



GLOBAL JOURNAL OF RESEARCHES IN ENGINEERING: J
GENERAL ENGINEERING
Volume 22 Issue 2 Version 1.0 Year 2022
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4596 & Print ISSN: 0975-5861

Analysis of Trending Hi-Tech and Software Industry in Bangladesh

By Norottom Paul

Abstract- Hi-Tech/Software Technology parks are being developed in many countries to create an efficient work environment for knowledge based industrial development. Major aim of these technology parks is to attract foreign companies to set up operations and to transfer the indigenous technological capability for the development of the local industries. The aim of this work is to find out factors that influence technology park development and a suitable strategic framework for successful implementation of Hi-Tech (HTP) and Software Technology Park (STP) in Bangladesh. For this study Analytic Hierarchy Process is applied as a Multi-Criteria Decision-Making Method (MCDM) which is a technology assessment tool. The assessment has been conducted by considering infrastructure, strategic & business support & governance as criteria and basic facility, digital facility, social facility, research & strategic facility, industrial chain & innovation facility, capacity development, policy support, operational modality, and park management as sub criteria. IBM SPSS (Statistical Package for the Social Sciences) software also used for identifying the key variables.

Keywords: *hi-tech park, software technology park, technology park, multi-criteria decision-making method (MCDM).*

GJRE-J Classification: *DDC Code: 005.1 LCC Code: QA76.76.D47*



Strictly as per the compliance and regulations of:



Analysis of Trending Hi-Tech and Software Industry in Bangladesh

Norottom Paul

Abstract- Hi-Tech/Software Technology parks are being developed in many countries to create an efficient work environment for knowledge based industrial development. Major aim of these technology parks is to attract foreign companies to set up operations and to transfer the indigenous technological capability for the development of the local industries. The aim of this work is to find out factors that influence technology park development and a suitable strategic framework for successful implementation of Hi-Tech (HTP) and Software Technology Park (STP) in Bangladesh. For this study Analytic Hierarchy Process is applied as a Multi-Criteria Decision-Making Method (MCDM) which is a technology assessment tool. The assessment has been conducted by considering infrastructure, strategic & business support & governance as criteria and basic facility, digital facility, social facility, research & strategic facility, industrial chain & innovation facility, capacity development, policy support, operational modality, and park management as sub criteria. IBM SPSS (Statistical Package for the Social Sciences) software also used for identifying the key variables. At the end operational modality-based process is suggested for HTP/STP development.

Keywords: hi-tech park, software technology park, technology park, multi-criteria decision-making method (MCDM).

I. INTRODUCTION

Knowledge-based industries, particularly related to information technology have been recognized as the top priority sector by countries making transition from agro-industrial economy to information economy. Hi-Tech/Software Technology parks are being developed in different countries, both developed and developing, to provide a range of infrastructure and administrative support services to create an efficient work environment for development of IT/ITES enabled industry [1,2].

Considering the world trends, Bangladesh has also recognized that new directions must be set for the future prosperity of the country. Information technology has been identified as a "thrust sector" for the economy of Bangladesh. Strategic plans have been prepared to enable Bangladesh to embrace the information age and to become an important player in the global market in information and other high technology sectors. The Government of Bangladesh has declared *Vision 2021* with a target to transform Bangladesh into Digital

Author: Bangladesh Hi-Tech Park Authority (BHPTA), ICT Division, ICT Tower, Agargaon, Dhaka. e-mail: norottom@gmail.com

Bangladesh [3]. Government has taken initiative to established Hi-Tech/Software Technology Parks around the country to ensure knowledge-based industry.

II. ELEMENTS OF TECHNOLOGY PARKS

Technology parks need to provide wide ranges of services to the company or investors. As a result, it requires a mixed eco system to operate efficiently and effectively for the client in the park. It depends on a close linkage with knowledge-based partners to ensure technology transfer, commercialization, education, and training. Study suggests the following elements are very important for technology parks.

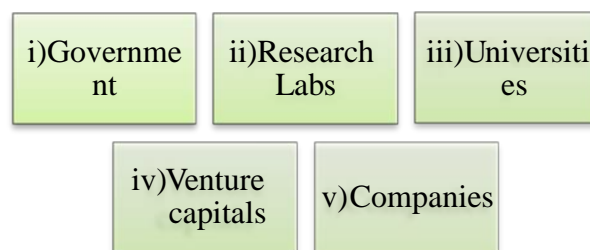


Figure 1: Basic elements of technology parks

III. STUDY OF TECHNOLOGY PARKS

Nations around the globe realized that innovation targets and transition economics requires appropriate technological infrastructures. Infrastructures that can add value to the society, can create employment, promote knowledge-based product with commercialization, transfer technology and ensure high return on investment. Technology Park is such an ecosystem. Nations understood the importance of knowledge industry for sustainable economic growth and commence for the establishment of technology park of different geographical scale. Many researchers studied the concept of technology park, its development history, working process, focus area, role & responsibility towards economic development, policy, R&D institution requirement and common services. Several models have been developed for technology park. However, technology park in developed country and developing country varies. Sometimes, it is seen that anchor tenants plays a vital role in developing country technology park [4].

Around the globe technology parks operates in various mode, i.e., Private, Government, Public-Private

partnership model, Mixed model (university, government, industry). Whatever the model is, research and development play a vital role for sustainability.

IV. TECHNOLOGY PARK BEST PRACTICES

During the last couple of decades, technology parks practices different firework for success. The success or failure varies region to region. Based on technology parks case study and various research available shows that for long term success, high quality infrastructure is important. Specialized business infrastructure for targeted group; knowledge intensive work force; collaboration with university and research institution; R&D; Technology Transfer Support; Incubation facilities; Innovation & Patent support; Product Commercialization; Marketing Assessment; Financial Incentives are the vital player for the success. It requires a mixed eco-system.

V. RESEARCH DESIGN

To achieve the objectives of the thesis work, four steps are followed. Initially related literature reviewed from journals, book, thesis etc. Then ongoing project site and completed project site were visited. After that survey questioner used to collect the data.

Various type of tools used to analyses the collected data and finally a frame work is developed. Tools and tetchiness are very essential to analyses values, attitudes, opinions, feelings, and behaviors of individuals and understand how these affect the overall research outcome. In this study few tools are used to analyses the data to draw the result. These tools are described in the following sections.

a) Analytical Hierarchy Process (AHP)

The mathematical formulation of the AHP has been well presented by Saaty in 1978. The AHP provides a means of decomposing the problem into a hierarchy of sub-problems which can more easily be comprehended and subjectively evaluated. The subjective evaluations are converted into numerical values and processed to rank each alternative on a numerical scale. The AHP uses hierarchical decision models, and it has a sound mathematical basis. A model is a representation of a phenomenon. It can be manipulated the model, either physically if it is a physical model, or mathematically in the case of hierarchical model, to discover the important influences. The methodology of the AHP can be explained in following in figure 2.

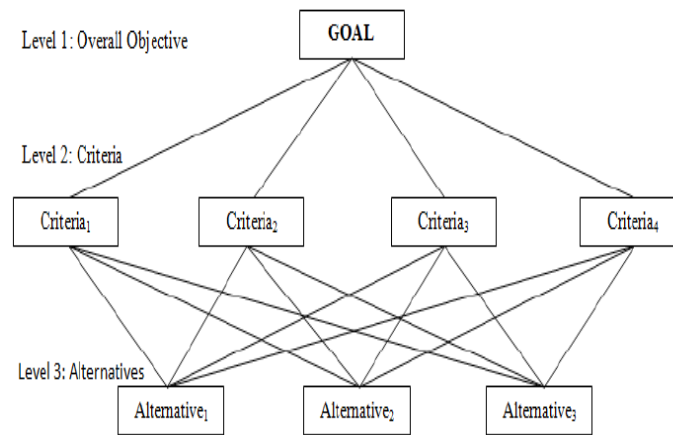


Figure 2: Generic hierarchic structure of AHP

This method used for both tangible and intangible factors analysis. for real world problems. again, mutual agreement can also be provided among decision makers prior to their final decision. Firstly, the alternatives, main and sub-criteria -if there is any- must be determined. In the next step the decision problem is modelled hierarchically by considering previously selected criteria. The decision-makers' judgments are collected through pairwise comparisons in the third step. In this step, the importance rankings of alternatives and criteria will be determined by analyzing these data which are obtained from these comparisons. Hence comparisons must be performed among these criteria and alternatives [5-7].

b) Questionnaires

Questionnaires is developed to collect expert's opinion for AHP analysis. The AHP technique is a widely used and accepted method for gathering data from respondents within their domain of expertise. The technique is designed as a group communication process which aims to achieve a convergence of opinion on a specific real-world issue. It has been used in various fields of study such as program planning, needs assessment, policy determination, and resource utilization to develop a full range of alternatives, explore or expose underlying assumptions, as well as correlate judgments on a topic spanning a wide range of disciplines. In this study seven experts are chosen for

selecting the criteria and sub criteria. The personal profile of expert panel is shown in table below. Based on the interviews and interaction of relevant experts, observation and literature review, modalities, criteria,

and sub-criteria are included in this study. Sample questionnaires for the criteria are shown below and details questionnaires are included in the annexure.

Table 1: List of Experts

SN	Designation	Overall Exp. (Years)	Relevant Exp. (Good, Better, Best)	Education Qualification	Organization
1	Expert-1	25+	Best	Masters	Government Officer
2	Expert-2	25+	Best	B.Sc. Engr.	
3	Expert-3	20+	Best	B.Sc. Engr.	
4	Expert-4	20+	Better	PhD	
5	Expert-5	20+	Better	PhD	Professor
6	Expert-6	30+	Best	Masters	Senior Consultant, Asian Development Bank
7	Expert-7	40+	Best	Masters	ICT Industry
8	Expert-8	20+	Best	PhD	Professor
9	Expert-9	8+	Good	PhD	Assistant Professor
10	Expert-10	30+	Best	Masters	Senior Consultant, Asian Development Bank
11	Expert-11	40+	Best	Masters	ICT Industry
12	Expert-12	30+	Good	Masters	ICT Industry

i. Questionnaires for Criteria

- Let given the frequency selection options, what is more important to you: Infrastructure (F1) or Governance (F2)?
- Let given the frequency selection options, what is more important to you: Infrastructure (F1) or Strategic & Business Facility (F3)?
- Let given the frequency selection options, what is more important to you: Governance (F2) or Strategic & Business Facility (F3)?

c) Main Attributes and their Sub-attributes

i. Infrastructure (main attributes)

Infrastructure is one of the most important parts for the development of HTP/STP. It is considered that within 2025 Bangladesh may require 20 million square feet buildup space for IT/ITEs sector. For HTP/STP infrastructures are considered in three way which are assumed as sub attributes i.e.,

a. Basic Facility (sub-attributes)

Land, working space, meeting room, auditorium/conference room, cafeteria; utility like generator, sub-station, HVAC, fire safety, 24/7 working environment, good connectivity etc.,

b. Digital Facility (sub-attributes)

Networking, security surveillance, lab facilities/lab equipment for rent, videoconference room, software-based utility billing system and paperless management etc.

c. Social Facility (sub-attributes)

Dormitory, banking services, shopping facility, gymnasium, recreation zone, health care, library, day care facility etc.

ii. Strategic and Business Support (main attributes)

Strategic and business support is required to create the eco-system. This is the major forces shaping the initial investment to success.

a. Industrial Chain and Enterprise Development (sub-attributes)

R&D facilities, industrial co-operation, international collaboration, university linkage, technology transfer center/ support etc.

b. Innovation and Strategic Facility (sub-attributes)

Incubation/start up development facilities, innovation & patent support service, product commercialization, marketing assessment, financial incentives, business development/mentorship etc.

c. Capacity and Market Development (sub-attributes)

Entrepreneurship development training, project and financial management, venture capital, co/shared workplace/workforce facility, seminar/symposium, professional membership, internship support, global standard certification support, need based on job training support, cyber security/latest technology support etc.

iii. Governance (main attributes)

a. Policy Support (sub-attributes)

b. Operational Modality (sub-attributes)

- Government
- Private
- Mixed Model
 - University-Industry
 - University-Govt.-Industry mixed type
 - Government- Industry

c. *Park Management (sub-attributes)*

- Administrative capability and employee structure
- Legal Service
- Social Service
- Innovation Culture development etc.

academic experts and professional experts are collected. The purposive sampling method is used. It is one where the sample is selected on need basis according to the specialization. The matrix of pair-wise comparisons depicts the intensities of expert's preference/importance. Geo metrics mean of the value of each pair wise comparison determined and then matrix is formed with respect to the goal [8-10].

VI. RESULT

To build the pair-wise comparison matrices for the main attributes and sub-attributes, opinion of

Table 2: Result of main attributes

Main Attributes	Weightage	Position
Infrastructure (F1)	0.469	1 st
Strategic & Business Support (F2)	0.433	2 nd
Governance (F3)	0.097	3 rd

Table 3: Result of sub-attributes

Main Attributes	Sub-Attributes	Weightage	Position
Infrastructure (F1)	Basic Facility (F1A1)	0.422	2 nd
	Digital Facility (F1A2)	0.501	1 st
	Social Facility (F1A3)	0.076	3 rd
Strategic & Business Support (F2)	Research & Strategic Facility (F2B1)	0.656	1 st
	Industrial Chain & Innovation Facility (F2B2)	0.253	2 nd
	Capacity Development (F2B3)	0.089	3 rd
Governance (F3)	Policy Support (F3C1)	0.279	2 nd
	Operational Modality (F3C2)	0.658	1 st
	Park Management (F3C3)	0.062	3 rd

VII. CONCLUSION

It been seen that, most of the initiatives are infrastructure focused rather than strategy based. After infrastructural initiatives, government is taking strong actions to establish business strategy. Many initiatives are seen around the country to support innovation and entrepreneurship. Government also trying to support new idea and products. But to make these steps and HTP/STP successful targeting successful institutionalization, operation modality shall be the most important variable. From the study the following process is proposed for the development of HTP/STP in Bangladesh [11].

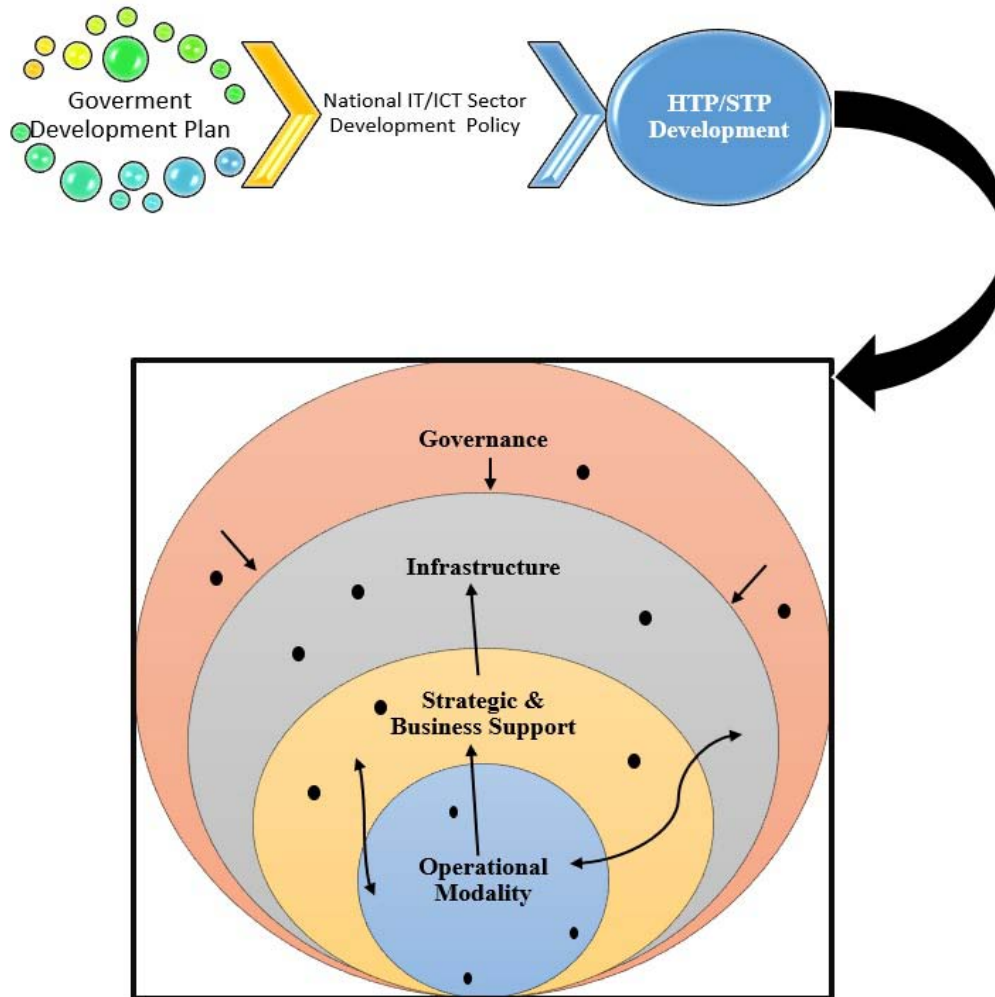


Figure 3: HTP/STP Development Process

REFERENCES RÉFÉRENCES REFERENCIAS

1. I. Stankovic, M. Gocic, S. Trajkovic., "Forming of Science and Technology Park as an Aspect of Civil Engineering", *Journal of Architecture and Civil Engineering*, Vol.7, PP. 57-64, 2009.
2. G. Vaidyanathan, "Technology parks in a developing country: the case of India", *The Journal of Technology Transfer*, Volume 33, Issue 3, pp 285–299, 2008.
3. Information and Communication Technology Division of Bangladesh, <http://ictd.gov.bd>, [Last access on 11 June 2019].
4. Bangladesh Hi-Tech Park Authority, <http://bhtpa.gov.bd>, [Last access on 01 June 2019].
5. A. D. Narasimhalu "Science and Technology Parks as an Open Valorization Catalyst", UNESCO-WTA Workshop on *Valorization: Tangible Benefits from STPs*, 14-16 November 2012.
6. A.K.M. Golam Baharul, "Technology Assessment By Applying Fuzzy Hierarchical Process For Priority Ranking of Different Power Generation Methods In Bangladesh", M.Sc. Thesis, Institute of Appropriate Technology, Bangladesh University of Engineering and Technology, 2016.
7. Eylem Koç and Hasan Arda Burhan, An Application of Analytic Hierarchy Process (AHP) in a Real-World Problem of Store Location Selection *Advances in Management & Applied Economics*, vol. 5, no.1, 2015, 41-50 ISSN: 1792-7544 (print version), 1792-7552(online) Scienpress Ltd, 2015.
8. Y. Wind and T.L. Saaty, Marketing applications of the analytic hierarchy process. *Management Science*, **26**(7), (1980), 641–658.
9. S. Mian, A. Fayolle and W. Lamine, "Building sustainable regional platforms for incubating science and technology businesses Evidence from US and French science and technology parks", *Journal of Entrepreneurship and Innovation*, Vol.13, pp 235–247, 2012.

10. United Nations Educational, Scientific, and Cultural Organization, <http://www.unesco.org>, [Last access on 06 June 2019].
11. S. Shaw, D. B. Grant and J. Mangan, "Developing environmental supply chain performance measures Benchmarking: An International" Journal Vol. 17 No. 3, pp. 320-339, 2010.

