Document of the Inter-American Development Bank

**Guyana**

**Enhancing the National Quality Infrastructure for Economic Diversification and Trade Promotion**

**(GY-L1059)**

**Monitoring and Evaluation Arrangements**

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| **Acronyms** | |
| CROSQ | CARICOM Regional Organization for Standards and Quality |
| CROSQ | CARICOM Regional Organization for Standards and Quality |
| EA | Executing Agency |
| EA | Executing Agency |
| EDB | Economic Development Board |
| EDB | Economic Development Board |
| EU | European Union |
| EU | European Union |
| GDP | Gross Domestic Product |
| GDP | Gross Domestic Product |
| GNBS | Guyana National Bureau of Standards |
| GNBS | Guyana National Bureau of Standards |
| Go-Invest | Guyana Office for Investment |
| Go-Invest | Guyana Office for Investment |
| GSBB | Guyana Small Business Bureau |
| ICT | Information and Communication Technology |
| IDB | Inter-American Development Bank |
| LAC | Latin American and the Caribbean |
| M&E | Monitoring and Evaluation |
| MIF | Multilateral Investment Fund |
| MoA | Ministry of Agriculture |
| MoB | Ministry of Business |
| MoH | Ministry of Health |
| NARE | National Agricultural Research and Extension Institute |
| NQI | National Quality Infrastructure |
| OM | Operating Manual |
| PEU | Project Execution Unit |
| PS | Permanent Secretary |
| PSAR | Private Sector Assessment Report |
| SFD | Sector Framework Document |
| SME  SMTQ | Small and Medium-sized Enterprises  Standards, Metrology, Testing and Quality Management |
| SPS | Sanitary and Phytosanitary Measures |
| WEF | World Economic Forum |

1. Introduction
   1. Guyanese exports basket is highly concentrated in mineral or agricultural commodities (82% of the country exports are concentrated in less than ten products: gold accounting for 45%, rice for 18%, and raw sugar for 7%[[1]](#footnote-1)). While this composition was compatible with the favorable external conditions for commodities prices observed in the last years (and let the country grow at an average annual pace of 4.5% between 2009-2014)[[2]](#footnote-2), now it poses relevant development risks for the country. In fact, slower economic growth registered in the last years in major mineral consumers (e.g. China) has put pressure for diminishing prices of minerals. At the same time, recent increases of production costs of Guyana’s main agricultural products (rice and sugar) challenge the competitiveness that Guyanese exporters need in global market.
   2. Concentration is not limited to the composition of the supplied exports basket. It is also observed in the composition of the destination of Guyanese exports as five countries make up for about 3/5 of the demand of its exports. Access to these markets require compliance, in most cases mandatory, with technical requirements that are standards-based and include: food safety, good agricultural practices, good manufacturing practices, quality standards, animal health, plant health, environmental, social, safety, information security, efficiency and certification standards. This requires a quality infrastructure with laboratories that are able to generate precise and accurate results when testing and certifying goods for exports.
   3. GY-L1059 aims at coping with these risks by supporting diversification of exports products (non-traditional agricultural exporters will be targeted as main final beneficiaries of the project) and by improving the national system for quality control (as to facilitate the compliance with international standards for exports to main destinations). In order to strengthen the institutional framework to facilitate quality improvements[[3]](#footnote-3), activities will be conducted in two fronts (supply and demand related): through the enhancement of the National Quality Infrastructure (NQI) and through a National Export and Investment Promotion Strategy. In particular, the specific subcomponents of the intervention are:
   4. **Subcomponent 1. Modernization of the Institutional Framework for the NQI (US$0.615MM).** The subcomponent will support the capacity building of the stakeholders of the NQI, in particular the GNBS, by strengthening the areas of technical regulations, compliance, conformity, accreditation and training, and capacity building of public and private stakeholders. The governance structure of the NQI will be streamlined to include the needs of private sector with priority given to non-traditional exporters and a network of laboratories will be created in order to promote the most efficient use of the current facilities. In addition, the network of laboratories under the GNBS will create a monitoring and evaluation system, in which data of the users of the NQI will be collected. This subcomponent will finance: (i) activities to support the accreditation process of existing laboratories; (ii) training and capacity building for laboratories in the network and for the GNBS; (iii) creation and operation of a network of laboratories; (iv) capacity building activities on SMEs and standards (v) the development of a strategic plan for the GNBS that aligns with both the regional and national policy framework; and (v) awareness campaigns on the use of standards and quality.
   5. **Subcomponent 2: Improving Laboratory Facilities and Equipment (US$5.79MM).** The objective of this subcomponent is to improve facilities for the NQI. This subcomponent will finance specifically: (i) architecture and engineering designs of the new laboratory facility for the GNBS, including "green building" provisions; (ii) building of the new facility (the facility will house metrology, testing, chemistry and microbiology, and legal metrology); (iii) required equipment for the adequate functioning of the GNBS; (iv) maintenance contracts; (v) specific support to the main laboratories related to the export/import processes under the MoH and MoB filling specific gaps in those laboratories; and (vi) a sustainability plan (to guarantee the sustainability of the investment, the development of the facilities will be concentrated in the core functions of the GNBS - metrology, calibration and testing - and will provide specific support to the Food and Drug and Agriculture facilities related to export promotion). Additional requirements, derived from quality value chain analysis that will be conducted on selected sectors and the quality bottlenecks, as part of the activities of Subcomponent 3 will be addressed by this component as well.
   6. **Subcomponent 3: Implementing the National Export and Investment Strategy (US$1.16MM).** In order to enhance the capability of export and investment promotion, this subcomponent will support: (i) technical assistance to design and implement a trade and investment promotion strategy, including mapping major value chains; and (ii) technical assistance for the strengthening of Go Invest and its ability to promote exports and attract foreign direct investment, especially in the sectors that will need the operation of modern certified lab facilities that are required for accessing international markets.
2. Monitoring
3. A. Indicators
   1. The vertical logic of the program and the causality chain of outputs delivered, expected results and impacts is summarized in the Results Matrix of the project (see Annex II). The monitoring of the indicators proposed in the matrix constitutes one of the main inputs to conduct the evaluation of effectiveness of the program at project completion. Monitoring, then, will provide annual updates of all the outputs and outcome indicators. Biennial updates will be provided for those impacts and outcomes drawn from ad-hoc surveys (as it will be explained later, we distinguish results indicators according to the source of information: annual for those coming from administrative data, biennial for those relying on an ad-hoc survey for labs and their clients that will be advanced for this program through the non-reimbursable TC GY-T1129)
   2. As explained, three types of indicators will be monitored: outputs (Table 1), outcomes and impacts (Table 4). For evaluation and accountability purposes (PMR and PCR), attention will be put in the first two. For learning purposes, impacts will be also monitored and analyzed.
   3. Table 1 show the projected annual financial execution for the outputs planned to be delivered for each subcomponent of the program (Annex II reports the projected annual physical execution).
4. B. Data collection
   1. Monitoring of outputs will be conducted biannually through reports to the GSBB. The ROP will indicate that the GSBB will be responsible for the collection, processing, validation and submission of this information to the Bank as to fulfill the monitoring and evaluation clauses described in this document.
   2. The main source of information to conduct the monitoring and evaluation of outcomes will be the customs administrative records collected by the Guyana Revenue Authority and processed by the National Bureau of Statistics. Both institutions have collaborated with aggregate information computed from information at the level of the firm with coverage of the universe of formal firms of the Guyanese economy. For the purposes of the project, and spite of the level of informality of the economy, the formal sector is the relevant target as it is virtually impossible for an informal firm to comply with all the requisites (metrology, sanitary, etc.) by importer countries.
   3. Outcome variables are measured systematically by GRA. Data is transactional and is recorded at the moment of each event of exports. The level of measure is by product by firm. GRA collects several variables (name of firm, product sold, volume sold, value of export, country of destination, number of workers, etc.). All of these information allow to identify the outcomes and observables of interest, for the types of exporter of interest, for the two groups of interest (treated and non-treated), for several periods, pre and post treatment. For M&E purposes, data will be collapsed yearly for non-traditional producers and for treated and control groups. Contribution of aggregate measures made by GRA during the preparation of this document show that access to aggregate information coming from this sources is feasible and that the monitoring and evaluation activities will not be undermined by data access.

**Table 1. Outputs**

**Annual projection of financial execution**



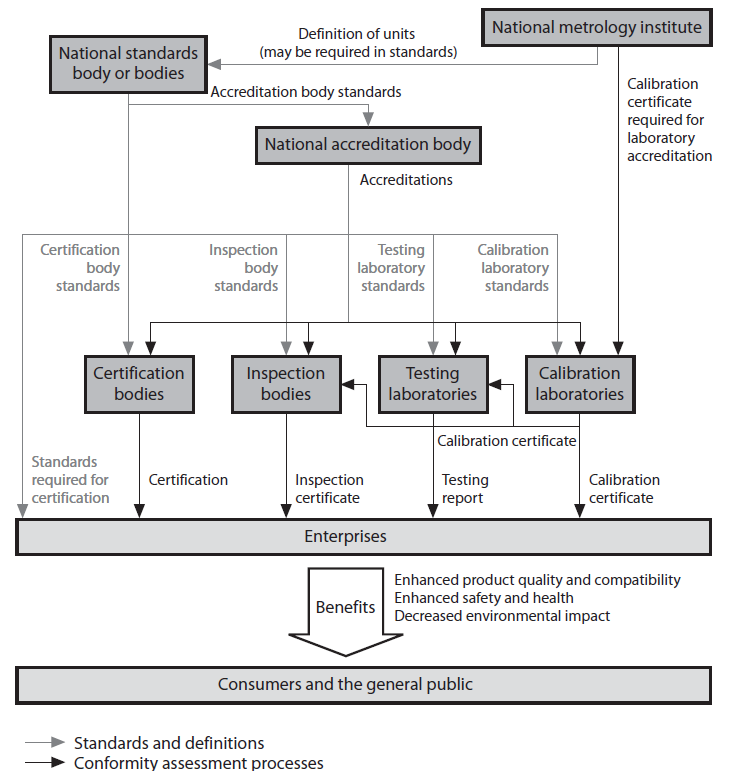
Source: Projections of financial progress (Annual projection of Physical progress are reported in Annex II Results Matrix).

* 1. Two complimentary sources of information are also of interest. Annual reports of the Guyana Marketing Corporation and the Central Bank Statistics. Complementary aggregate data will be drawn from these sources (as for example aggregate level of exports). Data availability coming from these sources is also granted. Central Bank produces and publishes official aggregate data on a frequent basis. The Guyana Marketing Corporation Annual report also produces and publishes aggregate information related to non-traditional exports.
  2. A third source of information will be financed by GY-T1129. The TC will invest US$200 thousand in generating knowledge aimed at strengthening Guyana’s competitiveness through the improvement of its National Quality System (the objective of this TC will be to enhance the capacity of the Ministry of Business by providing necessary data for informed decision making. The specific objectives will be to carry out a survey to gather information about the existing laboratories, survey to identify the needs and practices of exporters regarding quality and standards and to carry out facilitating workshops with stakeholders). US$70 thousand are earmarked for data generation (survey to exporters) and US$40 are allocated for dissemination and US$10 for contingencies, all of which could be oriented to complement data collection activities if necessary. The survey will collect data about the cost of use of laboratories for all users of the local network of laboratories benefitted by the program and from exporters non-users of the services of the local network.

1. C. Reporting
   1. For evaluation purposes, three reports will be produced: at the baseline, an intermediate report and a final report. The MoB will be responsible of these reports. The IDB will provide technical advice and technical inputs as well as feedback on the documents produced. The IDB will also participate in the design of the survey (GY-T1129), the collection of the information and the econometric analysis necessary to evaluate the impacts of the programs. The MoB will be responsible to deliver all necessary inputs for the evaluation exercise, this is, the MoB is responsible to provide all necessary information to comply with the Monitoring Plan (customs administrative records, transactional records of the program, ad-hoc survey, etc.).
   2. For outputs and activities, the project considers several indicators (see Table 1, PEP, POA and Annex II). Monitoring of progress and compliance of physical and financial delivery of outputs will be registered in the PMR of the project based upon those indicators. To this end, the MoB will report every semester progress reports on the evolution of each output (information on physical and financial progress as well as disbursement progress necessary to update the biannual PMR, the annual operation plan and the annual acquisition plan). The IDB can request additional information or reports considered relevant to complement the monitoring and evaluation plan. The second semester report will contain a synthesis of the main achievements per subcomponent describing main challenges faced during execution and analyzing the actual risks faced by the program (and describing how the mitigation strategies envisioned in the Risk Matrix of the program were of use). In this sense this second semester report will recount a consolidated vision of the lessons learned during implementation as well as the recommendations based upon this learning. Biannual progress reports will be delivered no later than 30 days after the end of each semester.
   3. The annual operative plan (POA) consolidates all the activities that will be carried out during a specific execution period and its physical and financial schedule. The first POA reaches the first deadline period, 18 months after the undersigning of the loan contract. The second POA reaches its deadline on December 31st of the year after the first revision. From then onwards, POAs will be presented for each calendar year (January 1st to December 31st). The document will be presented to the IDB before November 30th of the previous year to its application. The POA will include an update of the Acquisition Plan (PA). This document is aimed at describing the detail of all the acquisitions and contracts that will be undertaken in each specific period of execution of the program. The PA will be updated on an annual basis or when necessary during the whole period of execution of the program.
   4. At mid execution term (three years after starting execution or when 50% of disbursements have been made), an intermediate evaluation will be undertaken.to evaluate the progresses in execution of the different subcomponents of the program. Besides documenting progress, the evaluation will consider case studies of successful exporters that managed to improve the intensity of exports thanks to the use of treated labs. The intermediate evaluation will also show potential sources of problem in case of slow progress or ineffectiveness in the achievement of planned goals. This input will be key for the fine tuning of the program during execution.
   5. At the end of the program, the MoB will undertake a final evaluation of the program. The Terms of Reference for the production of this evaluation will be reviewed and approved by the IDB and will emphasize the importance of the attribution analysis necessary to claim effectiveness due to the project in the achievement of outcomes and impacts stated in the Results Matrix. This evaluation will be coordinated with the preparation of the Project Completion Report (PCR) of the operation. The evaluation will be delivered 90 days after the disbursement of 90% of the loan.
2. D. Coordination, workplan and budget
   1. The MoB will be responsible for the supervision, technical and administrative coordination of the program. The MoB will also be responsible for the biannual execution reports as well as for any additional report or document required by the IDB in order to fulfill the Monitoring and Evaluation Plan. The schedule of activities, the disbursement program and the implementation costs of the monitoring plan are shown in Table 1. Both, the project (see Table 1) and the TC (GY-T1129) devote resources to comply with the Monitoring and Evaluation Plan (US$50,000 and US$70,000 respectively).

1. Evaluation
2. A. Conceptual framework and theory of change
   1. While the literature on impact evaluation of this type of programs is very thin, existing knowledge on the conceptual approach to quality and standards, as well as lessons and recommendations coming from documented case studies and policy-oriented manuscripts related to this topic, is not scarce. A comprehensive piece, well referred in the recent policy making literature about NQI is Guash et al (2007). Their contribution steramlines the concepts, the rationale behind the elements of the NQI, the connection between its actors (see Figure 1) and it documents the economic effects of the adoption of standards (see Table 2).

**Figure 1. Schematic Representation of a National Quality System**



Notes: National standards bodies are organizations that bring together public and private stakeholders to develop official national standards. National Metrology Institutes establish a country’s national measurement system and maintain, develop, and diffuse measurement standards for basic units. National accreditation bodies give formal recognition that an organization (certification body, inspection body, testing laboratory or calibration laboratory) is competent to carry out its tasks. Certification bodies provide independent assurance that a product, service, system, process, or material conforms to one or more standards or specifications. Inspection bodies conduct visual supervision or revision to determine whether a product or process meets certain requirements. Testing laboratories determine the characteristics or performance of a product or process according to a specified procedure. Calibration laboratories determine the relationship between an instrument’s input and the magnitude or response of its output.

Source: Guash et al (2007).

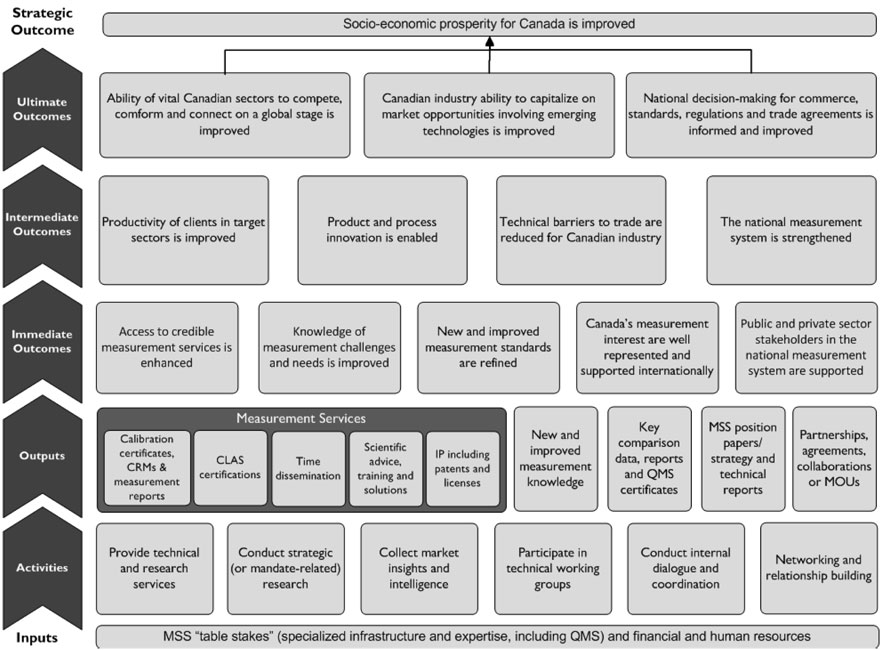
**Table 2. The Economic Effects of Standards According to Their Function**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Positive Effects | | | | Negative Effects | |
| Function | Exploitation  of network effects | Innovative  and  productive efficiency | Reduction  of imperfect information | Innovation diffusion | Constraints on innovation | Constraints on competition |
| Compatibility and interface | X | X |  | X | X | X |
| Minimum quality and safety |  |  | X | X | X | X |
| Variety reduction |  | X |  | X | X | X |
| Information and reference |  |  | X | X | X | X |

Source: Guash et al (2007)

* 1. Chapter 2 of Guash et al (2007), “Economic Impact and Effect of Quality and Standards”, offers a comprehensive review of the literature on this matter. Following DTI 2005, Swann 2000 and Blind 2004 the authors distinguish four basic functions of standards adoption: Information and reference (measurement); variety reduction of a product across entities (interchangeability); compatibility and interface (for example energy infraestructure standards like universal outlets that prevent the need of adaptors) ; and minimum quality and safety (for example in the production of foods, as is the case in this operation, but also in drugs, toys, electric appliances).
  2. NQI can generate positive effects on these functions. For instance, Variety-reducing standards lead to economies of scale and economies of learning. They allow suppliers to achieve lower per-unit costs by producing large homogeneous batches. In addition, producers gain skills and experience by focusing on fewer product variations and can increase their effi ciency through economies of learning. Standards also play a particularly useful role in disseminating knowledge in industries where products and processes supplied by various providers must interact with one another. They ensure that information on innovations in one part of the sector will be diffused to other parts of the sector. Standards can also reduce the transaction and search costs that are caused by imperfect information. This is another role of minimum safety standards, but it can also be accomplished by quality standards and product description standards. In addition, by codifying market preferences and technical information and establishing interchangeability, standards promote competition. (Guasch et al 2007, Robertson and Swanepoel 2015).
  3. But adoption of standards could also be countervailing in some cases. Obsolete, inappropriate standards may hamper technical change by preventing the adoption of superior technology through the lock-in effect. Standards can also have anticompetitive effects if only one or a few companies are able to internalize their benefits or control their content. In this case, standards can be used as strategic instruments to expand market power. Yet, these offsetting effects are unlikely at the stage of inception in more controlled environments (economies with participants of lower scale and activity) and therefore should not present a major consideration for our purposes.
  4. With this framework in mind, the theory of change and the vertical logic of the operation turns more tractable. As a reference, Figure 2 shows the vertical logic of the Canadian office of Measurement Science and Standards or MSS (NRC 2015). The results chain of GY-L1059 closely resembles this model. Figure 2 schematizes how activities and outputs (very similar to those listed in the POA and PEP of this project) are delivered and transformed into immediate, intermediate and ultimate outcomes. There are two reasons to report the logic model of another NQI. First, to document compelling evidence that endorse the internal validity of the design of NQIs. Second to point out that even in a more developed context, evaluations of NQIs are limited to cualitative approaches (see NRC 2015 for an evaluation of the Canadian MSS system). The field of impact evaluation on this topic is virtually uncharted (further discussion follows in Section C).

**Figure 2. MSS Logic Model**



Source : NRC (2015)

1. B. Existing knowledge
   1. Evidence on the effects of adoption of standards is very scarce for developing countries. For developed ones, a number of studies quantify the economic impact of adoption of standards using different techniques such as economic modelling, case studies, cost-benefit analysis and interviews. There is no empirical evidence based on impact evaluations besides some limited attempts conducted by UNIDO (UNIDO 2010a and 2010b) in developing economies.
   2. With respect to the first group (non-causal analysis), Table 3, extracted from Robertson and Swanepoel (2015), summarizes recent estimations of impacts of standards adoption for several developed economies. Besides the size of the impacts, that are not directly translatable to our case, it is interesting to emphasize two aspects: first, that there is strong empirical evidence for developed economies that lends validity to the logic of the proposed intervention as implementation or strengthening of NQI systems are related to growth of production, productivity and exports; and second, that precisely these outcomes, used to measure the impact of adoption on the economy, are aligned to the expected impacts of this project: increase productivity, exports and in general economic growth.

**Table 3. International studies that quantifies the economic impact of standards adoption**

|  |  |  |  |
| --- | --- | --- | --- |
| Publication | Country / Region focus | Methodology | Quantification of impacts |
| CIE (2006) | Australia | Statistical approach and case studies | A 1 per cent increase in the stock of standards is associated with a 0.12 per cent to 0.17 per cent increase in economy-wide productivity. |
| Standards Australia (2013) | Australia | Economic modelling | A 1 per cent increase in the production of standards is associated with a 0.17 per cent increase in GDP, which translates to approximately $2.8 billion in 2009. |
| Haimowitz and Warren (2007) | Canada | Economic modelling and interviews | A 10 per cent increase in the number of standards would lead to a 3.56 per cent increase in labor productivity. Over the period of 1981–2004, standardization accounted for 17 per cent of the growth rate in labor productivity, which translates into approximately 9 per cent of the growth rate in output (real GDP). In 2004, the level of economic output (real GDP) would be expected to be $62 billion lower if there had been no growth in standards over the 1981–2004 period. |
| Williams (2002) | EU | Econometric estimation, Cost-Benefit Analysis and Case Studies | Measurement produces returns equivalent to 2.7 per cent of GDP with a benefit-to-cost ratio of nearly 3:1. |
| Miotti (2009) | France | Economic modelling and interviews | The elasticity coefficient of 0.12 indicates that a positive variation in the stock of standards of 1 per cent induces an increase of 0.12 per cent in the growth of TFP. The impact of standards for the period 1950–2007 on TFP (and consequently on the total growth of the French economy) is 0.81 per cent per year on average. Over 66 per cent of the companies interviewed stated that standardization contributes to the generation of profits. |
| Jungmittag et. al. (2011) | Germany | Econometric modelling | The economic benefit of standardization is equivalent to 0.72 per cent of GDP per year. |
| Stokes et. al. (2011) | New Zealand | Econometric estimation (incl. CGE modelling) and case studies | A 1 per cent increase in the stock of standards leads to a 0.1 per cent increase in total factor productivity and a 0.054 per cent increase in labor productivity. Thus, in turn, lead to a 0.3 to 1 per cent addition to GDP over a 10-year period. |
| UK DTI (2005) | UK | Economic modelling | The elasticity of labor productivity with respect to the number of standards  of 0.05 suggests that a 1 per cent increase  in the standards catalogue is associated with a 0.05 per cent increase in labor productivity. |
| National Measurement Office (2009) | UK | Economic modelling | Additional government investment of £6 million (an additional 10 per cent investment) in the National Measurement System would produce a return of £300 to £400 million for the UK economy. |
| Centre for Economics and Business Research (2015) | UK | Econometric analysis, surveys, interviews and case studies. | Standards contribute towards 28.4 per cent of annual GDP growth and 37.4% of annual labor productivity growth. It support on average 3.2 per cent of additional exports per year. Companies that use standards are twice as likely to export relative to the average firm of the same size in the whole economy. The most productive sectors are the most intensive users of standards. Standards are shown to be a catalyst for innovation. At the sectoral level, impacts on annual turnover ranged from 1.7 per cent to 5.3 per cent. Survey results reflect that the majority of respondents stated that standards enhance the quality of products, optimized their compliance with regulation, enhanced their reputation, allow them greater control of environmental problems and made technical information more accessible. Around half of companies surveyed reported a net benefit from standards. |
| US NSIT (2000–2011) | US | Laboratory economic impact studies based on benefit-cost analysis. | Over the 11-year period, 2000–2011, 16 economic impact studies (covering a wide range of technologies and industries) reflect an average benefit-cost ratio of 47:1. Others measures include the social (internal) rate of return, the social (implied) rate of return and net present values. |

Source: Robertson and Swanepoel (2015)

* 1. Another recent study applying similar approaches (modelling, impact based on cost benefit analysis, etc.) for the region is CEPAL (2014). The book offers case studies for Argentina (economic impact of the use of scales at docks and industrial plants; economic impact of inspection of fuel pumps), Panama (economic impact of electric energy metrology), Brazil (economic impacts of certification of reference material for ethanol in water), Peru (contribution of the accreditation of hydro biological export products), Uruguay (impact of the NQI in the milk chain; impact of NQI to the viticulture sector). Most of these studies conduct basic before and after comparisons on outcomes such as non-conformity rates, number of export destinations, volume and value of exports, productivity, etc.
  2. With respect to the second group, the impact evaluations attempted by UNIDOs studies were limited by several factors ranging from difficulties to build control groups to high reserves on the side of surveyed firms to disclose data on exports. While there is no statistical ground to support conclusive inference from these studies, the conceptual backbone to explain the vertical logic, the qualitative evidence collected by the studies and the recommendations for policymakers interested into building this sort of capacities are of value for this project. In this sense, governance of NQI and SMTQ projects, private sector involvement, regional cooperation of different NQIs, self-sustainability of the NQI are topics with lessons worth to observe from UNIDO’s experience.
  3. For instance, not to underestimate the necessity of NQI, UNIDO (2010a) claims that “an important issue when defining the ideal make-up of a national quality system is whether having quality infrastructure promotes the emergence of export sectors or whether quality infrastructure should respond to needs as and when they emerge. There would be little point in developing a comprehensive and expensive national quality system for sectors of industry that either do not yet exist or are never likely to emerge. However, there is an element of chicken and egg argument in this discussion, because there is anecdotal evidence that not having certain infrastructure constrains investment just as existence of quality infrastructure is likely to encourage investment.” At the same time, and not to overestimate the capacities of NQI, UNIDO (2010a) also argues that “there is emerging evidence that development objectives laid down in most project documents (facilitating trade, market access) would require a more comprehensive approach going beyond the traditional aspects of SMTQ. Some of the evaluations revealed an explicit need for support in issues related to marketing (packaging, advertising, market research and market information). Enterprises need comprehensive assistance in all areas relevant to international competitiveness. Integrating such supplementary services to enterprises into projects worked significantly better than delivering them through other projects, which often lead to coordination problems.” These are important considerations that subject to tight budgetary considerations the project is mindful about.

1. C. Main evaluation questions
   1. Given the scarcity of documented evidence of effectiveness of this type of interventions in developing countries, opportunities to fill this knowledge gap would make us pose several questions to measure many of the aforementioned impacts (Section A). Nevertheless, the scale of the intervention prevents a more ambitious evaluation exercise for two reasons. First, to expect aggregate noticeable impacts in the economy would be over ambitious after an initial investment of US$9MM. That said, impacts are expected among benefitted non-traditional exporters (total amount of non-traditional exports hovered around US$9.5MM in 2014[[4]](#footnote-4)), but not necessarily beyond that group at a first stage. Second, the nature of the intervention and the size of the pool of direct beneficiaries prevent the design of experimental evaluations. In spite of these facts, we take the opportunity to pose relevant questions measurable in the timeframe of the intervention and consistent with the initial stage of development of the local NQI. We focus our attention in three fronts, all related to trade and competitiveness: exports intensity, exports efficiency and variety of exports.
   2. To evaluate exports intensity, we ask:

*Value:* do exporters using local strengthened laboratories increase the value of exports vis a vis comparable exporters using external laboratories?

*Volume:* do exporters using local strengthened laboratories increase the volume of exports vis a vis comparable exporters using external laboratories?

* 1. To evaluate exports efficiency, we ask:

*Costs:* do testing costs faced by users of local strengthened laboratories improve vis a vis comparable exporters using external laboratories?

*Rejections:* do exporters using local strengthened laboratories decrease the number of rejections of export attempts vis a vis comparable exporters using external laboratories?

* 1. To evaluate exports variety, we ask:

*Variety:* do exporters of non-traditional products increase the value of exports vis a vis comparable exporters of traditional products? (this will be addressed at the impact level)

* 1. These questions are consistent with the UNIDO reference framework for SMTQ evaluations (UNIDO 2010a), where the expected impact of strengthening of SMTQ systems is to “enable beneficiaries to produce and trade goods and services that meet international public and private industrial standards” and the related outcomes are “Increased exports, in particular from poverty relevant sectors”, “reduced rejection rates of exported products” and “new products brought to the global market”.
  2. These questions also relate directly to the vertical logic of the project. Activities and outputs advanced by the project such as improvement of facilities and equipment of laboratories, training for staff of laboratories, certification of laboratories for accreditation, awareness campaigns for laboratories to join to the improved network, training to potential clients (SME) on the value of quality and standards, design of an export strategy and value chain analysis targeted to selected non-traditional industries are expected to translate into better standardization of non-traditional export products, less rejections at international destination markets and hence into increasing exports of these products (enhancing in this way the variety of the composition of the exports basket), more value of exports and lower operative costs of exporters (lower testing costs due to availability of in-land testing facilities and lower losses due to rejection of samples at destination markets).

**D. Main indicators**

* 1. The evaluation plan will be aimed at identifying and quantifying the effects attributable to the program as a whole. By design, the effects of the different subcomponents are also captured by the interaction of activities and outputs delivered by all the subcomponents at once. For instance, improved national strategies for investment and exports, and more specific targeted strategies for non-traditional industries with high potential growth (subcomponent 3) will complement the efforts of investments in the modernization of the institutional framework of the NQI (the “software” of the program, or subcomponent 1) and in the improvement of laboratories facilities and equipment (the “hardware” of the program, or subcomponent 2). In fact, the national strategy provides a macro frame to assure minimum development conditions for a successful NQI and the specific sector analysis targets the most promising specific beneficiaries as to assure a suitable selection of those non-traditional industries that would take the most advantage of the investment. The unit of analysis will be the final beneficiary (exporter) as it is further explained in section E.
  2. While we are interested into learning about the effects of the program in the dimensions referred before (intensity, efficiency and variety), given data availability, the M&E plan will commit to evaluate quasi-experimentally to the first dimension at the outcome level exploiting administrative records. The other two dimensions will also be evaluated either with a non-experimental approach (before and after comparison) or with a quasi-experimental method depending on the level of measurement (aggregate or individual).
  3. Table 4 shows the list of selected results indicators proposed to monitor and evaluate development effectiveness attributable to the program. Specific selected indicators are measurable in the time frame of execution of the project. Targets are realistic and based on conservative estimates projected with existing literature and recent trends observed in the country. The most rigorous evaluation will be conducted over the universe of formal exporters of the country using administrative records. This will be an unprecedented effort to conduct an impact evaluation with firms population data in the country. Yet, in order to include more specific questions related to efficiency gains, GY-T1129 will complement the information to conduct a complementary quasi-experimental evaluation based on a sample of control units (universe of treated will be included).
  4. Notice when reading the table that, for every case, non-traditional exports will refer to the following fresh and processed products[[5]](#footnote-5):

Fresh: Bora, Boulanger, Coconut, Citrus (lime, orange, tangerine), Eddo, Mango, Pepper (hot), Pepper (wiri wiri), Pineapple, Plantain, Pumpkin, Sesame, Squash

Processed: Achar, Copra, Copra Meal, Casareep, Guava Jam & Jelly, Pineapple (Chunks)

3.21 Notice also that baselines indicate that the pretreatment situation is not the situation of no exports, but the situation of exports without program. In this sense, entrants to the export market thanks to the program will also be monitored but not evaluated. That said, and as explained later, new products exports of incumbent exporters or exports to new destinations by incumbent exporters will be considered as to distinguish impact heterogeneity at these margins.

Table 4. Results indicators

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Expected Result** | **Indicator** | **Unit** | **Baseline** | | **Goal** | | **Means of verification** | **Observations** |
| **Value** | **Year** | **Value** | **Year** |
| **Impacts** | | | | | | | | |
| Increased variety of exports basket | Non-traditional exports as a percentage of total exports per year | % | 0.65 | 2014 | 0.75 | 2022 | Guyana Revenue Authority administrative records of customs and Bank of Guyana Annual Report | Goal based on conservative increase projected from comparison of annual average of the period 2011-2013 (0.46%) and the baseline (0.65%) |
| **Outcomes** | | | | | | | | |
| Increased value of non-traditional exports | Average annual flow of USD exports of non-traditional products per exporter | Ratio (USD/exporter) | 11,667 | 2015 | 14,000 | 2022 | Guyana Revenue Authority administrative records of customs and Guyana Marketing Corporation | For impact evaluation purposes, impact of the program on these outcomes will be computed as the average of a double difference (difference in levels for variables before and after for the treated group) vs (difference in levels for variables before and after for the non-treated group). Goals based on yearly growth rate of 2.5% (see Table 3, given the potential for the non-traditional sector growth, 2.5% of annual growth is deemed possible). |
| Increased volume of non-traditional exports | Average annual flow of Tons of exports of non-traditional products per exporter | Ratio (Ton/exporter) | 18.04 | 2015 | 21 | 2022 |
| Decreased testing costs for non-traditional exporters | Average testing cost faced by exporters of non-traditional products (as a percentage of total operational costs per year) | % | N.A. | N.A. | N.A. | N.A. | Special Survey Guyana Competitiveness GY-T1129 | Information on this indicator was not available (not collected nor processed) at the time this document was being produced. For monitoring and evaluation purposes, every firm that uses a service from a laboratory must fill in an ad-hoc survey reporting this information. Non- traditional exports are both fresh products and agro processed commodities (see 3.20). |
| Decreased rejection rates for fruits and vegetable exports to US | Unit Rejection Rate (URR) for fruits and vegetable exports to US | Ratio | 6 | 2010 | 4 | 2022 | UNIDO. Trade and Standards Compliance Footprint | Unit Rejection Rate (URR) is calculated as the number of rejections per US$ 1 million of exports over the period 2002 to 2010 (based on latest statistics from UNIDO, after controlling for outliers). This measure takes account of changes in the volume of exports such that it provides a direct measure of the rate of non-compliance. The focus is put at the most disaggregate level of information available at the data source (main rejecter country for the most akin group of products exported by Guyana). |

**D. Methodology**

* 1. Development effectiveness of the program will be measured using quasi-experimental methods. Difference in Differences combined with Propensity Score Matching (DDM) allows a double comparison (before and after for treated and non-treated) over a common support of observable variables.
  2. DD methodology is standard and measures the difference between the average level of the outcome indicator for the beneficiaries before and after his participation in the program, subtracted of this same difference for the control group. The methodology allows the estimation of the average effect of an intervention controlling for the observable and non-observable differences between beneficiaries and non-beneficiaries under the assumption that unobservable features are constant over time. Under this methodology, the estimation follows a specification of a common fixed effects model:

(1)

where is the outcome indicator for the firm *i* in period *t*, is a binary variable equal to 1 if the firm *i* has been treated in period t and 0 if not; are fixed time effects; is a vector of observable control variables (number of workers of the firm, number of years of activity of the firm according to customs records, product of export, country of destination, number of exports per year, lagged outcomes, etc.) ; is an individual fixed effect that controls for all those characteristics that vary between individuals nut that are fixed in time; and is the error term. The treatment effect is captured by .

DD can be strengthened when combined with matching methods. DD model requires a common trend for treated and non-treated in the pretreatment situation.[[6]](#footnote-6). Even when this assumption cannot be tested, a common accepted practice to strengthen the credibility of the assumption is showing that these trends were the same before the treatment period. Matching is used for this reason, as to identify a non-treated group that is similar to the group that is exposed to treatment in all relevant pre-treatment variables, including if possible, pretreatment trends of the outcome variable. Then, for a specific cohort of beneficiaries the first pretreatment year will be used as baseline and for each potential beneficiary, the conditional probability of participation will be estimated using the following model:

(2)

where Z is a vector of control variables[[7]](#footnote-7); is a vector of *k* lags of the outcome variable, , and is the Normal cumulative distribution function. Then, a matching algorithm will be used to identify the most similar control group based upon the estimated propensity score. Finally equation 1 will be estimated again, using the beneficiaries and their controls (identified as a result of the propensity score matching).

1. E. Technical Aspects

Treatment and Control Groups

* 1. The unit of analysis will be the final beneficiary (non-traditional exporter). The program will assure outreach to the targeted final beneficiaries as all laboratories serving specific targeted industries will be treated. The program will also conduct awareness campaigns among the potential final beneficiaries (population of actual exporters using the services of international labs) in order to promote the use of local benefited labs[[8]](#footnote-8). It is important to emphasize that the program will also deliver accreditation of local laboratories. This will guarantee a fully equivalent certification to that currently only accessible through international providers (currently, local labs provide local certification only for export of rice), and given the high expenses implied in the packaging and shipment of samples, the substitution of export certificates issued abroad by those locally issued thanks to the project is quite likely. Homogeneous certificates to those issued abroad, lower costs of local certificates and aggressive promotion among potential beneficiaries should yield a substantial interest and procurement of the treatment.
  2. Therefore, the treatment category will be assigned to those firms that used the Guyanese treated labs to get certification for exports and exported non-traditional products during a specific year. In turn, the category of non-treatment will be assigned to comparable firms (i.e. matched trough observable relevant characteristics) that did not use the services of certification of local labs and still exported during a specific year. Administrative records disclose transactional events of exports for every single occurrence of outgoing trade from the country and therefore they will be used as data source for monitoring and evaluation purposes. For those outcomes not recorded by the GRA, ad hoc surveys funded by GY-T1129 will be conducted.
  3. In order to document the population size of potential beneficiaries, Table 5 reports the actual number of firms exporting different non-traditional products from 2011 to 2015. Around 500 to 600 firms per year record export activity per year (396, 424, 595, 602, 529 each year respectively). The table also reports that those firms complete about 3,800 transactions a year (4,037; 3,769; 3,966; 4,039; 3,235 respectively). In addition it is important to highlight that between 2012 and 2015 Guyana exported to about 20 identifiable destinations per year on average (21, 20, 22, 19 each year respectively). The list of destinations include Antigua and Barbuda, Saba, Aruba, Barbados, Belgium, Canada, Denmark, Dominica, Dominican Republic, France, United Kingdom, Grenada, Hong Kong, Jamaica, Japan, Saint Kitts and Nevis, Cayman Islands, Saint Lucia, Montserrat, Mozambique, Netherlands, Netherlands Antilles, Curacao, St. Maarten, St. Martin, Suriname, Turks and Caicos islands, Trinidad and Tobago, Ukraine, United States, Minor Outlying Islands, United States, Saint Vincent and the Grenadines, Venezuela, British Virgin Islands and U.S. Virgin Islands. These margins are relevant as each one generates new opportunities to treat to the potential beneficiaries: each time a firm export, its shipment has to comply with imports requirements at the destination country. As requirements to export vary by destination and by product, and each destination requires compliance for each transaction, an exporter –either user of local or international labs- will generate new events each time she/he attempts to (i) export a new shipment; (ii) access to a new market; (iii) export a different non-traditional product. Data permitting, this would allow to test for effects of intensity of treatment within each margin and heterogeneity of impact across each margin.
  4. With respect to the level at which the counterfactual will be approximated through the proposed control units, and given that there are no laboratories providing in-land services of testing and certification for export purposes, there is no possible source of contamination of the control donor pool through spill overs as non-users of the national labs who manage to export will be users of laboratories abroad exclusively. Then the counterfactual scenario assumes that for the treated firm to export, access to some other service of testing, certification, etc. in absence of the project would be necessary. Control units to simulate this situation are then actual exporters using services of laboratories abroad. Attention will be put to entrants to the export market (both in the treated and non-treated groups) to differentiate their behavior and prevent distortions in the outcome measures. That said, the identification strategy relies mainly in the incumbents that will substitute international certification services for local certification provided by the labs treated by the program.

**Table 5. Number of exporters and transactions per non-traditional product**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Product | Exporters | | | | |  | Transactions | | | | |
|  | 2011 | 2012 | 2013 | 2014 | 2015 |  | 2011 | 2012 | 2013 | 2014 | 2015 |
| Achar, kuchela and similar preparations | 19 | 23 | 28 | 36 | 30 |  | 60 | 68 | 79 | 72 | 93 |
| Bora (bodi) beans (Vigna spp.) fresh or chilled | 30 | 37 | 57 | 41 | 36 |  | 536 | 503 | 499 | 398 | 370 |
| Casreep | 16 | 25 | 47 | 43 | 47 |  | 22 | 74 | 120 | 145 | 108 |
| Coconuts, desiccated | 9 | 1 |  | 5 | 7 |  | 25 | 11 |  | 7 | 9 |
| Coconuts, in shell | 32 | 36 | 37 | 42 | 35 |  | 511 | 428 | 373 | 439 | 245 |
| Copra | 3 | 5 | 6 | 6 | 5 |  | 31 | 42 | 26 | 18 | 19 |
| Eddoes | 43 | 49 | 72 | 70 | 60 |  | 448 | 355 | 387 | 438 | 326 |
| Flour and meals of copra | 1 |  | 1 |  | 1 |  | 2 |  | 1 |  | 1 |
| Grapefruit, fresh or dried | 1 |  |  |  |  |  | 21 |  |  |  |  |
| Guava jams and jellies | 7 | 2 | 5 | 3 | 4 |  | 11 | 2 | 6 | 4 | 4 |
| Lemons, fresh or dried | 1 | 1 |  |  |  |  | 1 | 1 |  |  |  |
| Limes, fresh or dried | 14 | 9 | 20 | 24 | 14 |  | 97 | 48 | 64 | 109 | 69 |
| Mangoes, fresh or dried | 18 | 29 | 34 | 42 | 34 |  | 434 | 533 | 449 | 417 | 396 |
| Oranges, fresh or dried | 7 | 8 | 15 | 9 | 9 |  | 65 | 56 | 53 | 45 | 21 |
| Ortaniques, fresh or dried | 4 | 3 |  | 2 |  |  | 8 | 7 |  | 2 |  |
| Other citrus fruits, fresh or dried | 7 | 3 | 2 | 2 | 5 |  | 22 | 4 | 2 | 3 | 5 |
| Other coconuts | 27 | 41 | 36 | 46 | 56 |  | 317 | 302 | 314 | 342 | 355 |
| Other fruits of genus Capsium or of genus Pimenta, dried or crushed | 5 | 2 | 2 | 3 | 1 |  | 5 | 2 | 2 | 6 | 1 |
| Other mandarins (incl. tangerines & satsumas); clemintines etc., fresh or dried | 6 | 4 | 14 | 3 | 5 |  | 48 | 30 | 44 | 39 | 13 |
| Paprika |  | 1 |  |  | 1 |  |  | 1 |  |  | 1 |
| Pepper of the genus dried, neither crushed nor ground | 32 | 39 | 67 | 58 | 40 |  | 495 | 513 | 646 | 584 | 428 |
| Pepper, crushed or ground | 16 | 14 | 14 | 17 | 24 |  | 48 | 28 | 41 | 56 | 90 |
| Pimento (allspice) |  |  |  |  | 1 |  |  |  |  |  | 1 |
| Pineapples | 11 | 5 | 4 | 3 | 3 |  | 13 | 12 | 4 | 3 | 3 |
| Pineapples, fresh or dried | 36 | 41 | 57 | 64 | 57 |  | 398 | 410 | 444 | 474 | 394 |
| Plantains, fresh | 16 | 7 | 16 | 21 | 15 |  | 105 | 21 | 58 | 107 | 65 |
| Pumpkins, fresh or chilled | 33 | 39 | 61 | 61 | 39 |  | 311 | 318 | 354 | 330 | 218 |
| Ugli fruit, fresh or dried | 2 |  |  | 1 |  |  | 3 |  |  | 1 |  |
| **Grand Total** | **396** | **424** | **595** | **602** | **529** |  | **4,037** | **3,769** | **3,966** | **4,039** | **3,235** |

Source: Customs records GRA

Data sources (the same as in the Monitoring section)

* 1. The main source of information to conduct the monitoring and evaluation of outcomes will be the customs administrative records collected by the Guyana Revenue Authority and processed by the National Bureau of Statistics. Both institutions have collaborated with aggregate information computed from information at the level of the firm with coverage of the universe of formal firms of the Guyanese economy. For the purposes of the project, and spite of the level of informality of the economy, the formal sector is the relevant target as it is virtually impossible for an informal firm to comply with all the requisites (metrology, sanitary, etc.) by importer countries.
  2. Outcome variables are measured systematically by GRA. Data is transactional and is recorded at the moment of each event of exports. The level of measure is by product by firm. GRA collects several variables (name of firm, product sold, volume sold, value of export, country of destination, number of workers as a range value, etc.). All of these information allow to identify the outcomes of interest, for the types of exporter of interest, for the two groups of interest (treated and non-treated), for several periods, pre and post treatment. For M&E purposes, data will be collapsed yearly for non-traditional producers and for treated and control groups. Contribution of aggregate measures made by GRA during the preparation of this document show that access to aggregate information coming from this sources is feasible and that the monitoring and evaluation activities will not be undermined by data access.
  3. Two complimentary sources of information are also of interest. Annual reports of the Guyana Marketing Corporation and the Central Bank Statistics. Complementary aggregate data will be drawn from these sources (as for example aggregate level of exports). Data availability coming from these sources is also granted. Central Bank produces and publishes official aggregate data on a frequent basis. The Guyana Marketing Corporation Annual report also produces and publishes aggregate information related to non-traditional exports.
  4. A third source of information will be financed by GY-T1129. The TC will invest US$200 thousand in generating knowledge aimed at strengthening Guyana’s competitiveness (the objective of this TC will be to enhance the capacity of the Ministry of Business by providing necessary data for informed decision making. The specific objectives will be to carry out a survey to gather information about the existing laboratories, survey to identify the needs and practices of exporters regarding quality and standards and to carry out facilitating workshops with stakeholders). US$70 thousand are earmarked to data generation (survey to exporters) and US$40 are allocated for dissemination and US$10 for contingencies, all of which could be oriented to complement data collection activities if necessary. The survey will collect data about the cost of use of laboratories for all users of the local network of laboratories benefitted by the program and from exporters non-users of the services of the local network.

Power calculations

* 1. GRA provided aggregate processed information for a subsample of exports with identifiable country of destination. The sample included actual measures of average and standard deviations of exports by exporter per destination country. Based upon such information, coefficients of variation were computed by year in order to approximate the standard deviation/mean ratio. The coefficient hovers around 0.7 for the 2012-2016 period. We assume that after matching the coefficient of variation could be reduced up to 0.5. Table 6 reports the minimum sample required to detect effects of certain size for two outcomes (value and volume of non-traditional exports per exporter). The Table simulates several scenarios for distinct parameter levels:

significance (alpha) = .05

power (beta) = 0.7, 0.8

ratio number of control units/number of treated units = 3

delta = different increment levels of the outcome

sd = 0.7\*m1, 0.6\*m1 and 0.5\*m1

m1: average value of the outcome at the baseline

m2: expected value of the outcome for treated at endline (in line with the target values of the Results Matrix)

Table 6 reports sample sizes necessary to detect minimum effects for different scenarios of parameters. The Table suggests up to about 500 total observations (roughly the average total number of non-traditional exporters per year observed in the last five years), from which between 60 and 150 would need to be treated units.

**Table 6. Sample size to detect effects of size delta**

a. Value of non-traditional exports

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| alpha | power | N | N1 | N2 | nratio | delta | m1 | m2 | sd |
| 0.05 | 0.7 | 380 | 95 | 285 | 3 | 2.4 | 11.6 | 14 | 8.12 |
| 0.05 | 0.7 | 280 | 70 | 210 | 3 | 2.4 | 11.6 | 14 | 6.96 |
| 0.05 | 0.7 | 196 | 49 | 147 | 3 | 2.4 | 11.6 | 14 | 5.8 |
| 0.05 | 0.8 | 484 | 121 | 363 | 3 | 2.4 | 11.6 | 14 | 8.12 |
| 0.05 | 0.8 | 356 | 89 | 267 | 3 | 2.4 | 11.6 | 14 | 6.96 |
| 0.05 | 0.8 | 248 | 62 | 186 | 3 | 2.4 | 11.6 | 14 | 5.8 |

b. Volume of non-traditional exports

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| alpha | power | N | N1 | N2 | nratio | delta | m1 | m2 | sd |
| 0.05 | 0.7 | 584 | 146 | 438 | 3 | 3 | 18 | 21 | 12.6 |
| 0.05 | 0.7 | 432 | 108 | 324 | 3 | 3 | 18 | 21 | 10.8 |
| 0.05 | 0.7 | 300 | 75 | 225 | 3 | 3 | 18 | 21 | 9 |
| 0.05 | 0.8 | 744 | 186 | 558 | 3 | 3 | 18 | 21 | 12.6 |
| 0.05 | 0.8 | 548 | 137 | 411 | 3 | 3 | 18 | 21 | 10.8 |
| 0.05 | 0.8 | 380 | 95 | 285 | 3 | 3 | 18 | 21 | 9 |

Source: Own computations (tests of mean comparisons) based on data from GRA

1. H. Reporting
   1. Documents to report the results of the impact evaluation during its different stages will be three: (i) Analysis at the baseline, where initial characteristics of control and treated groups will be compared; (ii) Analysis of follow up line, where first effects of the program (three years after initial investments) will be measured. At this stage, effects will be very limited and the evaluation will serve as a tool to verify the effectiveness of monitoring tools, to check for any attrition, and to carry out appropriate decisions to compensate potential small samples; (iii) the last report will compare the results at the end line with those at the previous lines. The fully fledged impact evaluation as that described in previous sections will be reported here. All of these reports will be socialized with all relevant stakeholders (including other EAs, local and regional academic institutions, international development organizations and research centers)
   2. The MoB and the IDB will be responsible for the dissemination of the results of the impact evaluation. The evaluation will be used as a tool to showcase the development effectiveness of this type of projects and to portray lessons learned for future design and implementation of similar projects in Latin America.
2. I. Coordination, work program and budget
   1. Table 7 reports the work program, including specific activities, responsible and Budget for the execution of the Evaluation Plan. Complementary funding will come from GY-T1129 for the collection of information necessary to evaluate impacts. Outcomes evaluation will not consume financial resources as data will be drawn from administrative records.

Table 7. Work program for impact evaluation

| **Activities** | | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Responsible | Cost  (Thousand US$) |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Baseline, follow up line and end line (ad hoc survey for laboratories and exporters GY-T1129) | |  |  |  |  |  |  | MoB, IDB | 70 |
| Baseline, follow up line and end line (Administrative records) |  |  |  |  |  |  | MoB | 0 |
| Initial progress evaluation |  |  |  |  |  |  | MoB, IDB | 10 |
| Mid project evaluation |  |  |  |  |  |  | MoB, IDB | 15 |
| Final evaluation |  |  |  |  |  |  | MoB, IDB | 15 |

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1. Observatory of Economic Complexity 2016. [↑](#footnote-ref-1)
2. Guyana Private Sector Assessment Report (PSAR). 2014. Bureau of Statistics Data. [↑](#footnote-ref-2)
3. The scale of the Project allows financing activities and outputs oriented to enable the improvements of quality but it does not finance the quality enhancements themselves. [↑](#footnote-ref-3)
4. Guyana Marketing Corporation (2014). [↑](#footnote-ref-4)
5. Classification is taken from Guyana Marketing Corporation (2015). [↑](#footnote-ref-5)
6. The main identification assumption of the DD model is the absence of factors that vary on time that may affect both participation and outcomes, which means that unobservable relevant factors have to be constant over time for them to be removed after time differencing. [↑](#footnote-ref-6)
7. Considers same observable control variables included in X (except for lagged outcomes). As indicated in equation (2), Z will include values for control variables observed at the baseline. Values for variables considered for X, Y and Z are available at the administrative records referred in 3.27 since 2011. [↑](#footnote-ref-7)
8. Random promotion cannot be considered as an identification strategy in this case as that method relies on a more local comparison of treated and control units abstracting from those always takers and never takers that may not comply according to the promotion. Given this, the sample size requirements become more stringent at that neighborhood of the compliers. Given the size of the country and of the potential beneficiary population, the most likely scenario is to promote the use among the universe of potential beneficiaries and match based on observable characteristics of final takers and non-takers. [↑](#footnote-ref-8)