# CRITERIA SYSTEM TO ASSESS THE PERFORMANCE OF HI-TECH BUSINESS INCUBATORS

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***Abstract:***

*The establishment and development of hi-tech business incubators have been received due attention of the Party and State for many years with a view to creating favorable conditions for the formation and development of high-tech enterprises, thus contributing to fostering the commercialization of research results and the application of high technologies in production.*

*The Law on High Technology (2008) stipulated functions, conditions and measures to promote and support the development of high-tech business incubators. The strategy for science and technology (S&T) development for 2011-2020 also set a target of establishing 30 and 60 high-tech business incubators by 2015 and 2020[1], respectively. So far, there have been various high-tech business incubators with more than 5 years of operation. Furthermore, many organizations and local governments are presently promoting the establishment of business incubation facilities or conducting preparatory studies to establish high-tech business incubators.*

*In order to facilitate the efficient operation of newly established incubators and effective application of the State's incentive policies in this respect, it is indispensable for management agencies to conduct an assessment on the actual performance of existing high-tech business incubators to understand of how it look like? To what extent the expected results have been obtained and the set objectives have been achieved so far? What are their impacts on socio-economic, scientific and technological development? Whether or not it has met the requirements of the State on the development of high-tech business incubation? This assessment exercise is to not only show the achievements, but also identify causes of success and possible constraints.*

*The purpose of this paper is to create an analytical framework (approach) with scientific and practical basis, and from there to propose a set of criteria to assess the performance of high-tech business incubators.*

***Keywords:*** *High- tech enterprises; Business incubation.*

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[1] Including high-tech incubators.

## 1. Approach to develop assessment criteria

### *1.1. Result-based management approach*

Result-based management (RBM) is a management strategy to ensure necessary inputs, processes, products (or services) can be mobilized to obtain the desired results. RBM requires regular monitoring on the progress of activities, the production of results and then suggests necessary adjustments to improve the situation towards achieving the desired results *(OECD, 2010; IFAD, 2005)*.

Traditional management normally focuses on ***inputs*** (what spent), ***activities*** (what done), and ***outputs*** (what directly created). Traditional approach is often not interested in the process towards solving mayor problems, it may therefore lead to leave other problems unsolved at the completion of the project/program. RBM is a modern management method, it requires a look far beyond the activities and output elements so as to focus on the actual results and their long-term impacts *(Schalock, 2002)*.

Compared with traditional management approach, result-based assessment approach has the following strengths/advantages:

- It supports the achievement of intended objectives and positive outcomes;
- It facilitates the identification of negative results and risks, thus suggesting the measures to be taken in order to mitigate those negative results before they become more serious;
- It clarifies the division of duties, responsibilities and establishes feedback and working mechanisms among stakeholders;
- It provides transparent basis for decision making based on actual and practical information and data;
- It facilitates the exchange of information on the results achieved with stakeholders.

To realize or apply RBM, it is very important to make clear on the definition of the result chain. Normally, this chain consists of five elements: (i) inputs (ii) activities, (iii) outputs of these activities (iv) outcomes, and (v) impacts.

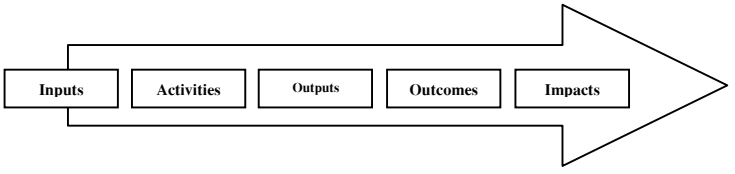



**Figure 1.** The result chain

The definition of the above elements can be explained as follows:

- *Inputs:* are financial, human resources, equipment and materials needed to produce the expected outputs.
- *Activities:* are specific activities to be carried out according to designed plan towards the target beneficiaries in order to obtain the targeted result*s*.
- *Outputs:* are direct products of the inputs and the activities conducted, they should be tangible (easily measurable in practice), of short or medium term in nature, obtainable thanks to the use and management of inputs to carry out specific activities.
- *Outcomes:* include changes made from the outputs, they are largely the direct results from previous outputs, activities and inputs, and can be positive as initially expected/designed. However, if the use and management of inputs is not good or the design is not appropriate or not timely adjusted, it may bring about undesired, even negative impacts.
- *Impacts:* are those big changes of sustainability in nature that make expected direct/indirect influence and impact by the project/programme on the general socio-economic environment. Therefore, impacts are not always positive and have right track to obtain, there may be negative effects occurred due to the oversight in project design, input management, implementation of activities and output management, poor outputs, no timely adjustments.

Depending on the object being evaluated and the scope of assessment, a number of studies using the result chain model which includes only three main elements, namely: (i) Inputs, (ii) Activities or Implementation Processes, and (iii) Results *(Robert, 2002; EC, 2002)*.

While the elements (i) and (ii) in the two above result chain models are the same; the element (iii) in the three element model, in fact, is a synthesized element of the (iii), (iv) and (v) elements of the five element model. In essence, the shortened model (3 elements) and the full model (5 elements) are the same.

In RBM, the construction of result chain using the causal relationship is very important. Besides the identification of inputs, activities (processes), outputs (results) based on their direct causal relationship, it should also identify other external factors concerned which can have indirect influence or impact on the chain cycle.

### *1.2. Approach following general theory of evaluation*

Around the world, there have been many theoretical studies and applications on project/program and policy evaluation. International experience shows that there are 5 commonly used criteria, which can be summarized as follows[2]:

- *Relevance:* It is to see whether or not a project/program /policy is a good idea in improving the problem context? Whether or not the project/ program/policy is for the interest of and supportive to priority target groups? Why and why not? Have they met the needs and desires of the intervened objects or not?
- *Effectiveness*: It is to find out whether the expected goals, objectives, outputs and outcomes of planned activities were achieved or not? Why and why not? The intervention/supporting activities were logical or not? Why and why not?
- *Efficiency:* It looks at the inputs element (resources and time) to see whether they have been used in the best possible way to produce the results? Why and why not? What can we do differently to improve the implementation in order to maximize their impact at acceptable cost and in a sustainable manner?
- *Impact:* It is to evaluate the degree of contribution of the project/program/policy to achieve long-term goals? Why and why not?

[2] Many international organizations (OECD, UNDP, EU) and support programs of advanced countries use this 5 criteria system. Experience of the United States, European Community show that they have basically relied on this system of criteria to assess the performance of high-tech business incubators.

What are possible unforeseen positive and negative consequences? Why do they arise? To what extend the project has contributed to socio-economic development? Why and why not?

- *Sustainability:* Can positive impacts, as the result of project/program/ policy, continue after the support/intervention of donors (if any) terminates? Why and why not?

## 2. Approach to establish criteria for Vietnam to assess the performance of high-tech business incubation facilities

Basically, in this study we simultaneously used the two approaches as mentioned above for the establishment of criteria to assess the performance of high-tech business incubators in Vietnam.

To be appropriate and convenient for the assessment, we decided to select the shortened result chain model. Operationally speaking, high-tech business incubators can essentially be considered as a simple model including: the input element, process implementation or support activities, and the outputs. For the case of high-tech business incubators assessment, the above elements can be understood as follows:

- *Inputs:* technical infrastructure/physical facilities, investment capital, human resources, incubation projects needed to conduct concerned incubation activities;
- *Activities:* activities to provide professional consulting services to support incubation businesses including services related to finance, business administration, intellectual property, legislation, etc.;
- *Outputs:* Results produced by incubation businesses to meet the requirements of the incubators, i.e, after being graduated it can create positive impacts on socio-economic development (e.g, corporate revenue, job creation, etc).

In addition to identify the direct causal relationship of input, activities/ processes, outputs/outcomes elements, it is also necessary to identify external factors which may influence or have indirect impacts to the chain cycle (for example, competitive environment, business culture, policy environment, etc).

At the same time, the assessment of high-tech business incubators under the result chain should also be associated with evaluation criteria concerning the relevance, effectiveness, efficiency, impact and sustainability as

analyzed above. For the case of high-tech business incubators assessment, these criteria can be interpreted as follows:

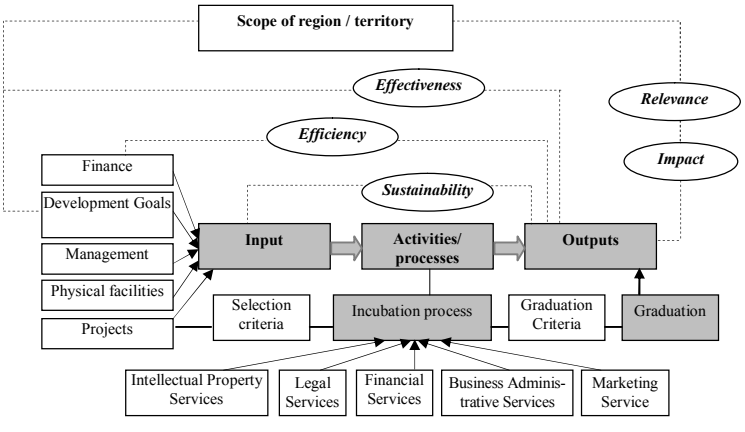
(1) *Relevance:* Whether it is a good idea or not to establish and develop high-tech business incubators in the proposed context (local/ regional/hi-tech park)? How much business incubators have paid attention to and supported for high-tech incubation businesses (priority clients)? Why was that group of clients? To what extend the needs and desires of the supported clients were satisfied? Why and why not?

(2) *Effectiveness:* Have the goals and objectives, outputs and outcomes set in the plan of high-tech business incubators achieved yet? What are the evidences? Why and why not?

(3) *Efficiency:* to see whether or not the inputs element (resources and time) has been used in the best possible way to produce the results? Why and why not? What can we do differently to improve the implementation in order to maximize its impact at acceptable cost and in a sustainable manner?

(4) *Impact:* To estimate how much high-tech business incubators contributed to long-term socio-economic development objectives? Why and why not? What are unforeseen positive and negative results? Why did they arise?

(5) *Sustainability:* Can positive impacts, as the result of project/program/ policy, continue after the support/intervention of the Government and/or donors (if any) terminates? Why and why not?




*Source: Improvement based on the reference of the European Commission, 2002*

**Figure 2.** The high-tech business incubators evaluation model

The Law on High Technology (2008) stipulated that high-tech, high-tech business incubators had the function to provide favorable conditions in respect of necessary technical infrastructure, resources and services for organizations/individuals to complete high technologies, establish and develop high-tech enterprises during the incubation period. Therefore, the assessment of high-tech business incubators should firstly evaluate the content and criteria related to the conditions prescribed for high-tech enterprises in general and high-tech business incubators, in particular.

On the basis of studies on the actual status of high-tech business incubators, institutional conditions of them, as well as of incubation businesses, high-tech enterprises, and foreign experience (United States, the European Community and China) relating to assessment of the performance of high-tech business incubators, we would propose a set of quantitative criteria as shown in the table below for the evaluation of the performance of high-tech business incubators. At the same time the proposed criteria system can be used for the assessment of high-tech business incubators in line with 05 qualitative criteria (in respect of relevance, effectiveness, efficiency, impact and sustainability) to better clarify the quantitative assessment results.

Time frequency for qualitative assessment can be 2-3 or 5 years/ assessment to ensure the attainment of long term results. Quantitative assessment can be conducted regularly, say once a year to get updated information, data for appropriately adjusted decisions to achieve mid-term and long-term outcomes/objectives.

**Table 1.** Evaluation criteria system incubators high-tech enterprise

| CRITERIA | Unit | Evaluation | Remarks[3] |
|---|---|---|---|
| **I. INPUT** | | | |
| **Area** | $m^2$ | | China: National incubators must have an area of more than 20,000$m^2$, National specialized incubators must have an area of more than 10,000$m^2$.<br>Europe: the average area of incubators in Europe: 3,000$m^2$. |
| **1. Designed and actual area in use** | $m^2$, % | | |
| 1.1. Office space for management | $m^2$ | | |

[3] Summary from sources of Ministry of Science and Technology of China, 2012; EU, 2002; Lankaka, 2000.

| CRITERIA | Unit | Evaluation | Remarks[4] |
|---|---|---|---|
| 1.2. Area used as offices for incubation businesses | $m^2$ | | China: for national incubators, there must be an area for business under incubation (including the public services area) which accounted for over 75%. |
| 1.3. Meeting area and other general professional activities | $m^2$ | | |
| 1.4. Total designed and actual area for incubators | $m^2$ | | |
| 1.5. Area occupancy rate rented by businesses | % | | |
| **2. Satisfaction level with the incubator's technical infrastructure** | As per scale [5] | | |
| 2.1. In terms of area for enterprise's offices | | | |
| 2.2. In terms of telecommunication services | | | |
| 2.3. Location of incubators | | | |
| **3. Human Resources** | Quantity, % | | |
| ***Management Personnel*** | | | |
| 3.1. Number of managers | Quantity | | Europe: 2.3 people (on average); Requirements: 2 people |
| 3.1.a. Time spent for consulting and support to businesses | % | | |
| 3.1.b. Time spent for incubation management | % | | |
| ***Incubator's staff*** | | | |
| 3.2. Number of incubator's staff | Quantity | | |
| 3.2.a. Time spent for consulting and support to businesses | % | | |

[4] Summary from sources of Ministry of Science and Technology of China, 2012; EU, 2002; Lankaka, 2000.

[5] The survey on businesses having been incubated (1 very satisfactory, 2 satisfactory; 3 fair, 4 not satisfactory, 5 very dissatisfactory).

| CRITERIA | Unit | Evaluation | Note |
|---|---|---|---|
| 3.2.b. Time spent for incubation management | % | | |
| 3.3. Proportion of incubator's graduate and post-graduate staff | % | | China: 90% have university and post-graduate degree (in national incubators) |
| 3.4. Proportion of staff having been trained in incubation skills | % | | China: over 30% (in national incubators) |
| 3.5. Total number of managers and staff | Quantity | | |
| **4. Investment Capital in construction and infrastructure development** | Value | | It is not appropriate to make a comparative assessment or put out a required investment and operating cost as it depends on the type of incubator, which is very diversified and plays a decisive role in the size of investment and operating costs. |
| 4.1. Source of fund | Value | | |
| 4.2. Private sources | Value | | |
| 4.3. Foreign sources | Value | | |
| 4.4. Total budget | Value | | |
| 4.5. Proportion of State funding/ total budget | % | | |
| **5. Cost to maintain regular operation of incubators** | Value | | |
| 5.1. Salaries of incubator's staff | Value | | |
| 5.2. Cost of electricity, water | Value | | |
| 5.3. Cost of telecommunication services | Value | | |
| 5.4. Cost of land, office rental | Value | | |
| 5.5. Cost of hired consultants | Value | | |
| 5.6. Cost of organization of workshops, exhibitions | Value | | |

| CRITERIA | Unit | Evaluation | Note |
|---|---|---|---|
| 5.7. Total regular expenditure | Value | | |
| **6. Financial sources for regular operation of incubators** | % | | |
| 6.1. Government budget | % | | |
| 6.2. Donors' support | % | | |
| 6.3. Revenues from customers | % | To assess the sustainability | |
| **7. Time needed to put the high-tech business incubator into operation from date of its official establishment** | Year | To assess the effectiveness, efficiency | |
| **II. OPERATION** | | | |
| **7. Satisfaction with the provided professional consulting services** | As per the scale | To assess the relevance | |
| 7.1. Intellectual Property | As per the scale | To assess the relevance | |
| 7.2. Administrative management | As per the scale | | |
| 7.3. Financial matters | As per the scale | | |
| 7.4. Marketing matters | As per the scale | | |
| 7.5. Support to find out customers, partners | As per the scale | | |
| 7.6. Support to build up network of consultants | As per the scale | To assess the relevance | |
| **8. Preferential rates compared with the market price of professional consulting services** | % | To assess the sustainability | |

| CRITERIA | Unit | Evaluation | Note |
|---|---|---|---|
| **III. RESULTS** | | | |
| 1. Number of business incubators has been graduated annually | Quantity | Effectiveness, Sustainability | |
| 2. Total number of graduated businesses | Quantity | Effectiveness | China: there must be 25 (national incubators); and 15 (national specialized incubators) |
| 3. Graduate business rate | % | Effectiveness | Europe: 85% (on average and required) |
| 4. Number of enterprises graduated annually | Quantity | Effectiveness, Sustainability | |
| 5. Total number of businesses are under incubation | Quantity | Effectiveness | Europe: 27 (on average) required: 20-30 depending on the type of business |
| 6. Average incubation time | Months or years | Effectiveness | Europe: the standard period is 3 years; however it varies depending on specific cases.<br>United States: 27 months |
| 7. Total number of jobs created by the business has been graduated | Quantity | Effectiveness & Impact | China: 1,200 jobs in national incubators; 800 jobs in specialized national incubators (calculated based on the total number of graduate businesses) |
| 8. Total number of jobs created by the business are being incubated | Quantity | Effectiveness & Impact | |
| 9. Average annual revenue from high-tech products of graduated businesses | Value | Effectiveness & Impact | |
| 10. Average annual revenue growth of the graduated businesses | Percentage | Impact & Sustainability | |
| 11. Average number of qualified, skilled jobs created from a business under incubation | Quantity | Effectiveness & Impact | |

| CRITERIA | Unit | Evaluation | Note |
|---|---|---|---|
| 12. Average number of qualified, skilled jobs created from a business which has been incubated | Quantity | Effectiveness & Impact | Europe: on average 6.2 jobs / business |
| 13. Number of patents have been registered | Quantity | Effectiveness & Impact | China: businesses under incubation have 30% of total number of patents registered |
| 14. Average cost to create a job | Value | Efficiency | - It is hard to compare if incubators come into operation at different time. It can be comparable if the year of establishment is considered as the first year and so on for following years. For example, we can make a comparison between the first year and 5 years later of its establishment.<br>- State-run incubators receive investment from the State at different level, so it is also difficult to compare, unless the State's support/incentives are also converted into quantitative value. |
| 15. Investment per $m^2$ | Value | Efficiency | |
| 16. Investment for a business has been incubated | Value | Efficiency | |
| 17. Investment for a graduated business | Value | Efficiency | |
| 18. Number of graduated businesses maintaining operations in the locality where high-tech business incubators established | Quantity | Impact | |

## 3. Conclusion

The purpose of this paper was to create an analytical framework (approach) with scientific and practical basis, from that to propose a system of criteria to assess the performance of high-tech business incubators.

Considering that present high-tech business incubators in Vietnam are still small in amount and poor in experience of operation, the paper proposed a system of common criteria for all types of high-tech business incubators. Based on that, local S&T management agencies should make further study to create more specific criteria to be appropriate to the requirements of each industry, sector and different types of high-tech business incubators existing in the locality.

In Vietnam, the assessment on the performance of high-tech business incubators is still a very new job, it requires gradual implementation, multiple testing to draw necessary lessons learnt from experience. The elaboration of evaluation criteria should be carried out with extensive discussions with a view to increasing their scientific basis as well as getting higher consensus in society on the criteria./.

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