PERFORMANCE REVIEW REPORT

ON

INDUSTRIAL TECHNOLOGY INSTITUTE

PREPARED FOR

NATIONAL SCIENCE AND TECHNOLOGY COMMISSION

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INTRODUCTION

Industrial Technology Institute (ITI) is a statuary board, which came to existence on 1st April 1998 by virtue of the Science and Technology Development Act of no: 11 of 1994. It's the successor to the Ceylon Institute of Scientific and Industrial Research (CISIR), which was established in 1955.

The ITI is a demand driven institute that operates as a market oriented partner to clients and stakeholders and created with the objective of facilitating rapid industrialization in Sri Lanka through development of modern technology. ITI is wholly owned institution of the Sri Lanka government with its Board of Management within the preview of the Ministry of Technology.

The object and functions of ITI are specified in the Science and Technology act of 1994 that came to effect on 1st April 1998. (Appendix 1).

ITI consists of three major divisions; Technical Services Division, Research & Development Division and Administration and Operations Division and two supporting departments, Quality Assurance Department and Information Service Center.

The Technical Services Division functions in testing and measurement services which cover chemical and microbiological testing , materials testing and development , industrial metrology and , Electro- Technological testing. The main areas of Research and Development in ITI include Food technology, Herbal technology, Biotechnology, Materials technology and Environmental technology.

Review Team and the Purpose of the Review

The Science and Development act no: 11 of 1994, mandates the National Science and Technology Commission to review the progress of science and Technology Institutes in relation to objects set out in section 2 of the act.

Accordingly, NASTEC appointed the following team to carry out an external review of ITI and to submit a review report with comments and recommendations on the performance of ITI. The team is required to assess the availability of and resources and their effective utilization, to produce outputs relevant to its stake holder's requirements and its contribution to national development.

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The NASTEC review manual provided the guidelines / guidance for this review. It specially states that transparent disclosures of the review procedure and review results are expected from this exercise.

2. PROCEDURE ADOPTED FOR PERFORMANANCE REVIEW

This review was carried out by a five member review team appointed by this NASTEC with the approval of the Ministry of Science and Technology. The guidelines, given in the review manual made available to the review team by NASTEC, were strictly followed. The reasons for conducting the review outlined in page 2 of the manual and the terms of reference (TOR) given to the review team members for this task were used as the basis of guiding principles.

Each member of this review team was provided in advance with a copy of the Self Evaluation Report (SER) prepared by the institute which described in detail, the organizational structure, research and the technological development & services provided by this institute's infrastructure facilities, laboratory facilities, human resources available and procedures adapted by the institute to achieve the object and functions of the ITI specified in the Science and Technology act. No: 11 of 1994 during the period 2009-2013.

The review commenced on 24th April 2013 at ITI premises and continued over few weeks (appendix 2) during which time the review team had discussions with Chairman, Director, Board of Governors, different categories of staff of scientific & technical divisions and finally clients & stake holders who obtain the services of the institution.

The following divisions of the ITI were visited by the review team.

- Research & Development divisions.
- Technical Services divisions.
- Administration and Operation division.
- Information Services Centre
- Quality Assurance Department
- Internal Audit Department

The review team visited all the relevant laboratories, offices of the above divisions held, useful discussions in order to verify the facts and judgments given in the self-evaluation report as required by NASTEC guidelines.

The review team examined the following documents provided by NASTEC.

- SER (self -evaluation report)
- Corporate plan 2009 -2013.
- Annual reports.
- Science & Technology Act relevant to ITI
- Booklet entitled ITI, partners in Technological industrial growth.
- Booklet catalogue of services offered by ITI.
- List of projects / Programmes undertaken from 2009- 2011.
- List of projects, Completed , Commercialized and not completed (in progress)

A separate list of updated publications of Research staff during the last 5 years, Action plan of the divisions for the current year and information of patents, which ought to be considered during the review, according to the guidelines were not available.

However the review team was able to extract some information on the research publications by the staff from the annual report of 2011 & number of research publications from SER. Some of the information required for output assessment (7.1 page 26 NASTEC Review manual) were not readily available to the review team. The review team was expected to make general comments on quality & relevance of these outputs. The descriptions in the SER of the technologies developed, technology transferred, Patents, and publications - **(**Technical reports, Consultancy reports, Advisory materials, Newsletters, Training manuals and Training programmes**),** were confined to numbers only. The reviewers were not provided with any of these documents. This review is based mainly on the materials provided in the SER and annual reports and the two booklets provided to us.

The review team felt that the majority of the staff members were either not aware of the importance of an external review or apathetic. Very few of them were able to highlight the important outputs they have achieved.

3. MANAGEMENT ASSESSMENT

The ability of the ITI to produce useful and relevant outputs in accordance with the object and functions described in the corporate plan of the institute with respect to their internal policies, strategic management practices were examined under various headings. The basic instruments used in this analysis were the corporate plan, the SER and other documents, submitted by the institute. The SWOT analysis described in the corporate plan was also considered in this exercise.

The reviewers noted that ITI has an organized management structure with a fulltime executive Director / CEO, functioning under the guidance of a Chairman and Governing Board (appendix 3) several divisions, departments and centers, internal audit functions under the Director / CEO.

The review team was made to understand that the different divisions and centers listed in the organizational charts are functioning well to achieve the objectives specified in the act No. 11 of 1994 (a-f Science and Technology act 11 of 1994) and relevant formal meetings are held at regular intervals throughout the year. However, no documentary evidence could be observed.

One of the major mandatory functions of ITI is to conduct research and development activities with a view to accelerating industrial development in Sri Lanka. Throughout this exercise, reviewers carefully examined the strategies, which the ITI has adopted to accelerate the industrial development.

During discussions with the scientific staff it was revealed that research project /programmes may be initiated due to a request made by a Government Ministry / arising of a National Issue (e.g. Arsenic in Rice) or on a specific requests of industrial clients, or by own efforts of the division /department of the ITI. The SER states that the research and development advisory and monitoring committee appointed by the Board of Directors are responsible for recommending, implementation of new projects and reporting progress to the Board of Governors. Reviewers reliably understand that there is a guiding mechanism in place for considering research projects, their planning, budgeting, final evaluation and approval, in accordance with the framework suggested in the corporate plan.

The scope of a research planning and monitoring committee or its composition was not indicated in the organizational structure chart in the SER provided to the reviewers. The reviewers are of the opinion that the research planning monitoring committee should consist of Senior Scientists of relevant fields from ITI as well as from universities, entrepreneurs from industry. Also it is the reviewer's opinion that the policy advisory committee should also consist of outside representatives in addition to Director and Deputy Directors shown in the organization structure in the corporate plan of 2009 – 2013.

3.1 Response to External and Internal Environment

The response to external environment in an institute like this include the adoption of policies of the Government, Stakeholders demands, response to prevailing national issues etc. The internal environment means the institutional staff at all levels, the CEO / Director and the Board of governors. Both external and internal environment influence the performance of the institute.

The review team considered several key issues as being pertinent to the response of the institution to external and internal environment. One of the major issues the team considered was the role of the government policy and development goals played in the creation of organizational structures and to what extent, they were issued in programme planning and implementation.

The government policy and development goals are described in Policy Statement, "The development policy framework of government of Sri –Lanka" published by the ministry of Finance & planning in 2010, and Mahinda Chintanaya. These are the blue prints to change the attitude, skill level and outlook of the Nation by infusion of Science & technology at all levels of the society. In sections 5.4 of this document on modern economy through Science and technological innovation. ITI is one of the eight government institutions selected to be vanguard of these changes.

The SER described that all projects are within the framework of the corporate plan and are in compliance with the guidelines for economic development stipulated in Mahinda Chinthanaya . ITI has also contributed to the Vidatha programme , Divineguma programme and Deyata Kirula programme organized by government ministry.

The organizational structure of ITI appear to look after the internal environment effectively maintaining cordial and cooperative relationship between institutional staff at all levels. The SER briefly describes the success stories of building research teams and interdepartmental programmes within ITI. The review team understands that there are adequate mechanisms build in the organization structure of ITI , to effectively plan & execute meaningful R & D programmes relevant to national development. However documents containing structure and function of some levels of structures in the organization chart, management – committee, Policy advisory committee and the availability of an external audit were not available to the Reviewers. Also documents containing a meaningful action plan of the institute which should incoperate essential features of institutes strategic planning of R & D were not available to us.

The annual report (2009 – 2011) SER and the discussions that followed during the laboratory visit of many divisions convincingly demonstrated that most divisions of the ITI have been responsive to external environment. There was adequate evidence to show that S & T staff and other supporting staff were able to handle a few national issues , provide technical services to industries and address industrial consultancies. According to the SER the services provided to industries and other stakeholder have enable ITI to nearly become self-sufficient with regard to recurrent expenditure.

The technical services division , chemical and microbiology division , materials laboratory , electro technology division and industrial metrology division appeared to have been very sensitive to external environmental demands , such as client's request , requests from various government ministries by performing large number of tests, issuing technical reports , conducting training

pragrammes . The laboratory instrumentation and equipment of these divisions were of high-calibre and the review team was very appreciative of the cleanliness and proper maintenance schedule of laboratory and equipment, especially in the chemical and microbiological laboratories. It was also noted that these laboratories are accredited by SLAB or SWEDAC.

Views of some external stakeholders who have obtained services from ITI, indicated that the majority of them are satisfied with the approach adopted by ITI in handling analytical tests and issuing test reports. However some expressed concerns about the difficulties of contacting ITI staff through reception, delays in providing analytical reports and accepting payments. Practically all of them highlighted the high costing of testing facilities offered by the ITI in comparison to other analytical service providers.

On a comparative basis there is no proper mechanism to respond to issues of the external environment in planning new research projects in R&D divisions. Also the number of R&D projects successfully completed and commercialized during the review period are not adequate and not commensurate with the facilities available in the ITI. (see later)

Since one of the mandated tasks of ITI is to conduct research for rapid industrialization of Sri Lanka, it is the well-considered opinion of the review team that ITI should conduct an annual stake holders meeting / workshop with industrialists, relevant government institutions and chambers of commerce with a view to collecting information of industrial needs for R& D while highlighting the facilities available at ITI. This was also the view of the Stake holders.

3.2 Planning S&T / R&D Programmes and Practices

The Science and Technology and Research and development projects in ITI are initiated by the team leader of the project (Project origin was described earlier) and go through the senior management team and finally forwarded for the approval of the director. There is a clear formal mechanism of programme design and approval in the ITI. Also there are provisions to incorporate foreign collaborations, private sector partners and outside experts in planning and developing S&T and R&D projects.

According to SER all project proposals are supposed to be approved by the Director ITI with the recommendation of research and development advisory and monitoring committee prior to submission to funding bodies.

However there was no actual documentary evidence to verify this procedure, since specific project proposals or its details were not available to the review team. Also the composition and the functions of advisory and monitoring evaluation committee are not documented in any of the literature provided to us.

The reviewers unequivocally acknowledge that the ITI, possess an excellent infrastructure, facilities buildings, modern analytical equipment, a good library and information service and well qualified scientific staff to fulfill the mandate given by the act.

3.3 Project Management and Maintenance of Quality

The information provided to us in SER states that all project proposals are expected to fall within the framework of the corporate plan in compliance with the guidelines for economic development and that all aspects of the project are reviewed by a senior management team.

The team noted that quality assurance programmes are in place to ensure the credibility of laboratory procedures, maintenance and test results by maintaining accreditation by SLAB under ISO 9000 standard and by SWEDAC under ISO 17025 standard.

However, there is no indication in the SER or in other documentary sources of any information on regular monitoring procedure and evaluation, which ensures project management and the quality of research. The review team strongly felt that the progress of ongoing projects must be examined regularly, to maintain quality and applicability of outputs. The reviewers strongly felt this procedure should involve participation of external evaluators, along with the internal team of experts.

3.4 Human Resource Management

There are discrepancies in the statistics of Human Resources; the number of employees and few other details recorded in the SER differ from those in the printed annual report of 2011.

However, the majority of the staff is in the research and development divisions and technical services divisions. According to the annual report chemical and microbiological laboratory is the largest division consisting of almost 38% of the total staff. Research staff consisted of 79 research officers and majority of them (56%) possess post graduate qualifications.

The information on the approved cadre position in various categories of staff was not available in the documents provided to us. Therefore it was difficult to obtain an idea of the current number vacancies in their staff categories. All divisions had a multidisciplinary team of scientific staff. The qualifications and the expertise in staff categories, scientific and supporting staffs are adequate and applicable for a meaningful national development programme. The annual reports specifically highlight several areas of expertise for which ITI is recognized nationally. The newly established Biotechnology unit had the lowest number of qualified staff.

The SER indicated that there is a mechanism of short-term training of some categories of staff, locally or through overseas study tours / workshops /conferences. The review team was pleased to note that ITI implement a treasury approved performance based incentive scheme for its staff members. In addition research officers working on externally funded grants are eligible for a research allowance for their consultancy services.

The reviewers noted that the total number of scientific staff at various levels have slightly dropped from 2009 – 2011. Discussions with the staff indicated that many qualified scientists leave and that there is a problem of recruiting new qualified staff due to poor salary structure of the institute. Some other categories of staff at lower levels also expressed dissatisfaction regarding their salary structure.

The review team feels that if the ITI is planning to introduce new areas of modern technology, at least few members of the scientific staff must be trained at postgraduate level in appropriate reputed institutes overseas. This need is specially felt in areas like materials technical technology and newly established Biotechnology divisions.

While appreciating the existing intranet, the team noted tardiness in supplying information when asked for. It is possible that these delays are due to inefficiency of database handling, A well designed and maintained Management Information System could have supplied the data requested and such system will reduce delays and errors in administration and finance.

3.5 Organizational Assets

3.5.1 Infra-structure management

Information available to the review team in annual reports, SER and our own field visits in ITI premises, indicated that ITI possess a massive infrastructure in terms of buildings, laboratories equipment and information service. Discussion with the staff of the administrative division, laboratory visits indicated that the institution possesses an adequate mechanism for maintaining buildings, laboratory premises in excellent condition. In addition modern R & D complex including new laboratory buildings, auditorium administration building is being constructed in Malabe, according to the information given in SER and Annual Report.

The review team wishes to particularly mention that the ITI laboratories are well equipped with modern laboratory and analytical equipment maintained very well by its staff.

3.5.2 Fund Management

The department of Fund management comes under the deputy director administration and operations division. There is a separate finance manager generally in charge of activities of stores and supplies, according to the organizational structure chart in the corporate plan. Finance manager is responsible for preparing budget covering sectional financial requirements and has also contributed to the chapter dealing with finance in the corporate plan.

ITI receives treasury funds for capital and recurrent expenditure estimated at Rs.303 million in 2011. In addition it also earned from business activities, consulting and testing, around Rs. 157 million in 2011. It operates few foreign grants (Canada, India) and also receives specific research funds from local funding authorities like NSF and NRC.

Procedures of financial management are based on standard government procedures. Research project budgets prepared by R&D section are reviewed by a senior management team comprising the Director and additional director. It appeared that ITI fund management is satisfactory and all activities are carried out strictly in accordance with the procedure recommended by the Government Treasury.

3.5.3 Intellectual Property Management

Since one of the functions of ITI is developing new technology, intellectual property management is an essential activity. However this aspect was not documented in the SER or any other documents supplied to us. The institute has obtained several patents for their technologies. Therefore it is assumed that ITI is takes care of intellectually property management and has a mechanism to safeguard intellectual property rights.

3.6 Coordinating and integrating internal functions

These functions are usually achieved by regular statutory meetings, like Board of Management meeting, management committee meetings, directors meetings, ad-hock meetings, and discussions at different levels in any institutions. However no indications of such meetings were documented in the SER and no minutes/records of such meeting were available to the reviewers. But reviewers reliably understand that such meetings have been held in accordance with the organization structure chart provided in the SER. It is a common practice in reviews like this to note the functions at different levels and procedures adopted by institutes for coordinating and integrating internal functions, through minutes and records of statutory meetings of the institute. The review team noted that an excellent computer network facilities, both internet and intranet are available for co-ordination of some internal functions. A MIS as suggested earlier may alleviate some of these problems.

In additions it was also understood that scientific officers and clients in industry are well coordinated through the activities of information service centre (ISC)

3.7 Managing Information Dissemination and Partnerships

Management information and dissemination is basically a function of ISC, marketing division and individual R&D division. As we understood the information services centre has an information network through its membership to support business, industry, academics and research workers in the ITI and outside.

The publications, ITI bulletin and Sci -Tech brief offers latest's development in S&T to interested parties of the general public. ISC also has developed facilities to offer on-line library information to scientists and others through a membership.

ITI has a mechanism to publicize its capabilities and establish partnerships for R&D and business activity. The SER lists several such partnerships established with local public institutions, private institutions in Sri Lanka and foreign institutions. The Review team reliably understands that marketing team of ITI is closely associated with partnerships involved in National programmes, for organizing information dissemination through exhibitions etc. Some of the examples given in SER are 'Divinaguma' programmes and 'Vidatha' programmes. SER also lists several local inter-institutional and international partnerships established during the last few years.

The annual report of ITI lists many activities it has undertaken to disseminate information to general public, scientists and academics. They included several exhibitions held in Colombo and other parts of the country and publications on ITI services in news paper articles.

The reviewers are pleased that information management and dissemination aspect is well taken care of. The reviewers however cannot independently verify the effectiveness of information dissemination procedure. It is however advisable to carry out a survey of effectiveness of information dissemination through public media.

3.8 Monitoring and evaluation and reporting

A procedure for monitoring and evaluation of S&T and R&D activities has been mentioned in the presentation of the additional director R & D. It appears to be conducted by the team leader of the project according to ISO quality management system. A mechanism regular progress review of activities also has been mentioned in the presentation. The research projects are assessed by the funding agencies and the postgraduate work by the respective universities. However the extent to which the output of new products, technologies developed assessed was not evident in the presentation. The review team is of the opinion that the final evaluation of research, products developed or technologies developed must be done internally by a team consisting of internal scientists with the participation of externally appointed scientists and relevant industrialist before implementation. This will maintain the credibility, legal states of the ITI as well as stakeholders interests. It is suggested that present procedure of monitoring and evaluation of project output is modified accordingly to involve external evaluators.

The review team also feels that any new technology or products developed for human consumption or environmental applications must go through a safety evaluation for toxicity, allergenicity, intended objective (nutritional or therapeutic) or in case of an environmental application product, the impact of biodiversity health effect etc. Same precaution should be taken with development of medical equipment.

The analytical data regarding these must be presented to the National regulatory authority (if any) when their approval is sought. This specially applies for any product developed in Biotechnology Food technology and herbal technology.

3.9 Strategic planning

The Review Manual refers in many places to " Strategic planning " The team had access to the current Corporate plan and annual reports for years 2009 – 2011. Strategic planning entails a milieu of formally described and linked activities such as preparation and implementation of action plans with time frames, progress monitoring and evaluation, analysis and corrective action and reporting. No documentary evidence on such a system were available to the team. It was also accepted that to run the organization at least an informal system may be in place. It is felt that ITI should analyze this situation carefully and bring the system up to date. It was also noted that science and technology sections, department etc has well run quality systems. ITI may extend the quality assurance activities other divisions as well.

4. Output Assessment

Annual reports, SER and several other documents indicated that all R&D sections and technical service divisions of ITI are engaged in research and development of new technologies and products. Some of these technology products and technologies have been transferred to private commercial

companies, institutes and government departments. Technology transfer highlights and product development highlights are colorfully illustrated in the annual report of 2011.

The SER provided us with the details of projects / programmes undertaken form 2009 – 2011 by all divisions of the ITI, which included the objectives, relevance of the project, the budget and the present states. The total number of projects handled during the period was 43, number of projects completed was 15, and the number of projects still in progress was 17.

A list of technologies developed in R&D projects by materials section and food technology. Section supplied to us, indicated that during 2009 – 2012, they handled 24 projects of which 12 have been completed, 12 projects are still in progress (not competed) and only 3 have been commercialized.

The reasons for non commercialization have been attributed to lack of partners, insufficient funding, and lack of proper marketing system.

Since one of the major functions ITI according to the act is to develop new technology and transfer technology to clients for commercialization, it may be worthwhile considering the shortcoming of project management, during project planning and monitoring.

The reviewers also would like to request the ITI, to look into the problems of non - completion of research, non – commercialization of research projects and technologies developed.

4.1 Technology Developed

Major research and development highlights of all divisions were described in the performance review presentation by the additional director. These included the following;

- Value addition to Rice
- Range of Rice based products
- Bamboo cultivation
- *Bacillus thuringiensis* for cabbage and vegetable pests
- Bottled welpenela
- Red clay based floor titles and shock resistant cookware.
- Synthesis of grapheme from graphite.
- Development of absorbent materials from banana fibers for feminine hygienic products and diapers.
- Development of rain guard sealant for rubber trees
- Low cost continuous flow solar reactor for purification of contaminated water
- Mosquito repellant
- DNA bar coding for branching Ceylon cinnamon
- Automated weather station for measurement of weather parameters
- Wind measurement and logging system
- Automated street lamp system
- Temperature Humidity Data logger
- Auto flushing system for urinals.
- Land slide early warning system

4.2 Technologies transferred to industry / state

ITI has played an important role in developing certain technologies and transferring them to national institutes and some commercial institutes, industry and SME s. Every R&D section and Technical divisions has contributed to technological transfer.

Some of the examples of technology transferred to industry listed in the SER, annual reports and oral presentations were as follows;

- Dry and wet formula for sea bass
- Bt mosquito control
- RTS Beverage from *Garcinia cambogia*
- Lime blast – sports drink
- "MassaK – NP" Natural insecticide
- Kotalahimbutu biscuit
- Automated Rain gauge
- KASPER technology
- Cinnamon based products

However the review did not visit any industry which use the above technologies or products and are unable to assess the level of commercialization of products or extent of use of technology developed. The only sources of information the review team had were annual reports, SER and discussions with staff .We also felt that ITI should maintain a display cell in the premises to show products developed and technology developed; for public or visitors and also carry out an appropriate market survey.

4.3 Information dissemination / Extension

The ITE marketing team, ISC and individual R&D divisions functions in information dissemination and extension services. ITI marketing team appears to work closely with the Ministry of Research and Technology participates in 'Vidatha' programme.

The annual report of ITI and SER describe many activities it has undertaken to disseminate information to general public. It has received publicity for its activities through electronic media and print media through several releases for participating in 13 exhibitions including "Deyata Kirula" and 'Devinaguma'. It has also published several books and media articles in local newspapers, mainly in English medium, but not much in Sinhala and Tamil. Since the majority of students study science either in Sinhala or Tamil, it is important that these publications aimed at the emerging youth be published in Sinhala and Tamil.

The review team would like to see more vigorous programmes of publicity and advertise their capability of services facilities available to increase public awareness.

4.4 Research Publication and patents

The presentation of the additional Director R&D of ITI listed a total of 43 research publications in refereed journal, co-authored by ITI staff members. The majority of the publications were from Food Technology and Herbal Technology divisions. There were no details about patents in the SER.

4.5 Services provided to outside organizations

The ITI through its expertise and well equipped laboratories has provided several services to industries, government institutes. The ITI possess SLAB and SWEDAC accredited laboratory services (ISO 17025) for chemical analysis, microbiological analysis, Industrial Metrology and, sound and vibration measurements. It is said to be capable of performing a total of 117 analytical parameters for water, wastewater, pesticide residues food and fertilizer. The SER indicates that in 2011 alone about 7300 technical reports on such analysis have been issued to clients. In addition materials laboratory also has been recognized for material testing, The Electro-technical laboratory carries out SLAB accredited noise pollution testing / noise level monitoring while Industrial metrology

laboratory provides SWEDAC accredited calibration services for mass, volume, temperature and electrical quantities.

ITI also offers consultancy services in many areas of its expertise to industries and government departments. Analysis of Arsenic in rice, Arsenic and Mercury in imported pesticide for Sri Lanka customs are two significant examples of ITI contribution to solving national issues.

In addition it offers a variety of extension services to support government's quest to uplift the rural economy, by training rural people (Gamata Thakshanaya) in the preparation of rice based products, Kithul tapping technology, medicinal plant cultivation through Vidatha resource centers. ITI takes an active role in certain Divinaguma programmes coordinated by Ministry of traditional industries and enterprise development.

Several training programmes provided to industries, laboratories and scientists in Sri Lanka and overseas clients have been listed in the annual report of 2011. There have been over 40 such training programmes conducted during 2011.

The SER lists several other services offered by ITI such as accreditation of laboratories calibration of instruments and repair of specific instruments.

4.6 Training of staff local and Foreign

The details of training given to ITI staff either in local institutions or foreign institutions are not given in the SER. The specific areas of training postgraduate qualified staff were not available to the review team. Page 18 of the SER contains a summary of staff training given to staff from 2009-2011. A projected plan of training personnel of ITI on specifically identified areas of science and technology anticipated for future development was not available.

A total of 17 staff members have been given training at Postgraduate level, but it does not indicate whether they are trained at Masters Degree level or Ph D level.

The SER also lists short term training, study tours given to staff members. In the absence of details of specific 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 training in specific areas must be developed especially foreign training in new areas of technology for Materials Technology Industrial Metrology, Electro-technology, Environment Technology and Biotechnology.

4.7 Productivity of the institution based on output and S&T staff strength

The ITI has a qualified S&T and supporting staff with a hierarchal organization structure with inbuilt management information flow system, enviable infrastructural facilities, buildings, ample space, very well equipped laboratories containing modern equipment. The reviewers noted that ITI carries out all the mandatory functions stipulated in the Science and Technology Act to support the industry. The evidence for these functions are documented in SER and illustrated in the annual reports of

2009 to 2011. The reviewers are pleased to note that ITI has implemented its mandate in a satisfactory manner.

Productivity is a ratio of output/input in production (production of technologies or production of new products) and measures the efficiency of production which involves monitory considerations. The SER, annual reports and other documents available to us indicated that S&T staff has undertaken several R&D projects which resulted in the production of new products and technologies. However there was no information or evidence on the extent of use of such products in the industry, their marketability monitory benefits received by the ITI. Some technologies mentioned in the SER have not been commercialized due to various reasons. In terms of the number of products and the technologies developed the ITI teams have worked very hard to keep its mandate. But the absence of information on market surveys of the developed products and the level of applicability of technologies developed in Sri Lanka are constraints faced by the review team in arriving at a judgment of productivity. The object of creating the ITI in 1998 at been to elevate the level of technology of Sri Lanka to the level required for rapid industrialization. The services rendered by different laboratories of the technical services divisions are quite impressive. This includes technical services, chemical analysis, issuing of test reports, metrological calibrations and consultancies offered to industries, government departments and ministries. With the data available to the team, it cannot come to a similar conclusion in the case of R and D activities.

The ITI has also fulfilled its mandate by training persons in areas relative to relevant divisions and participated in disseminating low cost technological innovations via national level exhibitions and collaborating with government departments in surveying monitoring of environmental pollutions and environmental disasters.

The present achievement of ITI in terms of their mandate is moderate considering the threats outlined in the SWOT analysis given in the SER. These threats are considerably influence a country like Sri Lanka. The threats sited are low level investments in Sri Lankan industries, free availability of R&D knowledge from foreign sources apathy of industries to adopt high intensity technology. The SER itself admits that the overall productivity is below the optimum due to variety of reasons. The review team totally endorses the constraints and the conclusions mentioned in the SWOT analysis of SER of the institute.

Appendix 1

Appendix 2

Review of Industrial Technology Institute

- **24th April 2013** - First meeting held at NASTEC

- **22nd May 2013 -** visit to ITI

  Meeting with Director and senior officers
  Visit to Food technology Division + Herbal Technology Division
  + Industrial Meteorology Laboratory + Electro- technology Laboratory

- **13th June 2013** - visit to ITI
  Administration and Operations Divisions
  Human resource department
  Finance department
  Marketing and Busines development department
  Internal Audit department
  Meeting with Board of Management
  Meeting with union representatives

- **25th June 2013** - visit to ITI
  Chemical and Microbiology Laboratory + Biotechnology unit
  + Materials Technology Division + Environmental Technology Division
  + Materials Laboratory + Information services Centre

- **25th July 2013** - Stake-holders meeting
  visit to Engineering services division + Quality Assurance Department

  Meeting with the Director, ITI

Appendix 3

Board of Governors