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**Guyana**

**Cost-Benefit Analysis of Establishing an Electronic Single Window for Trade**

**(GY-L1064)**

**Economic Analysis Annex**

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**Cost-Benefit Analysis**

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# **Introduction**

The main objective of the project is to improve the trade facilitation performance of Guyana through the modular development of the Electronic Single Window (ESW). The project specific objective is to reduce the time and costs of trade processes. Guyana currently places 142th out of 189 economies on the Doing Business ranking for trading across borders.

The implementation of an Electronic Single Window (ESW) has a lot of benefits, among others the reduction of time, costs and documents necessary for border compliance in order to reduce the time and transaction costs for foreign trade and business processes. The implementation of a modern ESW requires the interoperability of the systems between agencies. This process generally also allows to adjust operational processes to current international best practices and the implementation of a risk management strategy. An ESW usually calls for the improvement and development of the electronic payment capabilities.

The following cost-benefit analysis was undertaken to assess if the expected benefits of the program exceed its cost. The analysis demonstrates that if the target reductions to processing time and costs for foreign trade are achieved, the economic returns to the stakeholders justify the investment in the development of the ESW.

This analysis is structured in this introduction and five other sections.

# **I Methodology and Assumptions**

It seems clear that the implementation of an Electronic Single Window (ESW) would potentially streamline various business and trade processes, the primary target for improvement is processing of import and exports permits and licenses. Specifically, it is expected that the program activities will reduce the number of hours that importers and exporters of goods spend on document preparation, customs clearance, and inspections and the costs associated with these processes.

The results matrix has goals in terms of time and costs. The methodology proposed measures both components. First of all, we compute the benefits of save time in export and import processing time (equation 1). In second term, we calculate the save of money, costs (equation 2).

There are a number of transaction costs related to the time spent in processing, including the cost of rent, utilities and insurance, handling costs, deterioration and obsolescence (particularly in the case of perishables), and the opportunity cost of capital of the inventory for the duration that it is held. As a simplifying assumption, this analysis focuses on the opportunity cost of capital to quantify the transaction cost savings. The choice to limit analysis to the primary economic impact of the project avoids the use of more tenuous assumptions due to data availability, and represents a conservative approach which understates total benefits in the analysis.

The marginal savings of time to exporters and importers as a result of project implementation are estimated as follows for year *n*:

(1)

where is the value of total imports, is the value of total exports, UMn is the percentage of imports using the ESW in the year n, is the percentage of exports using the ESW in year n, COCx is the annual cost of capital for country *x*, and HIn is the marginal number of hours saved in processing imports over the baseline and HEn is the marginal number of hours saved in processing exports over the baseline. Without the implementation of the ESW *UMn=0* and =0 so the marginal benefit of time is equal to zero. With the implementation of the project the hours saved in process imports and exports are reflect in the value of *HIn*and *HEn*. When the project will begin of *HIn*and *HEn* take the values of the baseline line in the matrix of results (in matters of time) and at the end of the project *HIn*and *HEn* will take the values of the goals at 2024 in matters of time. *HIn*is the marginal number of hours saved in processing imports, it means the time to import (*TIn*) in the year n in comparision with the time to import in baseline year (*TI0*) and *HEn*is the marginal number of hours saved in processing exports, it means the time to export (*TEn)* in the year n in comparision with the time to export in baseline year (*TE0*)Our next step, it needs to add to equation (1) the marginal savings of money (reductions in costs) to exporters and importers as a result of project implementation. We compute the monetary benefit in this way:

(2)

Where is the net savings of money to process an export and is the net savings to process an import operation, N°EX and N°IM are the number of export and import operations per year. Without the implementation of is assumed that the costs will be the same to the baseline year, so equation (2) also will be equal to zero. With the implementation of the project the costs saved in process imports and exports will be incresed. When the project will begin and  will take the values of the baseline line in the matrix of results (in matters of costs) and at the end of the project and will take the values of the goals at 2024 in matters of costs (see matrix of results).

For the cost-benefit analysis of the implementation of the Electronic Single Widow, it is proposed to quantify the resulting benefit and compare it with the cost of the project. This classical financial approach allows calculating both the Net Present Value (NPV) as well as an Economic Rate of Return (ERR) of the Project. While the cost is directly the present value of the financial cost of meeting the payments established in the project, the benefits require the establishment of social valuation criteria for a determined flow of economic variables. For the calculation of the benefits, and taking account that the project goals look to achive results in terms of save time and money, this study uses the formulas presented in (1) and (2) to aggregate these results So the benefits of the program are (1)+(2).

The time horizon of the analysis reflects that the improvements to the platform, once implemented, will enable users to accrue the marginal benefits for the long term. A 5-year perspective is lengthy enough to see benefits in force, but to see the full benefits of the program is needed a 10-year perspective, while also limiting the horizon to a reasonable period for macroeconomic projections. It is also assumed that over the 5-year or 10-year timespan, regular maintenance to the ESW will take place whose costs would not exceed the maintenance that would have occurred had the project not been implemented, and that any additional upgrading of the ESW would occur beyond the 5-year horizon. The time horizon does present challenges for foreign trade projections. As such, the variability of exports and imports growth have been assessed in the sensitivity analysis.

As it is standard in the literature, we assumed an opportunity cost of capital (12%) in the analysis. This estimation was also utilized as the discount rate for assessing the present value of the costs and benefits of the program.

# **II Economic Benefits**

Since the economic benefit in the model is the opportunity cost of capital over the period of hours saved by merchandise importers and exporters (equation 1) and the savings of money for border and documents compliance for exports and imports through implementation of the program (equation 2), the estimation of the number of hours and costs for processing both exports and imports each year of analysis is critical to the estimation of benefits.

The project proposed is structured in three components and, among others the following project activities are expected to contribute to the reduction of costs and hours to process a foreign trade operation:

* Component 1: Modernization of the operational and regulatory environment (US$370,000). The objective of this component is to set the foundation for the development of a fully-fledged single window environment in Guyana by streamlining processes, harmonizing documents and data requirements. The specific activities to be financed under this component are the following:
  + Regulatory review
* Component 2: Design and Deployment of Guyana’s ESW (US$3,724,000). The objective of this component is to design and deploy Guyana’s ESW infrastructure. Following lessons learned from similar projects, the implementation of the system will follow the modality of “Design-Build-Operate-Transfer”. The specific activities to be financed under this component are the following:
  + Business process reengineering.
  + Development of a license, certificate and permits (LCPs) module. This module will serve as the single-entry point and management system for all LCPs issued by the participating agencies for imports and exports.
  + Development of an inter-agency goods declaration module.
  + Development of an integrated risk management system (IRMS). The IRMS will include the following features: i) a sophisticated risk rule engine for all participating agencies with, at least, deductive and inductive risk criteria to differentiate between low risk and high risk cargo; ii) a post clearance audit tool with a powerful data analytics and visualization engine that will aggregate, search and analyze data from disparate databases to optimize revenue collection and identify malpractices; and iii) a GPS tracking system for cargo released to the importer premises for physical inspection.
* Component 3: Institutional Strengthening for ESW Stakeholders (US$868,000). This component will: i) modernize the institutional capacity and human resource policies of the participating agencies; and ii) provide a robust capacity building program for the future users of the ESW in the private and public participating agencies.

Since the BPR is expected to be completed by the beginning of project year 2 (2021), that is when benefits begin to accrue in the model. All of the activities which streamline procedures are expected to be in force by project year 5 (2024).

While it is clear that the implementation of the ESW will reduce the time and the costs to import and export, it is more challenging to quantify the number of hours saved and the exact amount of money saved. Currently, according to the Doing Business 2018 report, document preparation for export in Guyana takes 200 hours and customs clearance and inspections require 72 hours, for a total of 272 hours. In the case of imports, documents preparation takes 156 hours and customs clearance and inspection 84 hours. The following table presented the hours and costs reported in the trading across border indicator of the Doing Business 2018 report.

**Table 1: Hours and Costs in USD dollars of import and export operations in selected countries and regions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Guyana | Average Caribbean | El Salvador | Trinidad y Tobago |
| Time to export (hours) | 272 | 123 | 39 | 92 |
| Cost to export (USD) | 456 | 654 | 178 | 749 |
| Time to import (hours) | 240 | 154 | 49 | 122 |
| Cost to import (USD) | 328 | 896 | 195 | 885 |

Source: Doing Business 2018

Table 1 shows that Guyana has a good performance with respect to the other Caribbean countries in respect to cost to export and cost to import. On the other hand, Guyana has a bad score in time required to export and import.

Singapore is widely considered the global best practice country, having implemented one of the world’s first ESWs in 1994, and today, in the case of exports, has a total document preparation time of 2 hours and a customs clearance and inspection time of 10 hours, for a total of 12 hours.

Another smaller country from within the LAC region, El Salvador, is arguably one of the best benchmarks for Guyana. El Salvador set up a single window linking customs, government ministries and tax and social security authorities, reducing the number of documents traders need to submit. Their performance in the most recent Doing Business report is 39 hours and 178 USD dollars for exports and 49 hours and 195 USD for process an import. Also within the region, Trinidad y Tobago is implementing an electronic single window and it has made great advances in time to export and import.

In sum, in this report we expect that the implementation of ESW allow to achieve the time results of the average of the Caribbean countries in 2021 and El Salvador results in 2024 at the end the 5-years period. For the cost saved we assume the results of the El Salvador will be achived in 2024. Expected benefits are consistent with the baseline in the Results Matrix; while calculations in this analysis have been used to set up intermediate and final goals ().

Table N°2 Estimation of the results

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Data** |  | Equation | **2018** | **2019** | **2020** | **2021** | **2022** | **2023** | **2024** | **2025** | **2026** | **2027** | **2028** |
| Time to export: Border compliance (hours) | 1 DB |  | 72 | 72 | 62 | 62 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| Cost to export: Border compliance (USD) | 2 DB |  | 378 | 378 | 278 | 278 | 128 | 128 | 128 | 128 | 128 | 128 | 128 |
| Time to export: Documentary compliance (hours) | 3 DB |  | 200 | 200 | 161 | 161 | 61 | 61 | 61 | 61 | 61 | 61 | 61 |
| Cost to export: Documentary compliance (USD) | 4 DB |  | 78 | 78 | 68 | 68 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| Time to import: Border compliance (hours) | 5 DB |  | 84 | 84 | 67 | 67 | 36 | 36 | 36 | 36 | 36 | 36 | 36 |
| Cost to import: Border compliance (USD) | 6 DB |  | 265 | 265 | 213 | 213 | 128 | 128 | 128 | 128 | 128 | 128 | 128 |
| Time to import: Documentary compliance (hours) | 7 DB |  | 156 | 156 | 107 | 107 | 87 | 87 | 87 | 87 | 87 | 87 | 87 |
| Cost to import: Documentary compliance (USD) | 8 DB |  | 63 | 63 | 61 | 61 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Estimation** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Time to export (hours) | *TE* (1+3) |  | 272 | 272 | 223 | 223 | 91 | 91 | 91 | 91 | 91 | 91 | 91 |
| Cost to export (USD) | EX cost (2+4) | Eq (2) | 456 | 456 | 346 | 346 | 178 | 178 | 178 | 178 | 178 | 178 | 178 |
| Time to import (hours) | *TI* (5+7) |  | 240 | 240 | 174 | 174 | 123 | 123 | 123 | 123 | 123 | 123 | 123 |
| Cost to import (USD) | IM cost (6+8) | Eq(2) | 328 | 328 | 274 | 274 | 188 | 188 | 188 | 188 | 188 | 188 | 188 |
| Total Imports |  | Eq(1) | 1.630 | 1.740 | 1.857 | 1.981 | 2.115 | 2.257 | 2.408 | 2.570 | 2.743 | 2.927 | 3.124 |
| % M using ESW |  | Eq(1) | 0 | 104 | 223 | 357 | 507 | 677 | 867 | 1.080 | 1.317 | 1.581 | 1.875 |
| Total Exports |  | Eq(1) | 1.490 | 1.596 | 1.709 | 1.830 | 1.960 | 2.099 | 2.248 | 2.407 | 2.578 | 2.760 | 2.956 |
| % Ex using ESW |  | Eq(1) | 0 | 96 | 205 | 329 | 470 | 630 | 809 | 1.011 | 1.237 | 1.491 | 1.774 |
| Export (hours saved) |  | Eq(1) |  | 0 | 49 | 49 | 181 | 181 | 181 | 181 | 181 | 181 | 181 |
| Export (USD saved) | EX costn - EX cost0 | Eq(2) |  | 0 | 110 | 110 | 278 | 278 | 278 | 278 | 278 | 278 | 278 |
| Import (hours saved) |  | Eq(1) |  | 0 | 66 | 66 | 117 | 117 | 117 | 117 | 117 | 117 | 117 |
| Import (USD saved) | IM costn - IM cost0 | Eq(2) |  | 0 | 54 | 54 | 140 | 140 | 140 | 140 | 140 | 140 | 140 |

Source: Own elaboration in base of database and estimation results. DB is Doing Business Database.

In table N°3 the results expected are summarized and presented.

**Table 3: Expected results for the ESW implementation**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Indicator | 2018 | 2021 | Δ 2018-2021 | 2024 | Δ 2018-2024 |
| Time for exports: Border compliance (hours) | 72 | 62 | 14% | 30 | 58% |
| Cost for exports: Border compliance (USD) | 378 | 278 | 26% | 128 | 66% |
| Time for exports: Documentary compliance (hours) | 200 | 161 | 20% | 61 | 70% |
| Cost for exports: Documentary compliance (USD) | 78 | 68 | 13% | 50 | 36% |
| Time for imports: Border compliance (hours) | 84 | 67 | 20% | 36 | 57% |
| Cost for imports: Border compliance (USD) | 265 | 213 | 20% | 128 | 52% |
| Time for imports: Documentary compliance (hours) | 156 | 107 | 31% | 87 | 44% |
| Cost for imports: Documentary compliance (USD) | 63 | 61 | 3% | 60 | 5% |

Source: Own elaboration in base of interviews to experts and Doing Business 2018.

In sum, the expected range for document preparation among best practice countries is 12-70 hours, and for customs clearance and inspection is 2-36 hours. Thus, the base model uses the figures of table N°3 that are not very demanding results.

The quantification of the transaction cost savings by merchandise importers and exporters as a result of the reduction in time to import and export was calculated using the opportunity cost of capital methodology described above, and utilizing the inputs in the following table:

**Table 4 Inputs to Calculation of Benefits**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Value** | **Description** | **Source** |
| IM2017 | 1,630 | Value of merchandise imports, 2017 (MM USD) | WTO Statistic Database (see: <http://stat.wto.org/Home/WSDBHome.aspx> ) |
| EX2017 | 1,490 | Value of merchandise exports, 2017 (MM USD) | WTO Statistic Database (see: <http://stat.wto.org/Home/WSDBHome.aspx> ) |
| GRIM | 6.72% | Compound Annual Growth Rate of Imports | Calculation with WTO data, 1948-2017 |
| GREX | 7.09% | Compound Annual Growth Rate of Exports | Calculation with WTO data, 1948-2017 |
| U2018 | 0% | % of imports or exports using ESW |  |
| ΔUM and UX | 6% | Projected annual growth rate of ESW use | Own estimation |
| COCx | 12% | Annual cost of capital for Guyana | Damodaran, 7/01/2018 |

The resulting model produced the following estimated benefits:

**Table 5 Expected Economic Benefits from the Project**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 2019[[1]](#footnote-1) | 2020 | 2021 | 2022 | 2023 | 2024 |
| Value of merchandise imports (IMn), projected  (MM USD) | 1,630 | 1,740 | 1,857 | 1,981 | 2,115 | 2,257 |
| Value of merchandise exports (EXn), projected  (MM USD) | 1.490 | 1.596 | 1.709 | 1.830 | 1.960 | 2.099 |
| % of merchandise imports and exports using ESW | 0% | 6% | 12% | 18% | 24% | 30% |
| Total benefit  (MM USD) | 0,538 | 0,950 | 3,545 | 4,734 | 5,442 | 6,237 |
| Present value of benefit  (MM USD) | **13,02** |  |  |  |  |  |

It is worth to highlight that these benefits are consistent with the impact indicators found in the Results Matrix (see Annex I Results Matrix).

# **III Economic Costs**

The project is to be financed with a US$ 6 million loan. It will be disbursed over 5 years as indicated below. While the terms of the loan are not known at the time of analysis. Disbursements by year were estimated from the draft Project Execution Plan (PEP) at the time of analysis.

Total economic costs of the project are therefore estimated as follows:

**Table 5 Expected Costs**(US dollars)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Contingencies (5%) |
| $804,986 | $3,787,800 | $719,800 | $241,800 | $159,900 | 285,714 |

Source: Project Execution Plan (PEP)

For the years 5 to 10 we estimate a maintenance cost of the Electronic Single Window of $200,000 per year.

# **IV Economic Returns**

With a discount rate of 12%, the project has a net present value of US$ 1.04 million and an economic rate of return (ERR) of 23% in a 5-year horizon and a net present value of US$ 14.99 million and an economic rate of return (ERR) of 57% in a 10-year horizon when almost all the imports and exports operations use the electronic single window.

**Table 6 Economic Return of the Program**(in millions of US dollars)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
| Benefits | 0 | 0.538 | 0.950 | 3.545 | 4.734 | 5.442 | 6.237 | 7.127 | 8.121 | 9.230 |
| Costs | 1.19 | 3.7 | 0.7 | 0.6 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| Net Present Value 5 year horizon (DR 12%) | 1.04 |  | Net Present Value 10 year horizon (DR 12%) | 14.99 |  |  |  |  |  |  |
| ERR 5 year horizon | 23% |  | ERR 10 year horizon | 57% |  |  |  |  |  |  |

Source: Own elaboration based on estimations

# **V Sensitivity analysis**

The model was tested with a sensitivity analysis, adjusting key assumptions: the projected growth rate of imports and exports, and the rate of increase in use of the ESW (ΔU). These scenarios were also run utilizing varied discount rates. Given the model’s methodology, changes to the discount rate also impacted the calculation of benefits by adjusting the opportunity cost of capital.

**Projected value of imports and exports:** Imports and Exports over the 10 year period of analysis could grow faster or slower than the rate estimated from historical data.

**Table 7 Sensitivity Analysis: Growth Rate of Imports and Exports**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Net Present Value (MM USD) | 4.72% imports  5.09% exports | 5.72% imports  6.09% exports | 6.72% imports  7.09% exports  (base case) | 7.72% imports  8.09% exports | 8.72% imports  9.09% exports |
| COC = DR = 10% | 15.94 | 16.47 | 17.45 | 18.49 | 19.59 |
| COC = DR = 12% | 13.67 | 14.14 | **14.99** | 15.89 | 16.85 |
| COC = DR = 14% | 11.79 | 12.15 | 12.89 | 13.67 | 14.51 |
| ERR  (COC = 12%) | **55%** | **56%** | **57%** | **58.5%** | **60%** |

**Percentage of Exports and Imports Using ESW:** Usage of the platform would likely be not as fast as projected. Thus, this analysis assesses the impact on the model if growth is slower or faster than the base estimate. 6% growth (base case) means the ESW achieves 60% use by 2027. 10% growth implies 100% use is achieved by 2027. While usage is expected to approach 100%, it is unlikely to be achieved unless there is a regulatory change requiring the mandatory use of the ESW, as has been implemented in other countries.

**Table 8 Sensitivity Analysis: Rate of Increase in Percentage of Imports and Exports Using ESW**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Net Present Value (MM USD) | 2% | 4.5% | 6% (base case) | 9% |
| COC= DR = 10% | 6.19 | 10.02 | 17.45 | 24.86 |
| COC = DR = 12% | 7.39 | 11.73 | **14.99** | 21.50 |
| COC = DR = 14% | 8.80 | 13.74 | 12.89 | 18.63 |
| ERR  (COC = 12%) | **39%** | **50%** | **57%** | **70%** |

As Tables 7-8 indicate, the net economic return of the project is positive under the test conditions. From the above analysis, it is evident that the investment is worthwhile if the program can reduce the total time for document preparation, customs clearance and inspections and the costs associated with these procedures.

Finally were estimated the minimum time and cost savings for the project to have a positive net present value. The results are present in table 9.

**Table 9: Minimum expected results for positive net present value of the ESW implementation**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Indicator | 2018 | 2024 | Δ 2018-2021 | 2028 | Δ 2018-2024 |
| Time for exports: Border compliance (hours) | 72 | 62 | 14% | 30 | 58% |
| Cost for exports: Border compliance (USD) | 378 | 278 | 26% | 128 | 66% |
| Time for exports: Documentary compliance (hours) | 200 | 161 | 20% | 61 | 70% |
| Cost for exports: Documentary compliance (USD) | 78 | 68 | 13% | 50 | 36% |
| Time for imports: Border compliance (hours) | 84 | 67 | 20% | 36 | 57% |
| Cost for imports: Border compliance (USD) | 265 | 213 | 20% | 128 | 52% |
| Time for imports: Documentary compliance (hours) | 156 | 107 | 31% | 87 | 44% |
| Cost for imports: Documentary compliance (USD) | 63 | 61 | 3% | 60 | 5% |

Source: Own elaboration in base of simulations.

# **Conclusions**

Based on conservative assumptions that quantify only the most direct impact of the proposed program, the economic return was found to be strongly positive. Additionally, the sensitivity analysis demonstrated that even adverse changes to the majority of our key assumptions will also produce a positive return on investment. As would be expected, the model is highly sensitive to the reduction in the time to import and export, and care must be taken in the design and implementation of the program to ensure that the activities produce significant savings of time for merchandise importers and exporters.

1. Here we use the last figure available. At the moment of doing this CBA the last trade date available is for the year 2017. No new insights are for estimate the real value of 2019 trade and then apply the methodology. [↑](#footnote-ref-1)