

Development of Appropriate Technology Based SMEs in Bangladesh: Role of Bangladesh Council of Scientific and Industrial Research (BCSIR)

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Abstract

This paper highlights and assesses the role of Bangladesh Council of Scientific and Industrial Research (BCSIR) in exploring the small and medium enterprises (SMEs) in our country. BCSIR, as the prime public research organization is obligated to perform scientific and technological research works to explore industrial development. In tune with the objective, so far BCSIR has contributed to boost up appropriate technology based SME sectors to some extent. However this contribution is not significant and the motto with which it started its mission has not yet been fulfilled to the fullest extent. It could have done further provided adequate R&D allocation on one hand and magnanimous support from the entrepreneurs on the other hand.

Keywords: Appropriate technology, SME, BCSIR, R&D.

1. Introduction

In this 21st century small and medium enterprises (SMEs) particularly stapled with need based appropriate technology have occupied the front line in controlling the lively economy of developing countries. Appropriate technology based SMEs can easily penetrate into local market to accelerate the economy by speedy but low-cost employment generation, lucrative revenue earnings as well as controlling export and trade. Indeed being the prime driver of long-term sustainable escalation of socio-economic condition, SMEs globally have emerged as an obligatory component of the supply chain in all key industrial sectors.

Bangladesh as a developing country is striving to turn into a middle income country through underpinning a healthy economic base by 2021, the 50th

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anniversary of our independence. However to achieve this target, certainly the role of appropriate technology oriented demand based SME sectors is pivotal. Because such SMEs have grasp the steering of “rapid and sustainable industrialization” placed in *musical chair of amplifying economy* and always being replaced by latest innovations. In the perspective of Bangladesh there is no other substitute but exploring SMEs based on appropriate technology. Although SMEs of this category need lower capital investments but generate significant work opportunities particularly for young generation and female workers. However, lack of proper access to appropriate technology is one of the hindrances for sustainable development of SMEs in our country and to overcome this obstacle, being the largest multi-disciplinary government research organization Bangladesh Council of Scientific and Industrial Research (BCSIR) is always marching forward. Indeed, BCSIR is playing a crucial role in the country’s industrial development by promoting and commercializing research and technology.

2. Role of BCSIR in exploring SMEs

2.1 Functions of BCSIR

BCSIR commenced its’ magnificent journey as the “East Regional Laboratories” of PCSIR (Pakistan Council of Scientific and Industrial Research) in January 1955 and since commencement BCSIR is being engaged in performing scientific and technological research works with the aim to achieve self-reliance in industrial development. Indeed, BCSIR is mandated to execute scientific and industrial *research and development (R&D)* programmes to expedite the socio-economic development of the country providing services to the: (i) society; (ii) industry; and (iii) entrepreneurs, SMEs. In tune with this mandate, R&D programmes of BCSIR are always being emphasized on the following focused objectives:

- i) Development of marketable products from indigenous resources with a view to substitute currently imported products and promoting exports.
- ii) Development of indigenous technology suited to our environment by adaptation and assimilation of imported technology.
- iii) Promote and assist national industrial development by providing technical services and scientific inputs to industrial enterprises.

However, keeping the above mentioned mandates in mind BCSIR is mostly performing applied R&D programmes concerning with the development of

technologies related to the industries as well as useful to the current needs of the country. Prioritizing the socio-economic condition, BCSIR always pays attention on developing appropriate technology with a motive to assist and explore SMEs. Thus the key issues considered for choosing R&D projects are:

- i) National demand and market acceptability;
- ii) Feasibility (technical, schedule, economic and operational);
- iii) Utilization of local resources and raw materials;
- iv) Expected outcome and output;
- v) Suitability for the establishment of SME’s; and
- vi) Competitive sustainability

In order to fulfill the demand of time BCSIR has expanded its domain and aiming to be self-reliance in industrialization, nine full-fledged research units of BCSIR are performing R&D projects in various emerging fields of science and technology. Since, techno-economic feasibility study is the prerequisite for any industrial process to be commercialized; BCSIR has also established a “Pilot Plant and Process Development Centre (PP & PDC)” to conduct the techno-economic feasibility study of the processes developed by different units of BCSIR. Thus, the entire effort of BCSIR blends both the innovation and commercialization of developed technologies toward the successful establishment of sustainable SMEs.

2.2 Execution of applied R&D projects for product or technology development

Materialization of a R&D project to a successful end is not so easy as the entire procedure is a collective form of many individual steps. Nevertheless to materialize any R&D project successfully, BCSIR usually collates various steps starting from project selection to execution for desired product or technology development as sketched in Figure 1.

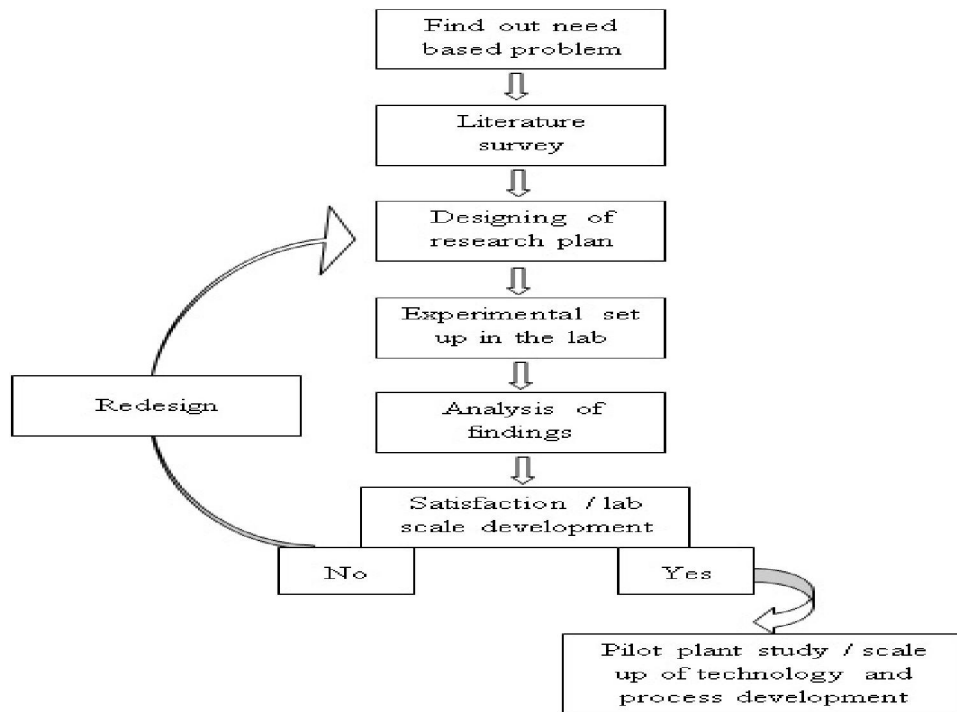


Fig. 1 Execution of applied R&D projects en route for technology development

The success of any R&D project is measured in terms of its output and outcome; *i.e.* nos. of processes developed, patents registered as well as scientific publications have been set as accountable criteria on one hand while on the other hand successful commercialization of developed processes is also considered. Hence aiming the establishment of SMEs, economic feasibility, technical feasibility, operational feasibility etc. get top priority to assess a developed process. Nonetheless, as break-even point (BEP), payback period, internal rate of return (IRR), net present value (NPV) and profit volume ratio (PV ratio) etc. act as the key norms for a process to be commercialized as successful and sustainable one, these factors are taken into account while developing a process in BCSIR.

2.3 Commercialization of developed technologies or processes to explore SMEs

Successful commercialization is one of the *key performance indicators* (KPI) to assess the contribution of BCSIR particularly in accelerating the economy and

BCSIR is obligated to stimulate industrialization in the country; so it is imperative to publicize the developed technologies crossing the boundary of BCSIR. In order to disseminate and commercialize developed R&D outputs to local entrepreneurs as well as to prop up the establishment of new entrepreneurship an open bid system is offered by BCSIR. Such an open bid system has merits of many folds; *e.g.* (i) it helps BCSIR to lease out developed process in a transparent way; (ii) a significant number of entrepreneurs get opportunity to participate in the bid; and (iii) it encourages a competitive market to be flourished. So far BCSIR has developed about 950 processes and among them about 390 processes have been leased out for commercialization which have directly contributed the establishment of SMEs and offered huge employment opportunities. Some of the important processes which have already been commercialized by local entrepreneurs to explore SMEs are:

- i. Brake oil.
- ii. Portable fibre glass biogas digester.
- iii. Fire extinguisher.
- iv. Spirulina as food supplement.
- v. Water filter
- vi. Oral saline
- vii. Iodized table salt
- viii. Soybean oil
- ix. Diabetic sweets and biscuits
- x. Anti diabetic herbal tea
- xi. Soy protein biscuit

It should be mentioned here that BCSIR transport pool as well as the government transport pool is using the developed brake oil which is of international standard. However, during the last 10 years 234 lessees came forward to join their hands with BCSIR in commercializing the developed processes and thus over this period BCSIR contributed to generate revenue of 1.6 million BDT. A pictorial representation as illustrated in Figure 2 portrays the percentage of BCSIR lessees/entrepreneurs during this phase.

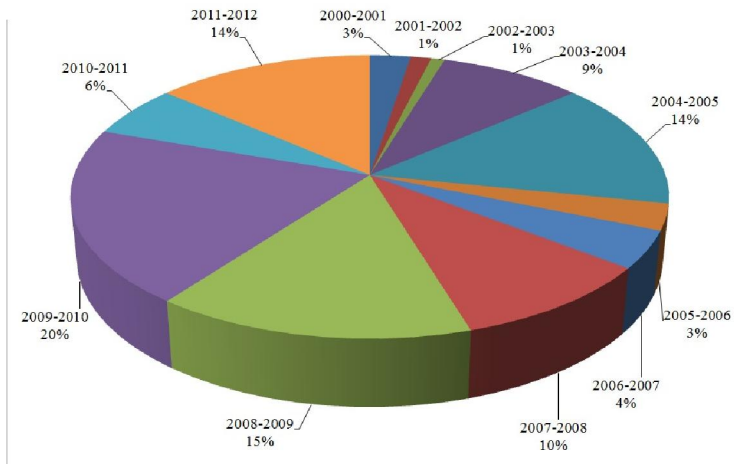


Fig. 2. Percentage of lessees / entrepreneurs involved in commercializing the developed processes of BCSIR during the period 2000 – 2012.

However, still BCSIR has about 560 processes in its credit which are ready to be leased out for commercialization and among these processes some important ones are:

- i. Ceramic stain (royal blue, pink, red-brown, green and black).
- ii. Dual-fuel engine for irrigation purpose.
- iii. Improved cooking stove.
- iv. Arsenic removal filter.
- v. Arsenic detection kit.
- vi. Low cost transparent glaze for pottery.
- vii. Chrome free tanning process.
- viii. Formalin detection kit.
- ix. Insulating brick from rice husk ash.
- x. Bio-ceramic material.
- xi. Diabetic shoe
- xii. Urea formaldehyde resin.
- xiii. Super saver dim-light.
- xiv. Energy efficient and energy saving building brick.
- xv. Water proof wood varnish

2.5 Contribution of BCSIR in exploring SMEs – SWOT analysis

Being the largest public research organization BCSIR is authorized to endorse industrialization through scientific and technological development and so far BCSIR has contributed to boost up appropriate technology based SME sectors to some extent. However this contribution is not significant and the motto with which it started its mission has not yet been fulfilled to the fullest extent. It could have done further provided adequate R&D allocation on one hand and magnanimous support from the entrepreneurs in developing local technologies on the other hand. It should be mentioned here that in several cases though the developed processes have significant merits but successful industrialization faces hindrance and even subsidy is being offered to disseminate them.

However, following SWOT (strength, weakness, opportunities and threat) analysis sketches a pen picture of R&D involvement and innovation scenario of BCSIR.

<u>Elements</u>	<u>Indicators</u>
(i) Strengths	<ul style="list-style-type: none"> • Competitive human resource • Technical efficiency and expertise • Significant number of developed processes in credit
(ii) Weaknesses	<ul style="list-style-type: none"> • Lack of proper dissemination of developed technologies
(iii) Opportunities	<ul style="list-style-type: none"> • Cultivate new and emerging technologies for the expansion of SMEs • Create competition in local market • Create job opportunities • Explore cost-effective technologies as import substitute • Accelerate country's economy
(iv) Threats	<ul style="list-style-type: none"> • Conflict of interest • Aggressive competition

It is clearly evident from this SWOT analysis that the strengths and opportunities related with the R&D innovations are in favourable position for industrialization by exploring SMEs and this could be materialized to a considerable extent with the openhanded support particularly from the entrepreneurs who would minimize the weaknesses and threats.

3. Conclusion

BCSIR is habitually performing scientific and technological R&D works particularly giving emphasis on appropriate technology to explore industrialization /SMEs which will ultimately foster economic development at national level. Since inception, BCSIR has a good number of developed processes in its credit which offers significant opportunities for potential development of SMEs. On the other hand, with the ever increasing global competitiveness, entrepreneurs are also facing intense pressure to augment economic development as well as profitability which could be achieved through the application of new and innovative technologies. So a mutual fusion of both parties (BCSIR & SMEs) mission and objectives can certainly contribute in sustainable industrialization and thus such an attempt will be a cornerstone to fortify our economy in this global competition and we are eagerly looking forward to that.