



INSTITUTIONAL REVIEW
of the
Gem and Jewellery Research and Training Institute
(GJRTI)
(2015 - 2018)



A report prepared for the
**NATIONAL SCIENCE AND
TECHNOLOGY COMMISSION**

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Abbreviations

BOM	Board of Management
DG	Director General
EDB	Export Development Board
GJRTI	Gem and Jewellery Research and Training Institute
IT	Information Technology
MIS	Management Information System
MSD	Management Services Department
NASTEC	National Science and Technology Commission
NSF	National Science Foundation
PPP	Private Public Partnership
RD	Research Division
RRC	Ratnapura Regional Centre
R & D	Research and Development
SAR	Self-Assessment Report
S & T	Science and Technology
T&DD	Training and Development Division

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Mr. Nawarathna Bandara Alahakoon (Chairman, GJRTI), Dr. Prashan Francis (Director General/CEO, GJRTI) and the entire staff of GJRTI co-operated with the panel completely, without reservation. We acknowledge their co-operation gratefully.

All the Heads of Divisions at the Head Office and the Ratnapura Centre with their senior officers agreed to meet the review panel and exchanged views and provided us insights which were valuable in arriving at our recommendations.

The efficient planning and co-ordination of all review activities by Ms. Rasitha Perera (Scientist and Review Coordinator – NASTEC) was indispensable in the successful completion of this review. The panel acknowledges her contribution with gratitude.

A wide selection of stakeholders of GJRTI from the gem industry, present and past students participated in lively stakeholder meetings held at Colombo and Ratnapura and gave us their frank feedback which helped us to assess the performance of the GJRTI in perspective. We are thankful to them.

Executive Summary

1. The National Science and Technology Commission (NASTEC), under its mandate given in the Science and Technology Development Act No. 11 of 1994 to review the progress of science and technology institutes, appointed a five-member review panel in February 2019 to report on the progress of the Gem and Jewellery Research and Training Institute (GJRTI) during the period 2015-2018.
2. GJRTI was established as an Institution by the gazette notification No. 882 of 28th July 1995 published by virtue of powers vested in the section 25(i) of National Gem and Jewellery Authority Act No. 50 of 1993. Accordingly, the Institute was empowered to (a) carry out surveys of gem minerals in Sri Lanka, (b) carry out gemmological research, (c) provide technical and other advice pertaining to gem and jewellery industry, (d) provide training in gem and jewellery fields, (e) conduct workshops and publish papers, books etc. relating to the industry, and (f) to perform other functions to facilitate proper discharge of services of the Institute.
3. The review was conducted as per guidelines stipulated in the Review Manual published by NASTEC.
4. The review commenced with careful perusal of the Self-Assessment Report provided by GJRTI. The panel had several visits to the Institute where the divisions were visited and separate discussions were held with the staff. The panel also visited the Ratnapura Regional Centre. Two interactive sessions were held with a wide range of stakeholders of GJRTI where frank discussions ensued. Information was also gathered from a questionnaire circulated among 150 randomly selected course participants in order to ascertain the quality of the training programmes.

5. Overall, the review panel is of the view that GJRTI, despite its limited physical and human resources, has performed well in discharging its research and training services, particularly during the last 3 years. The review panel presents a set of recommendations in this report to further improve its performance, as summarized below.
6. The Review Panel observed that GJRTI has failed to conduct as a fully-fledged Institution due to certain regulatory constraints, and this severely impedes its efficiency. Hence, it is recommended to reconstitute the Institute as a semiautonomous body through a Parliamentary Act. Until such time, the functions and procedures pertaining to GJRTI may be streamlined by a Gazette notification with a revised “Incorporation Order”.
7. In formulating the Corporate Plan of GJRTI, adequate attention needs to be given to address the critical challenges faced by the gem and jewellery industry in close consultation with the stakeholders. As regards the organizational structure, the review panel presents several recommendations, i.e. to establish a planning unit, to create a cadre position for a Director to be in charge of administrative matters and to improve IT and MIS systems.
8. A properly prepared Manual of Procedures is necessary to streamline the administrative system of GJRTI.
9. The review panel recommends that cadre vacancies in research and training be filled immediately. A comprehensive training scheme for the staff is essential to enable them to pursue higher studies in advanced countries so as to upgrade the Institute to meet international standards. Greater attention needs to be given in strategic planning to improve the financial viability of the Institute.
10. The recent initiative taken by the Institute to collaborate with the industry in conducting training courses is commendable. These schemes may be further expanded to research projects as well to evolve effective Private-Public Partnerships (PPP).

11. Considering the views of the stakeholders, the review panel recommends that industry needs be prioritized in identifying and conducting research projects. Action needs to be taken to disseminate the research findings to practitioners in industry by means of regular workshops and simplified publications.
12. Expansion of gem testing facilities of GJRTI to meet industry demand is recommended.
13. Regular monitoring and evaluation of the progress of all projects need to be carried out to enhance the quality of the research. The review panel also recommends evaluating the progress of ongoing projects with the help of a Science and Technical Committee with experienced earth scientists.

1.0 Introduction: Overview of Gem and Jewellery Research and Training Institute

1.1 History

The Gem and Jewellery Research and Training Institute (GJRTI) was established by the gazette notification No. 882 of 28th July 1995 published by virtue of powers vested in the section 25(i) of the National Gem and Jewellery Authority Act. No. 50 of 1993 incorporated after repealing the State Gem Corporation Act No. 13 of 1971.

Sri Lanka is known to have the highest quality gem stones including sapphires, rubies, cat's eye, and other varieties, which are in demand overseas. However, the country has not been able to exploit fully the potential of export of gemstones as a source of revenue. According to Central Bank data, in 2018, the exports of gems and jewellery has brought a revenue of USD 157 million which is only 1.32% of the revenue from total exports of value USD 11,890 million. The GJRTI was established with a view to remedy this situation by promoting the gem and jewellery industry.

1.2 Mandate of the GJRTI

As specified in the Gazette notification, “The objects of the Institution are to provide Training and Research facilities for the regulation, promotion and development of the Gem and Jewellery Industry.”

“The Institution shall have power: -

- (1) To carry out surveys of Gem Minerals of Sri Lanka:
- (2) To carry out gemological Research pertaining to
 - (a) their location;
 - (b) identification;
 - (c) methods of enhancing the Gem Stones;

- (d) any other related field;
- (3) To provide Technical and other advice including invention of machinery for the development of the Gem and Jewellery Industry in areas such as mining, gem cutting, jewellery making, devices for the treatment of gem stones and making of jewellery;
- (4) To provide Training in -
 - (a) Gem cutting
 - (b) Production of Jewellery;
 - (c) Gemology including diamonds;
 - (d) Jewellery designing;
 - (e) Enhancement of gem stones;
 - (f) Any other related aspects of the gem and jewellery industry;
- (5) To conduct Workshops, Seminars and to publish Papers, Books on related topics, work done etc;
- (6) To do such other things as are necessary to facilitate the proper discharge of the functions of the Institute.”

1.3 Vision of the GJRTI

Be the Regional Centre of Excellence in Research and Training in the Gem and Jewellery Industry while facilitating the Growth and Development of the Industry in Sri Lanka.

1.4 Mission of the GJRTI

To enhance the Competitive capability of Sri Lanka Gem & Jewellery Industry by providing high quality Research & Training services leading to Exploration of Gem Deposits, Technological Innovation, Skill and Competency Development and Quality Improvement for the satisfaction of our Stakeholders.

1.5 Governing Ministry

GJRTI functions under the purview of Ministry of Mahaweli Development and Environment.

1.6 Sources of Funding

GJRTI, being a Government statutory board receives the annual capital and recurrent grants from the Government Treasury. A small percentage of funds for specific projects have been received from National Science Foundation (NSF).

1.7 Organizational Structure

GJRTI is governed by Chairman and the Board of Management (BOM). The BOM decides on the policies and the Director General as the Chief Executive Officer coordinates the activities. GJRTI has a total of 87 employees as of 2017 of which 17 are S&T personnel, 26 are administrative staff, 23 are technical staff and 21 are supporting staff.

The Institute has its Head Office (in a rented-out building) at Welivita, Kaduwela, where the main training center and the research laboratory facilities are also located and has eight regional centers.

2.0 Procedure Adopted for Performance Review

An independent panel comprising five members that was appointed by the National Science and Technology Commission (NASTEC), carried out the review. The panel members were:

Dr. N.P. Wijayananda (Chairman)	Former Chairman, Geological Survey and Mines Bureau.
Prof. P.G.R. Dharmaratne	Senior Professor, Department of Earth Resources Engineering, University of Moratuwa.
Prof. Sirimevan Colombage	Emeritus Professor of Economics, Department of Social Studies, Open University of Sri Lanka.
Prof. R.L.R. Chandrajith	Head, Department of Geology, University of Peradeniya.
Mr. Harsha Pathberiya	Deputy Director/Industrial Products, Export Development Board.

The review panel was formally informed about the review procedure at the meeting held on 30th January 2019 at NASTEC by Eng. D.D. Ananda Namal, Acting Director/CEO, NASTEC. The review was based on the guidelines given in the Review Manual prepared by NASTEC.

The panel made several visits to GJRTI for acquisition of information with regard to its functioning. Give below is the description of such visits made by the panel.

- 15th February 2019: 1st visit to GJRTI – Review panel met the Chairman, the Director General and senior officers of GJRTI. The presentations were made by the Director General and Divisional Heads. The panel also visited the training and laboratory facilities available at the Institute Head Office.
- 8th March 2019; Meeting with the stakeholders of the GJRTI, held at Construction Equipment Training Centre (CETRAC), Battaramulla.

- 11th April 2019: Visit to Regional Centre – Ratnapura. Meetings with the stakeholders of GJRTI from Ratnapura and the Regional Center staff. Observed the facilities of the Regional Center.
- 3rd May 2019: 2nd visit to GJRTI – Meetings with the Chairman, Director General and Heads of Research, Training, Administration & Human Resources and Finance Divisions. Discussion with some staff representatives of the Research Division.
- 31 June 2019 – Finalization of the report at NASTEC.

The panel perused documents made available by GJRTI and those provided on request. As specified in the review guidelines, information gathered during meetings, visits and stakeholder meetings along with information gathered by perusal of all relevant documents including the Self-Evaluation Report prepared by GJRTI and recent Corporate Plans were used by the panel to assess the outputs of the Institute and its management processes and to come to a judgement about its performance.

The Review Report was prepared in a participatory manner by all five members of the panel. Although different sections were written by different members, all collectively viewed the final document and there was complete consensus on all opinions and conclusions in the report. The panel takes collective responsibility for the contents of the report.

3.0 Management Assessment and Output Assessment

Commentary on Management Assessment

The Review Manual formulated by the NASTEC indicates nine management aspects and each aspect is further supported by a number of salient statements which are applicable to S&T institutions, in general, and in this case almost all are applicable to the GJRTI. Below we summarize the key points identified by the Review Team.

3.1 Assessment of Institutional Response to External and Internal Environment in Planning Organizational Strategies

GJRTI strictly adheres to the mandate laid down in the Gazette Notification No. 882 of 28 July 1995 in performing its functions. Meanwhile, it periodically adjusts its strategic plans to respond to the changing external and internal environment, as reflected in its 5-year Corporate Plans which are updated annually on a rolling basis. The external environment factors considered in strategic planning include government policies, research and training demands of industry actors and global market conditions. Internally, the management and the staff play a critical role in performing the institute's functions. The review panel had access to Corporate Plans for the periods 2011-2015, 2017-2021 and 2018-2022.

The Corporate Plan is prepared by a Committee appointed by GJRTI, and the draft copy is displayed in all regional centres so as to seek feedback from all employees. Thereafter final amendments are carried out by incorporating constructive comments of the employees. The review panel, however, observed that the management does not seek the views of the officers in the regional centres in preparing the Corporate Plan.

The Corporate Plan contains a fairly comprehensive SWOT analysis. However, it seems that some of the critical weaknesses and threats identified in this analysis are not adequately addressed in the strategic planning. For instance, the decline of funds received from the Treasury has been pointed out as a major constraint. But no strategic action to seek alternative funding is proposed to overcome this problem.

The review panel observed that the strategic and action plans in the Corporate Plans of GJRTI are sufficiently aligned with the government policies. The priority areas of more recent Corporate Plans for 2017-2021 and 2018-2022 are in line with the government's "A New Country in 60 Months" development programme. Steps have been taken to support the relevant government policies such as generating two-billion-dollar gem/jewellery export earnings by 2020, and facilitating SMEs under Enterprise Sri Lanka and Vision 2025. In line with the government policies on sustainable development, GJRTI has prepared strategies to introduce environmental gem mining techniques. The ongoing National Gem Deposit Survey, is aimed at harnessing gem resources in a sustainable manner so as to contribute to the country's GDP. A number of novel value addition technologies have been introduced along with the current global trends.

The review panel conducted stakeholder meetings at the Colombo Head Office and Ratnapura Regional Centre to sought their views on the services provided by GJRTI. Hence, they are of the view that GJRTI needs to be continued with some improvements. It was observed that there is broad consensus among the stakeholders that GJRTI has been providing useful research and training facilities to promote the gem and jewellery industry.

However, most of the stakeholders stated GJRTI does not consult them adequately in preparing its research and training activities, and therefore, they have been practically less effective in promoting the industry. According to them, the findings of research studies are mostly confined to typical academic publications, and they are not adequately disseminated in a pragmatic manner to harness new knowledge for the benefit of the gem and jewellery industry. Hence, it was suggested that action needs to be taken to disseminate the research findings to the industry through periodical symposiums, workshops, media releases etc..

Some stakeholders made a request to consider expanding the lab testing facilities currently provided by GJRTI to the trade. Non-availability of expensive sophisticated testing equipment in the Institute's labs on par with the international standards was pointed out by certain industry representatives. Sri Lanka, being a gem-resourceful country, lacks such equipment whereas they are available in countries such as Italy and Japan which do not possess any gem

resources. Hence, the review panel recommends GJRTI to initiate action to procure the necessary equipment to meet the industry needs. Some of the equipment are fairly expensive, and therefore, it is essential to carry out rigorous cost-benefit analyses in the procurement process while assuring optimal use of equipment on a sustainable basis.

GJRTI has adopted a system of periodical revisions of training courses in line with industry needs, technological advances and market trends. In this regard, an Island-wide survey in collaboration with the Uva-Wellassa University is in progress. Feedbacks from course participants obtained at the end of each semester are used to fill the gaps in courses identified by the participants.

The training services provided by GJRTI have contributed to produce skilled personnel required for the gem and jewellery industry. Some of the trainees have been able to obtain foreign employment as well. There are also a few self-employed trainees. The review panel observed that there is room for improvement in such training to respond to the human resources gaps in the industry. At present, there seems to be a lack of coordination with the industry in designing the courses, and at times the trainees do not reach the standards expected by the industry. Specifically, the Institute needs to address the problem of severe shortage of gem cutters. It was pointed out by certain industry representatives that the present Gem Cutting and Polishing Course have a wider coverage, and as a result, adequate focus is not given to gem cutting. Therefore, it was recommended that this course should be purely dedicated to gem cutting.

The initiative taken by GJRTI to sign an MOU with Beehive Industries (Pvt.) Ltd. so as to upgrade the gem cutting training courses to international standards is commendable.

A constraining factor of GJRTI is that it currently operates mostly as a government department strictly adhering AR and FR procedures rather than functioning independently as an Institution, as mandated in the gazette notification. The review panel is of the opinion that this practice inhibits the efficiency of the Institute. Hence, the Institute needs to initiate action to function as a more independent body within its mandate to enhance its capacity in providing research and training services with innovative programmes to cater to growing and complex industry needs. In this regard, the review panel

strongly suggests exploring the possibilities to conduct research and training activities in collaboration with the industry, thus paving the way for evolving private-public sector partnerships (PPP). This will not only help to reduce the Institute's dependence on Treasury funds, but also to contribute to promote the industry more effectively.

Considering the crisis faced by the gem cutting industry amidst the shortage of competent gem cutters and other inhibiting factors, GJRTI has to play a leading role in producing gem cutters that meet international industry standards. It is of the opinion of certain leading gem cutting industrialists that it is easier to train fresh recruits in gem cutting rather than to train those who have followed courses at GJRTI. This indicates that there are skill gaps among the gem cutters trained at the Institute. Globally, there is growing demand for perfectly cut gems, and local gem cutters need to be trained to meet such high standards. Traditional gem cutters in the country are generally reluctant to move to modern technology-based, high value-added gem cutting, and the Institute needs to take pro-active steps to attract them to follow the training courses. Some of the factors that have led to the shortage of gem cutters, of course, are beyond the control of the Institute. A common complaint made by gem cutters is that they are not adequately compensated for their hard work. Gem cutting is a delicate activity which requires high skills and dedication. In comparison, the youth have more lucrative and easier job opportunities in other sectors such as construction, transport and trade. The lack of social recognition for gem cutters is another factor that constrains the gem industry. Given these problems, GJRTI may consider adopting innovative approaches for conducting its training and research activities to meet global and domestic challenges.

3.2 Planning S&T Programmes and Setting Priorities

The Science and Technology and Research and development projects in GJRTI are initiated by the research personnel at the beginning of the year as per Self-Assessment Report (SAR). On further inquiry, it was found that the majority of the project proposals are put forward by the Director General. Afterward yearly action plans are prepared in accordance of the formats that are followed by line ministry (Ministry of Mahaweli Development and Environment). According to SAR, no indication of the presence of a research and development advisory and a monitoring committee was evident.

Proposals are selected and approved by the S&T personnel sitting together. It may be because of the fewer number of S&T personnel in the institute. The Budget is also assigned as planned in the Ministry format. Project monitoring and progress reviewing is done by the Ministry.

There is no clear formal mechanism of programme design and approval. Progress reviewing in the GJRTI is found to be rather weak. There are provisions to pursue foreign collaborations, private sector partners and outside experts in planning and developing S&T and R&D projects.

There were a number of specific project proposals available to the review panel. The panel acknowledges that the GJRTI, possess an excellent infrastructure, some analytical equipment and information service but not well qualified scientific staff to fulfill the mandate given by the Gazette notification. Of the total seventeen S&T personnel in 2017, there were only two with Ph.D., and one with an M.Phil. Three personnel with M.Sc. may not be adequately qualified to conduct research programmes. Therefore, it is not possible to expect quality R&D output. The Institute also lacks proper permanent buildings, facilities and a good library. As stake holders mentioned in section 2.1 above, modern testing facilities such as Laser Induced Breakdown Spectrometer (LIBS) and Laser-Ablation Inductively coupled Plasma Spectrometer (LAICPMS) to identify beryllium treated sapphires, the latest gem treatment, are not available with the Institute or for that matter anywhere else in Sri Lanka. May be perhaps the cost of such equipment as much as Rs 40Mn and Rs 80Mn respectively may have prevented the Institute acquiring them.

A majority of R&D work is mainly oriented towards product development initiated by the officers based on their individual interests and within their expertise. There are other projects well linked to major institutional S&T Programmes with specific objectives and linked to institute's objectives and national development goals.

3.3 Planning S&T / R&D Projects

The vision of the GJRTI is to be a regional center of excellence in research and training in the gem and jewellery industry while facilitating the growth and development of the industry in Sri Lanka. To achieve its objectives, research and development are a vital part of the institute. The research projects of the institute aim at identification of locations of gem deposits, developing methods of enhancing quality and clarity of gemstones among many others. The Research Division (RD) of the institute carries out various research activities to achieve above objectives. Seventeen scientists serve in this Division from which three have obtained postgraduate research degrees (Ph.D. and M.Phil.) Three other scientists hold MSc in RS & GIS and Nanotechnology which are important for the applications in gem potential mapping and innovations related to gems, respectively.

Among the R&D projects carried out by the institute, preparation of gem potential maps is the most important activity. So far six such maps in the scale of 1:50,000 have been completed. But these maps were not yet standardized and published hence, not available to the general public. The other main activity carried out by the institute is value addition techniques for low quality stones. This project is highly promising and performing extremely well. Further, the institute carries out innovative research related to gem stones. One of these is the water filter developed by the Institute which was already patented and commercialized. During last three years, the institute also has obtained two outside grants.

The RD has planned five new projects for the year 2019 and onward. However, regular monitoring and evaluation of the progress of all projects need to be carried out to enhance the quality of the research. The review panel also suggests evaluating the progress of ongoing projects with the help of external evaluators.

3.4 Project Management and Maintenance of Quality

Project management is necessary to maintain quality standards throughout the research project/ project's cycle to meet the expectations and deliver expected results.

GJRTI operates its activities with the minimum resources in terms of human resources as well as other infrastructure which need to carry out researches and projects effectively. Therefore, the management also not in the position to allocate resources appropriately to carry out programmes effectively especially research areas due to inadequate number of qualified staff members. GJRTI has only two senior research officers, nine research officers (field officers) and three supportive staff attached to the Research Division at present.

Uninterrupted supply of equipment and supplies are obviously critical to performing and it is important to have a system in place to manage supplies and data in a laboratory. Although, it was noticed that there are developments in laboratory facilities in the area of technology and equipment needed for their programmes and researches in recent years, there is no proper laboratory protocols within the institute to maintain the facilities appropriately.

Allowing the research staff to access scientific information is crucial for the quality of the researches carried out by an institute. On-line and off-line versions of the scientific journals play a vital role in the dissemination of scientific information for the end users.

The GJRTI is not maintaining offline or online database of information bases which is necessary for the research staff to have updated information regularly, although they are given access to PCs and necessary software needed for their researches.

3.5 Human Resource Management

The management of GJRTI identifies staff recruitments from time to time based on research and training needs. It complies with the government rules in recruiting the staff. The identified staff vacancies are forwarded to the Management Services Department (MSD) of the Ministry of Finance through the line Ministry for authorization. Job vacancies are advertised in all three languages in newspapers and in the website. The candidates are interviewed by an expert panel consisting of five members – three from the institution, an independent expert and a representative from the line Ministry.

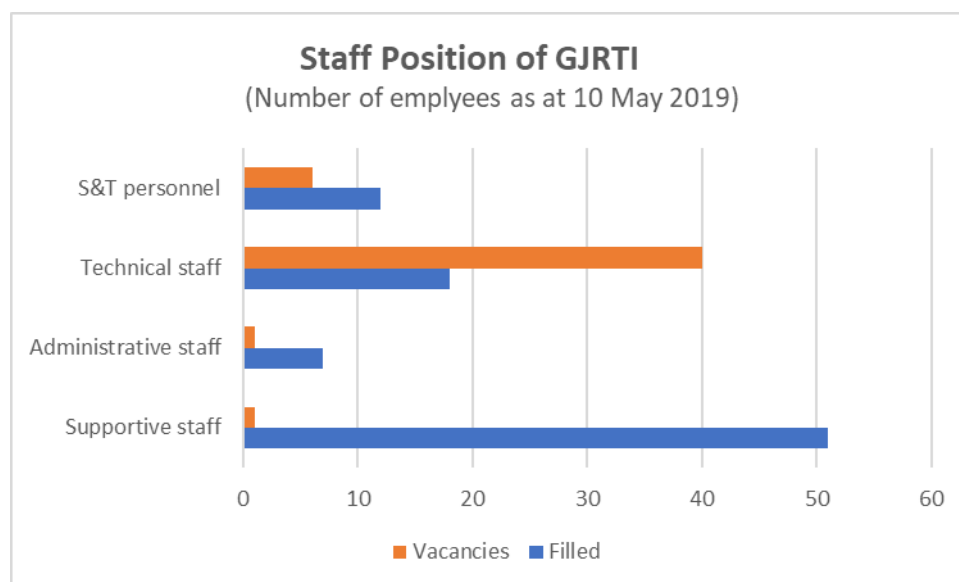
The institution has been facing a shortage of staff in the categories of S&T

personnel and technical staff continuously over the recent years (Table 1 and Figure 1). At present, only 12 out of 18 cadre positions in S&T category are filled leaving 6 positions vacant. In the technical category, only 18 out of 58 cadre positions are filled thus leaving as much as 40 vacancies. In comparison, the cadre positions of administrative staff (8) and supporting staff (52) have been almost filled. The review panel noted that the available S&T personnel account for only 34 percent of the total staff whereas the corresponding ratio for supporting staff is high as much as 58 percent. This has been the general trend over the years, and it reflects the human resources gap faced by the institution with substantial shortage of the vital research and training staff. GJRTI faces difficulties in attracting and retaining qualified scientists due to its less competitive salary structure and low fringe benefits. It is necessary to adopt a vigorous strategic plan to recruit and retain qualified scientific staff for effective delivery of the services anticipated from GJRTI.

	2017			2018			2019		
	Cadre	Filled	Vacancies	Cadre	Filled	Vacancies	Cadre	Filled	Vacancies
S&T personnel	18	13	5	18	12	6	18	12	6
Technical staff	58	21	37	58	19	40	58	18	40
Administrative staff	8	7	1	8	7	1	8	7	1
Supportive staff	52	47	5	52	46	7	52	51	1
Total	136	88	48	136	84	54	136	88	48

Source: GJRTI

Table 1



Source: GJRTI

Figure 1

The qualified staff available in GJRTI is rather limited (Table 2). In 2018, there were only 5 officers (including DG) with postgraduate qualifications, and there were only 7 graduates. The review panel was informed that action has been taken to recruit 10 science graduates shortly. Considering the need to enhance the research and training capacity of the Institute to keep up with the international standards, it is essential to expand the staff with qualified personnel with science background.

Table 2: Highest qualifications of research staff (Source: GJRTI)

Highest Qualification	2017	2018
Ph.D.	2	2
M.Phil.	1	1
M.Sc.	2	2
B.Sc.	8	7

The lack of any incentive schemes to reward the staff is a major constraint encountered by the institution in promoting research, and to retain competent researchers. The officers engaged in research do not receive the research allowances offered to other government organizations. In terms of the Management Services Circular No. 02/2014 of 11 February 2014 issued by the General Treasury, officers in the category of Academic and Research, Manager or higher posts who are serving in the permanent cadre of Statutory Boards are eligible to obtain a monthly research allowance of 35 % of the initial salary subject to the provisions. The review panel is of the opinion that the relevant GJRTI staff members are eligible to obtain this research allowance as per the Circular.

The review panel noted that GJRTI has not allocated separate cadre positions to Ratnapura Regional Centre (RRC) and other regional centres, and this has led to certain problems as regards division of labour. Specifically, there is no single management officer in RRC to conduct administrative and financial activities, and these are handled by the training and research officers sacrificing their time

and energy to be used for the tasks that are assigned to them. The panel also observed that in performing such functions in good faith, the officers incur some risks at times. For instance, they collect course fees in cash form when the students have difficulties in making money transfers through banks. Although this may be done for the convenience of the course participants, the officers involved are likely to face audit queries at a certain stage. Hence, this practice may be discouraged. The administrative functions including officers' leave details, petty cash handling, inventory control and consumable supplies are currently handled by the training and research officers, and this is undesirable. Hence, it is recommended to assign Management Assistants to carry out administrative and financial functions of RRC.

GJRTI provides in-house training to the recruits. Some of them are sent for training programmes conducted by third parties. In addition, overseas training is offered for selected staff members handling key subject areas.

GJRTI has a fairly comprehensive staff appraisal scheme. The student reviews are used to assess the performance of instructors who conduct training courses. The research officials are appraised based on their publications and patents. In addition, attendance and other routine procedures are used in staff appraisal.

GJRTI maintains and constantly updates staff profiles, and such information is posted in the institution's website. However, it is noted that updating of staff information in the website involves a time lag, as the institution does not have administration power to make such changes.

3.6 Management of Organizational Assets

3.6.1 Infrastructure Management

The review panel was informed that GJRTI does not possess its own buildings. The building rented out for the head office where the R&D works are solely conducted, does not have sufficient space for laboratories to engage in research professionally. The situation regarding training units in the head office are even worse, highly congested and quite unhealthy for trainees. The institute has a large number of equipment but not all that is required for an institute of this nature. Discussions with the staff of the administrative division, laboratory

visits indicated that the institute does not possess a proper mechanism for maintaining buildings, laboratory premises in good condition. In addition, the head office building does not have an auditorium to accommodate at least 30-40 participants which is required for the dissemination of R&D findings to stakeholders.

Shifting the head office and laboratories from Ratnapura to Malabe and then to Kaduwela within seven years does not well auger for the condition of equipment and employees' satisfaction. It is recommended that the GJRTI should have its main R&D and training units in a building owned by the institute. It is understood that a plot of land has been acquired in Ratnapura for this purpose. Ratnapura may be the best place for R&D and training units, since Ratnapura is the centre of gem industry and gem samples could be brought to the institute for analysis from nearby mining area by the stakeholders, and also young enthusiast may find it easier to follow training Programmes from the gem mining areas.

3.6.2 Financial Management

The main funding source of GJRTI has been the General Treasury (Table 3). In 2018, the total amount of grants received from the Treasury was Rs. 117.0 million; of this, a sum of Rs. 79.9 million was received as recurrent grants and the balance Rs. 37.1 million as capital grants. The income generated by GJRTI in 2018 amounted to Rs. 13.6 million accounting for 17.0 percent of total operating grant. According to the CEO of GJRTI, the Treasury determines the amount of recurrent grant for the forthcoming year by deducting the projected income from training courses. It is the view of the management that such income could have been utilized for further development of the Institute, had the Treasury made no deduction from recurrent grants.

Table 3: Financial Position of GJRTI (Rs. '000)(Source: GJERI)

	2014	2015	2016	2017	2018
Operating income	50,911	54,364	69,302	73,133	93,425
Recurrent grants from Treasury	43,357	47,081	58,627	62,440	79,854
Other income	7,554	7,283	10,675	10,693	13,571
Income from training courses	6,941	6,408	9,445	8,319	10,835

Operating expenditure	44,470	57,056	68,431	77,337	88,902
Net operating surplus/deficit	6,441	-2,692	871	-4,204	4,523
Capital grants from Treasury	13,863	26,447	33,523	38,742	37,105
Capital expenditure	17,572	31,261	27,769	35,880	38,840
Capital account surplus (deficit)	-3,709	-4,814	5,754	2,862	-1,735
Net surplus (deficit)	2,732	-7,506	6,625	-1,342	2,788

Around 80 % of the total income generated by GJRTI is from training course fees. It is significant to note that income from training courses increased from Rs. 6.4 million in 2015 to Rs. 10.8 million in 2018 reflecting the expansion of training provided by the Institute.

The review panel observed that there is no uniformity in course fees within a centre and across different centres. For instance, certain courses are offered in RCC with and without fees. Further, the course fees levied in the Nivithigala centre is lower than the fees levied in RCC for the same course. This has led to financial distortions and misunderstandings among course participants. Hence, the review panel is of the opinion that it is necessary to standardise the course fee structure in a rational manner.

Table 4 : Income Generated by GJRTI (Rs. '000)

Source	2015		2016		2017		2018	
	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual
Training course fees	5,570	6,409	4,958	9,445	9,348	8,319	12,000	10,835
Geological research charges			200	50	0	0	0	0
Geuda heat treatment charges	100	0	0	0	250	20	50	77
Interest income	200	248	300	343	300	506	300	506
Sundry income	200	626	300	837	500	1,849	1,250	1,849
Total	6,070	7,283	5,758	10,675	10,398	10,694	13,600	13,267

The review panel was informed that the Institute is compelled to offer certain courses on fee-reimbursement basis under the directives of various government bodies without considering the financial implications, and this practice has led to weaken its financial position. For instance, a sum of Rs. 0.5 million is due from the government for 2018 as reimbursement of course fees. However, had this amount was received, the income generated from course fees would have been around Rs. 11.3 million, which is closer to the projected amount of Rs. 12.0 million for the year 2018. It is necessary adopt an appropriate mechanism to ensure prompt reimbursement of course fees.

3.6.3 Intellectual Property Management

Since one of the functions of GJRTI is developing new technology, it is essential to ensure proper intellectual property management. However, this aspect was not documented in the SAR or any other documents provided to the panel. Certain researchers of the institute have obtained several patents in their own names for technologies developed by them while employed in the GJRTI. This does not seem to be appropriate. Therefore, GJRTI should take care of intellectual property management and develop a mechanism to safeguard intellectual property rights of the institute by getting employees to sign an agreement to this effect on recruitment.

3.7 Coordinating and Integrating the Internal Functions/Units/Activities

Allocation of functions and duties among different divisions of GJRTI are clearly illustrated in its Organization Chart annexed herewith. The BOM headed by the Chairman provides overall directives, and they are channeled through the DG to lower levels of the staff. In the Head Office in Kaduwela, there are two separate Divisions to deal with (a) Research and (b) Training and Development, and each of them is under the purview of a Director. The Research Division consists of three separate units for exploration, value addition and innovation. The Training and Development Division has three units for jewellery, gemology and curriculum. The Administration and Human Resources Unit and the Finance Unit directly report to DG. The Internal Audit Officer is responsible to

Chairman. Although the Organization Chart appears fairly comprehensive, it does not depict how the regional branches are placed in the organizational structure of the Institute.

Overall, the review panel is of the view that a close coordination between the Divisions is needed. However, the lack of a Planning Division/Unit is found to be a detrimental factor in formulating strategic plans and coordinating the activities of different Divisions. A Planning Division/Unit would be in a better position to identify the priority areas in research and training considering the industry needs, government policies and global trends.

The IT system of the Institute needs to be strengthened so as to improve the networking between the Divisions in the Head Office and Regional Centres with a single platform.

The Ratnapura Regional Centre (RRC) consists of Training and Research Sections under the purview of two separate Officers-in-Charge OICs). There is no superior officer above them, and the two OICs coordinate the activities between the Sections. The review panel is of the view that it would be desirable to have a senior officer to supervise the two Sections. The lack of a separate section in RRC to handle administrative and financial functions is found to be a major shortcoming. It has led to overburden the training and research officers with such functions and the associated risks, as already mentioned above.

3.8 Managing Information Dissemination and Partnership

The key method of information dissemination is leaflets, training manuals, hand bills, conducting seminars, workshops and participate in regional and national exhibitions.

Although it showed an increase of number of publications published by the GJRTI in 2018 compared to previous two years, the total number of publications was limited to 23 in 2018.

However, the panel is of the view that the utilization of IT based technologies such as e-mail campaigns, e-flyers, web site are not utilized effectively in disseminating information among the potential and existing customers. The dedicated web site, www.gjrti.gov.lk web does not contain important and vital

information on the GJRTI and its activities. Therefore, revamping of the web site is needed to attract and cater to the needs of the stakeholders. However, the review panel is conscious of the fact that the traditional gem miners may not look at websites to gather information.

Lack of proper network with most of the industry related public and private sector stakeholder is a major disadvantage for the institute. Especially the Institute is not maintaining close rapport with the main regulatory body for the Gem & Jewellery Sector in Sri Lanka, ie. National Gem & Jewellery Authority (NGJA) and other institutions such as Export Development Board (EDB), Sri Lanka Gem & Jewellery Association, Lanka Gem Dealers & Miners Association and other industry related associations and institutes. As a result, the industry is unaware of the availability of services and facilities provided by the GJRTI which could be obtained in Sri Lanka. It is desirable if the DG of the NGJA is made an ex-officio member of the Management Board of GJRTI.

Therefore, it is necessary to have close relationships with the industry related institutes, associations etc. in order to promote and increase the awareness of the institutional activities.

In addition, collaborations with industry specific associations, institutes will enable GJRTI to include employment-oriented goals in academic educational Programmes by developing curriculum, instruction modules and other training materials in order to create a pool of skilled labour force which meet the demand of the industry at present.

The GJRTI still does not have proper partnership with international institutes which provide similar kind of academic programmes and services. Such partnership could improve the quality of the programmes offered by the institution by incorporating staff exchange programmes, overseas implant training, high tech / innovative programmes etc. In addition, it would enhance the quality of the researches carried out by enhancing the capacities, knowledge and skills of the research teams and providing/ offering state of art and advanced technology used by the overseas partners.

The GJRTI is in the process of collaborating with the Gem & Jewellery Institute Thailand in order to enhance upgrade the services and the courses offered since

year 2016. However, the proposed MoU has been agreed by two institutions and is awaiting for the approval from the Ministry of Foreign Affairs.

3.9 Monitoring, Evaluation and Reporting Procedures

Proper and continuous monitoring and evaluation of a project is vital to keep the project on track in identifying the issues and mistakes on time and do the corrections appropriately. In addition, regular review also helps staff members to improve their skills and knowledge on the project.

The GJRTI has no mechanism to monitor the projects and the services provided by them and evaluate the outcome and the effectiveness of their researches. Since most of the researches and projects carried out in ad-hoc basis neither pre planning nor discussed or reviewed during the projects, the institute is not in the position to effectively use its achievements and failures for its present and future researches and programmes. Therefore, absence of such mechanism will lead to poor and inappropriate decision making during the project cycles.

4.0 Productivity of Institution Based on Outputs and S & T Staff Strength

4.1 Brief Descriptions of the Main Outputs

4.1.1 Technologies developed

A key function of the institute is to provide technical and other advice including invention and development of machinery for the enhancement of the gem and jewellery industry. During the period of 2016-18, the institute has developed several new products from which patents have been applied for three products. Patent has been awarded for one of the products “Develop an insole for footwear using natural rubber elastomeric thin sheets blend with tourmaline powder particles” and the institute has taken steps to commercialize it. It is encouraging to observe that the institute has carried out seven activities relevant to value addition of gem stones with satisfactory results. The personnel engaged in the gem industry are satisfied with the colour enhancement activities carried out by the institute, particularly the heat treatment of “geuda”. The institute also needs to take actions to popularize other colour enhancement methods such as a) colour and clarity enhancement of black zircon, b) epitaxial growth of dye on topaz etc. developed by the institute.

4.1.2 Technologies transferred to industry / entrepreneurs

The review panel is satisfied with the steps taken up by the institute in transferring technologies to industry/entrepreneurs. At present, one (1) patent has been obtained by the institute that was transferred to an entrepreneur for commercialization. The institute also provides some services of their instruments to the industry. Particularly, the personnel involved in the gem industry are satisfied with the heat treatment facilities provided by the institute. However, the panel believes that obtaining the necessary accreditations for laboratories are essential to provide better services to the general public. The institute needs to initiate necessary steps to issue internationally accepted certificates for gems and jewellery sector.

The review team also noticed that the S&T officials do not get opportunities to participate in international events such as trade shows, training Programmes and workshops. Only two officials (one in 2017 and the other in 2018) received training opportunities in other countries. For the technology transfer, such training opportunities are extremely valuable.

4.1.3 Information Dissemination / Extension

The dissemination of information is a key function of the institute. During the period under evaluation, the institute participated in several activities related to dissemination of the knowledge that obtained from its research activities. Among these are workshops to teachers (6 in 2018) and taking part in national level exhibition such as JEWELS, Vidatha etc. can be noticed. The institute also prepared a TV documentary on its activities. However, the activities carried out by the Institute and also facilities available at the institute for the gem industry are not well aware by those who engage in the gem industry. The review team would encourage officials of the institute to initiate much better publicity program and advertise the capabilities of service facilities available to increase the awareness among people engaged in the gem industry.

In the Corporate Plan 2018-2022, goals and objectives have shown certain strategies and action plans related to dissemination of information. If properly carried out, it will provide much needed publicity to the work carried out by the GJRTI. At present stakeholders are not aware of the research work carried out by the institute. Other than general public awareness programmes, high level information dissemination in the form of publications, conference proceedings and policy briefs etc. are not satisfactory (Table 5). Suitable mechanism should be established to make stakeholders aware of Institute's activities and findings regularly.

In the past, no links have been created with other research organizations but in the proposed action plan, better mechanisms are proposed. Actions are yet to be taken to transfer the technology developed gemstone treatment to stakeholders.

The feedback from participants of training Programmes, workshops etc are considered as a good performance indicator of GJRTI technology transfer activities. However, the review team is of the view that the GJRTI lacks a formal process for collecting and evaluating feedback from the participants on a

regular basis. The website of the Institute is another instrument that can be effectively used for wide information dissemination and corporate communications.

Table 5 : Awareness programmes-Teacher training programmes

2018		2019
Province	Number of teachers trained	Number of participants expected
Western	150	–
Uva	150	150
Central	150	150
Sabaragamuwa	150	300
Southern	150	450
Northwestern	150	150
Eastern	–	150

4.1.4 Publications

One of the key functions of the GJRTI is to carry out gemmological research and dissemination of findings to the scientific community and also to the general public. The Institute carried out several research projects during the last five years and reviewers believe that the performances are at satisfactory level. During the last 3 years, the institute was able to publish a paper in the ISI journal and another paper in a local journal. Scientists in the GJRTI also presented their findings in local and international symposia. Altogether 14 presentations were made during 2016-2018 by the scientists in the institute. Two books were published by the GJRTI during the 2016-18 periods in both English and Sinhala languages. Other than such publications, the institute produced four gem potential maps (1: 50,000) during the period under

consideration however; these maps were not yet published. The institute produced eight unpublished reports including program summery reports during the period of evaluation.

Obtaining two research grants from other agencies (NSF and UNIDO) by the Institute is encouraging. Scientists in the institute should further encourage writing research proposals and obtaining funds from outside sources.

The institute has 17 S&T staff as of 2017, but most of them are without postgraduate qualifications. The review team believes that the quality of scientific publications is not sufficient as only one publication appears in an international scientific journal during the period under review. The available facilities at the institute are good enough to produce scientific publications relevant to gem and jewellery in international level. Therefore, S&T personal should be encouraged to publish research papers in international journals. The GJRTI can collaborate with other institutes and universities to improve their research publication outputs. The panel of reviewers believes that lack of collaboration with other institutes is one of the major reasons for very slow progress in this area. Encouraging and providing necessary facilities to S&T personnel in the institute to carry out postgraduate degrees (M.Phil. or Ph.D.) possibly will improve the publication record in the institute. Although publishing research findings are not a major objective of the institute, but it will facilitate the industry. It is also important to send its S&T officials for foreign training and also encourage them to obtain their postgraduate degrees from other developed countries.

4.1.5 Patents

GJRTI has obtained three patents for research work done by R&T personnel however patents are in their names and not in GJRTI. Obtaining patents for the R&D work, means the recognition of original work done by the Institute and it upgrades the status of the institute.

4.1.6 Services (Testing, Calibrations, Consultations, Advisory and etc.)

The GJIRT laboratories are well equipped with modern instruments such as XRF, FTIR, Raman Spectroscopy etc. that can provide services to individuals, industries and government institutes. The Institute is capable of identification of

gems and determination of chemical compositions. It was observed that mostly universities obtained the analytical services of the institute. The records indicated that 8 outside entities obtained the service from the institute during the year 2018 that is higher compared services provided in 2016 (#2) and 2017 (#4). Furthermore, the Institute also provide consultancy service for identification of gem-bearing locations and also carry out feasibility studies for gem mining.

In order to provide advanced technical services to the gem traders, the institute established an advanced geuda heat treatment facility at Ratnapura recently but the services are yet to be provided. The electric furnace acquired to perform high temperature heat treatment has developed some problems in the power supply system and at the time of review, this matter was receiving attention.

As per the stakeholders' view, gem testing facilities should be available and analytical reports need to be issued quickly. Standardization of the results needs to be taking into consideration.

In addition to currently available extension and analytical services, more such services to the gem and jewellery industry should be offered from the Institute, particularly to improve the quality of jewellery manufacturing and gem cutting.

4.1.7 Trainings

The details of training programmes conducted for the public by GJRTI and the number of students trained have been provided to review team are given in Tables 5 and 6. Training centers are located in the main gem mining areas and jewellery related Programmes in areas traditionally engaged in jewellery manufacturing.

Table 6 : Training centres

	2016	2017	2018
Training centres	1. Malabe	1. Kaduwela	1. Kaduwela
	2. Rathnapura	2. Rathnapura	2. Rathnapura
	3. Kandy	3. Kandy	3. Kandy
	4. Galle	4. Galle	4. Galle
	5. Bingiriya	5. Bingiriya	5. Bingiriya
	6. Sooriyawewa	6. Sooriyawewa	6. Sooriyawewa
	7. Polonnaruwa	7. Polonnaruwa	7. Polonnaruwa
	8. Moragahakanda	8. Moragahakanda	8. Moragahakanda
	9. Jaffna	9. Jaffna	9. Jaffna
	10.Awissawella	10.Awissawella	10.Awissawella
		11.Aththanagalle	11.Aththanagalle
		12.Nivithigala	12.Nivithigala
			13.Deaf School - Rathmalana
Total	10	12	13

Only two S&T personnel have had foreign exposure to R&D activities, which is below graduate level. Any projected plan of training personnel of GJRTI on specifically identified areas of science and technology anticipated for future development was not available.

In the absence of details of specific staff training Programmes, such as specialization area, level of training, the review team found it difficult to make a meaningful judgment. The review team is of the opinion that a projected plan for postgraduate research training in specific areas must be developed. Mere post graduate qualifications at MSc by courses may not help R&D activities. Post graduate research training in foreign countries must be encouraged so that new areas of technology could be transferred.

4.2 Quantitative Summary of Output (2015 – 2018)

There are eight output categories defined in the NASTEC Review Manual

(Information Provided by GJRTI)

Category	Number			
	2015	2016	2017	2108
1. Technologies Developed <ul style="list-style-type: none"> New products/ technologies Improved products/ technologies/ laboratory methods 	<ul style="list-style-type: none"> - 01 	<ul style="list-style-type: none"> - 01 	<ul style="list-style-type: none"> 03 02 	<ul style="list-style-type: none"> - 01
2. Technologies transferred to industry/ entrepreneurs <ul style="list-style-type: none"> Technologies Developed locally Foreign technologies adapted and transferred 	<ul style="list-style-type: none"> - - 	<ul style="list-style-type: none"> 01 - 	<ul style="list-style-type: none"> - - 	<ul style="list-style-type: none"> 01 -
3. Information Dissemination/ Extension publications <ul style="list-style-type: none"> S & T institutional Review Reports Training Manuals Advisory Leaflets Maps Posters Dissemination events <ul style="list-style-type: none"> Workshops and seminars Conferences 	<ul style="list-style-type: none"> - - 03 01 01 01 - 	<ul style="list-style-type: none"> - - 05 - 01 03 - 	<ul style="list-style-type: none"> - - 10 05 01 01 - 	<ul style="list-style-type: none"> - 01 06 04 01 01 -

<ul style="list-style-type: none"> • Exhibitions • Media Events • Open Days • Demonstrations 	<ul style="list-style-type: none"> • 05 • - • - • - 	<ul style="list-style-type: none"> • 05 • - • - • - 	<ul style="list-style-type: none"> • 04 • 03 • - • - 	<ul style="list-style-type: none"> • 04 • 01 • - • -
4. Publications <ul style="list-style-type: none"> • Research papers in ISI journals • Other Research papers • Conference Proceedings • Books and Monographs • Technical Reports • Research Reports 	<ul style="list-style-type: none"> • - • - • 01 • 01 • 01 • - 	<ul style="list-style-type: none"> • - • 01 • 04 • 02 • 04 • - 	<ul style="list-style-type: none"> • - • 02 • 04 • 02 • 04 • - 	<ul style="list-style-type: none"> • - • 01 • 04 • 01 • - • -
5. Patents Individual <ul style="list-style-type: none"> • Local patents • Foreign patents Institutional <ul style="list-style-type: none"> • Local patents • Foreign patents 	<ul style="list-style-type: none"> • - • - • - • - 	<ul style="list-style-type: none"> • - • - • - • - 	<ul style="list-style-type: none"> • - • - • 02 • - 	<ul style="list-style-type: none"> • - • - • 01 • -
6. Services (Testing, Calibrations, Consultations, Advisory and etc.) <ul style="list-style-type: none"> • Policies developed • Reviews of S & T institutions • Research grants awarded 	<ul style="list-style-type: none"> • - • - • - 	<ul style="list-style-type: none"> • - • - • - 	<ul style="list-style-type: none"> • - • - • - 	<ul style="list-style-type: none"> • - • - • -

<ul style="list-style-type: none"> and administered • Funding for training Programmes and other S & T activities • Monitoring of technology/ Research Projects • Data bases developed • S & T surveys and maps • Science popularization activities • Environmental impact assessments • Instrument calibrations • Consultancy services • Testing and analytical services • Recommendations in S & T matters 	<ul style="list-style-type: none"> • - • - • - • 01 • - • - • - • 03 • - • - 	<ul style="list-style-type: none"> • - • - • - • - • - • - • 02 • - • - 	<ul style="list-style-type: none"> • - • - • - • 05 • - • - • 03 • 01 • - 	<ul style="list-style-type: none"> • - • - • - • 04 • - • - • 03 • 05 • -
7. Training Staff training Programmes <ul style="list-style-type: none"> • Local • Foreign Training Programmes for stakeholders	<ul style="list-style-type: none"> • 08 • 01 	<ul style="list-style-type: none"> • 05 • - 	<ul style="list-style-type: none"> • 02 • 04 	<ul style="list-style-type: none"> • 04 • 01
8. Other				

4.3 Staff Strength

The Permanent Staff in the Institution

Staff		2015	2016	2017	2018
Scientific	Research Staff	08	09	17	16
	Support Staff	10	10	23	22
	Librarians/ Information Officers	-	-	-	-
Accounting	Accountants	01	01	01	01
	Support Staff	05	05	07	07
Administration	Administrators	01	01	01	01
	Support Staff	12	12	36	36
Other		-	01	-	-

Research Staff Based on Areas of Expertise

Areas of Expertise	2015	2016	2017	2018
Science	08	09	17	16
Other	-	-	-	-

*Note: Include Director

Highest Level of Qualification of Research Staff

Qualification	2015	2016	2017	2018
PhD.	01	01	02	02
M.Phil.	-	01	01	01
M.Sc.	03	03	03	03
B.Sc.	04	04	11	10

*Note: Include Director

5.0 Overview of the GJRTI Performance and Contribution to National Development

The Board of Management headed by the Chairman, has set up several divisions that are overseen by the Director General who is the Chief Executive Officer (CEO) of GJRTI.

In order to assess the overall performance of the GJRTI it is necessary to look at the performance of the individual divisions. What follows is a brief critical review of the divisions and their role.

5.1 Research Division (RD)

The activities of the Research Division are mainly focused on 3 research areas. Harnessing gem resources in a sustainable manner, promote variety of gem stone value addition techniques and carry out diverse innovative research related to gem minerals are the main focus areas. During the past years, the Institute has carried out numerous research, development and innovation activities in the relevant fields with a view to enhance the outputs and outcomes of the industry. The institute needs to facilitate harnessing of the independent, individual, intellectual capacity of scientists and encourage scientists to carry out quality research and innovations directed towards the socio-economic development of Sri Lanka.

The research division is well capable of achieving its objectives. Modern equipment for gemmological research and also facilities for gem heat treatment are available in the division.

The services of the laboratories and instruments are available for universities and academic institutes at a concession rate.

“Geuda Sewa Piyas” that established in Rathnapura is expected to provide advance techniques and services to the gem traders to enhance quality of gemstones.

The institute planned several research projects that are in line with the main objectives of the research division.

5.2 Training and Development Division (T&DD)

T & DD has developed numerous training Programmes covering all the aspects of gems and jewellery sector. They also have established training centres in vital locations such as gem mining areas, traditional jewellery manufacturing villages where there are gem and jewellery exporting concerns are concentrated. Training Programmes include modern technology and modern equipment such as Computer Aided Design (CAD), electroplating, casting and 3D printing of jewellery models (see Table 7). The instructors need to be provided with regular training to upgrade their knowledge and to learn new technologies that have been developed elsewhere in the world.

Some of the equipment used in the training Programmes are far too old. It is necessary to evaluate the efficiency of the equipment routinely and replace unsuitable equipment and machinery, otherwise stakeholders become unsatisfied and the Institution loses its credibility. During the past few years, there is a clear increase in numbers of students trained (Table 7). It is learnt however that the trained students do to continue in their profession due to low wages of the gem and jewellery sector. The short comings are overcome by the industry by employing foreign personnel who are prepared to work for low wages for long hours per day. It is necessary to establish a mechanism to pay respectable wages for trainees so that the efforts of GJRTI will not go waist.

Table 7 : Training Programmes and number of students enrolled (2016 - 2018)

Training Course	Gemmology	Gemmology	Diploma in Gemmology
	Basic Gemmology	Basic Gemmology	Gemmology
	Geuda Heat Treatment	Geuda Heat Treatment	Basic Gemmology
	Gem Cutting & Polishing	Gem Cutting & Polishing	Geuda Heat Treatment
	Colour Grading & Marketing	Colour Grading & Marketing	Gem Cutting & Polishing

	Gem Carving	Gem Carving	Colour Grading & Marketing
	Jewellery Designing	Jewellery Designing	Gem Carving
	Jewellery Manufacturing	Jewellery Manufacturing	Jewellery Designing
	Costume Jewellery Manufacturing	Costume Jewellery Manufacturing	Jewellery Manufacturing
	Stone Setting	Stone Setting	Costume Jewellery Manufacturing
	CAD	CAD	Stone Setting
	Rough Gem Identification	Rough Gem Identification	CAD
	Special Foreign Trainings	Special Tailor Made Courses	Rough Gem Identification
		Special Foreign Trainings	Casting & Electro Plating
			Short course in Basic Gem Lapidary Techniques
			Special Tailor Made Courses
			Special Foreign Trainings
Total number	13	14	17
No of Students Enrolled	757	1200	1220

5.3 Administrative, Finance and Internal Audit Divisions

The major task of the Administrative, Finance and Audit divisions is to assist the GJRTI in human resources, financial asset and logistics management following the regulations and guidelines accepted by the government institutions. These divisions therefore, play a supporting role to the RD and T&DD that conduct research, training and development activities.

The Administration and Human Resources Division (AHRD) and the Finance Division (FD) are under the purview of two Assistant Directors who function as the Heads of their respective Divisions. They report directly to DG, as there is no Director or Senior Assistant Director in-charge of these two Divisions. Very often, the Heads of AHRD and FD are compelled to seek guidance from DG to carry out their functions. This arrangement exerts additional burden on DG, as he has to devote a significant portion of his valuable time to attend to trivial matters relating to administration, human resources and finance. Further, the two Heads are unable to delegate the responsibilities within their Divisions, as they have only Management Assistants down the line. Hence, they have to look into every detail of the activities within their Divisions: the functions include (a) staff attendance and leave, inventory, equipment maintenance and various other administrative matters in AHRD and (b) accounts, pay-roll management, procurement, liaison with audit and other financial matters in FD.

The review panel observed that both AHRD and FD are handicapped by the lack of a Manual of Procedures to carry out their functions effectively. For example, in granting maternity leave it is not clear whether to follow the Shop and Office Employees Ordinance or the Establishment Code. This has led to confusions and misunderstandings among the employees of the Institute.

At present there is no state-of-the-art Management Information System (MIS) at GJRTI and most of the functions including maintenance of staff profiles and leave records are carried out using a basic database system. Maintenance and networking of the computer system too does not seem to be satisfactory. There is no IT Division or Unit to deal with such functions.

Currently, the auditing activities of GJRTI are restricted to conventional financial auditing. Performance auditing is yet to be implemented.

GJRTI's Contribution to National Development

GJRTI has been established with the purpose of providing research and training services for sustainable development of the gem and jewellery industry in Sri Lanka. The GJRTI offers laboratory, research & development and educational services to the Sri Lankan gem & jewellery Industry.

The institute is fairly equipped to identify all types of gemstones, including various types of treatments done to coloured gemstones etc. In addition, the GJRTI has under taken various research studies directly related to gemstones, identification of colour and quality enhancement by various methods of treatments, such as heat, irradiation, filling of fissures with foreign substances, diffusion, etc.

In addition, GJRTI offers many training courses for the gem and jewellery industry to meet the demand for the employments in the areas such as Gem Cutting & Polishing, Jewellery Designing, and Gemological Sciences etc..

The entire industry employs approximately 600,000 persons including miners, cutters and polishers, dealers, jewellery designers, manufacturers and craftsmen, marketers and sales people. However, Sri Lanka's occupational structure in the gem and jewellery industry in the past had been to pass down particular skills from generation to generation whereas the scientifically based knowledge in both theory and practical work in testing and identifying gems have been minimal among most of the employees in the industry. Therefore, it is necessary to offer proper theoretical and practical training for the employees in the industry to create a pool of professionally qualified employees such as gemmologists, valuers, designers, lapidarists to meet the requirements of the local and international markets.

Sri Lanka's lapidary sector consists of cutting and polishing of diamonds and coloured gem stones and the industry plays a vital role in adding value to locally produced and imported gem stones. The sector is severely affected by the insufficient number of gem cutters available in the country to cater to the demand in the service cutting sector. It is estimated that there are around 5,000 to 10,000 gem cutters in the industry at present which was around 100,000 three

decades ago. The GJRTI produce around 100- 200 qualified gem cutters with proper training to the industry providing direct employment opportunities as well as self-employment opportunities.

In addition, GJRTI also provides training courses for jewellery designing and manufacturing which is considered as most important area where Sri Lankan employees lack capabilities in producing to the international market. These programmes no doubt will open up avenues and better prospects for the younger generation long term and this will create a pool of designers and craftsmen who have skills and capabilities to produce exquisite designs and products that meet the global demand. Hence these programmes conducted by GJRTI not only generate employment opportunities but contribute to promote gem and jewellery exports and thereby increasing foreign exchange earnings of the country.

6.0 Conclusions and Recommendations

GJRTI has developed into an Institute that provides valuable service to the gem and jewellery industry. This was well reflected at the two meetings the review panel had with the stakeholders and the responses received for the questionnaire circulated among the past students. In order to strengthen and expand the scope of its activities and make GJRTI's contribution more productive, the review panel makes the following recommendations.

I. INSTITUTIONAL REFORMS

6.1 Enactment of GJRTI

- It is recommended to convert GJRTI as an autonomous body by enacting an Act in the Parliament.
- As an interim measure, the functions and procedures pertaining to GJRTI may be streamlined with a revised "Incorporation Order" published in the Government Gazette.
- A Science and Technical Committee with experienced earth scientists should be established for project approval and project monitoring.

II. PLANNING AND DEVELOPMENT

6.2 Corporate Plan

- In formulating the Corporate Plan, adequate attention needs to be given to address the critical challenges faced by the gem and jewellery industry. These include shortage of skilled gem cutters and industry's heavy dependence on traditional gem cutting methods.
- Short, medium and long-term strategic plans are required to deal with severe labour shortages in the industry.
- Corporate Plan needs to be prepared with closer consultations with the industry stakeholders.
- The views of the officers in regional centres should be obtained when drafting the Corporate Plan.

6.3 Organizational Structure

- Regional centres need to be included in the Institute's Organization Chart.
- To create a cadre position for Director to be in-charge of the Administration and Human Resources Division and the Finance Division.
- To create appropriate number of cadre positions for Junior Managers in the Administration and Human Resources Division and the Finance Division.
- To introduce a state-of-the-art MIS system.
- To set up a Planning Division/Unit in the Institute.
- To improve the IT system to facilitate networking between Divisions and Regional Centres.

III. ADMINISTRATION AND FINANCE

6.4 Administration

- It is recommended to introduce a properly approved manual of procedures stipulating the regulations pertaining to different categories of leave, staff promotions, salary scales, fringe benefits etc. in order to streamline the activities of the GJRTI.
- It is recommended to shift the GJRTI's head office and its Ratnapura centre from the present rented-out premises to permanent buildings owned by the Institute.

6.5 Human Resources Management

- Immediate action deems necessary to fill the cadre positions in research and training categories.
- Medium and long-term human resource planning for the Institute is recommended.
- Training schemes for the research and training staff of the Institute need to be streamlined providing greater opportunities for higher studies at M.Phil. and Ph.D. levels abroad, particularly in developed countries.

- Opportunities should be provided to scientists to take part in foreign seminars, trade fairs etc.
- Management staff be appointed to the Ratnapura and other regional centres in an appropriate manner to relieve training and research staff from duties relating to administrative and financial matters.
- To consider offering research allowances to the staff of the Institute in terms of the relevant MSD Circular/s.
- Staff appraisal scheme needs to be streamlined with a view to improve labour productivity.

6.6 Financial Management

- Financial sustainability of the Institute needs to be assessed carefully with medium and long-term perspectives.
- Alternative funding sources other than the Treasury funds could be explored subject to the relevant rules and regulations.
- Discrepancies in course fees should be eliminated.

IV SCIENTIFIC AND TECHNICAL

6.7 Training

- Training courses need to meet industry requirement, and therefore, it would be desirable to design the courses in close collaboration with industry stakeholders.
- Potential to conduct training and research activities in collaboration with industry, based on the Private Public Partnership (PPP) mode, may be explored.
- Training programmes on modern jewellery products should be addressed adequately.
- Look into the feasibility of introducing weekend training programmes.
- There should be formal mechanism of research and training programmes design, approval and progress reviewing.
- The Institute should establish a formal process for collecting and evaluating feedback on training programmes conducted by them on a regular basis and revise programmes accordingly.

- Incorporate the results and achievements of research studies conducted by GJRTI in order to upgrade the courses conducted with the latest information and developments in the industry.
- NVQ standards should be obtained for the training courses.

6.8 Research

- GJRTI should take care of intellectually property management and establish a mechanism to safeguard intellectual property rights of the institute.
- Action should be taken to disseminate GJRTI's research findings to a wider audience, specifically to industry stakeholders. For this purpose, regular information dissemination forums are recommended.
- Regular monitoring and evaluation of the progress of the projects need to be carried out to enhance the quality of the research. The review panel also suggests evaluating the progress of ongoing projects with the help of external evaluators.
- S&T personnel should be encouraged to publish their findings in ISI journals so that the Institute can enhance its own ranking.
- A S&T Committee should be set up for project approval and monitoring.

6.9 Gem Testing Facilities

- GJRTI to initiate action to procure the necessary equipment to meet the industry needs. Some of the equipment are fairly expensive, and therefore, it is essential to carry out rigorous cost-benefit analyses in the procurement process while assuring optimal use of equipment on a sustainable basis.
- Potential to expand gem testing facilities to meet industry needs may be considered.
- Obtain accreditation to the laboratory facilities at GJRTI.

Appendix: I Management Assessment

I. Management practices assessment

(1) Always used/ always considered/ involved/analyzed	≡	Strong
(2) Occasionally used/ considered/ involved/analyzed	≡	Moderate
(3) Not used/ Not considered/ Not involved/Not analyzed	≡	Weak

i.) Assessment of Institutional Response to External and Internal Environment in Planning Organizational Strategy

The external environment of an institution (e.g. consumer/industry needs, government policies, market conditions, partners, and competitors) will critically affect its performance. Science & Technology institutions need to regularly assess these in order to plan and respond effectively to challenges and opportunities, and to deliver results that are relevant and useful.

The external environment of Science & Technology / Research & Development institution is vibrant due to changes in stakeholder conditions and needs. It is important for an institution to periodically review and adjust its directions and goals, to meet these changes. These adjustments in turn may require significant actions, such as changes in focus and Programmes, organizational structure, and management strategies.

Management Practice	Level of Practice (Performance Indicators) Strong/Moderate/Weak	Comments/ Evidence
Government policies and development goals are used/ considered to establish goals and plan organizational strategy for the institution	Moderate	The priority areas in the current Corporate -Plan for 2018-2022 are based on the government's development plan of "A New Country in 60 Months. Greater attention is needed to link GJRTI's strategies with the national export promotion drive.
The organizational mandate (as specified by the relevant Act) is considered in strategic planning	Strong	Strategic planning is based on the mandate stipulated in the Gazette notification

The institution is responsive to changes in Government policies and strategies	Weak	No evidence available
Factors such as strengths, weaknesses, threats and opportunities are considered in strategic planning	Moderate	Certain critical weaknesses and threats identified in the SWOT analysis are not addressed.
Stakeholder needs are taken into consideration in strategic planning	Moderate	Industry requirements need to be given highest priority in designing training programmes and research projects.
The Board of Governors is involved in strategic planning		A S&T committee insisting of earth scientists should be setup for project planning and monitoring.
The extent to which staff members are involved in strategic planning	Weak	Junior officers in the head office and officers in the Ratnapura Centre do not seem to be involved in strategic planning
Government allocations and alternative funding opportunities (donor funding) are considered in strategic planning	Weak	Financial autonomy is not available to the Institute being a government entity.
The extent to which policies and plans of the organization are reviewed and updated	Weak	No evidence

ii) Planning S & T Programmes and setting priorities

A program is “an organized set of research projects, activities or experiments that are oriented towards the attainment of specific objectives”. Programmes are higher in research hierarchy than projects. Program objectives should be consistent with organizational strategies and reflect user needs and development goals.

Management Practice	Level of Practice (Performance Indicators) Strong/Moderate/Weak	Comments/ Evidence
National development goals are considered in planning Programmes & setting priorities	Moderate	Needs to pay more attention to link research and training with the national development plans.
Board of Governors participate in planning and priority setting of program		
The extent to which the staff of the institution participate in programme planning and priority setting	Moderate	Training and research priorities are mostly decided by the Director General. It is recommended to set up a research and development committee.
Stakeholder interests are considered in programme planning	Weak	Closer collaboration with the industry is needed in identifying and designing training and research programmes.
The extent to which programmes are planned and approved through appropriate procedures	Strong	Stipulated requirements are strictly followed.
The extent to which the availability of funds (government allocations and other funds) generating funds are taken into consideration in planning programmes	Moderate	GJRTI should be permitted to use its generated funds for the development work of the institute.

The obtaining of necessary equipment is considered in planning programmes	Strong	Apart from purchasing equipment some are developed internally which is remarkable and should be encouraged.
Stakeholders are represented in the institution's planning and review committees.	Weak	No such evidence as revealed in the discussions the panel had with the stakeholders.
The extent to which socio economic and commercialization of aspects are considered in program planning.	Strong	GJRTI has obtained patents for some of their products during the last three years and some of them have already been commercialized.
Effectiveness and efficiency of institutional procedures in approving new S& T Programmes.	Weak	There is no formal mechanism such as an S&T committee for the purpose.

iii) Planning S& T / R& D Projects

A project is a set of activities designed to achieve specific objectives within a specified period of time. A project includes interrelated research activities or experiments, schedule of activities to be completed within a specific time period, budget, inputs and outputs, focused towards intended beneficiaries. Projects are the building blocks of Programmes. For an institution to achieve its objectives, it is necessary for projects to be well planned in terms of their expected outputs, activities, and input requirements.

Management practice	Level of Practice (Performance Indicators) Strong/Moderate/Weak	Comments/ Evidence
The staff is provided with guidance for project planning	Weak	A Science and Technology Committee should be established for project planning and monitoring.
Previous research results/data are used for planning projects	Moderate	Should address the research needs of the local industry.
The extent to which the institution follows a formal process for preparation, review and approval of projects	Weak	The process needs to be institutionalized by setting up relevant committee/s accommodating industry stakeholders.

The extent to which organizational plans (e.g. medium-term plan, corporate plan, strategy etc.) are used to guide project selection and planning	Moderate	Project identification and implementation are partly based on the Corporate Plan.
Multidisciplinary projects/activities are encouraged by the institutions	Strong	Certain by-products developed by GJRTI are health-related instruments/facilities.
Foreign collaborations are encouraged and incorporated in planning.	Weak	No attempt has been made.
Partnership with private sector is encouraged by the institution	Moderate	Initiatives have been taken recently to conduct collaborative training courses with industry
The extent to which development research/activities are considered in planning projects	Moderate	Further consideration is necessary
The extent to which basic research are considered when planning projects	Inapplicable	GJRTI should carry out basic research only when it is essential for its scientific work.
The degree to which adverse effects on environment are considered in planning projects	Moderate	The institute has introduced environmental-friendly gem mining.methods.

iv) Project management and maintenance of quality

Proper project management and quality assurance/improvement practices are needed to ensure effective research operations, the quality of output and achievement of desired objectives.

Management Practice	Level of Practice (Performance Indicators) Strong/Moderate/Weak	Comments/ Evidence
The effectiveness of the procedures for resource allocation at different levels (organization, departments, program etc.)	Weak	There are no formalized procedures for resource allocation.
Ensuring that instruments, equipment and infrastructure facilities are sufficient for implementation of projects	Moderate	Essential equipment are available.
The effectiveness of administrative procedures and support for project implementation (procurement and distribution of equipment and materials, transport arrangements, etc.)	Weak	The institute does not have a manual of procedures.
Formal monitoring and review processes are used to direct projects towards achievement of objectives	Weak	A Research & Technical Committee should be established to monitor the projects.
The extent to which the researchers are supported by the required technical / field staff.	Moderate	Apart from DG, no other senior qualified officers are available to guide the middle-level officers.
Ensuring that established field / lab methods, and appropriate protocols are used	Moderate	Accreditation is required for laboratory testing.
Research projects/ S& T activities are completed within the planned time frame.	Weak	No evidence of using time frames for activities. Gantt-type time schedules are recommended.

Ensuring that scientists / researchers have access to adequate scientific information (scientific journals, internet, international databases, advanced research institutes, universities etc.) that strengthens the quality of research.	Weak	Although internet facilities are available, there does not seem to be any scientific information gathering system. There is no library.
The extent to which quality assurance practices are followed by the institutions	Weak	There is no quality assurance mechanism.
Ensuring that researchers/scientists have access to computers and necessary software	Moderate	Tailor-made software systems are not available.

v) Human Resource Management

Availability of an adequate number of qualified staff and effective management of human resources are key determinants of organizational performance. Establishing a cadre of qualified staff takes many years. To keep pace with new developments in science, technology, and management, it is also essential to upgrade staff regularly. Staff planning, selection, recruitment, evaluation, and training are key components of human resources management that need to be in place for effective performance of an institution.

Management Practice	Level of Practice (Performance Indicators) Strong/Moderate/Weak	Comments/ Evidence
The institution maintains and updates staff information in a database (including bio data, disciplines, experience, publications, projects)	Weak	No Management Information System is available to maintain staff profiles.
The institution, plans and updates its staff recruitments based on program and project needs	Weak	No initiatives have been taken to fill staff vacancies in scientific categories in recent years.
The effectiveness of the selection procedures and the schemes of recruitment	Moderate	Difficult to attract competent scientists, given the standard government regulations and less-competitive salary packages.

Training is based on institution and program objectives and on merit,	Weak	Staff training is conducted on an ad hoc basis.
The effectiveness of the procedures in promoting a good working environment and maintaining high staff morale.	Moderate	Effectiveness of the promotions carried out following the standard procedures are not effective.
The effectiveness of staff performance appraisals	Weak	The annual staff appraisals are routinely done merely for salary increment purposes, but no objective appraisal system is evident.
The effectiveness of rewards and incentive schemes in motivating the staff	Weak	No performance-based rewarding system.
The effectiveness of managing staff turnover, absenteeism and work interruptions.	Moderate	Adequate consideration is not given.

vi) **Management of organizational assets**

Organizational assets include not only staff buildings, equipment, and finances, but also include assets such as knowledge, technologies developed, intellectual property, and even credibility and reputation. A continuous effort is needed to protect all of these assets, because they are the basis for the sustainability of the institution and allow it to continue delivering quality research and service outputs.

Management Practice	Level of Practice (Performance Indicators) Strong Moderate Weak	Comments/ Evidence
The ability of the institution to carry out its mandate and the assigned statutory powers	Weak	The statutory powers are not properly defined. Reconstitution of the Institute through a Parliamentary Act is recommended
Infrastructure (buildings, stations, fields, roads) is satisfactorily maintained.	Moderate	Shifting of the Institute to different rented-out buildings from time to time adversely affects the sensitive instruments as well as the morale of the staff.
Vehicles and equipment (lab, field, office) are properly managed and maintained.	Moderate	

The effectiveness of procedures to ensure that equipment are in working order	Strong	
The effectiveness of the institution's overall strategy in generation and proper utilization of funds	Moderate	Needs to improve financial management.
The extent to which the institution identifies opportunities for income generation and cost recovery	Moderate	Funds are generated through course fees. Anomalies in course levies should be eliminated.
The extent to which the intellectual property rights of the institute are protected	Weak	Certain patents are granted to particular individuals rather than to GJRTI.

vii) Coordinating and integrating the internal functions/ units/activities

The planning and coordination of units (departments, divisions, committees, research stations, etc.) and interaction among them are often neglected and it affects the overall performance of the institution. The organization of these units and the overall structure need to be reviewed from time to time to ensure smooth and efficient operations. The planning and coordination of units, logistics, resources, and information flows are necessary to achieve integration and smooth functioning.

Management Practice	Level of Practice (Performance indicators) Strong/Moderate/Weak	Comments/ Evidence
The extent to which institution is evaluated internally and restructured based on current needs	Weak	There is no system for internal evaluation.
The effectiveness of internal communication and coordination mechanisms	Strong	Given the small size of the staff, coordination between them is satisfactory..
Institution's overall direction and coordination are provided by a central planning committee / unit.	Weak	A Science and Technology Committee should be established.

The extent to which different units are assigned clearly defined functions	Strong	Work allocation between different divisions is satisfactory. However, certain reallocation is necessary in the case of the Ratnapura Centres.
Responsibilities of research / management staff are clearly identified	Moderate	At Ratnapura Regional Centre research staff is involved in administration.
Effectiveness of using appropriate reporting procedures and feedback in management at different levels	Weak	GJRTI should establish a manual of procedures.

viii) Partnership in managing information dissemination

An important requirement of all S& T / Research & Development institutions is management of dissemination of technology and information to users. The partnership / linking up with other actors in Science & Technology and information system (including, universities, industries, private sector, international research organizations, extension, farmers etc.) promotes information exchange, collaboration, and cost sharing, and ultimately improves the quality and relevance of research.

Management Practice	Level of Practice (Performance Indicators) Strong/Moderate/Weak	Comments/ Evidence
The institution systematically plans and performs dissemination of information	Weak	Dissemination is mostly confined to journal publications and books.
The extent to which the institution plans and maintains linkages with key partners for sharing and dissemination of information	Weak	No formal linkages are established with stakeholders.
The effectiveness of institutional procedures for technology transfer	Weak	No system
The effectiveness of the system to obtain feedback from different types of stakeholders	Weak	No system

ix) Monitoring, evaluation and reporting procedures

Monitoring (assessing ongoing S&T / research activities) and evaluation (evaluating the value, quality and results of research) are key management processes of public-S& T institutions. Monitoring and evaluation are also important for determining whether the institution is learning from its earlier achievements and failures. Monitoring, evaluation, and reporting procedures need to be properly designed (i.e. integrated into project planning and implementation) and periodically reviewed, in order to provide useful information for decision-making and accountability.

Management Practice		Level of Practice (Performance Indicators) Comments/ Evidence Strong/Moderate/Weak
The institution monitors and evaluates (M&E) its own activities periodically	Weak	Need independent outside Science and Technology Committee
M&E is supported by an adequate management information system (MIS), which includes information on projects (e.g. costs, staff, progress, and Results).	Weak	MIS does not exist.
The extent to which S& T results and other outputs are adequately reported internally (e.g. through reports, internal program reviews, seminars).	Moderate	Only small S&T staff
External stakeholders contribute to the M & E process in the institution	Weak	No stakeholder participation.
The extent to which the results of M&E are used for project/ research planning and decision-making.	Weak	There is no M&E at the institute.

Appendix: II Responses Received for the Questionnaire Circulated

Survey conducted by the review panel in collaboration with NASTEC to gather information from the past students who trained at the training centers attach to the Gem & Jewellery Research & Training Institute

This survey was conducted among the past students (2018, 2017 & 2016) of who trained at the training centers attach to the Gem & Jewellery Research & Training Institute.

A self-administrated questionnaire was circulated among the 150 randomly selected students, representing 50 from each academic year. The response rate was 13% (n = 20)

Q1: Primary reason for selecting this course

	Reasons	%
1.1	The course not required any Education Requirement	30
1.2	The course is required for my profession	20
1.3	The course aligns well with my interests	20
1.4	Following the course will help to find a job easily	25
1.5	The course fee is reasonable	5
1.6	Other.....	

Q 2. Feedback on the training obtained

	Statement	Response
2.1	The course was well organized and very useful	Agree
2.2	The course followed the syllabus well	Agree
2.3	The course covered enough practicals	Neutral
2.4	The course covered enough Laboratory facilities	Agree
2.5	The Instructor presented course material in a clear manner that facilitated understanding	Agree
2.6	The course materials provided were useful to follow the programme	Agree
2.7	The course was able to complete within the said period	Neutral
2.8	The course was useful to find an employment	Disagree
2.9	This training should continue by the GJRTI	Agree

Q 3 . Suggestions for course be improvement

	Suggestion	YES %	NO%
3.1	Course content should be improved	58	42
3.2	Course duration should be lengthened	53	47
3.2	Need to include more practical sessions	37	63
3.3	Need more industrial exposure	44	56
3.4	<p>Other suggestions</p> <ol style="list-style-type: none">1. Need to provide necessary arrangements for those joining the course expecting a job2. Recommending the course for those who want to gather knowledge and not recommending this course for those who want to find job after following3. Help to find career opportunities (local & foreign)for those who following the courses4. Need to train to produce modern jewelries5. Need to help a market for the products6. Need to absorb instructors/ lecturers with more practical knowledge7. Introduction of weekend courses8. Course fee of some programmes need to decrease9. Need to introduce modern techniques and equipment which is adopt in globally10. Need to increase the lecture hall facilities		

Q 4. Recommendation of this course to another person

YES %	NO %
79	21

ජාතික විද්යා තාක්ෂණ කොමිසම (NASTEC) සභාව මගින් සිදු කරන ලබන

මැණික් හා ස්වර්ණාභරණ පර්යේෂණ හා පුහුණු ආයතනයේ

ශ්රී ලංකාවේ විද්යා හා තාක්ෂණ ආයතන වල ජ්රගනීය සමාලෝචනය කිරීම සඳහා විද්යා හා තාක්ෂණ පනත නස්ටෙක් ආයතනය වෙත බලය පවරා ඇත. මෙම සමාලෝචන වල අරමුණ වන්නේ විද්යා හා තාක්ෂණ ආයතනවල ඉලක්ක හා අරමුණු සාක්ෂාත් කිරීමේදී ඒවායේ කාර්යසාධනය තක්සේරු කිරීමයි. මෙහිදී එම ආයතන විසින් සිදු කරනු ලබන විද්යාත්මක වැඩසටහන් වල ගුණාත්මක බව, පිරිවැය සඵලදායක බව, අදාලත්වය හා ඒවායේ බලපෑම තක්සේරු කිරීම ස්වාධීන විද්වත් කමිටුවක් මගින් සිදු කරනු ලබයි.

වර්තමානයේදී NASTEC ආයතනය විසින් මැණික් හා ස්වර්ණාභරණ පර්යේෂණ හා පුහුණු ආයතනය සමාලෝචනය කිරීමේ ක්රියාවලියෙහි යෙදී සිටී. සමාලෝචන මණ්ඩලය විසින් ඔබ මැණික් හා ස්වර්ණාභරණ පර්යේෂණ හා පුහුණු ආයතනයෙන් ලබා ගත් පුහුණුව පිළිබඳව ඔබගේ අදහස් ලබා ගැනීම සඳහා ජ්රශ්ණාවලියක් ලබා දීමට තීරණය කර ඇත. මෙම ජ්රශ්ණාවලිය සඳහා ඔබේ ජ්රතිචාරය අනිගයිත් අගය කරනු ලබන අතර මෙම සමීක්ෂණයේ සොයා ගැනීම් ආයතනය මගින් සිදු කරනු ලබන පාඨමාලාවල ගුණාත්මක බව ඉහළ නැංවීමට උපකාරී වනු ඇත.

මැණික් හා ස්වර්ණාභරණ පර්යේෂණ හා පුහුණු ආයතනය මගින් සපයනු ලබන පුහුණුව පිළිබඳ තොරතුරු රැස්කිරීම සඳහා වූ ජ්‍යෙෂ්ඨත්ව ලිය

INDEX NO

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කාර්යාලීය ජ්‍යෙෂ්ඨතා සඳහා පමණි.

I. සහභාගී වූ පාඨමාලාවේ නම (කරුණාකර √ ලකුණ යොදන්න)

රත්න විද්‍යා ඩිප්ලෝමාව	
රත්න විද්‍යාව	
මූලික රත්න විද්‍යාව	
ගෙවුඩනාප පිරියම් කිරීම	
මැණික් කැපීම සහ ඔප දැමීම	
මැණික් වර්ණශීරීණ ගත කිරීම හා අලෙවිකරණය	
මැණික් කැපීම	
ස්වර්ණාභරණ මෝස්තර නිර්මාණය	
ස්වර්ණාභරණ නිෂ්පාදනය	
විලාසිතා ආභරණ නිෂ්පාදනය	
ආභරණ සඳහා ගල් බැඳීම	
CAD	
දුබල මැණික් හඳුනා ගැනීම	
කාස්ටිං සහ විදියුන් තැටි	
මූලික මැණික් ලැකර් තාක්ෂණය පිළිබඳ කෙටි පාඨමාලාවක්	
විශේෂිත අවශ්‍යතා සලකාබලා සැකසුණු පාඨමාලා	
විශේෂ විදේශීය පුහුණු කිරීම්	
වෙනත්	

II. පුහුණු කාලය:..... (මාස / සති)

III. සහභාගී වූ වර්ෂය :

1. මෙම පාඨමාලාව තෝරා ගැනීම සඳහා මූලික හේතුව

1.1	මෙම පාඨමාලාව සඳහා අධ්‍යාපන සුදුසුකම් අදාළ නොවේ.	
1.2	මාගේ වෘත්තීය සඳහා මෙම පාඨමාලාව අදාළ වේ.	
1.3	මෙම පාඨමාලාව මගේ කැමැත්ත සමග හොඳින් ගැලපෙයි	
1.4	පාඨමාලාවට පසුව රැකියා පහසුවෙන් සොයා ගැනීමට උපකාරී වනු ඇත	
1.5	පාඨමාලා ගාස්තුව සාධාරණයි	
	වෙනත් 1..... 2.....	

2. පුහුණුව පිළිබඳ ඔබගේ ජීවිතයට (කරුණාකර ජීවිතයට අදාළ ලකුණු රවුම් කරන්න)

තදින්ම එකග නොවේ	1
එකග නොවේ	2
මධ්‍යස්තයි	3
එකග වේ	4
තදින්ම එකග වේ	5

2.1 පාඨමාලාව හොඳින් සංවිධානයකර තිබූ අතර ඉතා ජර්‍යෝජනවත් විය.

1	2	3	4	5
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2.2 පාඨමාලාව විෂය නිර්දේශයට අනුකූල විය.

1	2	3	4	5
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2.3 පාඨමාලාව තුළ ජර්මාණවත් ජ්‍යෙෂ්ඨතා ක්‍රියාකාරකම් ආවරණය කරන ලදී.

1	2	3	4	5
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2.4 පාඨමාලාව තුළ ජර්මාණවත් රසායනාගාර පහසුකම් ලබා දුනි.

1	2	3	4	5
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2.5 දේශකයා විසින් විෂය කරුණු පැහැදිලි ලෙස ඉදිරිපත් කරන ලදී.

1	2	3	4	5
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2.6 ලබා දුන් නිබන්දන පාඨමාලාව හැඳුරීම සඳහා ජ්‍යෙෂ්ඨතාවන් විය

1	2	3	4	5
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2.7 නියමිත කාලසීමාව ඇතුළත පාඨමාලාවට සම්පූර්ණ කිරීමට හැකි විය.

1	2	3	4	5
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2.8 රැකියා අවස්ථාවන් සොයා ගැනීම සඳහා මෙම පාඨමාලාව ජ්‍යෙෂ්ඨතාවන් විය

1	2	3	4	5
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2.9 මෙම පුහුණුව GJRTI විසින් ඉදිරියට ගෙන යා යුතුය

1	2	3	4	5
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3. පාඨමාලාවේ ගුණාත්මක බව වැඩි දියුණු කිරීම සඳහා ඔබගේ යෝජනා වන්නේ (කරුණාකර v ලකුණ යොදන්න)

3.1	පාඨමාලා අන්තර්ගතය වැඩි දියුණු කළ යුතුය	
3.2	පාඨමාලා කාලය දීර්ඝ කළ යුතුය	
3.3	වඩාත් ප්‍රායෝගික සැසි ඇතුළත් කිරීමට අවශ්‍යයි	
3.4	තව කාර්මික නිරාවරණයක් (Industrial Exposure) අවශ්‍ය වේ	
3.5	වෙනත් 1..... 2.....	

4. වෙනත් පුද්ගලයෙකු සඳහා මෙම පාඨමාලාව නිර්දේශ කරන්නේද?

ඔව් ☐

නැත ☐