

## Critical success factors of agri-business incubators and their impact on business performance

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### Abstract

The objective of the present study is to relate the critical success factors (CSFs) for agri-business incubation with business performance. The seven CSFs considered for agri-business incubation are: MI: Clear and Unambiguous mission; EE: Entry and Exit policy; NW: Networking Strategy; AS: Assessment process of the tenant in BI; FC: Facilities provided to tenant firms; SC: Services offered to the tenant firms; and MS: Manager's skill, experience and expertise. The data collected from 60 Business Incubations in India and PLS has been used for thorough analysis for the proposed model with relating Agri-business CSFs with Business performance. The results of Structural Equation modeling highlight that the outcome of business performance varies significantly with Facilities, Networking, and Services. Managerial Skills mediate between Assessment and Business Incubation performance. MI: Clear and Unambiguous mission has also emerged as significant CSF influencing BI performance in agri-business. Entry and Exit policy has a lower path coefficient, but it is significant. This study highlights that Entry and Exit policy needs to be improved, while services, networking and facilities may be enhanced for improving performance in Agri-Business.

### 1. Introduction

Technology entrepreneurship acts as a vehicle to facilitate individual, regional and national prosperity (Bailetti, 2012). The new, creative and small ventures play a vital role in the economic development of any region (Birley, 1986). Churchill and Lewis (1983) have proposed a five stage framework which new ventures go through before becoming a successful business entity. The stages are existence; survival; success; take-off; and resource maturity. The first stage i.e. existence or the start-up stage is considered as the most vital as it determines the true potentiality of the new business entity. Brooks (1986) opined that if extraneous factors like poor management, financial shortage, high overhead costs, responsible for early stage failure of small businesses are controlled or removed, the survival rate of such businesses will increase. He further mentioned that it will increase the employment and expand tax collection. Allen and McClusky (1990) elaborated the new business creator's role of a business incubator (BI).

For understanding entrepreneurship in the incubation process, Brooks (1986) has broken down new business formation into four distinct phases like business idea stage; attempt stage; development stage; and commercialization stage. Business Incubators (BIs) give proper structure and required credibility to new firms by managing controlled conditions to assist in the creation of new ventures (Smilor, 1987). Four components of BIs have received attention in previous researches (Aernoudt, 2004; Allen and McCluskey, 1990; Chan and Lau, 2005; Mian, 1996; Smilor, 1987; Lalkaka and Abetti, 1999).

- i. Shared office space, which is rented under favorable condition to incubators
- ii. Group of shared support service to reduce overhead costs
- iii. Professional business support or advice
- iv. Network provision, internal and/or external

Gartner (1990) provided a list of ten ingredients which are considered as very vital for starting and converting a start-up into a successful venture. They are as following:

- I. Land and other facilities' availability
- II. Competent and appropriate number of workforce availability
- III. Suitable and adequate financing
- IV. Accessibility to helpful input suppliers
- V. Local and national government support or absence of obstacles
- VI. Proximity of universities or research centers for assistance in research

- VII. Availability and access to proper transportation
- VIII. Local population support and participation
- IX. Availability of support services
- X. Low entry barriers.

O' Neal (2008) stated that all the above mentioned factors are important though the level of their importance may vary from business to business.

National Incubation Association (NBIA) considered 5 types of BIs. These are: Mixed use-47%; Technology- 37%; Manufacturing -7%; Service 6%; and Others- 4% (NBIA). Others include business incubators that are for web-related business, community revitalization program and simply other. Agri-Business incubators can be in the area of manufacturing or technology or service but the focus area is agri-business. BIs are also known with variety of names like "innovation center", "enterprise center," and "business and technology center" (Smilor, 1987). ABIs provide an attractive framework to new entrepreneurs associated with agri-business dealing with problems in establishing new firm. BIs can be considered as a solution for the difficulties that small and new firms encounter and they provide business support services (Smilor, 1987; Lalkaka and Abetti, 1999). This study is related with agri-business Incubation critical success factors and their influence on agri-business performance.

The present study has been taken with the following objectives:

O1: To determine the critical success factors (CSFs) for Agri-Business Incubation.

O2: To analyse the factors influencing Agri-Business Incubation performance.

O3: To find relationship between CSFs for Agri-Business Incubation and Business performance using SEM-Partial Least Square (PLS)

## **2. Review of Literature**

### **2.1. Critical success factors for agri-business incubation**

Hackett and Dilts (2004) covered the major areas that have created interest in the mind of the researchers regarding performance of the BIs. Incubators generally provide affordable work space, share facilities, counseling, training, information and access to external network for entrepreneurial groups, thereby helping promote venture creation and economic development (Allen and Rehman, 1985; Plosila and Allen, 1985; Campbell and Allen, 1987; Smilor and Gill, 1986). This focused assistance to new firms has increased their

chance of survival, providing benefits to the entrepreneur, enterprise, community and state (Lalkaka and Shaffer, 1999). According to Aernoudt (2002) the main objective of a BI is to produce new and successful firms that will leave the incubator financially viable and sustainable within a reasonable time.

An incubator should offer services such as hand-on management, access to finance (mainly through links with seed capital funds or business angels), legal advice, operational know-how and access to new markets in addition to provision of office space and common facilities (Aernoudt, 2004). BIs create a supportive environment conducive to the “birth” and development of new firms (Chan and Lau, 2005).

Incubator studies are mainly descriptive and mostly deal with varied concepts of BIs and their function (e.g. Allen, 1985; Allen and Leviru; 1986; Simlor and Gill Jr., 1986). These studies basically cover general requirements such as providing physical space i.e. building to house new small business, shared services including administrative services, business consulting service management assistance etc. (Merrifield, 1987). Technology developments encourage entrepreneurial talent; speed up the growth of new technology based firms (Campbell and Allen, 1987) and enhance the commercialization of technology (Brooks, 1986; Aernoudt, 2004).

Incubators hatch new ideas by providing new ventures with physical and intangible resources, speed up new ventures establishment and increase their chance of success (Tang, Baskaran, Pancholi & Muchie, 2011). Incubators assist in developing business and marketing plans, built management teams, obtain venture capital and provide access to professional and administrative services (Von Zedtwitz and Grimaldi, 2006). Counseling interaction with incubator management facilitates ventures to acquire business assistance, and networking interaction with incubator management assists in receiving technical assistance (Seillitoe and Chakrabarti, 2010). Matt and Tang (2010) elaborated on switching role from initial focus on basic facilities to value-added services and well defined incubation process.

Small and Medium Enterprises (SMEs) assist in job creation, yet many of these fail in the initial five years of operation (Stokes and Wilson, 2010). Highlighting the importance of BIs researchers have elaborated that BIs promote new business formation, prevent new venture failure and establish vibrant entrepreneurial sector (Berget and Norrman, 2008; Allen and Rehman, 1985; Gribaldi and Grandi, 2005; Ratinho et al., 2010). BIs provide an environment where public and private resources can combine to meet the needs of SMEs during their critical stages of development (Shalaby, 2009).

Literature on incubators can be broadly classified into two categories. First category deals with studies where researches focus on reasons, why incubators are formed, what are their aims and objectives and how they plan and manage their activities (Allen and McCluskey, 1990; Aeroudt, 2004; Becker and Gassmann, 2006). The second category focuses on measures to analyze the performance of the incubators. Akcomak (2009) and Lalkaka (2000) focused on addressing the deficiencies for improving BI performance. Kumar and Ravindran (2012) considered occupancy level, sustainability of the incubator, number of incubators in thousand sq. ft. and survival rate as essential factors for evaluating the performance of BIs.

The critical success factors as identified through literature and considered in the present study are:

- i. MI: Clear and Unambiguous Mission
- ii. EE: Entry and Exit policy
- iii. NW: Networking Strategy
- iv. AS: Assessment
- v. FC: Facilities
- vi. SC: Services assistance
- vii. MS: Manager's skill

## **2.2. Agri-business incubator Performance (ABI performance)**

Measuring the performance of any BI is very difficult yet essential (Sherman, 1999). As pointed by Phan et al. (2005) the basis on which the performance of a BI can be measured is not universally accepted. Campbell and Allen (1987) have proposed very comprehensive milestones as a measure of BI success.

This framework considers creation of consulting network and participation of financial intermediaries in tenant capitalization as important features for success. According to Lalkaka (1996) the performance of a BI should be measured essentially by the survival and growth of the businesses it incubates. Mian (1997) advocates sustainable growth and capability to provide required services. Simply locating in a BI does not assure success.

Vanderstraeten and Matthyssens (2010) use six criteria to compare the performance of various BIs. The criteria applied includes: average incubation time; share of start-ups; share of high-tech firms; client satisfaction; overall survival; employment growth after graduation. BIs are credited for the success of information technology boom in India, but the concept of

incubation is neither deep rooted nor properly exploited in India. In US from where it originated BIs are credited for entrepreneurial success. This study is an effort to analyse how it can be successfully applied in fostering entrepreneurial activities in India in agri-business.

### **2.3 Hypotheses Development**

#### **MI: Clear and unambiguous mission**

Clear and unambiguous Mission is taken as formative construct. ABIs need to have a Clear and unambiguous mission. The indicators of clear and unambiguous mission are: the mission statement of the incubator centre is clear and can be easily understood (Lalkaka and Bishop, 1996; Pals, 2006); the mission statement assists the manager in providing the right service mix to the tenants (Akcomak, 2009; Lalkaka,2000). The mission statement is vital for selection of tenant firms, entry-exit decision and their implementation (Lalkaka and Bishop,1996); and the mission statement aids the incubation centre acceptance in the community it is placed (Lalkaka and Bishop,1996; Hackett and Dilts, 2004). The related hypothesis is:

*H1: Clear and Unambiguous Mission influences ABI Performance.*

#### **EE: Entry and Exit Policy**

This is a formative construct related with ABI performance. The details are shown through table 1. The variable is formed by three indicators, EE11: Applicant's proposal potentiality, EE12: Admission & graduation policy and EE13: Post incubation scenario. According to Hackett and Dilts (2004) identifying the agri-business firms that are "weak-but-promising" and avoiding those that cannot be helped is an important task which affects the outcome of the incubation process. Berget and Norrman (2008) have stated that the entry and exit policy should focus on the potential of the proposal of the applicant, clear and well defined admission policy and once these firms graduate what is the condition outside BI. The same study also states that selection is a matter of criteria as well as matter of strictness in applying them. So the construct Entry and Exit policy is consist of factors like applicant's proposal potential, Admission and graduation policy and post incubation scenario.

**Table 1: Entry and exit policy**

<b>EE11: Applicant's proposal potentiality</b>	
The decision process begins with a staff review of applicant's growth potential.	Smilor, 1987; Hackett and Dilts, 2004; Totterman and Sten, 2005; Pals, 2006.
The decision process includes a staff review of applicant's Product Marketability.	Smilor, 1987; Hackett and Dilts, 2004; Totterman and Sten, 2005; Pals, 2006.
The decision process begins with a staff review of applicant's Application of new technologies	Totterman and Sten, 2005; Pals, 2006.
<b>EE12: Admission &amp; Graduation policy</b>	
The incubation centre has a formal policy for graduating tenant companies from the incubator	Hackett and Dilts, 2004; Smilor, 1987
The incubation centre has a formal policy for admitting tenant companies to the Incubator	Smilor, 1987; Berget and Norrman, 2008; Hackett and Dilts, 2004.
<b>EE13: Post incubation scenario</b>	
Suitable space is available to tenant companies outside the incubator after graduation	Lalkaka and Abetti, 1999.
Incubation centre continues to provide assistance to tenant companies even after graduation	Lalkaka, 2002; Totterman and Sten, 2005; Pals, 2006; Mian, 1994.
The related Hypothesis is:	

*H2: Entry and Exit Policy influences ABI Performance.*

## **NW: Networking**

Networking also may influence ABI performance. Networking is a formative construct with two factors viz. NW41: Networking Outcome and NW42 Networking Policy as depicted through Table 2. Brooks, (1986) opines that networking involves encouraging business relationships to develop; it leads to informal cross-fertilization of ideas; facilitate entrepreneurs to conquer isolation, and assists in lobbying for better business environment. Networks facilitate survival of new ventures and provide them with requisite information, knowledge, competence and know-how (Collinson and Gregson, 2003).

**Table 2: Networking**

<b>NW41: Networking outcome</b>	
Networking enhances funding prospect of incubator center.	Nohria and Eccles, 1992; Akcomak, 2006; Hansen, 2000.
The incubation centre has support from the local industry for its activities	Akomak, 2006; Hansen, 2000.
The incubation centre has a good understanding of industrial needs	Hansen, 2000; Nohria and Eccles, 1992.
The incubation centre shares information with other incubator on a regular basis	Suchman, 1995; Collinson and Gregson, 2003.
<b>NW42: Networking policy</b>	
Should the incubation centre adopt networking as deliberate strategy	Nohria and Eccles, 1992; Hansen et al., 2000.
Networking started late can affect the prospect of the incubation	Smilor, 1987; Nohria and Eccles, 1992.

centre

Adverse effect of excessive networking on secrecy was very high

Suchman, 1995; Collinson and Gregson, 2003.

The related hypothesis is:

*H3: Networking influences ABI Performance.*

### **FC: Facility**

Next critical factor considered for ABIs is Facility. The details are provided through Table 3. It becomes important to gauge whether the outcome of business performance vary significantly with Facilities. Literature supports that the type and extend of facilities provided by the BIs influences its performance. Physical supports like space for office, laboratory, telephone, photocopiers etc. are vital requirements and its proper allotment influences the outcome in the desirable manner. Different facilities like phone, fax machines, lab facilities etc are shared by tenants so money can be invested in other activities (Hackett and Dilts, 2004b; Chan and lau, 2005). The current study considers that every tenant firm is unique as far as the idea and facility requirement is considered.

**Table 3: Facilities**

The business incubation centre provides work space to tenant companies at below market rate rent.	Hackett & Dilts, 2004; Aernoudt, 2004; McAdam & McAdam 2008.
The incubation centre provides adequate communication facilities.	Hackett & Dilts, 2004; McAdam & McAdam 2008; Lalkaka, 2002.
Provides library facilities.	Pals, 2006; Hackett & Dilts, 2004; Aernoudt, 2004; McAdam & McAdam, 2008.
Provide laboratory facilities.	Lalkaka, 2002; Pals, 2006; Hackett & Dilts, 2004; Aernoudt, 2004; McAdam & McAdam, 2008.
The incubation centre provides high quality secretarial and legal services to tenant companies.	Berget and Norrman, 2008; Hackett & Dilts, 2004; McAdam & McAdam, 2008.

*H4: Facilities influence ABI Performance.*

### **SC: Services**

Services are a formative construct related with ABIs. It consists of four indicator items as shown in table 4. These are: SS71 Financial, informational & legal services; SS72: Cost & failure management services; SS73: Functional support services; and SS74: Technical services. As all these services are important thus services construct is a formative construct. The current study considers service requirement of tenant firms' influences BI performance. It is important to analyse whether the services affect ABI Performance significantly.



**Table 4: Services Provided**

<b>SS71: Financial, informational &amp; legal services</b>	
The business incubator disseminates information on business ideas.	Brooks Jr., 1986; Campbell et al., 1989; Allen, 1988; Smilor and Gill, 1986.
The incubation centre helps the tenant companies in securing capital.	Lalkaka, 2002; Lalkaka, 2002; Lendner and Dowling, 2003; Scaramuzzi, 2002.
The business incubation centre creates an environment where tenant companies learn from one another.	Berget and Norrman, 2008; Campbell et al. 1989; Allen, 1988; Smilor and Gill 1986.
The business incubator assists the tenant companies in obtaining statutory approvals.	Berget and Norrman, 2008; Bollingtoft & Ulhoi, 2005; Allen, 1988; Allen and Rahman, 1985; Smilor, 1987; Carayannis & vonZedtwitz, 2005; Becker & Gassmann, 2006; McAdam & McAdam, 2008.
Manager of the incubation center is able to monitor and assess performance of tenant companies.	Pals, 2006; Smilor and Gill, 1986; Allen and Rahman, 1985; Allen and McCluskey, 1990; Lalkaka 2002; Hannon, 2003; Mian, 1997.
Manager of the incubation center is technologically versatile.	Hackett and Dilts, 2004.
<b>SS72: Cost &amp; failure management services</b>	
The incubation centre reduces early stage operation costs by providing vital infrastructure	Berget and Norrman, 2008; Allen, 1988; Phan et al., 2005; Chan and Lau, 2005.
It minimizes the chances of failure of start-up firms.	Hackett and Dilts, 2004.
The business incubator provides business counseling to tenant companies.	Pals, 2006; Phan et al., 2005; Mian, 1997; Wiggis and Gibson, 2003.
It accelerates the development of new firms.	Lalkaka, 2002; Allen, 1988, Phan et al., 2005; Chan and Lau, 2005.
<b>SS73: Functional support services</b>	
The business incubator provides human resource management services	Lalkaka, 2002; Bollingtoft & Ulhoi, 2005; Carayannis & vonZedtwitz, 2005; Becker & Gassmann, 2006.
Provides required networking support.	Norhia et al., 1992; Hackett & Dilts, 2004, Nohria & Eccles, 1992.
It provides adequate marketing assistance	Bollingtoft & Ulhoi, 2005; Carayannis & vonZedtwitz, 2005; Becker & Gassmann, 2006; McAdam & McAdam, 2008; Abetti, 2004.
<b>SS74: Technical services</b>	
It provides good quality technical assistances.	Lalkaka, 2002; Hackett & Dilts, 2004; McAdam & McAdam, 2008
Assists the tenant companies in product development activities.	Bollingtoft & Ulhoi, 2005; Carayannis & vonZedtwitz, 2005; Becker & Gassmann, 2006; McAdam & McAdam, 2008.

The related hypothesis is:

*H5: Services influences ABI Performance.*

### **AS: Assessment**

Another CSF of ABIs is assessment. Assessment is also a formative construct composed of AS 51: assessing the level of satisfaction; and AS52: assessing requirements. It is assumed that adoption of proper assessment methods would drive ABI Performance. Assessment of tenant firms not only depends upon the business plan, but also on the skill of the managerial team. So manager's skill is taken as mediator between assessment and BI Performance.

## MS: Managerial skill

Managerial skill is another CSF related with ABIs. It is a formative construct consisting of MS81: Experience and efficiency of managers; and MS82: Functional Skills. The details are reflected in table 5. Selection of the tenant firm for the incubation process is carried out by the managerial team through certain process, designed and developed by them (Peter et al., 2004). Identifying the right candidate for the incubation process as they can be developed into a successful business depends on the ability of the managerial team (Hackett and Dilts, 2004). Business Incubator's performance not only depends upon the type of facilities provided to them, but also on how and when they are provided (Bhabra-Remedios and Cornelius, 2003).

**Table 5 :Managerial Skills**

<b>MS81: Experience and efficiency of managers</b>	
There is provision for periodic appraisal of managers and other staffs	Pals, 2006; Totterman & Sten, 2005; Lalkaka, 2002; Duff, 1987.
Manager have successful track record of working with start-up companies	Akcomak, 2009; Hannon, 2003; Studdard, 2006.
The manager of the business incubator should possess problem solving skill	Akcomak, 2009; Groen et. al., 2008; Pals, 2006.
Manager of the incubation centre is able to develop and maintain network.	Norhia et al., 1992; Bergek & Norrman, 2008; Hackett & Dilts, 2004; Nohria & Eccles, 1992.
The business incubator has well laid down criteria for selection of managers and staffs.	Pals, 2006; Hackett & Dilts, 2004; Lalkaka, 2002; Fry, 1987.
Manager of the incubation center is able to monitor and assess performance of tenant companies.	Akcomak, 2009; Hackett & Dilts,2004, Abetti, 2004; Campbell et al., 1989.
The manager of the business incubator possesses good interpersonal skill.	Pals, 2006; Rice, 2002; Hannon, 2003; Studdard, 2006.
<b>MS82: Functional Skills</b>	
Manager of the incubation center is technologically versatile.	OECD, 2010; Groen et al., 2008; Fukugawa, 2013.
The manager of the business incubator possess good marketing skill	OECD, 2010; Hannon 2003; Studdard, 2006; Abetti, 2004.
The manager is efficient in financial management.	Lalkaka, 2002; Hannon 2003; Studdard 2006.

The right combination of facilities and services offered to a tenant firm is determined by the managerial team who selects them for the incubation process and assess them periodically (Hackett and Dilts, 2004). Regular assessment of tenant by the management team helps to identify the actual support required by the tenant firm, which in future determines the outcome(Hackett and Dilts, 2004b; Aexts et. al., 2007; Akcomak, 2006). The manager's ability to carry out the assessment process is vital for the successful outcome. So

manager's skill influences the BI performance through his or her ability to assess the exact need of tenant firms and delivering them when required. Tailored, hand-on business advices is more productive and helpful as these types of advice and intervention by the management is embedded upon the assessment done by the BI managers (Aerts et al., 2007). The manager's ability and skill to assess the requirement of the tenant firm will impact the outcome of the new business entity. Thus, based on these viewpoints it is hypothesized that managerial skill mediates between assessment and BI Performance.

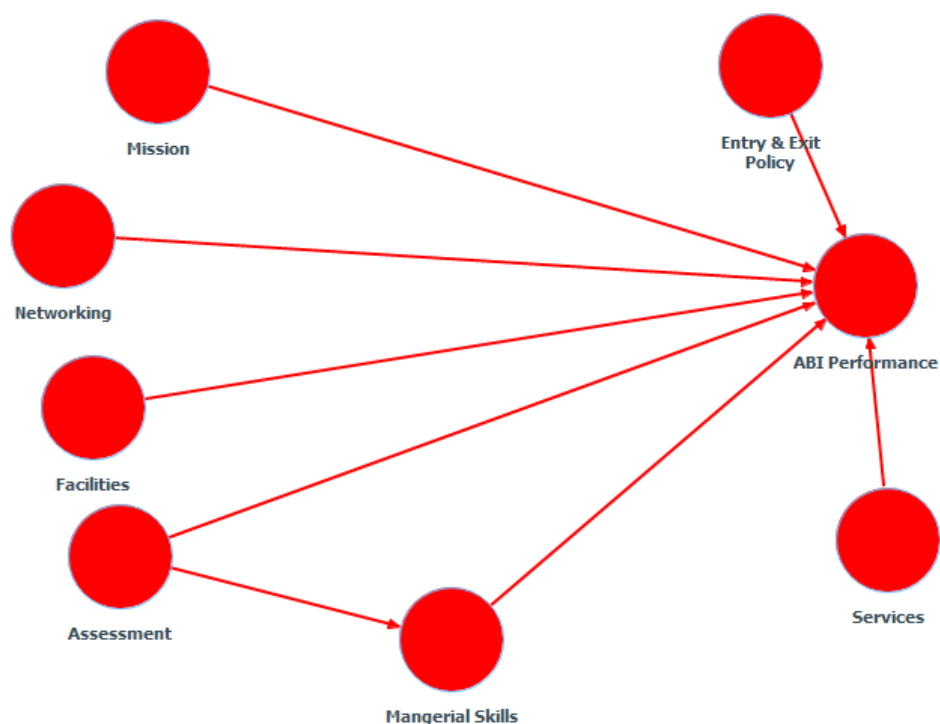
The next proposed hypothesis is:

*H6: Managerial Skills mediates between Assessment and ABI Performance.*

The present study used a structured questionnaire for collecting data from the incubators. The BI Managers and the managing staff were chosen as respondents. The questionnaire was five point Likert scale and it contains fifty seven questions dealing with different aspects of the study. In addition to these, there were few more to collect general information about the BIs pertaining to type of BI; Number of tenant firms admitted scenario, present status of number of firms and number of graduating firms.

#### **2.4 Designing a Strategic model relating critical success factors with Agri-business incubation performance and Hypotheses development**

The factors viz. MI: clear and unambiguous mission; EE: Entry and Exit policy, NW: Networking; AS: Assessment; FC: Facilities; SC: Services assistance; and MS: Manager's skill were taken as factors influencing BI Performance. BI performance is a reflective construct. The scale items for BI Performance covered had six factors. However three of these were dropped due to lower indicator scores. These are: BIs tenant firms admitted, Present firms scenario; and Graduating Firms Status. Thus the components of Business performance considered include: BI Profitably; BI Productivity and BIs Financial Viability (Lalkaka, 2002).



**Figure 1: Proposed Model**

In this study, we theorise that the outcome of ABI performance vary significantly with clear and unambiguous Mission, Entry and Exit policy, Networking, Services, Facilities, Assessment and Managerial Skills. The proposed model is shown in Figure 1.

### **3. Research Design and Methods**

#### **3.1 Target population and sample size covered**

The sample for the study was any business incubator indulging in agri-business, high tech sector, technology based service sector, information technology, manufacturing, and the biotech field or agri-biotech sector. Agriculture and Technology BIs from India were selected from information available on the websites of National Science & Technology Entrepreneurship Development Board (NSTEDB), Science & Technology Entrepreneurship Park (STEPS) and Network of Indian Agri-business incubators (NIABI). These organizations are recognized as true representative of BIs in India. They include both government funded as well as privately owned BIs in India. 120 BIs were identified, out of which 15 non active ABIs were eliminated. So in total 105 BIs were short listed for the study. Only 60 responses received were complete and being considered for the current study.

## ABI Performance

The scale items for BI Performance in reference to above explanation and as used in the current study are:

- i. BI Profitability (Hackett and Dilts, 2004; Pals, 2006; Mian, 1997)
- ii. BI Productivity (Hackett and Dilts, 2004; Pals, 2006; Mian, 1997)
- iii. BIs Financial Viability (Hackett and Dilts, 2004; Lalkaka, 2002)
- iv. BIs tenant firms' admitted scenario (Campbell and Allen, 1987).
- v. Present firms' status (Smilor, 1987; Mian, 1997).
- vi. Graduating Firms Status (Berget and Norrman, 2008; Campbell and Allen, 1987).

For the first three items of ABI performance, managers were asked to rate these on a scale of 1-5. For the last three, viz. ABIs tenant firms' admitted scenario; Survival Rates of Graduate Firms and Sustainability of present firms' data were available in numbers and they were converted to scale. To gauge business incubator performance they were rated on a scale of 1-5 on the basis of the number of tenant firms existing in the incubator. Business incubators having tenant firms between 1 -10, were rated 1, between 11-20 were rated as 2, 21-30 as 3, 31-40 as 4, and greater than 40 as 5. In the present study business incubators of different sizes were considered. This helped to gauge performance in terms of firms' sustainability of present firms. The numbers of tenant firm admitted in the incubators were also considered in the study. On a scale of 5 they were rated as 1 if the number of tenant firms was between 1-10, 2 between 11-20, 3 between 21-30, 4 between 31-40 and 5 for more than 40.

As the number of firms graduating from the business incubator is an important indicator of success for the incubators, in the current study this factor was also taken into consideration. The respondents were asked to mention the number of firms graduated from the business incubator. On the basis of number of firms graduated, the business incubators were classified. If the number of firms graduated from the incubator was between 1 to 5, it was categorized as 1, between 6 to 12 as 2 and 13-18 as 3, 19-24 as 4, greater than 24 as 5.

For overall reliability Cronbach alpha calculated through SPSS was used. The questionnaire was validated by experts and some questions were modified with suggestions from experts. The reliability of various constructs is given in Table 6.

**Table 6: Reliability of Questionnaire**

S. No.	Construct	No of Items	Cronbach's Alpha
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	Clear and Unambiguous mission	4	0.701
	Entry and Exit Policy	7	0.730
	Networking	7	0.701
	Assessment	7	0.858
	Facilities	5	0.794
	Services	15	0.827
	Managerial Skills	10	0.911
	Business Incubation Performance	6	0.703
	Total	57	

The dependent variable is ABI Performance. The independent variables are the CSFs for ABIs viz. MI: Clear and unambiguous mission; EE: Entry and exit policy; NW: Networking Strategy; AS: Assessment; FC: Facilities; SC: Services assistance and MS: Manager’s skill.

#### 4. Data Analyses

The study has used Structural equation modeling, partial least square (SEM-PLS) to analyse the relation amongst CSFs and ABI performance. This is represented in Section 4. The Composite Reliability of the BI Performance conducted through SEM-PLS is shown in table 7. It is 0.867 for ABI Performance. This is above the threshold value of 0.70. The Cronbach Alpha values are also greater than threshold value of 0.70 for BI performance. The AVE for ABI Performance is 0.686 and is higher than the critical threshold value of 0.50, lending support for the measures’ convergent validity. After having assessed the convergent validity, the next step was to assess the discriminant validity.

**Table 7: Reliability and Validity**

	Composite Reliability	Cronbach Alpha	AVE
<b>ABI Performance</b>	0.867	0.770	0.686

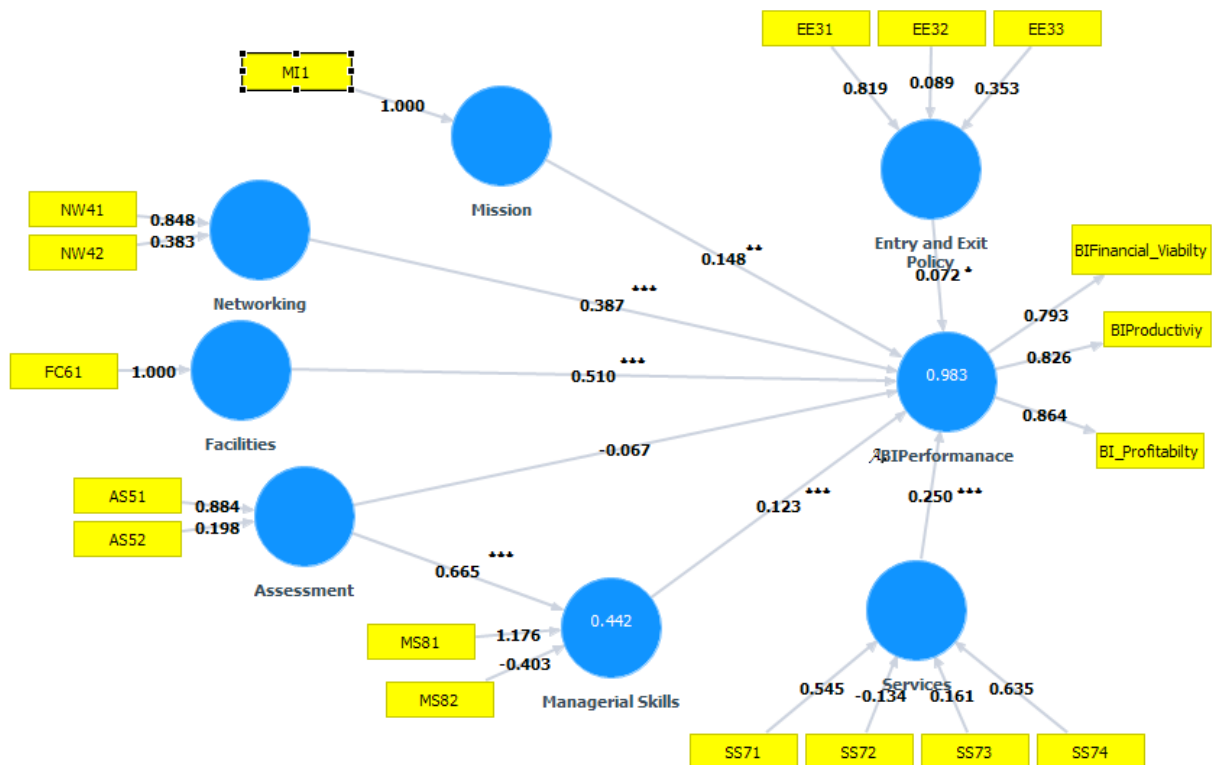
The next step was to check VIF values for Collinearity. All inner VIF values and Outer VIF values as shown through table 8 were below threshold level of 5.

**Table 8: Collinearity Statistic (VIF)**

Inner VIF Values	Outer VIF Values				
	ABI Performance		VIF		VIF
Assessment	4.536	AS51	1.356	MI1	1.000
ABI Performance		AS52	1.356	MS81	1.494
Entry and Exit Policy	2.346	BI Financial Viability	1.440	MS82	1.494
Facilities	1.949	BI Productivity	1.643	NW41	1.045
Managerial Skills	2.225	BI Profitability	1.779	NW42	1.045
Mission	2.687	EE31	1.233	SS71	2.128
Networking	2.559	EE32	1.213	SS72	1.237
Services	1.907	EE33	1.061	SS73	2.042
		FC61	1.000	SS74	1.178

### Structural Model Assessment

The next stage was to analyse the important CSFs. This was done through path analysis with PLS-SEM. The full PLS path model was assessed incorporating the combined effect of managerial skills as mediator between assessment and ABI performance. The results are shown through Figure 2 and table 9.



**Fig. 2: Structural Model**

Clear Mission F1 emerged significant factor Beta value of 0.148 (t-Statistics: 2.851, p-value<.01). As p-value is significant, hence, hypothesis *H1: clear and Unambiguous Mission influences ABI Performance* has been accepted.

Entry & Exit Policy influences Business Incubation Performance. Entry &Exit Policy emerged as an important CSF with low Beta value of 0.072 (t-Statistics: 2.049, p-value<.05). As p-value is significant, hence, hypothesis *H2: Entry & Exit Policy influences ABI Performance* has been accepted.

The next factor was networking. Networking also emerged as an important factor with path coefficient of 0.387 (t-value: 9.145) and the p-value is <0 .001. Thus the next hypothesis *H3: Networking influences ABI Performance* has been accepted.

Whether Facilities are related with BI Performance? Yes, Facilities emerged as the most important critical success factor with path coefficient is 0.510 (t-value: 11.400) and the p-value is <0 .001. Thus the hypothesis, *H4: Facilities influence ABI Performance* has been accepted.

The results indicate that the services also influence ABI Performance. The direct path coefficients 0.250 (t-statistics 8.732) and is highly significant (p<.001). Hence, hypothesis *H4: Services Performance influences ABI Performance* has been accepted.

The relation with Assessment on BI Performance was to be analysed. Here managerial skills were introduced as mediator as assessment with requisite managerial skills may improve BI Performance. Managerial skills emerge as a mediator between assessment and BI Performance. The indirect effect with path coefficients as 0.665(t-statistics: 11.572) and 0.123 (t-statistics: 3.806) were higher than direct effect of -0.067 and that too insignificant. The value of R<sup>2</sup> is 0.442 and adjusted R<sup>2</sup> is 0.433. Thus, the related hypothesis *H6 that managerial skills mediate between Assessment and ABI Performance* has been accepted.

**Table 9: Total effect**

	Original Sample (O)	Sample Mean (M)	Standard Error (STERR)	T Statistics ( O/STERR )	P Values
Assessment -> ABI Performance	-0.067	-0.053	0.052	1.293	0.197
Assessment -> Managerial Skills	0.665	0.667	0.057	11.572	0.000***
Entry and Exit Policy -> ABI	0.072	0.064	0.035	2.049	0.041*



Performance					
Facilities -> BI Performance	0.510	0.498	0.045	11.400	0.000***
Managerial Skills -> ABI Performance	0.123	0.125	0.032	3.806	0.000***
Mission ->ABI Performance	0.148	0.126	0.052	2.851	0.005**
Networking -> ABI Performance	0.387	0.383	0.042	9.145	0.000***
Services -> ABI Performance	0.250	0.243	0.029	8.732	0.000***

These results are indicative of the fact that all the critical success factors considered in the study influenced ABI Performance. Although the degree of influence varied and facilities emerged as strongest factor, followed by networking and services. Managerial skills mediated between Assessment and BI Performance. The lowest path coefficient was that of Entry and Exit, but even this was significant. Thus, the study highlights that the theorised model is good as these critical success factors explained 98.3% of variation with value of  $R^2$  as 0.983 and that of adjusted  $R^2$  as 0.979. These results are discussed in reference to other researchers in next section.

## 5. Discussion

Smilor (1987) identified ten factors for effective management of the incubator system which includes facilities to be offered, services and networking. In the present study also facilities, services and networking emerge as important factors causing variation in outcome of ABI Performance. As endorsed by Hackett and Dilts (2004) support services for proper incubation of tenants, proper selection process, assisting incubates with financial matters, in the present study also Services emerges as a significant factor. Norrman (2008) also has attached significant importance to services. Bhabra-Remedios and Cornelius (2003) stated that the types of services provided are not enough for success, but how they are delivered is also important. Intangible factors have received more importance in literature than tangible factors (Chan and Lau, 2005; Lalkaka, 2003). The results of present study also highlight the importance of intangible factors. The study is in line with those of by Brooks (1986) and Norhia et. al. (2000) allocating an important place to networking. This study has tried using mediation of managerial skills in assessment and BI performance and the results improved. Thus, all the factors analysed in study influence the outcome of ABI Performance. Thus it can be inferred that it is not only services and facilities, networking matters a lot along with requisite managerial skills for proper assessment.

## 6. Conclusion

Agri-Business incubation facilitates entrepreneurship development in the area of agri-business by promoting innovation and economic growth. Thus, it was essential to analyse the key success factors influencing ABI performance. For ABI performance construct, which is a reflective construct, all sub factors, viz. BI financial Viability (Lalkaka, 1996; Hackett and Dilts (2004), BI profitability and BI productivity are important (Yang et al, 2009). The total effect is highly significant for all CSFs included in the study. This study contributes to the literature on business incubation by not only providing critical assessment of the literature on CSFs influencing BI performance, but also designs a model for better understanding of how BI performance may be improved by focusing on key CSFs to foster the development of incubatee entrepreneurs and their firms. The structural model results throw light on factors of high importance. These are facilities, networking, and services. As highlighted by Buys & Mbewana (2007) networking is a proficient mode for businesses to access market opportunities and this is accelerated through incubation. Adlesic & Slavec (2012) & Peters et al. (2004) have accepted networking, interaction among incubatees, investors, mentors, consultants and others as a key determinant of the value creation for entrepreneurs. In the current study also networking has emerged as an important critical success factor of ABI performance.

More emphasis is needed for framing entry and exit policies. Time and again researchers (Hackett and Dilts, 2004b; Totterman and Sten, 2005; Pals, 2006; Timm, 2011; Bruneel et al. 2012)) have emphasized that clear criteria for selection is positively associated with BI Success. In the current study the results are significant but have low beta values suggesting low importance till yet given to this CSF. This suggests that incubators have still to evolve and be more critical in framing entry and exit policies.

Assessment is important but assessment with required managerial skills play a better role in improving ABI performance. However this study suggests that assessment with required managerial skills can play a more dominant role in BI Success. This model provides empirical verification suggesting managerial skills mediates between assessment and ABI performance. This is authors' contribution to literature.

## **7. Implications**

The present research offers some important insights on the CSFs for Agri-Business Incubation. This research has sought to enhance the knowledge concerning the management

of incubators in a developing country and provides helpful information to both academics and practitioners focusing on the areas of governance, enterprise development and selection policy. It has been established that not all the CSFs considered in the study for Agri-Business Incubation have high relevance and importance. This research can play a significant role in shaping the strength of the relationship and lead to success of ABIs by focusing on these services and Facilities. In today's scenario networking plays an important and vital role.

The study highlights that there is a need to give more attention to Entry and Exit policies. It is recommended that policy developers use this information as a basis for evaluating and updating their outlook and they can lay emphasis on advising to conduct programs to focus on right strategies for entry and exit criterion.

The CSFs for Agri-Business Incubation reported in the present study can serve as a set of industry guidelines to help incubator managers better serve their clients. The results of Structural model indicate that Managers of ABIs should be urged to clearly design services, admission and graduation criteria, and assessment of incubator's performance. Managers of incubators should be urged to clearly set their objectives with a focus on right entry and exit policies. The information that has emerged through results provide a good starting point for further exploration into the current state of incubators and what efforts are needed for future development of ABIs.

## **8. Limitations**

A chief limitation of this study has been a relatively small sample size of the quantitative survey. The research setting for the study was limited to the selected ABIs in India. The present study is cross-sectional in nature; the depiction of the relationships may be strengthened through a longitudinal study. A case study analysis of successful ABIs can also be undertaken in future studies to validate the suggested model.

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### Appendix 1

Critical Success Factors for Agri-business Incubators	Items of Critical Success Factor for ABIs	References
MI: Clear and unambiguous mission	The mission statement of the incubator centre is clear and can be easily understood	Lalkaka and Bishop, 1996; Pals, 2006.
	The mission statement assists the manager in providing the right service mix to the tenants	Akcomak, 2009; Lalkaka,2000.
	The mission statement is vital for selection of tenant firms, entry-exit decision and their implementation	Lalkaka and Bishop, 1996.
	The mission statement aids the incubation centre acceptance in the community it is placed	Lalkaka and Bishop, 1996; Hackett and Dilts, 2004.
Applicant's Proposal Potential	The decision process begins with a staff review of applicant's growth potential	Hackett and Dilts, 2004; Totterman and Sten, 2005; Pals, 2006.
	The decision process includes a staff review of applicant's Product Marketability	Smilor, 1987; Hackett and Dilts, 2004; Totterman and Sten, 2005; Pals, 2006.
	The decision process begins with a staff review of applicant's Application of new technologies	Totterman and Sten, 2005; Pals, 2006.
Admission and Graduation Policy	The incubation centre has a formal policy for admitting tenant companies to the incubator	Smilor, 1987; Hackett and Dilts, 2004.
	The incubation centre has a formal policy for graduating tenant companies from the incubator	Mian,1996; Totterman and Sten, 2005; Pals, 2006.
Post Incubation Scenario	Incubation centre continues to provide assistance to tenant companies even after graduation	Lalkaka, 2002; Totterman and Sten, 2005; Pals, 2006; Mian,1994.
	Suitable space is available to tenant companies outside the incubator after graduation	Lalkaka and Abetti, 1999.
Networking outcome	Networking enhances funding prospect of incubator center.	Nohria and Eccles, 1992; Akcomak,2006; Hansen,2000.
	The incubation centre shares information with other incubator on a regular basis	Suchman, 1995; Collinson and Gregson, 2003.
	The incubation centre has support from the local industry for its activities	Akcomak, 2006; Hansen, 2000.
	The incubation centre has a good understanding of industrial needs	Hansen, 2000; Nohria and Eccles, 1992.

Networking policy	Excessive networking and overflow of information can have adverse effect on secrecy( copying and stealing ideas)	Suchman, 1995; Collinson and Gregson, 2003.
	Networking started late can affect the prospect of the incubation centre	Smilor, 1987; Nohria and Eccles, 1992.
	Should the incubation centre adopt networking as deliberate strategy	Nohria and Eccles, 1992; Hansen et al., 2000.
Assessment Requirements	The incubation centre periodically collects information on key business parameters like employment, revenue etc. from the tenant companies	Hackett and Dilts, 2004; Aexts et al., 2007; Akcomak, 2006; Pals, 2006.
	Incubation centre makes a periodic assessment of tenant companies needs in the incubator	Hackett and Dilts, 2004; Aexts et al., 2007; Akcomak, 2006; Pals, 2006.
	Is there a difference between expectation of incubation centre and tenant companies	Hackett and Dilts, 2004; Aexts et al., 2007; Akcomak, 2006; Pals, 2006.
	Records include the number of tenant companies receiving admission	Hackett and Dilts, 2004; Aexts et al., 2007; Akcomak, 2006; Pals, 2006
	Records include the number of tenant companies graduating	Hackett and Dilts, 2004; Aexts et al., 2007; Akcomak, 2006; Pals, 2006.
	Records include the number of tenant closing business	Hackett and Dilts, 2004; Aexts et al., 2007; Akcomak, 2006; Pals, 2006.
Assessment Satisfaction	Makes periodic assessment of tenant companies satisfaction with incubator services	Lalkaka, 2000; Hackett and Dilts, 2004; Aexts et al., 2007; Akcomak, 2006; Pals, 2006.
	Has formal procedure for handling tenant companies grievances	Lalkaka and Abetti, 1999.
Facilities	The business incubation centre provides work space to tenant companies at below market rate rent	Hackett & Dilts, 2004; Aernoudt, 2004; McAdam & McAdam, 2008.
	The incubation centre provides adequate communication facilities	Hackett & Dilts, 2004; McAdam & McAdam, 2008
	Provides library facilities	Hackett & Dilts, 2004; Aernoudt, 2004; McAdam & McAdam 2008.
	Provide laboratory facilities	Hackett & Dilts, 2004; Aernoudt, 2004; McAdam & McAdam, 2008.
Functional support services	The incubation centre provides high quality secretarial and legal services to tenant companies	Hackett & Dilts, 2004; McAdam & McAdam, 2008.
	It provides good quality technical assistances	Hackett & Dilts, 2004; McAdam & McAdam, 2008.
	It provides adequate marketing assistance	Bollingtoft & Ulhoi, 2005; Carayannis & von Zedtwitz, 2005; Becker & Gassmann 2006; McAdam & McAdam 2008; Abetti, 2004.
	Provides required networking support	Hackett & Dilts, 2004; Nohria & Eccles 1992.
	The business incubator provides human resource management services	Bollingtoft & Ulhoi, 2005; Carayannis & vonZedtwitz, 2005; Becker & Gassmann, 2006.
Financial, informational & legal services	The business incubator assists the tenant companies in obtaining statutory approvals	Bollingtoft & Ulhoi, 2005; Allen, 1988; Allen and Rahman, 1985; Smilor, 1987; Carayannis & von Zedtwitz, 2005; Becker & Gassmann, 2006; McAdam & McAdam, 2008.
	The incubation centre helps the tenant companies in securing capital	Lalkaka, 2002; Lendner and Dowling, 2003; Scaramuzzi, 2002.

	The business incubator disseminates information on business ideas	Campbell et al, 1989; Allen, 1988; Smilor and Gill, 1986.
	The business incubator helps the tenant companies in conducting feasibility studies	Campbell et al 1989; Allen, 1988; Smilor and Gill, 1986.
	The business incubator assists the tenant companies in developing business plan	Fukugawa, 2013; Groen et al., 2008.
	The business incubation centre creates an environment where tenant companies learn from one another	Campbell et al., 1989; Allen, 1988; Smilor and Gill, 1986.
Functional support services	The business incubator provides business counselling to tenant companies	Phan et al., 2005; Mian, 1997; Wiggis and Gibson, 2003.
	The incubation centre reduces early stage operation costs by providing vital infrastructure	Smilor and Gill,1986; Allen and Rahman, 1985; Allen and McCluskey 1990; Lalkaka, 2002; Hannon 2005; Mian, 1997
	It accelerates the development of new firms	Allen, 1988, Phan et al., 2005; Chan and Lau, 2005.
	It minimizes the chances of failure of start-up firms	Campbell et al., 1989; Allen, 1988; Smilor and Gill, 1986.
Technical services	It provides good quality technical assistances	Hackett & Dilts, 2004; McAdam & McAdam, 2008.
	Assists the tenant companies in product development activities	Bollingtoft & Ulhoi, 2005; Carayannis & von Zedtwitz, 2005; Becker & Gassmann 2006; McAdam & McAdam, 2008.
Experience and efficiency of managers	The business incubator has well laid down criteria for selection of managers and staffs	Hackett & Dilts, 2004; Lalkaka, 2002; Fry, 1987.
	Manager have successful track record of working with start-up companies	Hannon, 2003; Studdard, 2006.
	There is provision for periodic appraisal of managers and other staffs	Totterman & Sten 2005; Lalkaka 2002; Duff 1987.
	The manager of the business incubator possess good interpersonal skill	Rice 2002; Hannon, 2003; Studdard, 2006.
	The manager of the business incubator should possess problem solving skill	Groen et. al., 2008; Pals 2006.
	Manager of the incubation centre is able to develop and maintain network	Bergek & Norrman, 2008; Hackett & Dilts, 2004; Nohria & Eccles, 1992.
	Manager of the incubation center is able to monitor and assess performance of tenant companies	Hackett & Dilts, 2004; Abetti 2004; Campbell et al., 1989.
Functional Skills	Manager of the incubation center is technologically versatile	Groen et. al., 2008; Fukugawa, 2013.
	The manager is efficient in financial management	Hannon, 2003; Studdard, 2006.
	The manager of the business incubator possess good marketing skill	Hannon, 2003; Studdard 2006; Abetti 2004.