

Terms of Reference (TOR)

Consultancy Services for the Design and Establishment of a Remote Image Analysis Centre (RIAC) for Non-Intrusive Inspection Equipment

1. Introduction

As part of its reform and modernization drive, the Federal Board of Revenue (FBR) intends to develop and adopt a robust Non-Intrusive Inspection (NII) program utilizing currently installed technology and upcoming, state of the art scanning equipment at entry and exit points. These scanners are to be fully integrated with customs clearance and risk management processes in line with the best international practices. The purpose of NII¹ is to leverage technology for facilitating cross border trade, while at the same time enhancing customs controls of imports, exports, and transit traffic.

One of the key components of the NII program is the setting up of a 'Remote Image Analysis Center (RIAC)' for centralized analysis of the scanned images from imports, exports, and transit / transshipment cargo. RIACs serve as centralized hubs where images captured by NII equipment, at various inspection sites, for detailed analysis while leveraging labelled digital scan library with AI enabled solutions. This centralization enables consistent and expert evaluation of scanned images, improving the detection of contraband, weapons, and other illicit items. RIACs also enable customs to conduct remote inspection of containers or vehicles using advanced communication technologies. In addition, RIACs also serve as training centers for image analysts and customs staff ensuring that personnel are proficient in interpreting complex images and ensure the standardized application of inspection procedures. The analysis made at RIAC also enable Customs Post Clearance Audit mechanism to improve compliances. Besides scanners other equipment like CCTV cameras, electronic weigh bridges, automated gates are being installed at ports as part of automated entry and exit system which would be linked through RIAC's to allow real time monitoring by Customs. RIAC is being made an integral part of the upcoming National Targeting Center (NTC) architecture by Pakistan Customs to allow a remote technology enabled surveillance mechanism for customs clearances across the country.

FBR is now seeking the services of a qualified consulting firm with expertise in NII technology and centralized image analysis systems to assist Pakistan Customs in the physical and operational design of the RIAC capable of receiving and analyzing images from the different seaports, airports, border crossing points, and others, and sharing the findings onwards with Custom authorities. The RIAC will employ artificial intelligence and exhaustive scanned image library to enable Customs for improved efficiency in selectivity and targeted inspections where required as well as generation of alerts. The consultancy will include complete design of the RIAC including technical and functional requirements along with cost estimates and tendering process support, maintenance and sustainability analysis. The consultants shall also analyze and propose the optimal HR organization, staff profiles, Infrastructure (digital and physical), processes, protocols, SOPs and other requirements for the establishment, operations and maintenance of the facility.

¹ According to the WCO Non-intrusive Inspection technology (NII technology) refers to technical equipment and machines such as X-ray or gamma-ray imaging type equipment that allow the inspection of cargo without the need to open the means of transport and unload the cargo

2. Background

With support received from the World Bank under the Pakistan Raises Revenue (PRR) project, Pakistan Customs has embarked upon an ambitious technology enabled reform drive. As part of this agenda, Customs is transforming its business processes and organizational set up, redesigning the customs clearance system (WeBOC), strengthening the post clearance audit and risk management functions as well as establishment of technology enabled National Targeting Center.

With the significant growth in Pakistan's international trade over the past two decades and higher volumes of international cargo coming through the seaports, airports, and border crossing points, Pakistan Customs needs to enhance its administrative and operational capabilities, requiring significant human and financial resources, to keep delivering at the current operational levels. Meanwhile the threat perception regarding illicit movement of weapons, drugs, and other contrabands has also increased given the peculiar geopolitical environment of the region. In this scenario, like many other customs administrations around the world, Pakistan Customs also has to contend with the need to balance trade facilitation with its enforcement and revenue protection functions. A higher than usual inspection rate at the ports, for example, may result in port congestion and delay the clearance and delivery of cargo by several hours and even days. On the other hand, a more relaxed approach towards inspections and customs examination may lead to higher incidents of misdeclarations, frauds, duty evasion, and smuggling of illicit/contraband goods.

The adoption and implementation of NII equipment helps mitigate some of these problems by digitally enhancing and streamlining the customs inspection and clearance process. Added to the overall risk management framework, it becomes possible for customs to opt for scanning of the cargo instead of an intrusive, detailed examination. Only those containers/pellets/parcels shall be referred to secondary examination where the scanned images show some inconsistency or variation with the customs declaration or where the scanners have detected a contraband good.

Some of the elements of the NII program are already in place in Pakistan. As per the conditions of the licenses granted to the terminal operators under the Pakistan Customs Act, 1969 and rules made thereunder², all terminal operators are required to install and integrate containers scanners with the Customs Computerized System (WeBOC). Scanners are thus installed and operational at various locations in the country as per **Annex-A**. However, the output of the scanners is not completely integrated with the WeBOC system thereby affecting the optimal utilization of these scanners. There is no labelled images library with AI solution to effectively utilize images of scanners which are operational and integrated with WeBOC system. In some cases, the scanners have become obsolete/ outdated producing poor quality images which cannot be relied upon by customs for informed decision making. Customs also lack trained image readers who can decipher scanned images for raising required alerts.

Pakistan customs is working with National Logistics Company (NLC) as well as terminal operators at seaports and ground handling agents at airports to upgrade/install scanners as per the specifications approved and provided by Customs. At the four main terminals at seaports in Karachi the NLC is required to install localized RIAC enabling Customs to utilize the scanners to be installed within this calendar year. NLC is also required to install other equipment to allow entry and exit at these terminals. In order to optimally utilize images from these scanners and other equipment, Customs needs a centralized facility to collect and analyze the images/information in order to support customs appropriate decision making. In addition, a centralized facility will help standardize the inspection procedures and ensure that the scanning

² SRO 1661(I)/2001 dated 22.12.2021

equipment installed at the terminal operators is well maintained, fully available, and replaced or upgraded when required. The RIAC is also required for enabling Customs in securing the transit throughput against any en-route pilferage through comparison of scanned images at entry and exit points.

The RIAC should also act as the centralized control room in the NTC for effective remote monitoring of seaports, airport terminals, dry ports, border crossing points and other customs control points while receiving and analyzing output/information from other equipment like CCTV cameras, electronic weigh bridges, automated gates, RFID readers, and other equipment, which are installed as part of the Automated Entry and Exit System (AEES). This would help in remote monitoring to ensure efficiency. The establishment of RIAC for NII and other equipment will help enhance cargo security and streamlining the inspection process. The proposed RIAC will centralize the analysis of images captured by X-ray, gamma-ray, and other NII systems at ports, border crossings, and other inspection points.

3. Objective

The primary objective of the consultancy is to assist Pakistan Customs in designing, developing, and supervising the establishment of a fully operational RIAC that supports the integration and centralized analysis of Non-Intrusive Inspection equipment deployed at various locations as per international best practices. The consultancy will help develop RIAC, as a key component of NTC architecture, to function as the centralized control room for integrating all equipment like CCTV cameras, weigh bridges, gates etc at seaports, airport terminals and customs control points enabling real time remote monitoring by Customs. The consultancy shall provide the cost estimates for the implementation, operations, and maintenance of the center, recommend requisite hardware/software, support during tendering and implementation, suggest any legal changes, define RIAC's general processes and standardized operating procedures, propose an HR organizational structure and provide job descriptions and training needs for the requisite staff.

4. Scope of Work

4.1. Assessment of Current NII Infrastructure:

- Conduct a detailed assessment of existing NII equipment in use at various customs stations including seaports, airports, off-dock terminals and border crossing points as per **Annex-A**. The assessment shall:
 - Include a systematic evaluation of the current infrastructure, technical capabilities, and operational status of the equipment deployed across various customs stations.
 - Identify equipment that is obsolete or nearing end-of-life, including scanners that produce poor-quality images or gaps against modern equipment.
 - Evaluate compatibility with existing software and systems (e.g., customs management systems like WeBOC)
 - Confirm operational status of each cargo scanner and evaluate how effectively the equipment is being utilized. For luggage scanners at airports, evaluate efficiency and obsolescence.

- Identify bottlenecks or inefficiencies in using NII equipment (e.g., delays in image analysis, manual intervention requirements, or equipment underutilization).
- Assess the connectivity and integration capabilities of existing scanners with WeBOC particularly the Risk Management System, Centralized image analysis systems (if any), other supporting systems like CCTV or entry-exit control systems and identify gaps in real-time data sharing and image transmission to a centralized facility or remote monitoring system.
- Review the technical and functional specifications of the scanners under procurement by various terminal operators and ground handling agents and recommend upgrades or additional tools if necessary.
- Identify gaps and opportunities for integrating the existing/new systems into a centralized analysis framework.
- Evaluate and propose suitable site for RIAC. Evaluate the convenience centralizing versus installing smaller RIACs at each airport to control shed scanners and propose a recommendation.
- Determine the number of images to be processed in RIAC, number of analyst and positions needed for image analysis, CCTV and AEES supervision, auditing and other needs.
- Evaluate the ICT infrastructure of FBR to identify gaps vis-à-vis needed hardware, software and networking requirements for smooth operations of RIAC.
- Identify regulatory issues concerning NII data governance, legal use of scans and evidence handling, or any other legal issue impacting the NII operation and propose recommendations.
- Evaluate HR and their training related gaps and needs within Customs to operate RIAC.

4.2. System Design and Integration:

- Develop a comprehensive design for the RIAC, including hardware, software, and communication infrastructure to support remote analysis of NII images.
- Propose processes and protocols for the comprehensive operation of the solution.
- Recommend and specify the technical architecture, including server requirements, network connectivity and capacity, and data transmission, storage (capacity and policy), and archiving protocols.
- Review and provide feedback regarding the provision of the proposed hardware and equipment in FBR's existing or planned data center and recommend upgrades or procurement of additional hardware/tools if necessary.
- Ensure compatibility with recently deployed and to be deployed NII equipment and recommend upgrades or additional tools/equipment if necessary.

4.3. Software, Analytical Tools:

- Identify and recommend appropriate software platforms for remote image analysis and communication.

- Evaluate and recommend suitable digital scan libraries compatible with different type of scanners to be used as reference for analysis of the images captured by scanners at different sites
- Evaluate and recommend off-the-shelf analytical tools, including artificial intelligence (AI) and machine learning to enhance image interpretation, image comparison at entry and exit points and contraband detection with dashboards and reporting tools. This may include digital scan libraries as well.

4.4. Budgeting and Procurement

- Provide comprehensive budget estimates for the purchase, installation, and ongoing maintenance of the recommended hardware, software, and communication tools.
- If additional contracting of services is required, the contractor shall be responsible for acquiring the necessary services.
- Provide expert support during the entire the procurement cycle including, tendering, evaluation of bids, response to technical questions, and ensuring compliance with World Bank procurement regulations for all relevant hardware and software solutions.

4.5. Operational Framework:

- Suggest institutional and organizational setup for operations of the RIAC along with a proposed organogram.
- Recommend staffing requirements for the RIAC, including the number of image analysts and technical support staff along with draft job descriptions and KPIs in line with global best practices.
- Define the physical and technical security of the installation and operation.
- Develop Standard Operating Procedures (SOPs) for image analysis, including roles and responsibilities of personnel, escalation procedures, and quality control measures, monitoring, audit and training.
- Define training programs for RIAC staff on image interpretation and system use.
- Develop a continuity plan, with high-availability architecture, including redundant systems, DR sites, data replication, off-site backups and failover procedures (this should be aligned with renewed datacenter work for FBR).
- Define specific cybersecurity standards or protocols to be mandated in the RFP.
- Develop a physical security statement of requirements and design.
- Define an RIAC performance KPI framework, linked to PCS / FBR processes and desired outcomes

4.6. Implementation and Testing:

- Oversee the implementation of the RIAC, including hardware installation, software configuration, and network setup.
- Develop a testing plan and supervise trial runs of the RIAC to ensure operational readiness.
- Provide troubleshooting support during the initial setup and testing phases.

4.7. Training and Capacity Building:

- Design and deliver training programs for RIAC personnel, covering image analysis, software tools, and NII systems.
- Develop long-term training and capacity-building strategies to ensure continued performance improvement.

4.8. Reporting and Documentation:

- Provide regular progress reports to the client, highlighting milestones achieved, challenges faced, and recommendations for the way forward.
- Deliver comprehensive documentation covering system architecture, SOPs, and operational guidelines for the RIAC.

5. Deliverables of the Consultancy

5.1. Deliverables and timelines:

Sr. No	Deliverable	Timelines
i.	Inception Report: A detailed work plan and methodology for completing the assignment, submitted within the first two weeks of the consultancy.	30 Days from signing of Contract.
ii.	Assessment Report: Findings from the Situational Assessment Report containing gap assessment of existing or proposed infrastructure and NII equipment as well as proposal for suitable site.	60 Days from the signing of Contract.
iii.	RIAC Design Proposal: a. A detailed design of the RIAC, including processes, protocols, technical architecture, hardware and software requirements (including administrative, monitoring and audit systems), data and access to premises security systems and operational framework including cost estimates. It should be able to integrate information from different sources and systems (CCTV, entry-exit systems, etc.). b. HR Plan - Proposed Institutional and organizational setup along with staffing requirements, draft organogram and job descriptions.	Within 120 days of signing of contract.
iv.	Procurement Support: If additional contracting of services is required, the contractor shall be responsible for acquiring the necessary services.	within 180 days of the signing of the contract.
v.	Implementation Plan: A comprehensive plan outlining steps for the setup, testing, and operationalization of the RIAC.	270 days of signing of contract.
vi.	SOPs and Operational Guidelines: Standard Operating Procedures and operational guidelines for image analysis and system use, and response protocols.	within 300 days of the signing of the contract.
vii.	Training Manuals and Training Sessions: Training materials and documented training sessions for RIAC personnel.	within 180 days of the signing of the contract.
viii.	Reports:	

	<ul style="list-style-type: none"> a. Regular progress reports on the deployment, installation, and training activities. b. A final report summarizing the consultancy’s activities, achievements, and recommendations for sustaining RIAC operations. 	
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5.2. Deliverable Key steps

- Kick-off meeting with stakeholders.
- Submission of **Inception Report** with a detailed work plan.
- Gap analysis report on specifications of scanners, localized RIACs and other equipment, as well as integration requirements.
- Stakeholder consultations to finalize site selection and operational model.
- Submission of **Assessment Report** summarizing findings and recommendations.

- Draft RFP/BOQs for procurement of hardware, software, and additional tools.
- Design operational framework (HR structure, job descriptions, protocols).
- Submit **RIAC Design Proposal**, including institutional setup and estimated budget and sustainability recommendations.

- Finalize procurement documentation (RFP/BOQs).
- Support procurement process and evaluation of bids.
- Develop initial training manuals for RIAC personnel.
- Supervise procurement of hardware and software.
- Supervise ICT and physical infrastructure for RIAC.

- Assist PCS supervising the installation and configuring of hardware and software.

- Assist Customs in setting up the network and data transmission systems through FBR’s service providers.
- Conduct testing and trial runs of the RIAC.
- Finalize SOPs and operational guidelines.
- Troubleshooting and refinement based on test results.

- Deliver initial training sessions for RIAC personnel on RIAC SOPs and protocols.

- Develop long-term training and capacity-building strategies.
- Provide **Training Manuals** and document training sessions.

- Oversee full operationalization of RIAC.

- Identification of gaps in implementation and operations of RIAC, if any.

- Submit regular progress reports to Pakistan Customs.

6. Duration and Reporting Arrangements:

The consultancy is expected to commence immediately upon appointment and will span the entire duration of the Pakistan Raises Revenue (PRR) project with a total timeline of 56 weeks. The consultant will work in close coordination with Pakistan Customs and the RIAC supplier to ensure timely completion of all tasks.

FBR has notified a dedicated PMU for NTC which is also responsible for establishing RIAC. The consultant will report to the Project Director NTC in FBR. The PD NTC will support the implementation of RIAC. The consultants will work with the PMU for NTC.

7. Qualifications and Experience:

7.1. Key Experts

Position	Role, qualification and experience
1. Team Leader / Project Manager	<p>Role: Lead the consultancy, oversee all activities, coordinate with stakeholders, and ensure deliverables are completed on time.</p> <p>Qualifications and Experience:</p> <ul style="list-style-type: none"> • Master’s degree in engineering, IT, or a related field. • A minimum of 10 years of proven experience in managing large-scale NII projects or centralized image analysis systems. • Proven track record in project management, including design, implementation, and supervision of NII technologies. • Familiarity with customs operations, risk management frameworks, and international trade facilitation. • Strong stakeholder engagement and communication skills.
2. NII Systems Expert	<p>Role: Provide expertise in the evaluation, integration, and design of NII equipment and systems.</p> <p>Qualifications and Experience:</p> <ul style="list-style-type: none"> • Bachelor’s/Master’s degree in Electronics, Telecommunications, or related fields. • A minimum of 8 years of experience in NII technology, including X-ray, gamma-ray, and other scanning systems. • Hands-on experience in integrating NII equipment with centralized systems and AI/ML technologies. • Knowledge of global best practices for customs inspection and contraband detection. • Experience in drafting technical specifications for NII hardware and software.
3. ICT and Systems Integration Specialist	<p>Role: Design the technical architecture, ensure compatibility of existing systems, and oversee software and network integration.</p> <p>Qualifications and Experience:</p> <ul style="list-style-type: none"> • Bachelor’s/master’s degree in computer science, Information Systems, or a related discipline. • A minimum of 8 years of experience in system integration, ICT infrastructure design, and network setup. • Expertise in data transmission, storage, and security protocols. • Experience working with large-scale, multi-site environments, preferably in the customs or logistics sectors. • Knowledge of cloud-based systems and AI/ML integration.
4. Customs Operations and Risk Management Expert	<p>Role: Provide insights on customs procedures, risk management, and operational protocols for RIAC.</p> <p>Qualifications and Experience:</p> <ul style="list-style-type: none"> • Bachelor’s/master’s degree in Customs Administration, International Trade, or a related field. • A minimum of 10 years of experience in customs operations, risk management, and post-clearance audits.

Position	Role, qualification and experience
	<ul style="list-style-type: none"> • Deep understanding of customs inspection techniques, including NII technologies. • Experience in developing SOPs, institutional frameworks, and training programs. • Familiarity with WCO and WTO guidelines on customs facilitation.
5. Artificial Intelligence and Image Analysis Specialist	<p>Role: Analyze and recommend AI/ML tools for image analysis and comparison and help develop the SOPs/guidelines for use of data.</p> <p>Qualifications and Experience:</p> <ul style="list-style-type: none"> • Master’s degree in Artificial Intelligence, Data Science, or a related field. • A minimum of 5 years of experience in applying AI/ML for image processing and analysis. • Expertise in training and deploying AI models for contraband detection and risk assessment. • Familiarity with digital scan libraries and image comparison tools. • Strong programming skills in Python, TensorFlow, or similar platforms.
6. Procurement and Budgeting Specialist	<p>Role: Develop cost estimates, draft RFPs/BOQs, and support the procurement process.</p> <p>Qualifications and Experience:</p> <ul style="list-style-type: none"> • Bachelor’s/master’s degree in business administration, Supply Chain Management, procurement or Finance. • A minimum of 8 years of experience in procurement, budgeting, and financial planning for large-scale technical projects especially in the public sector. • Knowledge of public procurement regulations and international best practices. • Experience in preparing RFPs/BOQs for ICT and hardware systems. • Strong analytical and documentation skills.
7. Training and Capacity Building Specialist	<p>Role: Design and deliver training programs for RIAC personnel.</p> <p>Qualifications and Experience:</p> <ul style="list-style-type: none"> • Bachelor’s/master’s degree in education, Human Resources, or a related field. • A minimum of 5 years of experience in designing and conducting technical training programs. • Expertise in customs operations, image analysis, and NII systems training. • Experience in creating training manuals, e-learning modules, and on-the-job training

SCANNERS INSTALLED OR TO BE INSTALLED

- 4 x 6 MeV at Torkham
- 4 x 6 MeV at Chaman
- 2 x Mob Scanners and 4 x Pass through Scanners are being installed at 4 x Ports.
- Gantry Type scanners from JICA:
 - One operational at West Wharf and in use by Pakistan Customs.
 - One will be operational at Port Qasim by June 2025.
- Operational scanners at all international airports