Physikalisch-Technische Bundesanstalt
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INTERNATIONAL COOPERATION

External evaluation

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"Establishment of a fit-for-future National Metrology Institute in Ghana"

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Executing agency:	Ghana Standards Authority (GSA)
PTB | Section:	Group 9.3
PTB | Project Coordinator:	Jana Bante
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This evaluation is an independent assessment. Its contents reflect the assessor's opinion which is not necessarily equivalent to PTB's view.

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List of abbreviations

BMZ	Federal Ministry for Economic Cooperation and Development
CD	Capacity Development
cW	capacity WORKS
DC	Development Cooperation
ECOWAS	Economic Community of West African States
FC	Financial Cooperation
GSA	Ghana Standards Authority
GhAS	Ghana Accreditation System
GIZ	German Agency for International Cooperation
KfW	German Development Bank
MoTI	Ministry of Trade and Industry
NMI	National Metrology Institute
NQP	National Quality Policy
OECD-DAC	Organization for Economic Cooperation and Development - Development Assistance Committee
SDG	Sustainable Development Goal
SWOT	Strengths, Weaknesses, Opportunities and Threats
TC	Technical Cooperation

1. Summary

This evaluation has been undertaken to assess the success of the bilateral cooperation project "Establishment of a fit-for-future National Metrology Institute in Ghana", implemented by the National Metrology Institute of Germany (*Physikalisch-Technische Bundesanstalt*, PTB) in cooperation with the Ghana Standards Authority (GSA). The project has been commissioned by the Federal Ministry for Economic Cooperation and Development (*Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung*, BMZ) in the frame project of the Development Programme "Training and sustainable growth for decent jobs in Ghana". The achievement of project objectives has been evaluated in accordance with the standards of the German Association for Evaluation (*Gesellschaft für Evaluation*, DeGEval) with focus on the criteria of the Organization for Economic Cooperation and Development - Development Assistance Committee (OECD-DAC) relevance, coherence, effectiveness, efficiency, higher level development results (impact) and sustainability. The assessment of the capacity WORKS success factors strategy, cooperation, steering structure, processes, and learning & innovation has been integrated in the evaluation of the criterium effectiveness. The evaluation has been conducted to comply with PTB's rule to evaluate projects during its duration to assure accountability towards BMZ and the Ghanaian cooperation partners as well as to contribute towards PTB's institutional learning.

The project with the objective "The National Metrology Institute (NMI) in Ghana provides relevant services to industry, science, and consumer protection" has been implemented over a duration of 4 years (08/2020 - 07/2024) with a budget of 2.000.000 EUR. The cooperation with GSA has been organised in 3 Outputs: (1) Preparation of a needs analysis for metrological services, (2) Strengthening the metrological capacities of the NMI and (3) Development of sustainable financial models and timetables.

The metrology department of GSA is currently acting as NMI according to the Law on Weights and Measures of 1975. Even though the metrological capacities of GSA are already advanced in several areas and several relevant services have been accredited, the available quality infrastructure at national and regional levels is still inadequate to improve the economic framework conditions. The setting-up and extension of the quality infrastructure in Ghana by establishing a sustainable NMI can contribute to increase the competitiveness of Ghanaian and regional industry, to improve the conditions for investment by domestic and foreign companies and to strengthen consumer protection.

The impact logic of the project is based on the hypothesis, that local private sector companies in Ghana as well as companies in the Economic Community of West African States (ECOWAS) region should have better access to metrological services provided by the Ghanaian NMI, which are traceable to national standards and the results are internationally recognised. This recognition is essential for products and services to be accepted at regional and international markets.

The underlying "theory of change" is that as such an essential framework condition to better exploit the development opportunities towards stronger competitiveness and increased trade in the region and beyond its borders is created. This increases the opportunities for more productivity and more positive social and economic impacts for the local population as employment, income and added value.

The virtual evaluation mission has been undertaken to interview all the relevant stakeholders of the project and carefully review the project activities based on their feedback. A set of recommendations, to be used for the appraisal of a planned follow-on project, have been developed based on the lessons learnt and on the feedback on the specific guiding questions.

Assessment according to the OECD DAC criteria

Criterion	Evaluation of the criterion
1. Relevance	1.7
2. Coherence	1.5
3. Effectiveness	2.5
4. Efficiency	2
5. Impact	2.5
6. Sustainability	1.3
Global assessment	**1.9**

☐ Since effectiveness, impact or sustainability were rated "4" or worse, the global assessment is downgraded to "4" although the mean would actually be better than "4".

☒ No downgrading of the global assessment.

Relevance	The intervention was found to be geared very well to Ghanian, BMZ and global policies and priorities, catering to the needs of the beneficiaries with an overall appropriate design and resilience to posed risks. Mark: 1.7
Coherence	The PTB module is very well imbedded in the DC program with relevant synergies to other modules and aligns well with regional PTB projects. Mark: 1.5
Effectiveness	The intervention has only partially achieved its objectives based on the defined indicators. The capacity development measures have been judged very useful to the participants and the capacity Works approaches have been well observed and implemented. Mark: 2.5
Efficiency	The resources have been used reasonably with respect to the outputs delivered (production efficiency) and the objectives achieved (allocation efficiency). Mark: 2
Impact	Although higher-level development changes can only be achieved over long impact chains, the project can contribute indirectly to improve social, economic, and environmental impacts. Mark: 2.5
Sustainability	The existing capacities of GSA on all levels present a sound base for developing them further and the needs-based implementation of the project was suited to strengthen GSA in a sustainable way. Mark: 1.3

2. Introduction

Project title	“Establishment of a fit-for-future National Metrology Institute in Ghana”
Program	“Training and sustainable growth for decent jobs in Ghana”
Project objective	The National Metrology Institute (NMI) of Ghana provides industry, the scientific community, and the consumer protection sector with relevant services.
Political partner	Ministry of Trade and Industry (MoTI)
Implementing partner	Ghana Standards Authority (GSA)
Term	08/2020 - 07/2024 (4 years), cost-neutrally prolonged
Volume	2.000.000 EUR
Evaluation period	08/2020 (start of implementation) - 04/2024

The evaluation has been conducted in accordance with the standards of the German Association for Evaluation (*Gesellschaft für Evaluation*, DeGEval) and focused on the criteria of the Organization for Economic Cooperation and Development - Development Assistance Committee (OECD-DAC) relevance, coherence, effectiveness, efficiency, higher level development results (impact) and sustainability. The assessment of the capacity WORKS success factors strategy, cooperation, steering structure, processes, and learning & innovation has been integrated in the evaluation of the criteria effectiveness. Furthermore, the 5 key principles (1. the evaluation empowers Africans, 2. the evaluation is technically robust, 3. the evaluation is ethically sound, 4. the evaluation is rooted in Africa, yet draws from across the world and 5. the evaluation shows the connectedness of the world, with special attention to where humanity’s footprint calls for new ideas and knowledge for change and transformation) of the “African Evaluation Guidelines” (African Evaluation Association, 2021) have been observed by the evaluation team throughout the evaluation process. In addition, the following specific questions have been assessed:

1. Was the project frame too narrow and could there have been a bigger impact on GSA/ quality infrastructure in the country with a broader perspective (inclusion of different stakeholders within & outside GSA)?
2. How did the difficult situation in the GSA Management influence the project implementation and how can the dependency be decreased?

The objectives of this evaluation are twofold: (1) to comply with the rules of PTB to evaluate projects during its duration to assure accountability towards the Federal Ministry for Economic Cooperation and Development (BMZ) and the Ghanaian cooperation partners and (2) to contribute to PTB's institutional learning.

The evaluation team was composed of the lead assessor Dr. Kerstin Bark, who acted as team leader and was responsible for the evaluation design and implementation in line with the standards, and the technical assessor Ali Gallas, who provided technical and content support. The evaluation team has been supported logistically and content-wise by the project team consisting of the project coordinator (PC) Jana Bante, the project assistance (PA) Lisa Kuehle, the local expert Paul Date as well as the intermittent short-term expert (iKZE) Christina Foerg-Wimmer and the technical expert Carlos Rupp-Binde. The evaluation mission has completely been carried out in a virtual mode, mainly due to the limited number of interviewees. In a first round of interviews, the project outcomes and results have been discussed first with the complete project team and then again with all team members individually.

The interviews/ discussions with partners and other relevant stakeholders have been organised by the project team (see Annex 1 - Mission schedule) and carried out based on specific guiding questions (see Annex 2 - Guiding questions). The evaluation findings have been presented to and discussed with partners and other stakeholders in the frame of a validation workshop on April 19th, 2024 (s. Annex 3 - Presentation of preliminary findings).

3. Framework conditions and strategic approach of the project

3.1. Framework conditions

Situation in the intervention area: The Economist Intelligence Unit expects the continuation of the ambitious industrialisation programme in Ghana (country report 2022). In addition to gas and oil extraction, cocoa production and gold mining, the construction industry, agriculture, and the production of consumer goods are other growth sectors. However, the high-technology raw materials sector only creates few new jobs, and economic output in labour-intensive sectors such as agriculture and manufacturing has been stagnating at a low level for years. High inflation and national debt, bureaucratic hurdles and the lack of well-trained workers are worsening the investment climate.

Situation in the sector: The setting-up and extension of quality infrastructure services can contribute to increase the competitiveness of Ghanaian industry, to improve the conditions for investment by domestic and foreign companies and to strengthen consumer protection. Even though the metrological capacities of GSA are already advanced in several areas and several relevant services have been accredited, the available quality infrastructure at national and regional levels is still inadequate to improve the economic framework conditions. Ghana is a signatory to the International Committee of Weights and Measures Mutual Recognition Agreement (CIPM-MRA). In addition, GSA has received an entry for recognized Calibration and Measurement Capabilities (CMC) in the field of temperature in the international database of the Metre Convention. The setting-up and extension of the quality infrastructure in Ghana by establishing a sustainable NMI can contribute to increase the competitiveness of Ghanaian and regional industry, to improve the conditions for investment by domestic and foreign companies and to strengthen consumer protection.

Changes during project implementation: The problems and potentials of the Ghanaian private sector have changed due to the current global situation (COVID-19 pandemic, ongoing war in Ukraine, supply chain problems, shortage of raw materials and inflation). The disruption and change in global supply chains have led to a steep increase in logistics costs in Ghana, and both imports and exports have become more expensive. The annual inflation rate measured by the consumer price index was 42.5 % in June 2023. The West African country is trying to overcome the worst economic crisis in a generation. As a result, this is leading to considerable difficulties and, in some cases, existential problems for the Ghanaian private sector. As a result of the COVID-19 pandemic, the Ghanaian government has developed a special Corona Alleviation and Revitalisation of Enterprises Support Programme (2021 - 2023) to revitalise the economy. The current "Revitalisation and Transformation of the Economy" phase includes several initiatives in key industries such as commercial agriculture, pharmaceuticals, textiles, and construction. However, a coordinated approach by the respective ministries, including the Ministry of Food and Agriculture and the Ministry of Trade and their flagship programmes "Planting for Jobs and Food" and "One District One Factory", is required to create the necessary framework conditions for businesses and investments. The above-mentioned approaches to private sector promotion are well complemented by the provision of metrological and quality infrastructure services, which are being developed as part of the module. They could contribute to

increase product and service quality and as such the competitiveness of companies on local, regional and international markets. The relevance of the module and the entire program can therefore still be considered high.

Although there were important developments at the legislative level, as the adoption of the Ghana Standards Authority Bill (2022) by the Ghanaian Parliament and the adoption of the National Quality Policy (NQP) by the Cabinet also in 2022, the needed quality infrastructure at national and regional level is not available to the necessary extent. Precise measurements are an essential part of industrial quality assurance. In the context of globalization of the economy and services, international comparability of measurement results is increasingly required. For metrological practice and traceability to national standards, most industrial countries have a metrological infrastructure with a National Metrology Institute. The metrology department of GSA is currently acting as NMI according to the Law on Weights and Measures of 1975. So far, GSA provides metrological services at the level of its calibration (secondary) laboratories or has a few national standards whose measuring ranges (e. g. in temperature) are too small to cover the growing requirements of industry, science, and consumer protection. The GSA laboratories are not sufficiently developed to fulfil the tasks of a modern NMI, which is oriented towards the needs of national and regional industry, research, and consumer protection.

3.2. Strategic approach of the intervention

The **strategic approach** is based on a combination of system-related and technical advisory and capacity development measures, which have been delivered in the frame of 3 outputs with the following objectives:

Output 1 “A needs analysis for metrological services has been prepared” aims to detect the relevant needs for metrological services in the country. The impact hypothesis states that relevant services can be offered by the NMI via a demand-oriented development of national standards and the traceability of the measurement results.

Output 2 “The metrological capacities of the NMI have been strengthened”. This means that new metrological services to be offered at NMI level will be traceable to national standards and the results will be internationally recognised. The impact hypothesis states that Ghanaian and regional companies will get a better access to internationally recognised metrological services via the NMI and improve the investment climate.

Output 3 “Sustainable financial models and timetables form the basis for the NMI's long-term development strategy”. A business plan will be developed with possible scenarios for financing investments as well as operation and maintenance costs and the required time frame for NMI development. The impact hypothesis states that the implementation of a sound and realistic business plan will enable a sustainable development of relevant services by the NMI.

The **impact logic** of the project is based on the hypothesis, that local private sector companies in Ghana as well as companies in the Economic Community of West African States (ECOWAS) region should have better access to metrological services provided by the Ghanaian NMI, which are traceable to national standards and the results are internationally recognised. This recognition is essential for products and services to be accepted at regional and international markets. The underlying “**theory of change**” is that as such an essential framework condition to better exploit the development opportunities towards stronger competitiveness and increased trade in the region and beyond its borders is created. This increases the opportunities for more productivity and more positive social and economic impacts for the local population (as employment, income, added value). In

addition, the share in high-quality products on the market increases and the consumer protection will be improved.

The underlying **capacity development strategy** has been developed based on a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of the partner system and the needs assessment (s. Output 1), focusing on the development of individual competence, organisation, cooperation systems and enabling frameworks. Main objective was to strengthen the implementation partner GSA via targeted training measures, study tours, temporary delegations/ secondments to other NMIs and other exchange formats as the participation in international conferences, limited laboratory equipment, etc. to increase the pool of qualified personnel for industrial, scientific, and legal metrology. A *"Wirkungsmodell"* (capacity WORKS tool 07) hasn't been established by the project. An impact logic has been worked out during the project appraisal and attached to the module proposal submitted to BMZ, see Annex 4 - Impact logic.

4. Evaluation methodology

4.1. Evaluation design

The evaluation design considered the triangulation of data and methods. Information and data on the project implementation and results have been collected and assessed as follows:

(1) Review and analysis of project-related documents, as e.g. project proposal with annexes to BMZ, SWOT analysis, stakeholder map, operational plan with financial monitoring, Technical Cooperation (TC) project and Development Cooperation (DC) program progress reports, expert reports, partner documents, as policies, strategies, studies, sector analysis etc. The information in these documents has been assessed with respect to consistency and cross-checked in discussions with the project team, partners, and external experts.

(2) Structured interviews have been carried out with partners and stakeholders on their perception of the project implementation, results and challenges encountered as well as potential future opportunities. The interviews were based on specific individually adapted guiding questions on the OECD-DAC criteria, including the capacity WORKS (cW) success factors and the specific questions:

- Was the project frame too narrow and could there have been a bigger impact on GSA/ quality infrastructure in the country with a broader perspective (inclusion of different stakeholders within & outside GSA)?
- How did the difficult situation in the GSA Management influence the project implementation and how can the dependency be decreased?

(see Annex 2 - Guiding questions).

The outcomes have been documented in the form of a "Zero draft" and analysed towards consistency and lessons learned. Due to the limited number of interviewees in Ghana, the evaluation mission has been carried out in a virtual mode. The lack of physical/ on-site visits especially to the partner laboratories was addressed by obtaining and assessing photos and videos of the GSA locations, in particular the laboratories in Accra.

(3) The preliminary findings have then been discussed and crosschecked first with the project team and then with partners and stakeholders in a validation workshop on April 19th, 2024 (see Annex 3 - Presentation preliminary findings).

A **strength** of this approach is the as such achievable triangulation of methods and data sources. The main **weakness** of the evaluation design is the enormous number of dimensions (18) and questions linked (54) in addition to the 2 specific evaluation questions, which are difficult to impossible to be covered fully during the data collection phase. This sheer number of aspects, which also often overlap, made it difficult to maintain focus and get to the heart of the project. Therefore, the focus was on treating relevant questions for the specific project, leaving some out with reason and summarising others where appropriate as well as answering them in one sentence.

4.2. Data sources; data quality

The evaluators had access to all relevant documents requested, which have been shared via PTBbox. Additional data and information have been provided by partners and project team anytime on request during the mission, so that the evaluators felt fully and comprehensively informed.

The basic documents - appraisal report, project proposal with annexes, implementation agreement, country-specific information (BMZ), project and DC program progress report, selected expert reports, are of good quality with respect to their content and significance. The capacity WORKS documents (stakeholder map, steering structure, and processes) have only been established once at the project start and not updated. The capacity development strategy was not explicitly worked out at the beginning of the project but developed step-by-step during the needs assessment (Output 1). Instead of a result-based monitoring instrument as per PTB format, the basic tool “Stackfield Operational Planning” was used, which represents mainly a list of tasks with responsibilities assigned and status but doesn’t cover needed monitoring & evaluation aspects (as e. g. achievements of objectives, measured by indicators and milestones). It is complemented by yearly updated operational workplans and lists of personnel, procurements, and trainings as well as the financial monitoring sheet. Although, room for improvement could be stated, using one working document as the PTB format results-based monitoring system to have all relevant information in one place.

5. Evaluation results

5.1 Status of the transformation process (OECD/DAC)

Marking scale for the evaluation of the OECD/DAC criteria

Evaluation	Grade	Description
very successful	1	very good result, far above expectations
successful	2	good result, entirely meets expectations
successful to a limited extent	3	satisfactory; results are below expectations, but mainly positive
rather unsuccessful	4	unsatisfactory result; below expectations; negative results prevail despite several positive results
mainly unsuccessful	5	negative results clearly prevail despite several positive partial results
entirely unsuccessful	6	the project has failed completely; situation has rather deteriorated

5.1.1 Relevance

Dimension 1: Is the intervention's design geared to country-specific, regional, and global policies and priorities of the partners and the BMZ?

Facts/ situation: The following relevant policies and strategies have been identified as per project proposal and project documents: (1) Country (Ghana) level: National Quality Policy, NQP (2022), Ghana Standards and Authority Bill (2022) and National Agenda 2030 (2017-2024), (2) German Cooperation/ BMZ level: Concept "BMZ 2030" for private sector promotion, G20 Initiative "Compact with Africa", German Aid-for-Trade strategy and German Chapeau-Paper to the Joint Programming Strategy for Ghana and (3) Global (Agenda 2030) level: Sustainable Development Goal (SDG) 8 "Decent work and economic growth", SDG 9 "Industry, innovation and infrastructure and SDG 17 "Partnerships for the goals".

Analysis: (1) Country level: The intervention contributes to achieving the NQP's objective to enable a at least partially government-subsidised NMI to play a key role in the economy. Furthermore, the intervention contributes indirectly to the intended safeguard of the already established quality infrastructure in Ghana and its expansion and to improve as such the quality and safety of products, which supports the achievement of the objectives of the National Agenda 2030. (2) BMZ level: The project contributes to provide Ghanaian companies and industry with improved calibration services, enabling them to better comply with international standards, to improve the quality and safety of products and services and such to increase their international competitiveness. (3) Global level: The project contributes over the improvement of quality infrastructure services for companies and industry indirectly to better work conditions, economic growth, innovation, and infrastructure in the spirit of "partnerships for the goals".

Conclusion and assessment: The intervention is very well aligned with Ghanaian, BMZ and global strategies/ priorities and is evaluated as very successful (1).

Dimension 2: Is the intervention's design geared to the needs and capacities of the target groups?

Facts/ situation: As conceived in the project proposal and project documents, target groups are Ghanaian and West African companies of different production/ industry sectors as well as (indirectly) consumers of local and regional products. Intermediaries and implementing partners are the management and technical staff of GSA.

Analysis: The customers (companies) of different production/ industry sectors, identified in the needs assessment, will have access to better calibration services for mass and temperature. This contributes to improve quality, safety, and competitiveness of their products also (indirectly) for the sake of the consumers of those products.

Conclusion and assessment: As there is a limited relevance for the final target group (companies and consumers), but a high relevance for the intermediaries (implementing partners) this dimension is evaluated as successful (2).

Dimension 3: Is the intervention's design appropriately, realistically, and plausibly geared towards achieving the intervention's objective?

Facts/ situation: As per project proposal, the intervention was designed in three outputs: (1) Preparation of a needs assessment for metrological services, (2) Strengthening the metrological capacities of the NMI/ GSA and (3) Development of sustainable financial models and timetables as a basis for the NMI's long-term development strategy.

Analysis: (1) The needs assessment was a crucial prerequisite/ needed base for developing appropriate and well-targeted calibration services, (2) Strengthening the metrological capacities and competences of GSA is contributing to qualify it for a "fit-for-future" NMI and (3) A sustainable financial strategy is an indispensable pre-condition for transforming GSA to a "fit-for-future" NMI.

Conclusion and assessment: The design of the intervention is considered appropriate and realistic to achieve the objective and evaluated successful (2).

Dimension 4: Has the intervention's design responded to changes in the environment and adapted to the needs?

Facts/ situation: A nearly one-year vacuum in the GSA management have occurred in 2022/ 2023 with an acting Director General, who hasn't been in the position to take decisions for implementing project activities, as e. g. on investment needed for the construction of a mass laboratory, needed for hosting the procured mass equipment. The most important change in the environment was the COVID-19 pandemic, which led to a near standstill of 'on the ground' activities since spring 2020 (no more international expert visits, no more physical/ on-the-job trainings possible).

Analysis: The project could not have any influence on the management vacuum but could deal well with the COVID pandemic caused situation by completely shifting activities, as trainings, communication, and networking to a virtual/ remote mode. The needs assessment could be carried out mainly over physical meetings with enumerators and partially in a virtual mode.

Conclusion and assessment: The project design has been adapted to the most important change in the environment and is evaluated as successful (2).

Summarized evaluation

Criterion	Evaluation dimension	Weighting	Appraisal
Relevance	The intervention's design is geared to country-specific, regional, and global policies and priorities of the partners and the BMZ.	25 %	1
	The intervention's design is geared towards the needs and capacities of the target groups	25 %	2
	The intervention's design is realistically and plausibly geared towards achieving the intervention's objective	25 %	2
	The intervention's design has responded to changes in the environment and adapted to the needs.	25 %	2
Global assessment of the relevance			**1.7**

5.1.2 Coherence

Dimension 1 "Internal coherence": Is the intervention designed and implemented within the German development cooperation in a complementary manner, based on the division of tasks?

Facts/ situation: As per program proposal (2021) and project progress reports, the TC project (PTB) is part of the German DC program "Training and sustainable growth for decent jobs in Ghana". Synergies and complementary within the program consist mainly with two TC modules, implemented by the German Agency for International Cooperation GIZ (1) "Sustainable employment through AgriBusiness (AgriBiz)" (PN 2020.2239.0) and (2) African Continental Free Trade Area (PN 2020.2208.5).

The PTB project contributes to the program indicators 1 (5 of the 10 Doing Business dimensions improve cumulatively by at least 3 score) and 3 (114,000 people (30% of whom are women) have completed a training or qualification programme funded by German DC).

Analysis: An effective communication, coordination and cooperation within the DC program is ensured over regular exchange meetings of the German Development Bank KfW, GIZ and PTB on the progress in implementation as well as on coordination and cooperation, the use of a common DC reporting system (Excel based) comprising an indicators definition sheet, regular exchange meetings also within the cluster to understand the portfolio and the different interventions and to identify synergies and the participation in the private sector working group (other projects/ donors, Ghanaian government, etc.).

The main - although very indirect - contributions to achieving the program indicators are realised via the intended provision of improved quality infrastructure services with the needed trainings. These will contribute to an ensured quality and safety of industrial products, enhancing competitiveness of the private companies, including the agriculture/ food sector.

Conclusion and assessment: The PTB module is very well imbedded in the DC program with relevant synergies to other modules and a regular exchange assured in the frame of the DC program. This dimension is therefore evaluated very successful (1).

Dimension 2 "External coherence": Does the intervention's design and implementation complement the partner's own efforts and are coordinated with other donors' activities?

Facts/ situation: As per project proposal and project documents, the main synergies consist with the following regional PTB projects: (1) ECOWAS-PTB Metrology Program (2019-2022), aiming at making the sub-regional metrology system more efficient in its next phase, which started in 2023, (2) PTB Pan-Africa program "Quality Infrastructure Upgrade for Africa" with the objective to promote free trade agreements and (3) PTB project "Alliance for product quality in Africa" for enhancing product quality in eight African countries, including Ghana, with focus on the agriculture sector.

Analysis: (1) As GSA is the most advanced NMI in the ECOWAS region it is also a key player in the regional PTB project. In its role, taking over a leading and steering role in the technical committees and working groups, it is supported by the Ghanaian project. (2) GSA with its very good reputation all over Africa plays a key role in providing quality infrastructure services for free trade agreements, in which it is strengthened further by the national project. (3) Close coordination with the regional and the national project is assured by a common project management, including e. g. that the Ghana project takes over trainings which could not be covered by the regional project.

Conclusion and assessment: The national project aligns well with the other regional PTB projects and is evaluated as successful (2).

Summarized evaluation

Criterion	Evaluation dimension	Weighting	Appraisal
Coherence	Internal coherence: Within German development cooperation, the intervention was designed and implemented in a complementary manner, based on the division of tasks.	50 %	1
	External coherence: The intervention's design and implementation complement the partner's own efforts and are coordinated with other donors' activities.	50 %	2
Global assessment of the coherence			**1.5**

5.1.3 Effectiveness

Dimension 1: Has the intervention achieved its objective (at outcome level) according to the indicators agreed upon?

Facts/ situation: Drawing from the project objectives and indicators as per result matrix, the project was conceptualised by the definition of 3 indicators on outcome level and 6 indicators on output level to measure the achievement of the project objectives.

Analysis: After a careful review of the relevant project documents (project proposal, expert reports, meeting minutes, lab assessments etc.) and multi-level discussions with the involved project team and partners, it has been assessed that at outcome level 1 indicator has been achieved, 1 indicator partially, and 1 indicator not achieved (detailed in the table below). At output level: 5 indicators have been achieved or will probably be achieved within the project duration and 1 has not been achieved (see Annex 3 - Presentation preliminary findings).

Conclusion and assessment: The project has partially achieved its objectives, measured by the indicators at outcome and output levels and is evaluated as successful to a limited extent (3).

Outcome indicator	**Degree of fulfilment (in %)**	**Appraisal (A-C)***	**Justification**
1. Based on a needs assessment, GSA has extended the range of existing national measurement for legal, industrial, and scientific metrology, and provided measurement standards where such were lacking. *Target value 2024*: 2 (up to 3 were planned, fixed at 2 after completion of the needs analysis)	0 %	B (the measurement standards/ calibration services targeted must be specified and numbered to make this indicator SMART)	For achieving this indicator, equipment must be procured, and GSA staff trained in operating this. The procurement for mass and temperature lab equipment is still under way, leading to the fact that the GSA calibration services could not be extended yet: indicator not achieved.
2. Industry, the science community, and the consumer protection sector are increasingly using the NMI's metrological services. *Target value 2024*: Annual increase in the number of metrological services used by 5 %	100 %	B (the metrological services targeted, and the intended increase must be specified and numbered to make this indicator SMART)	Calibration certificates for thermometers issued have increased by 23.6 % in 2022 and 13 % in 2023. As part of the increase is due to thermometer calibrations requested for the elections under COVID conditions, the success cannot be fully allocated to the PTB project activities.

Outcome indicator	Degree of fulfilment (in %)	Appraisal (A-C)*	Justification
3. The GSA Governance Board has approved the funds needed to further develop the NMI. *Target value 2024*: 1	75 %	B (the needed funds must be specified further to make this indicator SMART)	The amount of funds needed will be finally proposed as part of the draft business plan, which will be submitted to the GSA Governance Board only end of April. The board can only then decide on the approval of the funds: achievement until the end of the project possible but not guaranteed.

*: Appraisal: A = adequate indicator; B = slight objections; C = poor indicator, to be revised if applicable

Dimension 2: Have the intervention's activities, inputs and outputs considerably contributed to achieving the intervention's objective (at outcome level)?

Facts/ situation: As per operational plan, the following activities, inputs, and outputs have been executed/ delivered: (1) 7 participants (whereof one woman) have been trained in facilitation skills, moderation management of development projects, (2) 22 participants (whereof 4 women) have been trained in metrology, mass and temperature, (3) 4 GSA co-workers (whereof one woman) have been seconded to NMI's and calibration labs (Germany, Slovenia and South Africa), (4) 6 GSA management staff have participated in a study tour to Germany and (5) 16 GSA co-workers (whereof 2 women) have participated in international conferences. For more details, see list of "Training and further education programs/ measures carried out" in the Annex 3 - Presentation of preliminary findings.

Analysis: As per feedback from partners and stakeholders, the activities implemented, have contributed to achieving the intervention's objective by, as follows: (1) These trainings on facilitation have been judged very useful by the participants enabling them to take over a more active role within GSA and the PTB interventions, (2) The technical trainings have been judged very useful by the participants strengthening their capacities needed for making GSA "fit-for-future", (3) The secondments have been judged very useful by the participants improving their knowledge of internationally recognised procedures in calibration labs, (4) The study tours helped to increase the understanding of the German quality infrastructure system and what could be applied in Ghana and (5) The participation in international conferences have been very beneficiary for the exchange of knowledge and experience as well as networking.

Conclusion and assessment: Although part of the capacity development measures could only be implemented virtually (due to the COVID pandemic), they have been very useful to the participants and are evaluated successful (2).

Dimension 3: Has the quality of the intervention's implementation considerably contributed to achieving the intervention's objective (at outcome level), based on the capacity WORKS (cW) success factors?

Facts/ situation: The cW instruments "Process landscape" (cW tool 25), "Stakeholder map" (cW tool 09), and "SWOT analysis" (cW tool 04), have been established at the begin of the project and documented mainly in German, but never reviewed/ updated. No explicit "Capacity Development (CD) strategy" as per cW tool 08 has been worked out, as it was intended to develop such as strategy based on a needs assessment foreseen at the begin of the project (see below). For operational planning, the "Stackfield tool" was used, which is limited to monitor activities ("to do"), status, responsibilities, and due date. No results model has been developed, only an impact logic as per module proposal is available (see Annex 4 - Impact logic). The result-based monitoring was limited to the regular update of an excel sheet with activities, tasks, milestones, responsible, due date, and status (no use of the PTB matrix for result-based monitoring).

Analysis "Strategy": The project strategy of strengthening GSA to become a "metrology champion" in the region has been developed together with the partners in the appraisal mission and discussed further in the process of the participatory establishment of the operational plan. As base for the development of a well-targeted CD strategy for GSA, a needs assessment on quality infrastructure services requested by different industrial sectors, research and scientific institutions etc. was carried out. On this base CD needs on priority calibration services (temperature and mass) have been identified and the according trainings, study tours, participation in international conferences, organisational development measures and procurements planned. The contribution of these CD measures to achieving the project's objective have been regularly reviewed and adapted if needed in a participatory process during updating the operational plan.

Analysis "Cooperation": Two weekly working group meetings are used to refine the needed contributions of the different actors (mainly GSA staff) in a participatory process, which are regularly reviewed and adapted (if needed) during the participatory operational planning process. As such it could be ensured that the partners know their respective roles and responsibilities in the project implementation. Communication and cooperation between PTB, partners and relevant actors have been ensured over yearly steering committee meetings and the GSA website as well as further supported by the project manager assigned by GSA and the PTB local consultant, who took both care of ensuring smooth communication and cooperation.

Analysis "Steering Structure": All relevant actors are addressed via the yearly Steering Committee meetings, in which they could exchange, network, coordinate and cooperate. As such strategic discussions have been facilitated providing impulses for the successful project implementation and the achievement of objectives on module and output level as measured by the indicators.

Analysis "Processes": In the original process map internal cooperation, learning, supporting, and steering processes have been clearly defined in a participatory process together with the partners, but "external" processes that occur independently of the project haven't been considered. Cooperation partners from other projects, as the two GIZ modules of the DC program and the three regional PTB projects contribute to realising synergies and improving the overall performance (see criterion internal and external coherence).

Analysis "Learning & Innovation": The project promotes the introduction of two new high-level calibration services (temperature and mass) at GSA by providing the needed equipment and the needed training for its proper operation. The project supports as such the further development of GSA into a "fit-for-future" NMI, which could play then an even more important role in the ECOWAS region and the whole of Africa. Learning experiences are regularly shared over the GSA website, the

publishing of PTB Candela articles and the participation in international conferences as well as the organisation of world metrology days in Ghana.

For more details, see the cW self-assessment in Annex 5.

Conclusion and assessment: Although the capacity Works tools/ instruments haven't been applied/ updated one to one as per guideline, the success factors strategy, cooperation, steering structure, processes, and learning & evaluation have been well observed and implemented and as such contributed to achieving the project's objective. This dimension is evaluated successful (2).

Dimension 4: Has the intervention leveraged potentials of unintended positive results and reacted to risks and/or the occurrence of (unintended) negative results?

A **potential leveraged** was the development of additional parameters: GSA took the opportunity to develop/ improve other parameters, such as humidity and volume, in parallel to mass and temperature (analysis).

A **risk occurred** was the about one-year vacuum in the GSA management with only an acting Director General: This vacuum delayed decision-making for implementing project activities, in particular on investments (see criterion relevance, dimension 4).

Conclusion and assessment: A potential leveraged but a risk not contained. This dimension is evaluated as successful to a limited extent (3).

Summarized evaluation

Criterion	Evaluation dimension	Weighting	Appraisal
Effectiveness	The intervention has achieved its objective (at outcome level) according to the indicators agreed upon.	25 %	3
	The intervention's activities, inputs and outputs have considerably contributed to achieving the project's objective (at outcome level).	25 %	2
	The quality of the intervention's implementation has considerably contributed to achieving the intervention's objective (at outcome level).	25 %	2
	The intervention has leveraged potentials of unintended positive results and reacted to risks and/or the occurrence of (unintended) negative results.	25 %	3
Global assessment of the effectiveness			**2.5**

5.1.4 Efficiency

Dimension 1: Is the use of resources by the intervention deemed reasonable with regard to the outputs achieved (production efficiency)?

Facts/ situation: As per module proposal, operational plan, and financial monitoring the project has been implemented by a small project team, consisting of international part-time staff (one project coordinator, one project assistant, one metrologist, and one intermitted short-term expert) and one national part-time expert. For specific services and assistance qualified consultancy companies (needs assessment) and technical experts (trainings, technical assistance etc.) have been implied. One project manager for coordination was provided by GSA at no cost. Mainly due to the COVID pandemic, the use of virtual formats for trainings and technical consultancy has been widely applied.

Analysis: A small project team is contributing to cost-efficiency in the delivery of outputs and products. A cost-efficient use of consultancy companies and technical experts is guaranteed by identifying them over tender procedures in a competitive way. The provision of a project manager by GSA was an important cost-efficient partner contribution. Virtual formats are less costly than physical trainings and site visits, although often less effective

Conclusion and assessment: The resources are used reasonably with respect to the outputs delivered. This dimension is evaluated as successful (2).

Dimension 2: Is the use of resources by the intervention deemed reasonable regarding the achievement of the intervention's objective/outcome (allocation efficiency)?

Facts/ situation: The procurement of equipment for the new calibration services was defined on the base of technical specifications and worked out in a participatory way with GSA based on a needs assessment. Partner contributions were the release of GSA staff to coordinate and implement the project, to support awareness-raising and informative meetings as well as to participate in workshops, seminars, study visits, secondments, and training events as well as the provision of adequate premises and logistical support for events and training. Furthermore, important counter funds for the construction of a mass laboratory and the refurbishment of the temperature laboratory (about 150.000 €) have been provided. All relevant partners and stakeholders have been included in the steering of the project as members of the steering committee.

Analysis: The equipment under procurement is specifically needed and well targeted, which is contributing to cost efficiency and avoiding procurement of over-dimensioned or unnecessary equipment. The partner contributions provided of about 350.000 € (estimated), which is about 17 % of the total project budget, are important. Participatory steering and coordination contribute to the achievement of objectives in a cost-efficient way.

Conclusion and assessment: The use of resources is assessed reasonable with respect to objectives achieved. This dimension is evaluated as successful (2).

Summarized evaluation

Criterion	Evaluation dimension	Weighting	Appraisal
Efficiency	The use of resources by the intervention is deemed reasonable with regard to the outputs achieved (production efficiency).	50 %	2

	The use of resources by the intervention is deemed reasonable with regard to the achievement of the objective/outcome (allocation efficiency).	50 %	2
Global assessment of the efficiency			**2**

5.1.5 Higher-level development results

Dimension 1: Have the intended higher-level development changes taken place or are expected to take place in the near future?

Facts/ situation: The intended **economic and social impacts** as per module proposal have been to strengthen productivity and competitiveness of local and regional enterprises though improved metrological skills, to have a positive influence on trade development in Ghana, in the region and beyond, to support sustainable and large-scale economic development in the ECOWAS region, leading finally to benefits for workers in Ghana and in the region from additional income and employment opportunities (important factor for reducing poverty).

The intended **environmental impacts** as per module proposal have been to improve environmental protection by a more economical use and handling of energy and raw materials achieved by introducing quality management systems and calibrated equipment and to contain environmental risks and to reduce health risks for workers by using the improved measurement capability for legally regulated areas, e.g. acoustics, air, and water quality, as well as waste management.

Analysis: The provision of better calibration services by GSA can indirectly help local and regional companies to improve their product quality and to become more competitive. This could also have a positive influence on trade development in Ghana, the region and beyond and as such support a sustainable and large-scale economic development in the ECOWAS region, with benefits for workers (jobs and income) linked to it.

The provision and use of better calibration services can contribute to a more economical use and handling of energy and raw materials and such indirectly to an improved environmental protection. The provision and use of better calibration services for legally regulated areas, e.g. acoustics, air, and water quality, as well as waste management, can contribute indirectly to the containment of health risks for workers.

Conclusion and assessment: Although the positive social, economic, and environmental impacts can only be achieved over long impact chains, the provision and use of calibration services is one prerequisite. This dimension is evaluated successful (2).

Dimension 2: Have the results achieved by the intervention (at outcome level) contributed to the intended or implemented higher-level changes?

Facts/ situation: As per module proposal a contribution to achieving the SDGs 8 (“Decent work and economic growth”), 9 (“Industry, innovation and infrastructure”) and 17 (“Partnerships for the goals”) has been intended.

Analysis: The project contributes indirectly over the improvement of quality infrastructure services for companies and industry to better work conditions, economic growth, innovation, and infrastructure in the spirit of partnerships for the goals.

Conclusion and assessment: A very specific TC project of such a limited scale can only very indirectly contribute to the achievement of higher-level development changes. This dimension is evaluated as successful to a limited extent (3).

Dimension 3: Has the intervention contributed to positive and not to negative unintended higher-level development changes?

No positive or negative unintended higher-level development changes have been observed during the evaluation process nor mentioned by the interview partners. No explicit monitoring of these higher-level development changes was available. This dimension is therefore evaluated successful (2).

Summarized evaluation

Criterion	Evaluation dimension	Weighting	Appraisal
Higher-level development results	The intended higher-level development results have taken place or are expected to take place.	25 %	2
	The results achieved by the intervention (at outcome level) have contributed to the intended or implemented higher-level results.	50 %	3
	The intervention has contributed to positive and not to negative unintended higher-level development changes.	25 %	2
Total assessment of the higher-level development results			**2.5**

5.1.6 Sustainability

Dimension 1: Have the partners, target groups and organizations involved the capacities required to ensure that positive results are continued?

Facts/ situation:

Individual competences: GSA provides of a sound basis of technical staff/ metrology experts who are already experienced and highly motivated to deepen their metrology knowledge further and to extend their competences to new quality infrastructure service.

Organisational development: A temperature laboratory is under refurbishment and the construction of a E2 mass laboratory is under preparation.

Strengthening of the system: GSA is already playing a leading role in metrology in the region and is willing to develop further via coordination and cooperation with international NMI's.

Analysis: The implementation of specific trainings, secondments to other NMI's, study tours, participation in international conferences, etc. is appropriate to strengthen the individual competences of GSA staff further in a sustainable way. The prerequisites for the delivery of new calibration services are given within GSA, which will be as such strengthened further in its role of a "fit-for-future" NMI (organisation) in a sustainable way. The knowledge and experience exchange as well as international networking organised, is suited to strengthen GSA in performing its leading role for metrology in the region (system) in a sustainable way.

Conclusion and assessment: The existing capacities of GSA on all levels present a sound base for developing them further in a sustainable way and are evaluated as very successful (1).

Dimension 2: Has the intervention considerably contributed to the capacity of partners, target groups and other organizations involved to continue the positive results?

Facts/ situation:

Individual competences: An assessment of specific capacity and knowledge gaps of GSA staff has been carried out in the frame of the needs assessment for new calibration services (mass and temperature).

Organisational development: The procurement of equipment for new calibration services (temperature and mass) is underway.

The **system** is further strengthened by continuing the long-term relationship and good cooperation of GSA and PTB, the participation in international conferences, network meetings, etc., the organisation of metrology days and the publication of newsletters or similar.

Analysis: The capacity development needs of GSA staff (individual competences) have been well addressed via trainings, secondments to other NMI's, study tours, participation in international conferences, procurement of needed equipment etc. and as such sustainably anchored in the institution (GSA has low personnel/ staff changes). The new equipment, accompanied by training of staff for its operation and maintenance is strengthening GSA in its role of a "fit-for-future" NMI, (organisation) contributing to the competent and sustainable delivery of calibration services. Via regular knowledge and experience exchange as well as international networking, GSA is strengthened in performing a leading role for metrology/ becoming a "metrology champion" in the region (system).

Conclusion and assessment: The participatory and needs-based implementation of the project is suited to strengthen GSA in a sustainable way. This dimension is evaluated as very successful (1).

Dimension 3: Are the results of the intervention durable?

Facts/ situation: As per module proposal the following **main risks** have been identified: (a) Change of government and/or change of GSA management, (b) Insufficient human resources of MoTI and GSA, including skilled personnel to build the standards, (c) Lack of government funds for the setting-up of a national metrology institute, (d) Staff changes (e.g. migration of skilled workers) and scarcity of resources at the partner institutions and (e) Detrimental environmental impacts due to the relevant industrial sectors (chemicals, waste, noise) and impacts on health.

As per module proposal the following **potentials** have been identified: (a) Strengthening of metrological capacities in Ghana can contribute to economic improvements, as increased competitiveness, strengthening of export potential, etc., (b) GSA can increasingly support other NMIs

in Africa and the region as a mentor, (c) Synergies with other German and international development partners in the economic development sector in Ghana and the region can be realised.

Analysis risks: (a) Due to political reasons, a nearly one-year long vacuum in GSA management could be observed, leading to considerable delays in decision making and as such in project implementation, (b) human resources in GSA are sufficient, (c) the government is providing funds for investments (construction of a mass lab) and subsidies for the service delivery of GSA a per NQP, (d) GSA provides of a stable staff structure and (e) no increase in detrimental environmental and health impacts through project implementation observed during the evaluation process.

Potentials are still valid and used by the project.

Conclusion and assessment: The strengthening of the organisational and technical metrological capacities of the Ghanaian NMI is contributing to anchor these sustainably in the institution and the Ghanaian system. This dimension is evaluated successful (2).

Summarized evaluation

Criterion	Evaluation dimension	Weighting	Appraisal
Sustainability	The partners, target groups and organizations involved have the capacities required to ensure that positive results are continued.	33.33 %	1
	The intervention has considerably contributed to the capacity of partners, target groups and other organizations involved to continue the positive results.	33.33 %	1
	The results of the intervention are durable.	33.33 %	2
Total assessment of the sustainability			**1.3**

5.1.7 Summary of the intervention's contributions to the 2030 Agenda for Sustainable Development

This section describes the intervention's contribution to the implementation of the principles of the global 2030 Agenda for Sustainable Development. This is not a repeated assessment, but merely the summarized consideration of the contributions to the 2030 Agenda based on the assessment of the OECD-DAC criteria. Drawing on the evaluation questions for each of the evaluation criteria, the summary makes the connection between the various findings and provides a synopsis of the intervention's overarching contributions to the 2030 Agenda.

Universality, shared responsibility, and accountability

The contribution of the project to the achievement of the SDGs 8 "Decent work and economic growth", 9 "Industry, innovation and infrastructure" and 17 "Partnerships for the goals" of the global "Agenda

2030" is rather indirect. The supported improvement of quality infrastructure services for companies and industry is a prerequisite for ensuring the competitiveness of Ghanaian companies, economic growth in the region, innovation, infrastructure, and better work conditions by keeping the spirit of "partnerships for the goals". However, a TC project of limited scale can't directly and measurably contribute to the implementation of higher-level development changes (see impact criterion).

The PTB project is part of the German DC program "Training and sustainable growth for decent jobs in Ghana" and ensures close coordination and cooperation with other TC and FC modules in the program over regular exchange meetings on the progress in implementation and the use of a common DC reporting system. Synergies are realised via the provision of improved quality infrastructure/ calibration services by GSA (implementing partner), which contribute to a better quality and safety of industrial products, enhancing competitiveness of the target group private companies of different industrial sectors (s. internal coherence criterion).

GSA being the most advanced NMI in the ECOWAS region and having a very good reputation all over Africa is also supported in the frame of regional PTB projects in its role as a key player for providing quality infrastructure services e. g. for free trade agreements (s. external coherence criterion).

Interplay of economic, environmental, and social development

A strengthened at least partially government-subsidised NMI, as foreseen in the NQP, contributes to the safeguard of the already established quality infrastructure in Ghana and can play a key role in the economy by indirectly contributing to improve quality and safety of products. The provision of improved calibration services to Ghanaian companies and industry can enable them to better comply with international standards, to improve the quality and safety of products and services and to increase their international competitiveness (see relevance criterion).

The provision of better calibration services by GSA could also have a positive influence on trade development in Ghana, the region and beyond and as such support a sustainable and large-scale economic development in the ECOWAS region, with benefits for workers (jobs and income) linked to it. Furthermore, the provision and use of better calibration services can contribute to a more economical use and handling of energy and raw materials and such indirectly to an improved environmental protection. The provision and use of better calibration services for legally regulated areas, e.g. acoustics, air, and water quality, as well as waste management can contribute indirectly to the containment of health risks for workers. Although the positive social, economic, and environmental impacts can only be achieved over long impact chains, the provision and use of calibration services is one important prerequisite (see impact criterion).

Inclusiveness/ Leave no one behind

The project is essentially technical in nature and does not have impacts (either positive or negative) on particularly disadvantaged or vulnerable groups of beneficiaries and stakeholders. No such positive or negative unintended impact has been observed during the evaluation process nor mentioned by the interview partners.

6. Assessment of specific evaluation questions

Two additional specific questions have been raised as per Terms of Reference for the evaluators and answered by the evaluators as follows:

1. **Was the project frame too narrow and could there have been a bigger impact on GSA/ quality infrastructure in the country with a broader perspective (inclusion of different stakeholders within & outside GSA)?**

As GSA is the key player for quality infrastructure in Ghana it should be kept as main implementing partner, providing of the future reference (primary) lab for mass and temperature.

In future, the activities could be extended to more secondary labs within GSA (as e.g. pH/ conductivity lab, flow lab, dimensional lab) to widen the scope of quality infrastructure in the country.

Furthermore, a closer cooperation with GhAS (Ghana Accreditation System) should be considered.

The extent of cooperation activities should be defined in a participatory way at the beginning of the next project phase.

2. **How did the difficult situation in the GSA Management influence the project implementation and how can the dependency be decreased?**

The long vacuum (around one year in 2022/ 2023) in GSA top management with only an acting DG led to important delays in decision-making on project activities.

This concerned mainly the support to the mass and temperature labs, which was limited, as e. g. no decision was taken on the construction of an E2 mass lab which should host the new calibration equipment. As such procurement was also concerned with the result that the provision of the needed calibration equipment (mass and temperature) was delayed and the module indicator 1 could not be achieved.

The dependency can't be decreased, but a focus on more technical and less investment involving activities and the further implication of the GSA board could help.

7. Learning processes and experiences

The strategic approach to support GSA and its metrology department an already established key player in Ghana and the ECOWAS region to further develop towards a "fit-for-future" NMI, has proven successful. To support an institution, which provides a sound basis of technical staff/ metrology experts who are already experienced and highly motivated to deepen their metrology knowledge further and to extend their competences to new quality infrastructure service, is a very sustainable approach. The fostered structured knowledge and experience exchange as well as international networking with other NMIs is suited to strengthen GSA in performing its leading role for metrology in the region in a sustainable way.

The shift to virtual formats for capacity development and trainings was successful, as the project activities could be implemented despite the travel restrictions due to the COVID pandemic. Although these remote formats have their limitations and can't replace face-to-face/ on-the-job trainings completely. A hybrid approach is considered as cost-efficient and seems promising for the future.

8. Recommendations

The recommendations given by the evaluators to be considered in the appraisal of the planned follow-on project.

Recommendations to partners:

- Determine a well-defined timeframe for launching the construction project of the new E2 mass laboratory (see sections 5.1.3 and 5.1.4)
- Consider the Ghanaian accreditation body (with its new structure “GhAS”) as a key partner and ensure a closer corporate relationship with GSA (see sections 5.1.2, 5.1.3, 5.1.6 and 6)
- Continue strengthening GSA capacities to provide satisfactory traceability to secondary labs (see sections 5.1.1, 5.1.3, 5.1.5, 5.1.6 and 6)
- Support the NMI in playing a more important role in the region by establishing/ improving formal channels to promote GSA calibration services (see sections 5.1.1, 5.1.2, 5.1.3, 5.1.5 and 5.1.6)
- Strengthen internal knowledge transfer within GSA further (see section 5.1.3)
- Continue sharing the knowledge on metrology with other external beneficiaries (governmental and/ or private institutions), see sections 5.1.1, 5.1.2, 5.1.3, 5.1.5 and 5.1.6.

Recommendations to the project team:

- Continue close cooperation with GSA as the main implementing partner (see sections 5.1.3, 5.1.4, 5.1.5, 5.1.6 and 6)
- Continue regular physical visits of PTB staff and external international experts to Ghana until a formal recognition of GSA competency (granted by third parties) to deliver suitable calibration services for the new parameters (see sections 5.1.3 and 5.1.6)
- Hold-on to the bi-weekly working group meetings (see sections 5.1.3 and 5.1.4)
- Continue communication and cooperation with the other TC and FC modules in the common DC program as well as with the regional PTB projects and other donors active in the sector (see sections 5.1.1, 5.1.2, 5.1.3., 5.1.4, 5.1.5 and 5.1.6)
- Perform an evaluation of the equipment installed and check if the new calibration services are offered by GSA to customers (see sections 5.1.3 and 5.1.4)
- Consider more realistic deadlines regarding the procurement process, taking into consideration the complexity of PTB administrative procedures and customs clearance from the Ghana side (see sections 5.1.3 and 5.1.4)
- Define smarter/ better measurable indicators (see section 5.1.3)

Recommendations to the International Cooperation Department (Group 9.3):

- When planning and preparing technical cooperation projects, continue to focus on PTB's special and unique strengths as a German NMI, which can deliver technical advice and support on an international level for increasing effectiveness, efficiency, and learning &

innovation, which other German executing agencies aren't able to ("Unique Selling Point"), see sections 5.1.2, 5.1.3, and 5.1.4

- Ensure that project indicators are SMART (Specific, Measurable, Appropriate, Realistic and Time-bound) for better measuring of project objective achievements (over your internal quality control system), which has been a shortcoming of the current project (see section 5.1.3)

Recommendations to the evaluation unit of Working Group 9.01:

During drafting the report, the evaluation team has identified some interfaces and perceived overlaps in the requested assessment of the OECD-DAC criteria and capacity WORKS success factors, leading to the following recommendations for streamlining the report format:

- Keep the approach to work with an evaluation team consisting of a lead assessor, experienced in evaluation processes, being in responsible for drafting the requested reports and a technical assessor with a metrology background for contributing specific sector expertise and experience,
- Consider simplification as well as reduction and contraction respectively of the dimensions to be assessed for the OECD-DAC criteria, especially for relevance, effectiveness, sustainability, and impact, where the interfaces between the different dimensions are not always clear and obvious,
- Give suggestions on how to evaluate the criterion 'impact (higher development changes)' in the case of small projects focused on technical advice of intermediaries.

9. Annexes to the evaluation report

Annex 1 - Mission schedule

Annex 2 - Guiding questions

Annex 3 - Presentation of preliminary findings

Annex 4 - Impact logic

Annex 5 - cW self-assessment