

TC DOCUMENT

I. Basic project information

▪ Country/Region:	Regional/IDB
▪ TC Name:	From Industrial Ports to Smart Ports: Addressing Future Challenges through Technological Innovation
▪ TC Number:	RG-T3123
▪ Team Leader/Members:	Krista Lucenti (TIN/CTT) team leader; Isabel Mejía Rivas (INT/TIN) alternate team leader; Mikael Larsson (INT/TIN); Margarita Libby, (INT/TIN); Alejandra Villota (INT/TIN); Reinaldo Fioravanti (INE/TSP); Monica Centeno Lappas (LEG/SGO); Christopher Persaud (INE/TSP); Paulo Martelli (INO/IEN); Sergio Deambrosi (INE/TSP); Yoo Seongjun (INT-TIN); Takiyah De Four (INE/TSP); Agustina Calatayud (IFD/CMF); Margarita Gómez (INT/TIN)
▪ Indicate if: Operational Support, Client Support, or Research & Dissemination.	Client Support
▪ Date of TC Document:	May 9, 2018
▪ Beneficiary:	Latin American and the Caribbean IDB member countries
▪ Executing Agency and contact name	Inter-American Development Bank (IDB), through Trade and Investment Division (INT/TIN)
▪ Donors providing funding	Knowledge Partnership Korea Fund for Technology and Innovation (KPK)
▪ IDB Funding Requested:	US\$ 500,000
▪ Disbursement period:	24 months (24 months execution)
▪ Required start date:	June 30, 2018
▪ Types of consultants:	Individuals; firms
▪ Prepared by Unit:	Trade and Investment Division (INT/TIN)
▪ Unit of Disbursement Responsibility:	INT/TIN
▪ Included in Country Strategy (y/n):	N/A
▪ TC included in CPD (y/n):	N/A
▪ Alignment with Update of Institutional Strategy 2010-2020:	Productivity and Innovation; Economic Integration

II. Objective and Justification of the TC

- 2.1. Logistics costs – e.g. cumbersome requirements and documents, or inefficient clearance of goods – and lack of good transportation infrastructure are widely singled out as some of the main obstacles to international trade. Logistics costs in Latin America and the Caribbean (LAC) are excessively high – between 18 and 35 percent of a product’s value (OECD: 8 percent) in a region where around 57 percent of exports are time-sensitive or logistics-intensive (OECD: 17 percent).¹ For small and medium-sized enterprises (SMEs), these costs can make up as much as 40 percent of final product value, which in turn considerably affects their capacity to compete internationally. Meanwhile, LAC countries rank low in terms of overall infrastructure quality,² with ports particularly affected by issues such as poor physical planning, low productivity, and excessive reliance on paperwork.³
- 2.2. At the same time, the adoption of information and communication technologies (ICT) is making life more digital than ever. An exponentially higher number of household and

¹ OECD/CAF/ECLAC, *Latin American Economic Outlook 2014: Logistics and Competitiveness for Development*, Paris: OECD Publishing, 2013.

² The Economist Intelligence Unit, *Latin American: Room for Growth*, London: The Economist, 2016.

³ The Latin America and the Caribbean Economic System, *Digital Ports in Latin America and the Caribbean: Situation and Prospects*, Caracas: SELA, 2015.

industrial devices is set to be directly connected to the Internet. The era of Big Data and connected devices – the so-called “Fourth Industrial Revolution” – is set to automate ever-growing portions of consumers’ daily life. Disruption and the speed of technological breakthroughs will reach unparalleled levels. In turn, the pace of innovations is to radically transform the way industries work, ushering significant gains in productivity.⁴ According to some estimates, the combined gains from the widespread adoption and embrace of the digital equivalents of so-called “foundational technologies” – health, energy, transport, communication, and production – could add as much as US\$ 2.8 trillion to the U.S. economy in the near future.⁵

- 2.3. Introducing some of these digital innovations to LAC port and maritime environments could not only improve the region’s logistics performance, but also address challenges related to ports’ spatial constraints, sustainability, productivity, and limited fiscal space. In this context, the machine-to-machine (M2M) communications and real-time data analytics made possible by the Internet of Things (IoT) and related technologies have the potential to improve reliability, automate processes, optimize the flow of information, and help efficiently manage trade flows. Furthermore, moving towards so-called “smart ports” can expand port operations and capacity without substantial new infrastructure or equipment investments – for instance, a holistic digital, connected-port strategy underpins the Port of Hamburg’s plans to double capacity without adding space.⁶ More importantly, similar initiatives would allow LAC ports – by analyzing the different, large data flows in the IoT infrastructure – to identify and take advantage of business models based on their position in the supply chain and ecosystem.
- 2.4. Nevertheless, each port environment is unique and the degree to which a port environment can innovate is contingent on the governance model. There are four primary port models: (i) public ownership and participation in port operations; (ii) public ownership and private participation in port/terminal construction, operations, and management; (iii) public ownership and private participation in superstructure installation (e.g., cranes) and operations; and (iv) private ownership and operations.⁷ Industry needs a policy and regulatory environment that focuses on driving innovation, on the adoption of robust regulations on data protection and cybersecurity, and on transparency in the implementation of environmental standards that promote sustainability. Cooperation between private port operators and port authorities and other regulatory agencies is critical to the success of smart port solutions.
- 2.5. Lastly, the development of smart port solutions needs to take into consideration the comparatively low connectivity levels in the LAC region – particularly in M2M communication,⁸ which forms the core of real-time data analytics solutions. In other words, there is no “one size fits all” smart port solution, and consequently the optimal level of automation in ports will have to be determined on a case-by-case basis.
- 2.6. Accordingly, the **general objective of this Technical Cooperation (TC) is to support the region’s transition from industrial – and in some cases, digital – ports to smart ports**, allowing countries to better leverage technological innovation. There is significant variation in the readiness of LAC ports and Port Authorities to capitalize on the opportunities

⁴ Schwab, Klaus. *The Fourth Industrial Revolution*. New York: Crown Business, 2016.

⁵ Suri, Rajeev. “[The Fourth Industrial Revolution Will Bring a Massive Productivity Boom](#)”. World Economic Forum.

⁶ Riedl, Jens et al. “[To Get Smart, Ports Go Digital](#)”. The Boston Consulting Group.

⁷ González Laxe et al. “The adaptation process in port governance: the case of the Latin countries in South America and Europe.” *Journal of Shipping and Trade*, 2016.

⁸ For instance, Cisco expects M2M modules to account for 33% of all networked devices in Latin America by 2020, compared to 60% and 58% in North America and Europe, respectively. Cisco, [VNI Forecast Highlights](#).

available by new high-tech developments – e.g. Big Data, IoT. **The specific objectives are to:** (1) **develop a toolkit** which allows regulatory authorities (e.g. Port Authorities, Customs) and other relevant governmental agencies, as well as port terminal operators if possible, to benchmark their performance against best practices in smart ports; (2) **prepare roadmaps** for prioritized and coordinated port- and national-level trade and logistics actions, reforms and investments (public and private sector); (3) prepare a **communications strategy and disseminate results** through knowledge products and workshops; and 4) create linkages with other trade facilitation measures (e.g. Single Windows for trade, Port Community Systems), through regional forums such as the **RedVUCE meeting**.

- 2.7. Based on IDB strategic dialogue and existing and future loan portfolio, four countries will be selected for the application of the toolkit and the preparation of the roadmaps envisaged in this TC. Countries selected will have shown a commitment (from public and private sector) towards a) streamlined, more competitive port environment and regulatory framework for the maritime sector; and b) financing implementation of smart, digital solutions. Note that ports will have access to the toolkit should they want to prepare their own assessment.
- 2.8. This TC is aligned with the goals to support competitive regional and global integration identified in the Ninth General Capital Increase and the Updated Institutional Strategy 2010-2020. The activities undertaken in this TC seek to improve the competitiveness of the region's ports and therefore its imports and exports, while at the same time supporting diversification of its economy through the expansion into new growth sectors such as maritime transport and logistics. In addition, this TC is aligned with the challenge of "Productivity and Innovation" of the Updated Strategy as the toolkit will identify productivity benefits through the application of artificial intelligence, IoT, automation etc.
- 2.9. This TC will build upon existing work done by the Bank on IoT and new digital technologies, particularly RG-T2724 and RG-T2931 which focus on technology applications to supply and value chains in LAC. This TC also builds upon existing work done by the Trade and Investment Division on Electronic Single Windows for trade, including interoperability of Single Windows (RG-T2527) and broader trade facilitation goals (RG-T2941).

III. Description of activities and outputs

- 3.1 **Component I: Smart Ports Toolkit (US\$100,000).** Analyze good practices in smart port implementation in extra-regional ports and produce a toolkit⁹ to support regulatory agencies and government Ministries, as well as port terminal operators, in assessing their own performance against these good practices. This toolkit – the first of its kind, as no similar tool is known to exist – will strive to provide a holistic view of the kind of legal, regulatory, and technological ecosystem necessary to implement smart ports solutions.
- 3.2 Consequently, this analysis will not only involve a thorough examination of the port environment and technological solutions, but also the requisite inter-institutional framework and interfaces with other trade and port facilitation tools. It will consider the relevant legal and regulatory framework for ICT, data protection and IoT technologies, as well as its application in ports and maritime transport more generally. A critical aspect of development of the toolkit is guidance on establishing the baseline by which a country will measure its own performance – this baseline will be both quantitative and qualitative. The output from

⁹ One option will be to prepare a digital toolkit which will be available to countries online. The Bank retains the rights to use and disseminate the toolkit to its countries.

this Component will be relevant and useful for all LAC countries, who can use the toolkit to:

- (i) Develop a custom-made, actionable roadmap of technological, ICT, infrastructure, legal, and process reengineering solutions that are not only necessary or recommended, but also viable, based on their own reality and unique needs and circumstances.
- (ii) Assess their own performance in adopting, implementing, and operationalizing these solutions, as well as ascertain best ways to close existing or lingering gaps or barriers to full implementation.
- (iii) Identify the minimum requirements for adopting smart port initiatives.
- (iv) Monitor year-to-year improvements and progress.

3.3 To this end, this analysis will thoroughly examine and analyze the following aspects:

- (i) Economic or social drivers for smart port solutions by Port operators and/or Port Authorities/Customs in the most advanced model countries/ports.
- (ii) The experience of the Government and/or Port operators in identifying, implementing, and operationalizing all necessary ICT, digital, process reengineering, and other relevant solutions.
- (iii) Any required changes to their governance structure to carry out these plans.
- (iv) The requisite inter-institutional framework and interfaces with other trade facilitation tools and port electronic platforms – e.g. single windows and port community systems.
- (v) The relevant national legal and regulatory framework governing ICT and IoT technologies – including the use and analysis of substantial amounts of industrial data –, and the application of said framework in the ports and maritime logistics sectors.
- (vi) In case of any initial or lingering conflicts between the data-related demands of a smart port solution and the existing legal and regulatory framework, how these difficulties were overcome.

3.4 Throughout this exercise, Component I shall take into consideration that governance structures could determine the degree of engagement from private terminal operators and that ports can reach heterogeneous degrees of digitalization¹⁰ based on a variety of factors, e.g. lack of infrastructure or physical integration with their surroundings, or limited scale for necessary investments.

3.5 Similarly, the proposed benchmarking in the toolkit will not assess the performance of the participating LAC ports vis-à-vis extra-regional advanced smart port solutions. Instead, the benchmarking will assess the performance and implementation of smart port initiatives in participating LAC ports vis-à-vis the baseline identified in the toolkit, which as previously stated will be bespoke actionable roadmap based on the operational realities of these LAC ports.

3.6 **Component II: Smart Port Roadmaps – Pilot Assessments (US\$210,000).** Assess the degree to which key LAC ports can advance in the evolution from industrial or digital ports to smart ports, adopting many of the good practices identified in extra-regional ports such as those in Korea and Europe. Using the toolkit developed in Component I, this activity will support pilot benchmarking assessments and roadmaps in **four LAC port environments**, taking into consideration a) their geographic location to maximize representation of LAC sub-regions; b) the volume and type of goods going through the

¹⁰ **Digitalization** is defined as “the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business” while “**Digitization** is the process of changing from analog to digital form.” Wikipedia.

ports; c) the country's interest in developing better port and trade facilitation systems; and d) the interest and engagement of the private terminal operator, if relevant.¹¹

3.7 The information gathered through this exercise will be used to develop targeted roadmaps using the baseline established in Component I and the target set by the good practices analysis. This component will undertake the following activities:

- (i) Review the toolkit and customize it to the piloted port, in collaboration with the government and relevant port management.
- (ii) In collaboration with the government and port management, apply the toolkit and develop a roadmap of technological, ICT, infrastructure, legal, and process reengineering solutions based on said port's economic reality and unique needs and circumstances. This should include national-level actions to streamline and improve relevant laws and regulations – on Big Data, ICT, logistics, and the like – , as well as existing digital infrastructure.
- (iii) Develop an implementation plan for the roadmap, including financing mechanisms and instruments.
- (iv) Validate measures outlined in these roadmaps through consultations and interviews with select government and industry stakeholders in the country's maritime community.
- (v) Prepare an evaluation of the toolkit and provide recommendations for its improvement.

3.8 **Component III: Communication, Dissemination and Technical Assistance (US\$95,000).** Component III will undertake three primary activities:

- (i) Develop a communications strategy to disseminate and socialize the results of all undertaken research and consultation activities under Components I and II. The strategy will include, for example, the creation of working groups, on-site and online workshops, webinars, blogs, and social media. This also includes the production of status reports, communication with all relevant stakeholders, logistical and content-related organization of any necessary meetings and outreach activities, and any necessary supporting research for Components I-IV.
- (ii) Develop a training module so that countries may thoroughly familiarize themselves with Component I's toolkit, which in turn will help them establish their own smart port baseline and roadmaps in the future.
- (iii) Provide resources for small dissemination and validation workshops in the four (4) piloted countries.

3.9 **Component IV: Meeting of the Red VUCE (US\$95,000).** Component IV will seek to generate a space for dialogue so that LAC countries can exchange experiences and lessons learned on ESWs and other port and trade facilitation measures. This Component will lay the groundwork for expanding the focus of the Inter-American Network of Single Windows (Red VUCE) in order to explore smart port solutions and links with ESWs.

3.10 To this end, Component IV will finance one (1) on-site workshop so that country officials may:

- (i) Share progress on implementation of trade facilitation measures and on lessons learned.

¹¹ Selection and engagement of the pilot countries will be done in consultation with relevant IDB Country Departments.

- (ii) Acquaint themselves with extra-regional experiences.
- (iii) Learn about the latest trends and developments related to issues such as risk management, blockchain, data mining, e-commerce, and the impact of these issues on trade and port facilitation measures.
- (iv) Reach agreements and commitments for adopting common standards and regulatory convergence to link different economic integration efforts on trade facilitation currently underway (Pacific Alliance, Mercosur, Central America, and CARICOM).¹²

3.11 Government officials from trade ministries, customs, ports, and sanitary agencies in all 26 LAC countries will be invited to participate in the meeting.

3.12 **Expected results and monitoring indicators:**

- (i) Identification of reference/model smart port projects in other regions and assessment of their replicability in LAC (**# of reference ports = 4**);
- (ii) Better understanding of the common technological, legal, regulatory, and process reengineering reforms necessary for implementation of smart ports (**# of toolkits = 1**);
- (iii) Identification of key smart port-related reforms and investments based on benchmarking of LAC ports (**# of pilot assessments = 4**);
- (iv) Awareness of good smart port practices based on the development of training products and strategies, as well as the organization of workshops (**# of communications and training materials = 4**);
- (v) Synergies and alliances with existing intergovernmental cooperation fora on trade facilitation and digital tools (**# of RedVUCE conferences = 1**).

The ability to replicate this project across the LAC region is facilitated by: (i) laying out the steps for identifying a set of digital investments and legal reforms key to smart port initiatives; (ii) identifying best international practices in the development and implementation of smart port initiatives; (iii) highlighting areas for the development of public policies to facilitate not only the adoption of smart port initiatives, but also other solutions related to Big Data and digitalization; (iv) featuring the pilot assessments of four regional ports. Furthermore, the project’s sustainability will benefit from (i) the involvement of relevant stakeholders – e.g. Customs, Ministries of Trade and Finance, and Port Authorities, as well as terminal and logistics operators – in the pilot assessments and different communication and dissemination activities; (ii) formation of synergies and alliances with existing intergovernmental groupings related to trade facilitation and digital solutions – e.g. RedVUCE –; and (iii) support other IDB operations and policy dialogues in areas such as trade, logistics, infrastructure, and technology innovation.

3.13 The total estimated cost of the technical cooperation is US\$500,000, financed by the KPK on a non-reimbursable basis.

Indicative Budget

Activity/Component	Description	IDB/Fund Funding	Counterpart Funding	Total Funding
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¹² The Pacific Alliance (PA) is currently implementing an ESW interoperability project that has thus far made significant strides in the standardization and exchange of phytosanitary and origin certificates, becoming the only regional initiative that has achieved such level of integration. For its part, Central America has a project in initial stages for developing a digital platform that seeks to reach the same goals. Likewise, Mercosur and PA recently agreed on an action plan and roadmap in which trade facilitation and ESW interoperability is a key component.

Component I	Toolkit for Smart Ports in LAC	100,000	-	100,000
Component II	Pilot Benchmarking Assessments and Roadmaps (4)	210,000	-	210,000
Component III	Communication, Dissemination and Training module	95,000	-	95,000
Component IV	1 On-site Meeting and Exchange of Experiences (Red VUCE)	95,000	-	95,000
	Total	500,000		500,000

3.14 This TC will be supervised by the Trade and Investment Division (INT/TIN) of the IDB.

3.15 **Monitoring and evaluation.** Given the new nature of this field and the additional layer of administrative and technical expertise required, funds will be allocated for hiring a consultant under Component III to support communication and dissemination, as well as monitoring of activities throughout the execution of the TC. The consultant will work closely with IDB technical specialists and external consultants. The team leader (Krista Lucenti, Senior Specialist, Trade and Investment Division) will identify a focal point in key pilot countries and will be supported in COFTT by a technical consultant hired to support TIN operations.

IV. Executing agency and execution structure

4.1 The Bank will be the project's executing agency, through the Trade and Investment Division of the Integration and Trade Sector (INT/TIN), given the regional character of the project and the fact that it needs elevated level of coordination and interdependence. In addition, in accordance with Annex 10 of GN-2629-1, there is no executing agency with the appropriate technical or operational capacity to execute this regional TC, given the level of complexity of the subject matter and the fact that there are LAC ports which are, with some exceptions, not operationally sophisticated (and therefore need further targeted support for adopting smart port initiatives). The Bank has the technical experience to ensure high quality products and activities carried under this project.

4.2 Moreover, since Red VUCE's creation, INT/TIN has been its institutional coordinator, mediator, and interlocutor for all relevant activities, including the different annual meetings as well as the Pacific Alliance countries' ESW interoperability project. Similarly, INT/TIN has promoted a series of initiatives on trade facilitation, taking into consideration the role that innovative technologies can play in making trade flows more streamlined and efficient. This is consistent with OP-1155-2 where the proposed activities are consistent with the Bank's regional and institutional strategies (Pacific Alliance, Caribbean Regional Strategy on Integration, and the Update to the Institutional Strategy).

4.3 In order to generate the necessary buy-in for further research on new policy areas and for all necessary related investments, it is essential that the Bank provide technical advice to and build consensus-building with government authorities and the private sector. Accordingly, this TC will finance eligible costs incurred during project execution to that end. More specifically, the Bank's participation is essential and necessary, as executor of

the TC, to organize, present at, or moderate workshops and similar activities meant to showcase, promote, and implement the results from Components I and II.¹³

- 4.4 The Bank will contract consultants (individual and consulting firms) in accordance with current Bank procurement policies and procedures. A procurement plan is included in Annex I.
- 4.5 Prior to initiating any activity in a beneficiary country, a letter request should be received by that country requesting participation in the technical cooperation being executed by the Bank.

V. Project Risks and issues

- 5.1 Implementation of a regional project implies a higher level of complexity, as well as risks related mainly to inter-institutional coordination and asymmetries in information. It is expected that these risks will be mitigated by having the IDB as the executing agency, especially considering that the Bank has and will continue coordinating relevant and related activities with the different public institutions responsible for trade and port facilitation in the LAC region.
- 5.2 Another risk to this project is lack of data to create the baseline necessary for countries to benchmark their performance. This will be mitigated by selecting countries where we are confident robust data exists.
- 5.3 Finally, a risk may arise from the reluctance of the private port operator to participate in the pilots. This risk has been mitigated by securing the participation of operators during the preparation phase of this technical cooperation.

VI. Exceptions to Bank Policy

- 6.1 There are no exceptions to Bank policy.

VII. Environmental and Social Classification

- 7.1 As this TC involves the procurement of consulting services, it does not pose environmental and social implications. Therefore, classification under Category C is suggested, per the [Environment and Safeguard Compliance Policy](#) (OP-703).

Required Annexes:

- Annex I - [Procurement Plan](#)
- Annex II - [Requests from the clients](#)
- Annex III - [Results Matrix](#)
- Annex IV - [Terms of Reference for activities/components to be procured](#)

¹³ TC policy GN-2470-2 does allow for the financing of staff travel with resources from technical co-operations (within certain parameters) when the funding source does not entail any special financing restrictions. This TC will not support or complement the Bank's administrative budget and will be used for the indicated purposes only when no other ways to finance staff participation in the dissemination events will be available, hence not constituting Bank's ordinary or routine activities, as stated in the document GA-220-12.

**FROM INDUSTRIAL PORTS TO SMART PORTS: ADDRESSING FUTURE CHALLENGES THROUGH
TECHNOLOGICAL INNOVATION**

RG-T3123

CERTIFICATION

I hereby certify that this operation was approved for financing under the **Knowledge Partnership Korea Fund for Technology and Innovation (KPK)** through a communication dated February 26, 2018 and signed by Byoung Kim (ORP/GCM). Also, I certify that resources from said fund are available for up to **US\$500,000** in order to finance the activities described and budgeted in this document. This certification reserves resource for the referenced project for a period of four (4) calendar months counted from the date of eligibility from the funding source. If the project is not approved by the IDB within that period, the reserve of resources will be cancelled, except in the case a new certification is granted. The commitment and disbursement of these resources shall be made only by the Bank in US dollars. The same currency shall be used to stipulate the remuneration and payments to consultants, except in the case of local consultants working in their own borrowing member country who shall have their remuneration defined and paid in the currency of such country. No resources of the Fund shall be made available to cover amounts greater than the amount certified herein above for the implementation of this operation. Amounts greater than the certified amount may arise from commitments on contracts denominated in a currency other than the Fund currency, resulting in currency exchange rate differences, represent a risk that will not be absorbed by the Fund.

Certificado:

Original firmado	06/07/2018
_____ Sonia M. Rivera Chief Grants and Co-Financing Management Unit ORP/GCM	_____ Date

Approved:

Original firmado	06/11/2018
_____ Antoni Estevadeordal Manager Integration and Trade Sector INT/INT	_____ Date