**IFD/CTI**

**Innovation and Competitiveness in Mining Value Chains**

**(RG-T2915)**

**Component I**

**CONSULTANCY FOR THE DEFINITION OF A FRAMEWORK FOR THE CONDUCTION OF COUNTRY CASE STUDIES IN MINING GLOBAL VALUE CHAINS**

**TERMS OF REFERENCE**

**Background**

Established in 1959, the Inter-American Development Bank (IDB) is the main source of multilateral financing for economic, social and institutional development in Latin America and the Caribbean. It provides loans, grants, guarantees, policy advice and technical assistance to the public and private sectors of its borrowing member countries.

Mining is a high share of Gross Domestic Product (GDP) and exports in many countries in Latin American and the Caribbean (LAC). It contributes to 12% of GDP in Chile and Peru, and 4% in Brazil. Regarding exports, the mining sector represents 60% of Chilean exports, 52% of Peruvian exports and 21% of Brazilian exports. Chile and Peru are major players in copper mining, while Brazil is a key player in iron mining. Chile led the rank of world copper production in 2014 with a share of 31%, while Peru, in fourth place, has a share of 7.5% (ECLAC, 2016). On the other hand, Brazil was the third producer of iron in the world in 2014, with a share of 9.9%. Also, driven by high commodity process, global investments in mining increased nearly ten-fold between 2000 and 2013, from US$86 billion to US$735 billion (Walter, 2016 and ECLAC 2013). Over the past decade, the LAC region has been the recipient of an important portion of global investment flows. In 2014, the region received approximately 25% of global exploration investment flows and held more than 28% of the world’s mineral investment portfolio (Walter, 2016 and SNL, 2015).

Still, the mining industry has had limited success in sparking a process of economic transformation and diversification spreading to other activities. As the experience of fast industrializers shows, this process is intrinsically related to the process of innovation and spillovers leading to the creation of value in existing sectors, as well as to the emergence of new sectors in the economy. Local provision of intermediate inputs and services is still limited, and confined to the second and third lower value added tiers of the mining value chains.

For larger formal mining operations, which account for the vast majority of Foreign Direct Investment in the sector, the provision of intermediate inputs is dominated by first tier providers that follow mining companies in their activities overseas, and that tightly control access to these niches. However, the recent evolution of the industry is creating interesting opportunities for local suppliers. These opportunities are related to: (i) the need that mining companies are facing to outsource and make production more efficient; (ii) the emergence of new solutions to extracting and manufacturing activities derived from advances in relevant branches of science and technology, such as biotechnology and ICT; (iii) the search for local solutions required to address technological, environmental, and social challenges that are increasingly local; and (iv) the emerging accumulation of scientific, technological and manufacturing skills in several layers of local companies. Still, these opportunities for domestic suppliers and local content can only be exploited provided that some underlying conditions are fulfilled. These conditions are related, for example, to the development of local technological competences, and the availability of an institutional setting that allows encompassing the social, environmental, and production-related demands within a coherent framework.

In order to transform the mining industry into an engine of dynamic and sustainable development, decision-makers require a clearer understanding of: (i) the evolution of the industry and of the challenges it is facing; (ii) the technological capabilities needed to meet the new demands coming from mining companies; (iii) the expectations of civil society stakeholders about production conditions and impact on their livelihoods; and (iv) the impact of environmental regulations in place and in preparation. It is critical to identify the type of knowledge, human capital and capabilities that are currently available; and those that are required to address the challenges that the mining industry is facing along the entire value chain. This information will enable the identification of the knowledge, human capital and institutional gaps that must be addressed to promote the accumulation of local innovative technological capabilities that are sources of competitiveness in the future.

**Consultancy objective(s)**

The objective of this consultancy is toprovide scientific and technical guidance to CTI and the researchers participating in the project. Based on previous academic experience the external advisor will provide suggestions and recommendations regarding methodology and interpretation of results in order to:

1. Increase the understanding with regards to the activities that intervene in the different stages of the mining chain (i.e., exploration, mine construction, mining, concentration, refining), identifying those associated with higher local economic contribution (in terms of value added);
2. Characterize the actors involved in these activities (i.e., mining companies, suppliers, universities), distinguishing local from foreign origin; the required services and inputs (i.e., geochemical and geophysical services, engineering products, mining support services, construction services, ICT services, among other);
3. Identify the specific technologies and scientific/technical knowledge involved in the different stages and activities of the chain, establishing comparisons between LAC countries under analysis, and advanced countries in the productivity frontier;
4. Define the conditions under which the development of a critical mass of competitive and innovative local suppliers is ensured, focusing on the capabilities required in each stage of the value chain, and on the capability levels and gaps faced by local firms in the value chain.
5. Draw policy implications that could help enhancing the development of the mining sector and maximizing its contribution to the local and national economy.

**Main activities**

The selected contractual will perform the following activities:

1. Review of available methodologies aimed at characterizing mining value chains, both quantitatively and qualitatively;
2. Provide recommendations regarding the selection of the countries and cases that should be studied in the research project.
3. Contribute to the selection of the Research Teams that should conduct the Country Case Studies and monitor their activities and performance.
4. Propose a conceptual framework and methodological strategy that provides guidelines on the key aspects to be analyzed in targeted country studies.
5. Provide analytical guidance and technical recommendations in technical workshops of the research project, where outlines, methodologies, data limitations, results and policy implications will be discussed.
6. Review and provide written recommendations to improve the quality of the Country Case Studies to be conducted.
7. Write a document that synthesizes the main results of the case studies.

**Reports / Deliverables**

The contractual will deliver the following:

* Product 1: A conceptual and methodological framework with guidelines on the key aspects to be analyzed in the Country Case Studies, proposing the countries to be studied.
* Product 2: Written comments to Country Case Studies.
* Product 3: Synthesis report with the main findings of the Country Case Studies.

The contractual is asked to submit the abovementioned Reports by the following dates:

* Product 1: 4 months (16 weeks) after the signing of the contract
* Product 2: 16 months (64 weeks) after the signing of the contract
* Product 3: 20 months (80 weeks) after the signing of the contract

**Payment Schedule**

The contractual will be paid a lump sum to be paid as follows:

* 20% on contract signing
* 30% on receipt of Product 1
* 20% on receipt of Product 2
* 30% on receipt of Product 3

**Qualifications**

Type of Consultancy: Products and External Services (PEC)

Start Date and Duration: a total of 6 months, distributed between January 1st 2017until November 31st 2018.

Place of Work: Home based. The external advisor is expected to participate in three workshops; related travel expenses will be covered by this contract.

Coordination: The consultant will work under the supervision of Juan Carlos Navarro (IFD/CTI) and Jocelyn Olivari (Consultant of the IFD/CTI Division).

Qualifications: A PhD degree in economics, public policy or a similar field is required. No less than 10 years of experience in quantitative and qualitative research in the fields of economics and policy of innovation, value chains, and industrial development. Proficiency in English and Spanish is required.

**IFD/CTI**

**Innovation and Competitiveness in Mining Value Chains**

**(RG-T2915)**

**Component I**

**CONSULTANCY FOR THE CONDUCTION OF A CASE STUDY IN MINING GLOBAL VALUE CHAINS IN COUNTRY XX**

**(2 consultancies)**

**TERMS OF REFERENCE**

**Background**

Established in 1959, the Inter-American Development Bank (IDB) is the main source of multilateral financing for economic, social and institutional development in Latin America and the Caribbean. It provides loans, grants, guarantees, policy advice and technical assistance to the public and private sectors of its borrowing member countries.

Mining is a high share of Gross Domestic Product (GDP) and exports in many countries in Latin American and the Caribbean (LAC). It contributes to 12% of GDP in Chile and Peru, and 4% in Brazil. Regarding exports, the mining sector represents 60% of Chilean exports, 52% of Peruvian exports and 21% of Brazilian exports. Chile and Peru are major players in copper mining, while Brazil is a key player in iron mining. Chile led the rank of world copper production in 2014 with a share of 31%, while Peru, in fourth place, has a share of 7.5% (ECLAC, 2016). On the other hand, Brazil was the third producer of iron in the world in 2014, with a share of 9.9%. Also, driven by high commodity process, global investments in mining increased nearly ten-fold between 2000 and 2013, from US$86 billion to US$735 billion (Walter, 2016 and ECLAC 2013). Over the past decade, the LAC region has been the recipient of an important portion of global investment flows. In 2014, the region received approximately 25% of global exploration investment flows and held more than 28% of the world’s mineral investment portfolio (Walter, 2016 and SNL, 2015).

Still, the mining industry has had limited success in sparking a process of economic transformation and diversification spreading to other activities. As the experience of fast industrializers shows, this process is intrinsically related to the process of innovation and spillovers leading to the creation of value in existing sectors, as well as to the emergence of new sectors in the economy. Local provision of intermediate inputs and services is still limited, and confined to the second and third lower value added tiers of the mining value chains.

For larger formal mining operations, which account for the vast majority of Foreign Direct Investment in the sector, the provision of intermediate inputs is dominated by first tier providers that follow mining companies in their activities overseas, and that tightly control access to these niches. However, the recent evolution of the industry is creating interesting opportunities for local suppliers. These opportunities are related to: (i) the need that mining companies are facing to outsource and make production more efficient; (ii) the emergence of new solutions to extracting and manufacturing activities derived from advances in relevant branches of science and technology, such as biotechnology and ICT; (iii) the search for local solutions required to address technological, environmental, and social challenges that are increasingly local; and (iv) the emerging accumulation of scientific, technological and manufacturing skills in several layers of local companies. Still, these opportunities for domestic suppliers and local content can only be exploited provided that some underlying conditions are fulfilled. These conditions are related, for example, to the development of local technological competences, and the availability of an institutional setting that allows encompassing the social, environmental, and production-related demands within a coherent framework.

In order to transform the mining industry into an engine of dynamic and sustainable development, decision-makers require a clearer understanding of: (i) the evolution of the industry and of the challenges it is facing; (ii) the technological capabilities needed to meet the new demands coming from mining companies; (iii) the expectations of civil society stakeholders about production conditions and impact on their livelihoods; and (iv) the impact of environmental regulations in place and in preparation. It is critical to identify the type of knowledge, human capital and capabilities that are currently available; and those that are required to address the challenges that the mining industry is facing along the entire value chain. This information will enable the identification of the knowledge, human capital and institutional gaps that must be addressed to promote the accumulation of local innovative technological capabilities that are sources of competitiveness in the future.

**Consultancy objective(s)**

The objective of this consultancy is tocharacterize the mining global value chain of Country XX and identify key gaps that need to be addressed in order to promote local innovation and higher sector productivity. Based on previous academic experience, the consultant will generate novel research in order to:

1. Increase the understanding with regards to the activities that intervene in the different stages of the mining chain (i.e., exploration, mine construction, mining, concentration, refining), identifying those associated with higher local economic contribution (in terms of value added);
2. Characterize the actors involved in these activities (i.e., mining companies, suppliers, universities), distinguishing local from foreign origin; the required services and inputs (i.e., geochemical and geophysical services, engineering products, mining support services, construction services, ICT services, among other);
3. Identify the specific technologies and scientific/technical knowledge involved in the different stages and activities of the chain, establishing comparisons between LAC countries under analysis, and advanced countries in the productivity frontier;
4. Define the conditions under which the development of a critical mass of competitive and innovative local suppliers is ensured, focusing on the capabilities required in each stage of the value chain, and on the capability levels and gaps faced by local firms in the value chain.
5. Draw policy implications that could help enhancing the development of the mining sector and maximizing its contribution to the local and national economy.

**Main activities**

1. Prepare a 5-page background report on Country XX’s Mining Sector (Report 1), containing information that is deemed to be relevant to the topic of the research project. The report should be presented in the inception workshop of the project where the conceptual and methodological framework will be discussed.
2. Participate in an inception workshop. During this workshop the consultant is expected to:
   * Present a synthesis of the 5-page background report.
   * Participate in: (i) discussions of the Conceptual and Methodological Framework expected to be used for the particular case study of Country XX; (ii) discussions to anticipate limitations that may require the attention and action of the Team Leader; (iii) sharing experiences and knowledge that may be relevant to the conduction of the Case Studies.
3. Develop an empirical strategy (Report 2) to conduct the Case Study of Country XX following the guidelines given in the Conceptual and Methodological Framework (CMF). This should include:
   * Definition of the main research questions to be answered for the Case Study of Country XX and the hypothesis to be tested.
   * Definition of the empirical strategy to answer the research questions. This entails: (i) identifying the unit of analysis (based on the unit of analysis proposed by the CMF); (ii) defining the effective sample to be included in the analysis; (iii) defining key variables to be analyzed and indicators to be built; (iv) developing questionnaires and surveys (if needed) that allow collecting the information required to build the variables and indicators defined in (iii).
4. Conduct fieldwork following the empirical strategy previously discussed and approved by the Team Leader and the external expert.
5. Elaborate a report (Report 3) that briefly describes the main characteristics of the fieldwork (Fieldwork Characterization). This should allow any reader to learn about how the Fieldwork was implemented. This should include: (i) the criteria used to select the sample and how it assures the representativeness of the study; (ii) the sample effectively covered and its characteristics; (iii) the methodology implemented to collect the data and its justification (i.e. if the consultant used a structured, semi-structured or open interview approach); (iv) obstacles faced during the fieldwork; (v) missing information and a corresponding explanation of why the data is missing; (vi) other relevant elements that are key to understand how a fieldwork like this is implemented.
6. Draft and submit to the Team Leader an Annotated Outline of the final report (Report 3).
7. Analyze the results of the fieldwork and elaborate a complete report (Report 4), which should contain the following:
   * Conceptual background, research questions and hypotheses.
   * Methodology.
   * Analysis. This should report results that ensure the accomplishment of objectives (a) to (c).
   * Discussion and policy implications. This should allow tackling objectives (d) and (e).
8. Participate in a Final Workshop to discuss the results of the Case Study of Country XX. During this workshop the consultant is expected to:
   * Present the complete report (Report 4) to the Research Team.
   * Receive feedback from the participants to the workshop.
   * Give feedback to the other Case Studies.
9. Include the comments received in the Final Workshop and submit an updated version of Report 4.

**Reports / Deliverables**

The contractual will deliver the following:

1. Report 1: Background Report on Country XX’s Mining Sector.
2. Report 2: Empirical Strategy for Case Study of Country XX.
3. Report 3: Fieldwork Characterization and Annotated Outline.
4. Report 4: Final Report on the Case Study of Country XX.

The contractual is asked to submit the abovementioned Reports by the following dates:

* Product 1: 1 month after the signing of the contract
* Product 2: 4 months after the signing of the contract
* Product 3: 11 months after the signing of the contract
* Product 4: 16 months after the signing of the contract

**Payment Schedule**

The contractual will be paid a lump sum to be paid as follows:

* 10% on receipt of Product 1
* 50% on receipt of Product 2
* 20% on receipt of Product 3
* 20% on receipt of Product 4

**Qualifications**

Type of Consultancy: Products and External Services (PEC)

Start Date and Duration: a total of 6 months, distributed between April 1st 2017and November 1st 2018.

Place of Work: Home based. The external advisor is expected to participate in two workshops; related travel expenses will be covered by this contract.

Coordination: The consultant will work under the supervision of Juan Carlos Navarro (IFD/CTI) and Jocelyn Olivari (Consultant of the IFD/CTI Division).

Qualifications: A PhD degree in economics, public policy or a similar field is required. No less than 10 years of experience in quantitative and qualitative research in the fields of economics and policy of innovation, value chains, and industrial development. Proficiency in English and Spanish is required.

**IFD/CTI**

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**Component II**

**CONSULTANCY FOR ANALYZING THE IMPACT OF MACROECONOMIC VOLATILITY IN MICROECONOMIC INNOVATION PROCESSES**

**TERMS OF REFERENCE**

**Background**

Established in 1959, the Inter-American Development Bank (IDB) is the main source of multilateral financing for economic, social and institutional development in Latin America and the Caribbean. It provides loans, grants, guarantees, policy advice and technical assistance to the public and private sectors of its borrowing member countries.

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For larger formal mining operations, which account for the vast majority of Foreign Direct Investment in the sector, the provision of intermediate inputs is dominated by first tier providers that follow mining companies in their activities overseas, and that tightly control access to these niches. However, the recent evolution of the industry is creating interesting opportunities for local suppliers. These opportunities are related to: (i) the need that mining companies are facing to outsource and make production more efficient; (ii) the emergence of new solutions to extracting and manufacturing activities derived from advances in relevant branches of science and technology, such as biotechnology and ICT; (iii) the search for local solutions required to address technological, environmental, and social challenges that are increasingly local; and (iv) the emerging accumulation of scientific, technological and manufacturing skills in several layers of local companies. Still, these opportunities for domestic suppliers and local content can only be exploited provided that some underlying conditions are fulfilled. These conditions are related, for example, to the development of local technological competences, and the availability of an institutional setting that allows encompassing the social, environmental, and production-related demands within a coherent framework.

In order to transform the mining industry into an engine of dynamic and sustainable development, decision-makers require a clearer understanding of: (i) the evolution of the industry and of the challenges it is facing; (ii) the technological capabilities needed to meet the new demands coming from mining companies; (iii) the expectations of civil society stakeholders about production conditions and impact on their livelihoods; and (iv) the impact of environmental regulations in place and in preparation. It is critical to identify the type of knowledge, human capital and capabilities that are currently available; and those that are required to address the challenges that the mining industry is facing along the entire value chain. This information will enable the identification of the knowledge, human capital and institutional gaps that must be addressed to promote the accumulation of local innovative technological capabilities that are sources of competitiveness in the future.

**Consultancy objective(s)**

The objective of this consultancy is to provide scientific and technical guidance to CTI in the study of the effects of macroeconomic volatility in microeconomic innovation processes around the mining sector. Based on previous academic experience the consultant will produce novel knowledge in order to:

1. Increase the understanding of the impact of the evolution of the macroeconomic framework on capabilities creation in firms in mining value chains;
2. Identify possible policy alternatives to anticipate and mitigate the damages caused by the macroeconomic volatility.

**Main activities**

The selected contractual will perform the following activities:

1. Propose a conceptual and methodological framework to analyze the mechanisms through which the macroeconomic framework and business cycle affect the development of local capabilities in the mining industry. The methodology should include the application of both quantitative and qualitative research methods.
2. Propose a selection of countries and cases to be studied and carry out these studies..
3. Develop a proposal on policies and tools to mitigate, anticipate, finance, and provide insurance in a context where the business cycle negatively affects the buildup of capabilities. These policy measures should help protecting and encouraging the firm-level learning required for increasing the resiliency of local content and suppliers’ development.
4. Participate in all the workshops of the project and provide comments to the research teams.

**Reports / Deliverables**

The contractual will deliver the following:

* Product 1: A Report containing a conceptual and methodological framework with guidelines on the key aspects to be analyzed in the Country Case Studies, proposing the countries to be studied.
* Product 2: A Report analyzing the impact of the business cycles on the development of capabilities in the mining industry.
* Product 3: A Report containing a proposal on policies and tools to prevent and mitigate the negative effects of macroeconomic volatility in learning and innovation processes in the mining sector.

The contractual is asked to submit the abovementioned Reports by the following dates:

* Product 1: 10 weeks after the signing of the contract
* Product 2: 28 weeks after the signing of the contract
* Product 3: 38 weeks after the signing of the contract

**Payment Schedule**

The contractual will be paid a lump sum to be paid as follows:

* 20% on contract signing
* 20% on receipt of Product 1
* 30% on receipt of Product 2
* 30% on receipt of Product 3

**Qualifications**

Type of Consultancy: Products and External Services (PEC)

Start Date and Duration: a total of 6 months, distributed between January 1st 2018and October 31st 2018.

Place of Work: Home based. The consultant is expected to participate in three workshops; related travel expenses will be covered by this contract.

Coordination: The consultant will work under the supervision of Juan Carlos Navarro (IFD/CTI) and Jocelyn Olivari (Consultant of the IFD/CTI Division).

Qualifications: A PhD degree in economics, public policy or a similar field is required. No less than 10 years of experience in quantitative and qualitative research in the fields of economics and policy of innovation, value chains, and industrial development. Proficiency in English and Spanish is required.