gemstone mining nations where adherence to international standards expected of transactions in gemstones, such as the issuance of a Certificate of Origin and laboratory

reports from qualified and recognised institutions, is largely absent, the Tucson Tanzanite Protocol (TTP) was developed in 2002 to protect tanzanite and ensure an ethical route to the market and eliminate the risk of tanzanite being a “conflict gem” [77]. The TTP is a cooperative effort by the government of Tanzania and all of the major industry stakeholders, including miners (Arusha Regional Miners Association, Tanzanian Chamber of Mines), dealers (including the Tanzania Mineral Dealers Association), manufacturers, suppliers and retail jewellers. Industry groups include the American Gem Trade Association, the American Gem Society, the International Colored Gemstone Association, Jewelers of America, the Jewelers Vigilance Committee, the Manufacturing Jewelers & Suppliers of America, the Indian Diamond & Colorstone Association and the Jewelers Association Jaipur [78]. The TTP is similar to the Kimberley Process Certification Scheme (KPCS) established in 2000 and designed to prevent rough conflict diamonds from entering into the mainstream rough diamond market [79]. Adopting the TTP greatly enhances the value of tanzanite in the market as buyers increasingly insist on only dealing in gemstones that are certified as ethically sourced at place of origin. This an important sustainable mining advantage for Tanzania. Despite the TTP, fake tanzanite exists (e.g., glass and other substitutes such as synthetics and lab-grown gems) whilst not conflict gems are still problematic; thus, gemology expertise and gemstone grading are also important skills for women and men in the evolving M2M supply chain.

9. Promoting Gender Equity in Tanzanite M2M and Public Policy Recommendations

While Tanzania is making progress organizing the tanzanite gemstone sector to avail itself of economic opportunities, the next stage must include women’s economic participation. The unrealised potential of female entrepreneurship for a sustainable Tanzanian economy is immense. As a minimum, relevant policy objectives should include supporting the following:

1. TTP-compliant female ASM miners to scale up beyond subsistence with investment in basic equipment and facilitate ASM and M2M skills training;
2. Transparent and gender sensitive allocation of mining licences/mine access;
3. Design of safe and inclusive mining work environments for women;
4. Reduce the gender pay gap between women and men and produce pay guidance and gemstone grading standards (AAAA, AAA, AA and A) and price guides for female ASM tanzanite miners;
5. Female entrepreneurship in the M2M supply chain with education, micro-finance, internet access, small business skills and branding as a foundation for 21st century business development and long-term financial success;
6. The work of the Tanzania Women Miners Association (TOWAMA) and the Association of Tanzania Women Chamber of Commerce; and
7. Existing and new organisations that empower women consistent with the needs and demands of the global gemstone industry.

A national plan for a thriving, safe and inclusive 21st century M2M tanzanite gemstone sector involving women could be strategized. In the medium to long term, when Tanzanite gemstone availability declines, objectives might include support for local gemstone dealers; lapidarists; jewellery designers; physical, broadcast television and online e-retail; second-hand jewellery sales; pawnbrokers; and the like. As women become better organised, educated and gain relevant work experience, creating a range of social and cultural “tanzanite careers for women” and training events in the region would enhance sustainable development even after the tanzanite underground supply is used up or until a new source is located. Such sustainable development activities would highlight the range of roles for women in value-adding post-gemstone extraction.

10. Marketing Tanzanite to the World

In terms of regional policy, establishing a Tanzanite Marketing Board to work systematically with relevant local councils to identify market links for the gemstone in local,

regional and international markets to share and sell Tanzanite to the world is another strategy. Another high profile role involves training and deploying female representatives to gem fairs to establish networks with non-governmental organisations, stakeholders and financiers. Finally, as this uniquely rare generational gemstone holds so much fascination for gemstone collectors, a new Tanzanite Tourism Board could act as a vector in the region to facilitate a domestic tanzanite cultural heritage tourism market with a global profile. For example, Maasai legend explains how the stone was created when the Mererani hills were struck by lightning, turning the rock into blue violet crystal (displaying the property of pleochroism) [80].

10.1. Leveraging the “Tanzanite” Name and Association with the Republic of Tanzania

Tiffany & Company jewellers of the United States is credited with renaming the gemstone “Tanzanite” after its native country. The researcher carried out a trademark search on 11 February 2022 using the World Intellectual Property Organization (WIPO) Global Brand database confirming that 120 trademarks are registered that contain the name “TANZANITE” in several classes of goods and services, but all marks are registered to third parties not associated with Tanzania the nation, nor are any marks apparently owned by Tanzanian headquartered businesses [81]. Brand and reputation intellectual property rights (IPRs) is an area ripe for downstream tanzanite M2M cultural policy review that could fall within the remit of a Tanzanite Marketing Board. Trade marks are governed by the *Trade and Service Marks Act* and may be registered by the Business Registration and Licensing Agency (BRELA).

We have provided evidence to support the argument that there is a solid basis for an express and increased role for women in the tanzanite M2M extractive sector. Furthermore, we have identified numerous economic and cultural opportunities for women’s participation in the downstream tanzanite M2M creative, cultural, tourism and commercial activities.

10.2. Knowledge Exchange and Collaboration in Women-Led Tanzanite M2M Value Chains

It is recommended that a new strategic plan should study progress in neighbouring countries with gemstone mining industries such as Kenya and South Africa and forge new female partnerships and knowledge exchange [82]. The former has an active Association for Women in Energy and Extractives Industry Kenya (AWEIK), a Kenya-wide organisation that connects women with professional and business opportunities in the extractives industry value-chain (www.awei.or.ke, accessed on 20 February 2022). AWEIK is producing an upcoming Pioneer Women in Extractives Awards (PWEA2022) to recognise and reward the female talent from Africa’s extractives sector. Such knowledge exchange relationships will become increasingly important for navigating new global sustainable gemstone mining debates. Women should have a voice in the global gemstone mining debate as to whether genuine natural gemstone mining or synthetic laboratory-grown gemstone production is better for sustainable development and the economy in Africa [83].

11. Conclusions and Recommendations: Gender Inequalities and Tanzanite

The aim of this research has been to positively reframe the debate on tanzanite gemstone ASM in terms of gender and the role of women in value-adding economic opportunities in the mine-to-market (M2M) business model to support sustainable development in Tanzania. We argued that gender equity is an under-rated economic dimension of the sustainability ethos that challenges Tanzania’s mining and M2M policies. We argue that the contribution of women in the mining sector is a favourable part of the picture for achieving gender equality (SDG 5) in Tanzania. Due to its income generation capacity, the tanzanite M2M value chain holds immense promise to contribute to the country’s long-term sustainable economic, social and cultural development. In developed countries such as Australia and Canada, we noted that more women are becoming involved in the mining sector due to the economic rewards, reduced gender pay gap, skills development and progression opportunities afforded by the industry. Gender equality is as relevant

to the economics of sustainable development in developing countries such as Tanzania as in developed countries. However, each country faces specific challenges in pursuit of sustainable mining and gender equality. In Tanzania, women are inadequately represented in ASM tanzanite mining and in the M2M value chain at all levels. Thus, the remarkable life story of female Tanzanite miner and entrepreneur Pili Hussein, the subject of our case study in Section 3, provided an authentic foundation for creating an accessible gender-inclusive environment for Tanzanian women in the sector. With a rich understanding of the challenges in Tanzania's tanzanite industry, like Pili Hussein, the lives of women in the tanzanite M2M sector could be transformed with greater hope for improving their lives and lifting them from poverty. Attitudes towards women's capability to be involved in the front end of the M2M value chain are beginning to change in Tanzania. The country should act to mobilise a new regional gender equality strategy to underpin the multiple economic, social and cultural benefits to be derived. More targeted affirmative actions by the Tanzanian government are needed to address the antiquated attitude that mining is an exclusively male-oriented industry and that men are the breadwinners or mining licence holders. These attitudes are based on the patriarchal structures that exist in Tanzania and in the Maasai culture, limiting women's access to Tanzania's culturally important tanzanite mining. Fortunately, women like Pili Hussein are destroying Tanzanian society's view of the stereotypical tanzanite miner. Norms can change as economies develop, by changes in communication technology; by new laws, policies or programmes; by social and political activism; and by exposure to new ideas and practices through formal and informal channels (education, role models and media). Working in the mining industry is tough; however, this article has presented evidence that in Tanzania, as in developed mining economies such as Australia, women who work alongside men in the mining industry suffer less gender pay gap and enjoy higher-paying employment, while keeping mining practice safer for all involved. The traditional patriarchal norms that exist in the tanzanite extraction industries can change if new ideas emerge regarding gender roles and work. In conclusion, more effort is required on the part of the Tanzanian authorities to strengthen mechanisms to enhance women's effective engagement with the tanzanite M2M sector. A realistic pathway gender transformation of the profitable gemstone M2M and export market in a lesser developed country such as Tanzania holds immense promise for sustainable economic development. In conclusion, this rare, unique tanzanite gemstone is Tanzania's most globally recognised and promising export. The highly desirable gem will long be an important part of Tanzania's national history, national brand, future economy and socio-cultural development as it cannot be found anywhere else on the planet. Future sustainable development research into the intangible benefits the tanzanite for the nation's brand is also vital.

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References

1. Rimoch, D.; Cherng, S. A Rare and Beautiful Stone Fails to Shine: Tanzania's Missed Opportunity. Available online: <http://knowledgedetest.wpengine.com/article/rare-beautiful-stone-fails-to-shine-tanzanias-missed-opportunity/> (accessed on 20 February 2022).
2. Zagoritis, A. Tanzanite as an Investment (undated) The Rare Gemstone Company. Available online: <https://www.theraregemstonecompany.com/gemology-articles/tanzanite-investment> (accessed on 20 February 2022).
3. López, I. Sobre el desarrollo sostenible y la sostenibilidad: Conceptualización y crítica. *Rev. Castell. Manch. Cienc. Soc.* **2015**, *20*, 111–128.
4. Dollar, D.; Gatti, R.G. *Gender Inequality, Income, and Growth: Are Good Times Good for Women?* The World Bank Development Research Group: Washington, DC, USA, 1999; Available online: <http://documents.worldbank.org/curated/en/251801468765040122/Gender-inequality-income-and-growth-are-good-times-good-for-women> (accessed on 7 February 2022).
5. Gómez-Bezares, F.; Przychodzen, W.; Przychodzen, J. Corporate Sustainability and CEO–Employee Pay Gap—Buster or Booster? *Sustainability* **2019**, *11*, 6023. [CrossRef]

6. Farooq Hashmi, F.F. Mine to Market Evolution of the Rough Trade. Available online: www.jewellermagazine.com/article2/9389/mine-to-market-evolution-of-the-rough-trade (accessed on 17 February 2021).
7. Görner, S.; Kudar, G.; Mori, L.; Reiter, S.; Samek, R. Mining value chains face pressure from the ongoing uncertainty of the COVID-19 pandemic, whilst environmental concerns continue to evolve, and new regulatory policies continue to be enacted. In *The Mine-To-Market Value Chain: A Hidden Gem*; McKinsey and Company: New York, NY, USA, 2020; pp. 1–2.
8. African Union. About the African Union. Available online: <https://au.int/en/overview> (accessed on 20 February 2022).
9. Agenda 2063: The Africa We Want. Available online: <https://au.int/en/agenda2063/overview> (accessed on 20 February 2022).
10. World's Top Exports. World's Top Exports at Tanzania's Top 10 Exports 2019. Available online: www.worldstopexports.com (accessed on 5 May 2021).
11. Robertson, S.M. The Gem Trade of Tanzania. Available online: <https://www.gemguide.com/wp-content/uploads/2017/08/2017GGU-SeptOctTanzania.pdf#:~:text=THE%20GEM%20TRADE%20OF%20TANZANIA%20Stuart%20M.%20Robertson%2C,as%20elusive%20as%20the%20gems%20themselves.%20FEATURE%20ARTICLE> (accessed on 17 February 2022).
12. Gemological Institute of America (GIA). Tanzanite. Available online: www.gia.edu/tanzanite (accessed on 27 March 2022).
13. African Union. African Mining Vision. Available online: www.au.int/eng/ti/amv/about (accessed on 17 February 2022).
14. OECD. *OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas: Third Edition*; OECD Publishing: Paris, France, 2016; Available online: <http://www.oecd.org/daf/inv/mne/OECD-Due-Diligence-Guidance-Minerals-Edition3.pdf> (accessed on 20 February 2022).
15. Helliesen, M.S. Tangled up in Blue: Tanzanite Mining and Conflict in Mererani, Tanzania. *Crit. Afr. Stud.* **2012**, *4*, 58–93. [[CrossRef](#)]
16. Business & Human Rights Resource Centre. UN Women Mapping Study on Gender and the Extractive Industries in Mainland Tanzania. 2017. Available online: <https://www.business-humanrights.org/en/latest-news/un-women-report-on-gender-extractives-sector-in-tanzania/> (accessed on 18 October 2021).
17. Buss, D.; Rutherford, B. Gendering women's livelihoods in artisanal and small-scale mining: An introduction. *Can. J. Afr. Stud.* **2020**, *54*, 1–16. [[CrossRef](#)]
18. Lahiri-Dutt, K. Digging women: Towards a new agenda feminist critiques of mining. *Gend. Place Cult.* **2012**, *19*, 193–212. [[CrossRef](#)]
19. Hota, P.; Behera, B. Opencast coal mining and sustainable local livelihoods in Odisha, India. *Miner. Econ.* **2016**, *29*, 1–13. [[CrossRef](#)]
20. Mutagwaba, W.; Bosco Tindyebwa, J.; Makanta, V.; Kaballega, D.; Maeda, G. *Artisanal and Small-Scale Mining in Tanzania—Evidence to Inform an Action Dialogue*; IIED: London, UK, 2018; ISBN 9781784315948. Available online: <http://pubs.iied.org/16641IIED> (accessed on 20 February 2022).
21. The Fraser Institute. Annual Survey of Mining Companies 2020. 2020. Available online: <https://www.fraserinstitute.org/categories/mining> (accessed on 1 November 2021).
22. Baena, Ó.J.R.; Mendoza, L.E.M. Sustainability of the Artisanal and Small-Scale Gold Mining in Northeast Antioquia-Colombia. *Sustainability* **2021**, *13*, 9345. [[CrossRef](#)]
23. Porritt, J. *Capitalism as if the World Matters*; Earthscan: London, UK, 2007.
24. Eggert, R. What Sustainability and Sustainable Development Mean for Mining. In *Sustainable Management of Mining Operations*; Botin, J.A., Ed.; Society for Mining: Englewood, CO, USA, 2020; pp. 19–32. Available online: <https://drive.google.com/file/d/1cCcPz1-pId-gFj8SngXfddnU4bG31gtL/view> (accessed on 7 February 2022).
25. Bastida, A.E. The Environment, Mineral Resources and Sustainable Development. In *The Law and Governance of Mining and Minerals: A Global Perspective*, 1st ed.; Hart Publishing: London, UK, 2020.
26. UKCOP26.ORG. COP26: Uniting the World to Tackle Climate Change. In Proceedings of the 26th UN Climate Change Conference of the Parties (COP26), Glasgow, Scotland, 31 October–13 November 2021; p. 14. Available online: www.uncop26.org (accessed on 14 November 2021).
27. Ives, K. *Swiss Energy Strategy 2050 A Miner's Perspective*; Glencore: Baar, Switzerland, 2020.
28. Parizot, M. *Taking a Circular Approach to Mining Operations*; CIM Magazine: Montreal, QC, Canada, 2022.
29. Bastian, B.L.; Metcalfe, B.D.; Zali, M.R. Gender inequality: Entrepreneurship development in the MENA region. *Sustainability* **2019**, *11*, 6472. [[CrossRef](#)]
30. Abrahamsson, L.; Segerstedt, E.; Nygren, M.; Johansson, J.; Johansson, B.; Edman, I.; Åkerlund, A. *Mining and Sustainable Development: Gender, Diversity and Work Conditions in Mining*; Luleå Tekniska Universitet: Luleå, Sweden, 2014.
31. Monteiro, N.B.R.; da Silva, E.A.; Neto, J.M.M. Sustainable development goals in mining. *J. Clean. Prod.* **2019**, *228*, 509–520. [[CrossRef](#)]
32. HM Treasury. The Alison Rose Review of Female Entrepreneurship. Available online: www.gov.uk/government/publications/the-alison-rose-review-of-female-entrepreneurship (accessed on 7 February 2022).
33. Tanzanian Bureau of Statistics. Highlights on the First Quarter GDP. 2020. Available online: <https://www.nbs.go.tz/index.php/en/census-surveys/national-accounts-statistics/na-publications/532-highlights-on-the-first-quarter-gdp-2020> (accessed on 18 October 2020).
34. Tanzanian Bureau of Statistics. Available online: <https://www.nbs.go.tz/index.php/en/sdg> (accessed on 18 October 2020).
35. Tanzania's Second Five Year Development Plan 2016/17–2020/21: Summary and key action points. Available online: <https://set.odi.org/wp-content/uploads/2017/08/FYDP-II-Summary-Briefing.pdf> (accessed on 20 February 2022).

36. United Nations Development Programme (UNDP) Annual Report 2018. 2019. Available online: <https://undp.org/publications/UNDP-Annual-Report-2018> (accessed on 20 February 2022).
37. The World Bank. *Strategy for African Mining 1992*; The World Bank: Washington, DC, USA, 1992.
38. Schroeder, R.A. South African Capital in the Land of Ujamaa: Contested Terrain in Tanzania. *Afr. Sociol. Rev.* **2008**, *12*, 20–34. [CrossRef]
39. TanzaniteOne Mining Ltd. Available online: <https://www.tanzaniteone.com/> (accessed on 7 February 2022).
40. Global Health Data Exchange. United Republic of Tanzania Population and Housing Census. 2002. Available online: <ghdx.healthdata.org> (accessed on 20 February 2022).
41. Sachedina, H.; Trench, P.C. Cattle and Crops, Tourism and Tanzanite: Poverty, Land-Use Change and Conservation in Simanjiro District, Tanzania. In *Staying Maasai?* Springer: New York, NY, USA, 2009; pp. 263–298.
42. Mohamed, A.; Willetts, D.; Eames, J. *The Last of the Maasai*; Camerapix Publishers International: Nairobi, Kenya, 1987; pp. 53–54.
43. Maasai Girls Education Fund. The Life of a Maasai Woman. 2020. Available online: <http://maasaigirlseducation.org/the-need/the-life-of-a-maasai-woman/> (accessed on 20 February 2022).
44. Hamza, K. Tanzanite Mines Interrupted: Tanzanite Tailing Off (2005). Available online: <https://www.ganoksin.com/article/tanzanite-mines-interrupted/> (accessed on 17 October 2021).
45. Gibson, M. *Gender Equality, Health and Safety of Women in Small Scale Mining*; The Chronicle: Newcastle upon Tyne, UK, 2020.
46. Idriss, I. Mapping women's economic exclusion in Tanzania. In *K4D Helpdesk Report*; Institute of Development Studies: Brighton, UK, 2018; p. 12.
47. Khan, M.H. *Governance Capabilities and the Property Rights Transition in Developing Countries*; University of London: London, UK, 2009; pp. 93–95.
48. Lange, S. Gold and Governance: Legal Injustices and Lost Opportunities in Tanzania. *Afr. Aff.* **2011**, *110*, 233–252. [CrossRef]
49. TanzaniteOne Mining Ltd. TanzaniteOne Limited Community and Projects. Available online: <https://www.tanzaniteone.com/copy-project> (accessed on 18 October 2021).
50. Tanzanian Extractive Industries Transparency Initiative (EITI). *The 10th Tanzanian TEITI Report for the Period 1 July 2017–30 June 2018*; Mzumbe University: Mzumbe, Tanzania, 2021; Available online: www.eiti.org (accessed on 7 February 2022).
51. United Nations Development Programme. Briefing Note for Countries on the Human Development Report 2016—Tanzania (United Republic of). Available online: http://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/TZA.pdf (accessed on 18 October 2021).
52. Kisambe, S. Tanzanite Woman Miner Who Disguised Herself as a Man, Hits the Jackpot. Available online: <https://www.bbc.co.uk/programmes/p050jckm> (accessed on 18 October 2021).
53. McDermott, S. I Acted as a Man to Get Work—Until I Was Accused of Rape. 2017. Available online: <https://www.bbc.co.uk/news/magazine-39705424> (accessed on 17 October 2021).
54. Shakespeare, W. *The Twelfth Night*; Utah Shakespeare Festival: Cedar City, UT, USA, 2021.
55. Business & Human Rights Resource Centre. Tanzania: Woman Miner on How She Had to Disguise as a Man to Overcome Cultural Barriers in Mining Sector. 2017. Available online: <https://www.business-humanrights.org/en/latest-news/tanzania-woman-miner-on-how-she-had-to-disguise-as-a-man-to-overcome-cultural-barriers-in-mining-sector/> (accessed on 7 February 2022).
56. Mzumbe University. *The 10th Tanzanian TEITI Report for the Period 1 July 2017–30 June 2018*; Mzumbe University: Morogoro, Tanzania, 2020.
57. Meany, P. Poullain Believed in Gender Equality in the 17th Century. 2019. Available online: www.libertarianism.org (accessed on 1 November 2021).
58. Connell, C.; Claughton, D. Women in Mining: Dig the Changing Face of Australia's Mining Industry. 2018. Available online: <https://www.abc.net.au/news/2018-05-22/dig-the-changing-face-of-mining-as-women-make-inroads/9786020> (accessed on 18 November 2021).
59. Workplace Gender Equality Agency. 2019–20 WGEA Data Quality Report. Available online: www.wgea.gov.au/about/governance/data-quality/2019-2020-wgea-data-quality-report/ (accessed on 20 February 2022).
60. Cassells, R.; Duncan, A. *Gender Equity Insights 2018: Inside Australia's Gender Pay Gap*; Bankwest Curtin Economics Centre: Perth, Australia, 2018.
61. Workplace Gender Equality Agency. WGEA Case Study: Attracting Women to a Male Dominated Industry St Barbara. Available online: www.wgea.gov.au/sites/default/files/documents/WGEA-St-Barbara.pdf (accessed on 20 February 2022).
62. WIMWA. Women in Mining and Resources Western Australia. Available online: <https://womeninmining.com/> (accessed on 1 November 2021).
63. BHP Billiton. The Gender Equation. 2019. Available online: <https://www.bhp.com/media-and-insights/prospects/2019/10/the-gender-equation/> (accessed on 21 November 2021).
64. Kondo, H. An Exclusive Look at Tanzanian Women in Mining. Available online: www.ganoskin.com/article/tanzanite-mines-interrupted (accessed on 20 February 2022).
65. Tanzania Women Miners Association (TAWOMA). Available online: <https://www.tawoma.or.tz/home> (accessed on 20 February 2022).
66. Aboubakar, F. Tanzanite: Tanzanian Miner Earns Millions after Second Rare Find. 2020. Available online: <https://www.bbc.co.uk/news/world-africa-53642490> (accessed on 17 October 2021).

67. Connelly, L. Miner Who Became Millionaire After Finding Rare Gem Finds Another Stone Worth Millions in Tanzania. 2020. Available online: www.unilad.co.uk (accessed on 20 February 2022).
68. Goldstein, A.N.; Pinaud, M.; Reisen, H.; Chen, X. *The Rise of China and India: What's in it for Africa*; OECD Publishing: Paris, France, 2016.
69. Rybnikova, O. Tanzanite: A Rare Beauty. 2020. Available online: www.geologyforinvestors.com/tanzanite-a-rare-blue-beauty (accessed on 11 December 2021).
70. Tanzania Development Vision. Available online: www.assets.publishing.service.gov.uk/media/5af954d340f0b622d7cc6e59/Tanzania (accessed on 20 February 2022).
71. The Tanzania Government Portal. National Strategy for Gender Development. Available online: www.tanzania.go.tz/egov-uploads/documents-Tanzania_-_National-Strategy-for-Gender-Development-sw.pdf?msclkid=66 (accessed on 13 December 2021).
72. The Tanzanite Foundation. December's Birthstone—Tanzanite. Available online: www.thetanzanitefoundation.com (accessed on 22 January 2022).
73. Destination NSW. The new Australian Opal Centre, New South Wales Tourism. Available online: www.visitnsw.com (accessed on 17 February 2022).
74. Mkubukeli, Z.; Tengeh, R.S. Prospects and Challenges for Small-Scale Mining Entrepreneurs in South Africa. *J. Entrep. Organ. Manag.* **2016**, *5*, 2–10. [[CrossRef](#)]
75. Smith, N.M. No cow makes this sort of profit: Capital, success, and Maasai gemstone traders in Tanzania. *Extr. Ind. Soc.* **2016**, *3*, 442–449. [[CrossRef](#)]
76. Thomas, N. Tanzania Bans Export of Rough Tanzanite. Available online: www.theraregemstonecompany.com (accessed on 20 February 2022).
77. Schroeder, R.A. Tanzanite as a Conflict Gem: Certifying a Secure Commodity Chain in Tanzania. *Geoforum* **2010**, *1*, 56–65. Available online: www.sciencedirect.com/article/abs/pii/S0016718509000268?msclkid=9d55ea12adfa11ecb30565b3728323 (accessed on 25 January 2021). [[CrossRef](#)]
78. Roskin, G. The Tucson Tanzanite Protocols. 2002. Available online: www.jckonline.com/editorial-article/the-tucson-tanzanite-protocols (accessed on 25 January 2021).
79. The Kimberley Process. Available online: www.kimberleyprocess.com (accessed on 20 February 2022).
80. Jameson, L. How Tanzanite is Mined. Available online: www.slightlyblue.com (accessed on 20 February 2022).
81. World Intellectual Property Organization (WIPO) Brand Database. Available online: www3.wipo.int/branddb/eng (accessed on 20 February 2022).
82. The Natural Resources Alliance of Kenya (KeNRA). Available online: www.namati.org (accessed on 20 February 2022).
83. Saati, G. *First Synthetic 'All Diamond Ring Graded in Antwerp*; Jewellery Business: Richmond Hill, ON, Canada, 2019.