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**Title of Paper:** Impacts of education and training interventions

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**Abstract:** This paper will present a case study from the Amazonian region of Ecuador, where Lundin Gold and Lundin Foundation have partnered to develop and implement a community education intervention and subsequent skills training program targeted at local and indigenous community members from the area of influence surrounding the mine. The case study considers the social, economic and political impacts of the educational intervention and its consequent positioning for community members to successfully meet skills training program entry criteria leading on to approximately 350 employment opportunities at Lundin Gold's Fruta del Norte mine. Furthermore, the strategic link and business value of community education, training and employment is examined; program design and execution methodology are evaluated and subsequent impact assessment is offered. Additional considerations of the case study include the timing of the program in relation to the mine life cycle, and the added complexity that large-scale underground mining is an emerging industry in Ecuador that is not clearly understood by many stakeholders. Outputs from the case study include an analysis of the social, political and economic impact of the educational intervention and skills training program. Lastly, recommendations for similar educational interventions and community training programs in similar contexts and operating environments are offered.

## Executive Summary

During pre-operational consultation with the community stakeholders surrounding Lundin Gold's Fruta del Norte (FDN) mine in Ecuador's southeastern province of Zamora-Chinchipe, opportunity for employment was identified as the highest priority by the local and indigenous communities. Consequently, Lundin Gold and Lundin Foundation formed a strategic partnership and designed, developed and implemented both educational and pre-employment training programs to achieve the highest possible local representation in FDN's future workforce.

## Community Education – Government or Corporate Responsibility?

Education is a fundamental precursor to employment, and community education is the agency for education in rural and remote locations. Whilst this tenet is constant across most countries and cultures, the capacity of the state to deliver a suitable level of education in many developing countries is often deficient. Despite an increase in expenditure on education in developing countries over the past two decades and a subsequent increase in enrolment, student learning often remains poor (Mbiti, 2016).

According to the World Development Report 2018 (World Bank, 2018), school enrolments in developing countries have increased considerably over the past few decades. However, the World Bank (2018) cautions that:

According to leading international assessments of literacy and numeracy – Progress in International Reading Literacy Study (PIRLS) and Trends in International Mathematics and Science Study (TIMSS) – the average student in low-income countries performs worse than 95 percent of the students in high-income countries, meaning that student would be singled out for remedial attention in a class in high-income countries (p. 5)

Evidence of learning deficiencies at primary school level in mathematics and reading experienced in low-income countries compared to more developed countries is provided in Figure 1, together with differences in learning outcomes by region. Clearly, low income and lower-middle income countries perform poorly when compared to upper-middle income and high-income countries.

Median percentage of students in late primary school who score above a minimum proficiency level on a learning assessment, by income group and region

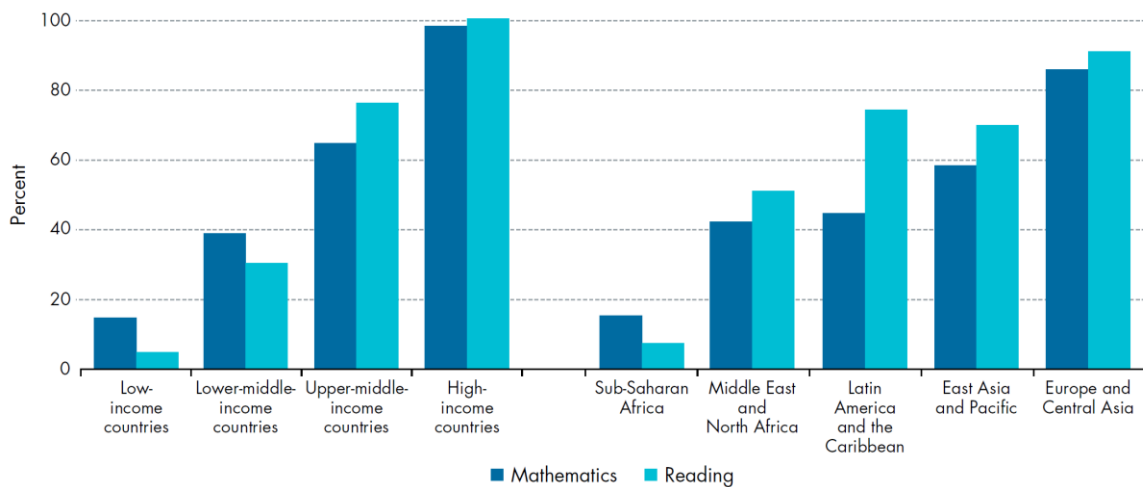


Figure 1: The percentage of primary school students who pass a minimum proficiency threshold

Source: World Development Report 2018. Data at [http://bit.do/WDR2018-Fig\\_0.5](http://bit.do/WDR2018-Fig_0.5).

*Note:* Bars show the unweighted cross-country median within country grouping. Regional averages exclude high-income countries. India and China are among the countries excluded for lack of data. Minimum proficiency in mathematics is benchmarked to the Trends in International Mathematics and Science Study (TIMSS) assessment and in reading to the Progress in International Reading Literacy Study (PIRLS) assessment. Minimum proficiency in mathematics means that students have some basic mathematical knowledge such as adding or subtracting whole numbers, recognizing familiar geometric shapes, and reading simple graphs and tables (Mullis and others 2016). Minimum proficiency in reading means that students can locate and retrieve explicitly stated detail when reading literary texts and can locate and reproduce explicitly stated information from the beginning of informational texts.

As explained in the World Development Report 2018, gaps in education present themselves in the form of a poorly skilled workforce (World Bank, 2018). Policies that seek to address labour force skills shortages are typically separated from the education debate; yet, the two are interconnected. Moreover, the essence of the problem is not just the absence of a skilled labour force, it is the absence of readily trainable labour force (World Bank, 2018).

Historically, for multinational corporations (MNCs) operating in rural or remote locations in developing countries, the topic of community education has rarely been a consideration. For community employment, educational levels typically determine eligibility and, as stated above, reflect one's capacity to learn new skills. With low educational achievement in rural areas, MNCs frequently pursue the immediate solution of widening their talent search to major population centres or engaging international personnel. Consequently, local employment levels are below what they would have been had the closing of local educational gaps been a strategic initiative of the MNC.

To achieve increased local employment, it is intuitive that MNCs must acknowledge the link between community education and employability. Furthermore, it is well understood that many governments of developing countries deliver poorly on their social responsibilities (Eweje, 2006), especially in rural areas removed from large population centers. As such, it is ever clearer that the participation of MNCs is essential if current educational trends in developing countries are to improve (Matten, Crane, & Chapple, 2003). Indeed, if MNCs consider themselves proponents of stakeholder theory (Freeman & Reed, 1983), they must acknowledge that improved community education is a strategic business objective.

Surprisingly, an analysis of MNCs in the oil resource sector suggests there are many actors with differing opinions as to whether MNCs should support governments within developing countries to meet their developmental responsibilities (Idemudia, 2008). Furthermore, Idemudia (2008) claims there is currently a distinct lack of empirical evidence to support any of the differing viewpoints.

## Lundin Foundation's and Lundin Gold's Education and Training Intervention

### Strategy

In the early stages of project planning, Lundin Gold identified that the absence of a local skilled workforce capable of supporting the Fruta del Norte gold mine would be a long-term challenge for the operation; especially given that long-term employment opportunities were by far the top issue identified by local communities in their early engagement with the Company. Thus, community employment, and employability, were identified as a top risk to maintaining FDN's social license and thus its successful development. In analyzing the local situation, an insufficient level of education required for a trainable talent pool was identified as a gap. Accordingly, a strategic decision was reached to facilitate an adult education 'accelerated high school program' as a precursor to operational readiness training programs.

### Education Initiative

Early on, it was decided that such a program had to be developed in partnership with the national government. Several complexities rapidly presented themselves, including perceptions associated with adult education in Ecuador and existing government programs that in theory provided the same outcomes that the Company sought, but in practice had limited impacts.

Nevertheless, all agreed that creating local employment opportunities was essential to the creation of a responsible large-scale mining industry in Ecuador. Agreement was thus reached to take forward the high school program. A cross-sector partnership was developed and the NGO *Fe y Alegría*, which has a long history of delivering adult education, was brought in as a strategic partner. The financing for the initiative was provided by Lundin Gold and Lundin Foundation, while the Ministry of Education agreed to recognize these adult students as official high school graduates upon passing the national exit exam. 217 local adults enrolled in the 18-month intensive program. As they needed to continue to work, the program was offered during the evening and on weekends. 210 of these students successfully completed their coursework and 100% of them passed the exit exam to become *bachilleres de la republica*.

The Company is undertaking a long-term study to understand the impacts of high school education on the professional development and income of these graduates; such data will become available over the coming years. It should be noted that many

impacts are expected in the areas of entrepreneurial pursuits which is outside the scope of this paper.

### Training for Operations Initiative

To prepare a local workforce to support Lundin Gold’s operational phase, in 2018 Lundin Foundation and Lundin Gold embarked upon a ‘training for operations’ initiative. Consequently, a six-month operator training program was designed and developed with the aim to transfer skills and knowledge to training program participants. A key requirement for the program was being a high-school graduate, thus establishing a link between the above-mentioned educational program and this effort to build a skilled local workforce.

Next, community members were categorized and prioritized by the proximity of their residence (Ring) to the Fruta del Norte mine. Notwithstanding, Shuar indigenous community members from across the province of Zamora Chinchipe were provided priority status and strongly encouraged to apply for the training program. During an eight-month recruitment effort, 2,423 community members completed the computerized operator aptitude testing; 70 belonged to the Shuar indigenous community. Subsequently, 316 community members were selected to participate in three separate training cohorts. The final distribution of trainees is provided in Table 1.

	MALE	FEMALE	RING 1	RING 2	RING 3	SHUAR	TOTAL	BACHILLERATO GRADUATE
Cohort 1	92	20	99	1	0	12	112	12
Cohort 2	91	18	26	52	27	4	109	2
Cohort 3	86	9	30	38	27	0	95	4
<b>Total</b>	<b>269</b>	<b>47</b>	<b>155</b>	<b>91</b>	<b>54</b>	<b>16</b>	<b>316</b>	<b>18</b>

Table 1: Lundin Gold and Lundin Foundation Training for Operations trainee distribution

The training program entry criteria were aligned with Lundin Gold’s employment criteria which included a minimum educational achievement of grade 12 (*bachilleres de la republica*). 316 local community members were selected for the operational readiness training program, 18 were graduates of the Bachillerato educational initiative. Whilst this group only represents 6% of the training program participants, it also offers an immediate correlation between an MNC educational intervention

and subsequent employment opportunities resulting from the educational intervention.

Upon graduation, 110 trainees from cohort 1 completed their respective operator training program and 109 gained employment with Lundin Gold. This includes all 12 Shuar community members and all 12 graduates of the Lundin Gold and Lundin Foundation sponsored Bachillerato educational program (as illustrated in Table 1).

## Sustainable Impacts

Immediate impacts of the Company's Bachillerato educational program are evident through the 210 community members who successfully completed the exit exam to become *bachilleres de la republica*. This is a meaningful achievement for community members who would not have otherwise completed their grade 12 education.

Furthermore, in a recent survey conducted by Lundin Gold, Bachillerato program graduates responded to questions regarding how the educational program, and attainment of their grade 12 certificate, has impacted their lives during the 12 months since graduation (as illustrated in Figures 2.1, 2.2, 2.3 and 2.4).

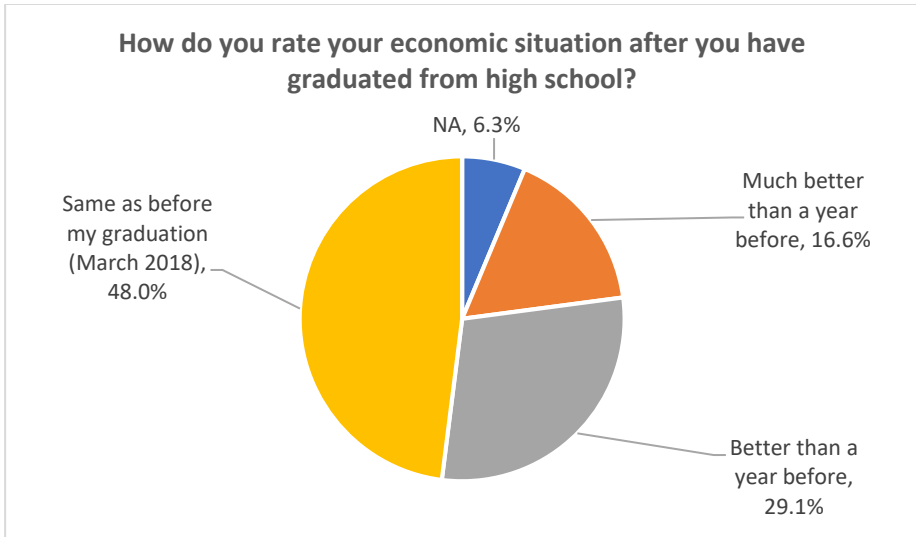


Figure 2.1: Qualitative survey question 1. Source: Lundin Foundation

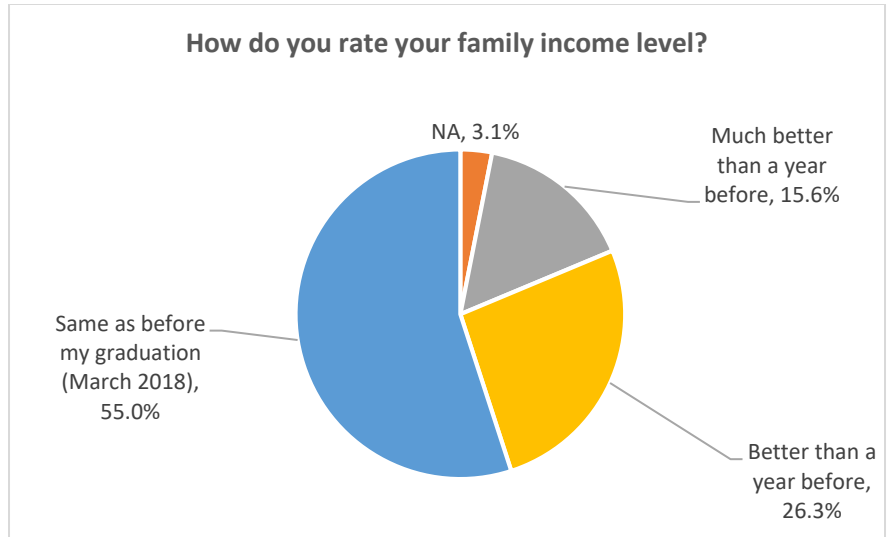


Figure 2.2: Qualitative survey question 2. Source: Lundin Foundation

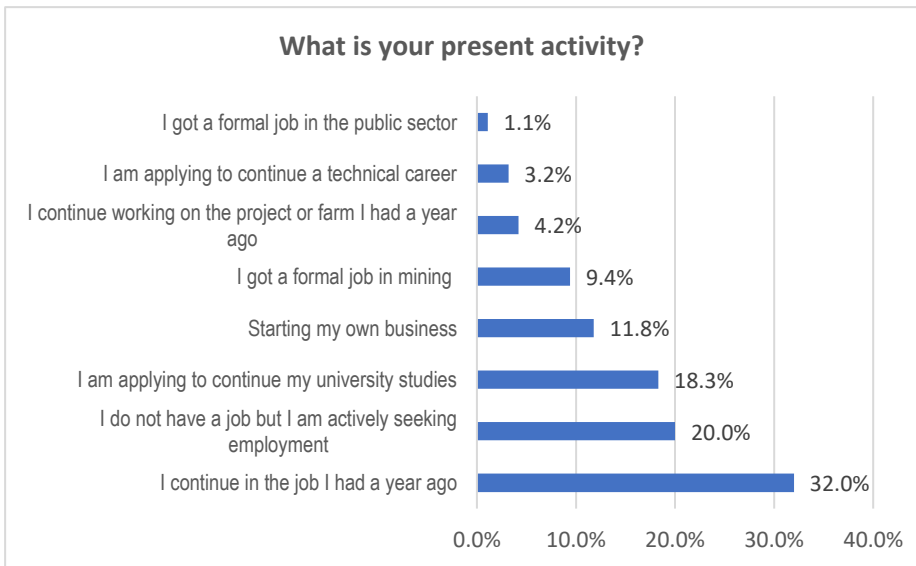


Figure 2.3: Qualitative survey question 3. Source: Lundin Foundation

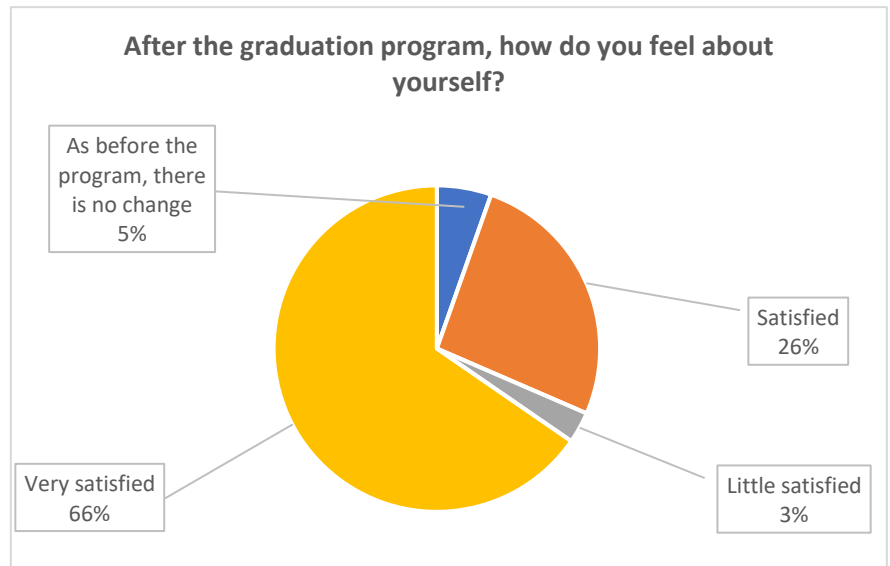


Figure 2.4: Qualitative survey question 4. Source: Lundin Foundation

The first 12-month survey of the Bachillerato program graduates indicates that approximately half of the graduates believe their financial situation has improved since graduating, whilst 92% report that they feel either satisfied or very satisfied with themselves. Moreover, 18% of those interviewed advise they are applying to continue their studies at university. Whilst recognizing that approximately half the interviewees reported no personal economic improvement since graduating, the statistics indicate a positive impact on graduate's self-worth and future aspirations.

Notwithstanding, the local community endures high unemployment, few options for income and widespread levels of poverty. Consequently, direct employment with Lundin Gold offers both immediate economic impact and provides new career opportunities for the local community.

Moreover, empirical data associated with the sustainable impacts of the operational readiness training initiative will be gathered using the *impact pathway* metrics in Table 2. It is the intention that these metrics will offer useful insight into the sustainable impact of Lundin Gold and Lundin Foundation's joint operational readiness training initiative.

Considering both the educational and operator training programs, it is expected that the sustainable impacts will extend across generations. It is Lundin Foundation's intention to measure impacts for the first three years from graduation.



	INPUT	ACTIVITIES	OUTPUTS	OUTCOMES (<1 YEAR)	OUTCOMES (1-3 YEARS)
<b>Timeline (relative to training)</b>		Months 1-6	Training: Month 6	6-12 months post training	12 months post completion of last cohort of training (24 months in project timeline)
Key Observable Events	Lundin Foundation \$ Training curriculum	<ul style="list-style-type: none"> <li>• Awareness raising and Pre-screening</li> <li>• Alignment on training requirements between Lundin Foundation and Lundin Gold</li> <li>• Selection of training candidates</li> <li>• Training programs delivered (3 cohorts of 6-month training programs)</li> </ul>	<ul style="list-style-type: none"> <li>• Trainees successfully complete course</li> <li>• Offer of initial employment by Lundin Gold for apprenticeship position (3 months)</li> <li>• Acceptance of employment by Trainees</li> </ul>	<ul style="list-style-type: none"> <li>• Successful completion of apprenticeships</li> <li>• Lundin Gold offer of full employment is accepted</li> <li>• Successful job performance of trainees, limited workforce challenges affecting Lundin Gold operations</li> <li>• Income benefits through employment</li> <li>• Local Employment</li> </ul>	<ul style="list-style-type: none"> <li>• Completion of 2-year commitments</li> <li>• Workforce performance in line with industry standards and operational requirements at Fruta Del Norte</li> <li>• Income benefits</li> <li>• Employment</li> <li>• Household level benefits arising among training graduates</li> <li>• On-going skills development/transferability</li> </ul>
Material Indicators		<ul style="list-style-type: none"> <li>• # of people submitting applications for training</li> <li>• Dover score</li> <li>• # of people selected for training (M/F, location, previous Fruta Del Norte employment)</li> <li>• Training completed</li> <li>• Amount of stipends paid per trainee</li> </ul>	<ul style="list-style-type: none"> <li>• # of people completing training (M/F)</li> <li>• # of job offers (3-month apprenticeship)</li> <li>• # of trainees hired (M/F, Zone, previous Fruta Del Norte employment) as apprentices</li> <li>• Wages offered (i.e. incomes)</li> </ul>	<ul style="list-style-type: none"> <li>• # of apprenticeships successfully completed</li> <li>• Total # of trainees employed as apprentices (M/F, Location)</li> <li>• Workforce performance</li> <li>• # of full employment offers</li> <li>• # of full employment accepted (conversion of offer to acceptance)</li> <li>• Total # of trainees employed on full contracts (M/F, local)</li> <li>• Wages paid (by contract type)</li> <li>• Satisfactory workforce performance as assessed by Lundin Gold</li> <li>• Retention rates of trainees at Fruta Del Norte</li> <li>• Reasons for attrition rates</li> </ul>	<ul style="list-style-type: none"> <li>• # of completed 2-year commitments and continued employment</li> <li>• Wages paid/incomes</li> <li>• # of trainees employed (M/F, location)</li> <li>• Satisfactory workforce performance as assessed by Lundin Gold</li> <li>• Retention rates of trainees at FDN</li> <li>• Reasons for trainees to leave Fruta Del Norte</li> <li>• HH level indicators (12 months post first employment offer) <ul style="list-style-type: none"> <li>- Education, savings, health, other</li> </ul> </li> <li>• Job title</li> </ul>

Table 2: Impact Pathway for the Lundin Foundation/Lundin Gold operational readiness training initiative  
Source: Lundin Foundation IMS – Project\_Management Plant Training for Ops LUG planning tool

## Challenges

For the operator training program, the absence of a large-scale mining industry in Ecuador extended to the absence of in-country mine operator training providers. Accordingly, training service providers were sourced regionally from Chile. Furthermore, preparing trainees for a large-scale mining environment presented challenges. It was found to be difficult to convey the industry operating environment from a classroom in the local town. As such, the final two months of training was conducted on the mine site to prepare and sensitize the trainees to their future work setting.

Another challenge presented was Shuar community engagement in the training program. With many Shuar community members eligible to apply for the program, registrations were lower than expected. Prior to launching the training program recruitment phase, Shuar community leaders had suggested a much larger level of interest was to be expected. It is unclear exactly why interest levels were lower than expected, though this is a point of discussion between Lundin Gold and the Shuar provincial leadership for the future.

## Recommendations

Program improvements might have included a more strategic approach of showcasing the training program prior to, and during, the inscription period. It was difficult for local and indigenous community members to envisage the technology employed in the training and the opportunity that was presented to them.

Trainee exposure to the operating environment early in the training program provided trainees an opportunity to consider their suitability and interest in the mining environment. This allowed trainees the option to exit at the onset of the training program and contributed to minimal early attrition once employed.

Furthermore, training program graduates commenced their employment with Lundin Gold as 'Operators in training'. This means their competence undergoes further assessment, and competency development continues under the operator development program managed by Lundin Gold. This is strongly recommended to ensure a safe and effective transition into the operating environment.

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