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# Comparative Analysis of the Level of Satisfaction with the Services Received at the Business Incubators in USA and Poland – pre-incubation and incubation stage

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### Abstract

The paper concentrate on the problems of customers satisfaction from services in incubator centres in USA and Poland. The aim of the paper is to analyse the level of satisfaction of Business Incubation Centre on the example of two incubator centres one from USA (Hazelton CAN-Be in Pennsylvania and second in Gliwice Poland). The analysis was conducted in pre-incubation and incubation stage. The analysis was conducted on example of survey analysis in both incubator centres. On the base of achieved results we assessed the priority of customers in each incubator centre.

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## 1. Introduction

The world network of the business incubator centers was created for stimulating economic growth in underdeveloped regions. Companies in the business incubator centers receive services which assist in developing successful business ventures. Every new business is entitled to those services. Some of those services are free-of-charge, but a majority of them are offered at below market cost. Assessment of the clients' perspective on the importance of those services as well as clients' satisfaction with those services is needed from the continuous quality improvement perspective.

The aim of the paper is to analyze the level of satisfaction of Business Incubation Centre on the example of two incubator centers one from USA (Hazelton CAN-Be in Pennsylvania and second in Gliwice Poland). The analysis was conducted in pre-incubation and incubation stage.

The concept and practice of business incubation was established in the advanced countries about 50 years ago. The inventor of nowadays innovation concept J. Schumpeter, who first emphasis on the importance of innovation within the economic cycles, considered entrepreneurship with a specific emphasis on innovation. In his view, innovation deals with (Wolniak, 2014; Wolniak, 2017; Wolniak et al.,

2018; Wolniak et al., 2014; Wolniak et al., 2017; Olkiewicz et al., 2017):

- new products,
- new production methods,
- new markets,
- new form of organization.

Successful innovation is a marriage of innovation and commercialization. It requires the cooperation between universities, government and private industry. These three partners work in different reward systems and often have different interests and expectations. Business incubator centers are the common grounds between research economy and commercial economy. The purpose of a business incubator center is to nurture new startup companies by surrounding them with an innovation ecosystem. Every new business is given the opportunity to become associated with a business incubator center. Business incubator centers supply many critical services to start-up companies. Some of the services are free of charge, but most of them are offered at a discounted rate. Business incubator centers provide new companies with an environment supporting the culture of innovation and celebrating research and creativity (Nadzeja et al., 2018; Dvoulety, 2018; Apa, 2017; Ingram, et al., 2010).

The incubation is a process which tends to be activated whenever there is a strong need to support entrepreneurs in developing their own business (Allahar et al., 2016; Al-Mubarak et al., 2012; Calza et al., 2014; Dublin et al., 2005; Monsson et al., 2016). The process, or parts of it, is put in place whenever there is a need of nurturing would-be entrepreneurs to think over and further develop the business idea and transforming it into a viable and sustainable activity (Al-Mubarak et al., 2015; Caiazza, 2014; Lose et al., 2015; Siemieniuk, 2015).

There are three stages of incubation:

- pre-incubation,
- incubation,
- post-incubation.

According to European Commission definition an incubator is a place where the incubation activities are carried out, and where the would-be entrepreneurs can find suitable place, in terms of facilities and expertise, to address their needs and develop business ideas to transform them into sustainable realities (Chiara, 2014; Davies, 2009; Xavier et al., 2008).

An incubator may still be an incubator even if it doesn't provide physical incubation services, and concentrate on virtual incubation. Virtual incubation in that case applies to "incubators without walls" and to e-platforms of online services deployed by incubators with physical premises (The smat guide, 2010).

Very important term in the case of business incubators are innovation-based incubators. In this case the entrepreneur can be seen as the agent of change who's scope is to develop innovation process within the organization. He should create value from an innovative idea in a context of change and uncertainty and the market is the trigger for it to happen. Innovation-based incubators work in the intersection between the sets of innovation and entrepreneurship supporting entrepreneurs to profit from added value of innovative ideas. Innovation-based incubators support innovative business projects which could be either technologically-oriented or non-technologically oriented.

Technology incubators is a variant of more traditional business incubation schemes, assist technology-oriented entrepreneurs in the start-up and early development stage of their firms by providing workspace (on preferential and flexible terms), shared facilities and a range of business support services.

The advantages of the business incubator are wide and varied. The incubators have big impact on business and local communities. We can use various indicators to measure the functionality and impact of particular incubators. Those indicator can include the following (Grebski, 2018):

- business creation and survival,
- business growth and markets served,
- businesses created by minority or low-income individuals,
- cluster development,
- environmental footprint,
- financial performance,
- markets development for products and services,

- investment in client companies,
- jobs created and safeguarded,
- local economic diversification,
- regional regeneration and social inclusion,
- tax and national insurance contributions.

## 2. Methodology of Assessment and Data Collection

To determine the level of satisfaction of client companies with services provided to them by the business incubator center, the same survey was conducted at CAN-BE in Hazleton and TECHNOPARK Gliwice. Two identical sets of surveys (and cover letters) were prepared. An English version of the survey was used for clients of CAN-BE in Hazleton. A Polish version of the survey was used for clients of the business incubator center at TECHNOPARK in Gliwice. The surveys were administered between October 15, 2016 and April 15, 2017. There were twelve companies during the incubation stage at both business incubator centers. The return rate was higher in Hazleton with twelve surveys returned compared to six surveys returned at TECHNOPARK. At the same time, surveys were also administered to faculty, students and volunteers providing services to the business incubator centers. The return rate of those surveys was sixteen surveys received from CAN-BE and twelve surveys from TECHNOPARK. After a statistical analysis of the technical data, the results are shown in Tables 1a, 1b, 1c, 1d and 2. During the statistical analysis, the following values were calculated and recorded:

- N-sample size,
- mean value,
- significance (sign): 2-tailed sign,
- T-test for equality of means.

For a majority of the data, the significance was within .05 (chance of error less than 5%). Only one set of data had a significance of .258 (chance of error 25.8%). This was due, however, to the relatively small sample. However, for comparing two business incubator centers, 25.8% error seems to be acceptable.

## 3. Limitations and problems using QFD method

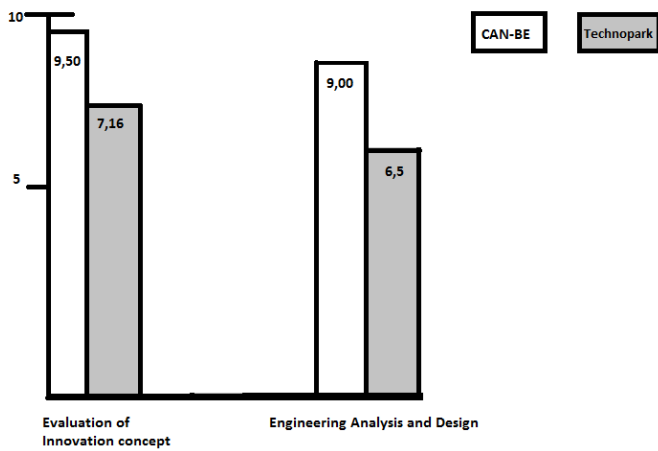
Table 1 reflects the satisfaction with help received by the company at the beginning (pre-incubation stage). The graphical comparison of the client satisfaction for the pre-incubation stage is shown in Fig. 1.

An assessment of the client satisfaction received at the pre-incubation stage (evaluation of the innovation concept, engineering analysis, etc.) indicates a higher level of satisfaction at CAN-BE (9.0% - 9.5%) than TECHNOPARK (6.5% - 7.15%). It seems that the companies at both business incubator centers are very satisfied with the assistance received at the pre-incubation stage. Both incubators, TECHNOPARK and CAN-BE, have a relatively large number of walk-in clients. (90 clients at CAN-BE and 100 clients at TECHNOPARK). Those walk-in clients receive help in the evaluation of the invention and business idea.

**Table 1.** Assessment of support received from the business incubator center in the beginning (before incubation) stage

(CAN-BE – upper number; TECHNOPARK – lower number)  
Scale 0-10; 1 = No Support; 10 = Exceptional Support

Type of Support	N (Sample Size)	Mean Value	Significance (2-Tailed)	T-Test for Equality of Means
Help in evaluation of innovation concept.	12	9.50	0.159	2.26
	6	7.16	0.169	1.59
Help in engineering analysis and designing of the details of the invention.	12	9.00	0.122	2.43
	6	6.50	0.122	1.81



**Fig. 1.** Assessment of support received from business incubator center in beginning (before incubation) stage

A high percentage of those clients receive further assistance in the development of a business plan or business model as well as introductory engineering analysis and design (50 clients at CAN-BE and 35 clients at TECHNOPARK). TECHNOPARK expects the clients to prepare a draft of the business plan before they start receiving assistance from TECHNOPARK.

This policy of expecting the clients to do extensive “homework” before asking for help is effective and increases the retention rate during the incubation stage. (The retention rate is 66% at CAN-BE and 91.7% at TECHNOPARK.) The clients seem to be very satisfied with the evaluation of the innovation concept. (The level of satisfaction is 95% at CAN-BE compared to 71.6% at TECHNOPARK.) The level of satisfaction in introductory engineering analysis and design is also high. (CAN-BE has a 90% level of satisfaction as compared to 65% at TECHNOPARK.) The level of satisfaction at the pre-incubation stage is relatively high at both incubators. (It is slightly higher at CAN-BE.)

Table 2 reflects the satisfaction with help received by the company at the incubation stage.

**Table 2.** Assessment of support received from business incubator center during incubation stage

(CAN-BE – upper number; TECHNOPARK – lower number)  
Scale 0-10; 0 = No Support; 10 = Exceptional Support

Type of Support	N (Sample Size)	Mean Value	Significance (2-Tailed)	T-Test for Equality of Means
Office space/secretarial support.	12	5.50	0.158	1.17
	6	6.33	0.258	1.08
Manufacturing space/warehouse.	12	5.00	0.023	3.35
	6	1.66	0.023	2.88
Consulting service from volunteers.	12	7.50	0.001	6.95
	6	1.33	0.001	6.39
Consulting services from faculty and students.	12	9.00	0.001	8.35
	6	1.66	0.001	6.60
Help from students cooperating with the company in the form of capstone design projects.	12	8.75	0.001	7.89
	6	1.66	0.001	6.33
Assistance from personal of the business incubator center.	12	5.00	0.159	1.47
	6	3.33	0.159	1.37
Legal assistance in protecting intellectual property (patent).	12	7.00	0.000	8.44
	6	0.00	0.000	12.12
Assistance in creating internet website for the company.	12	8.00	0.000	9.87
	6	0.00	0.000	14.18
Legal assistance in establishing and registering the corporation.	12	8.50	0.000	15.60
	6	0.00	0.000	22.40
Legal assistance in accounting and filling income tax.	12	8.75	0.000	15.55
	6	0.00	0.000	22.34
Assistance in marketing of the product.	12	7.75	0.008	4.68
	6	2.16	0.008	3.80
Legal assistance in securing tax-free status during the incubation stage.	12	9.00	0.002	7.02
	6	2.22	0.002	5.45
Assistance in professional development and training.	12	6.50	0.000	8.79
	6	0.00	0.000	12.62
Legal help in obtaining financial subsidies for creating new jobs.	12	5.00	0.000	5.89
	6	0.00	0.000	8.47

The graphical comparison of the assessment data which represents satisfaction of companies during the incubation stage is shown in Fig. 2. This refers to the services received from the business incubator.

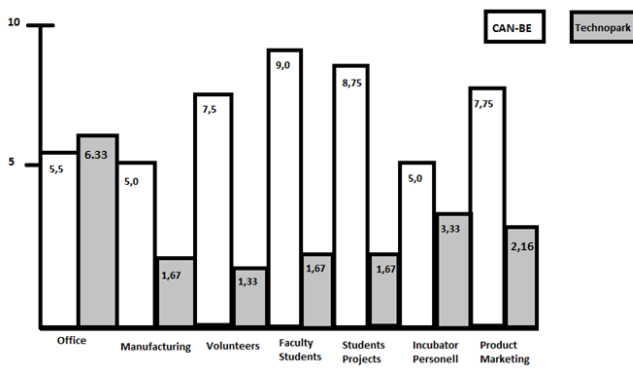


Fig. 2. Assessment of support received from business incubator center during incubation stage

By comparing the level of client satisfaction with the services received during the incubation stage, the discrepancy between CAN-BE and TECHNOPARK is much larger. This is because the business incubator at TECHNOPARK does not provide some of the services available at CAN-BE. The business incubator center at TECHNOPARK does not provide any services in the following areas:

- assistance in creating internet websites for the companies,
- legal assistance in establishing or registering a corporation,
- legal assistance in accounting and filing taxes,
- legal assistance in obtaining financial subsidies for creating new jobs,
- (There is a very limited subsidy for creating new jobs in Poland.)
- legal assistance in securing tax-free status during the incubation stage, and
- (There is no tax-free status for start-up companies during the incubation stage in Poland.)
- legal assistance in protecting intellectual property.

The assessment numbers in those areas would be "0" for TECHNOPARK and no comparison should be made in those specific areas between CAN-BE and TECHNOPARK. The rating of the quality of office space and secretarial support is higher at TECHNOPARK (5.67%) compared to CAN-BE (5.5%). By comparing the quality of manufacturing/warehouse space, there is a discrepancy in favor of CAN-BE, that is CAN-BE (5) and TECHNOPARK (1.67). This discrepancy is due, however, to the nature of the client companies. Most of the companies in TECHNOPARK are not involved in manufacturing yet. Client companies at CAN-BE utilize manufacturing and warehouse space to a greater extent. Consulting services provided by volunteers, faculty and students as well as assistance from students doing capstone design projects for client companies is being rated higher at CAN-BE compared to TECHNOPARK. The main reason is the larger network of volunteers at CAN-BE to provide a wider range of services. The entrepreneurial team building projects involving students from different majors in providing services to the client companies probably makes the biggest impact on the client satisfaction.

## 4. Summary and conclusion

Business incubator centers, CAN-BE in Hazleton, PA (USA) and TECHNOPARK in Gliwice, Poland. Provide a wide variety of services to client companies in the pre-incubation, incubation and post-incubation stages. Clients are generally satisfied with the service that they receive from the business incubators. Some services are not offered at both incubators to the same extent. That created some discrepancy in the assessment results.

Summary of suggestions proposed by client companies related to the improvement of the quality of services provided by the business incubator centers are as follow.

The clients at CAN-BE assigned the highest priority to the following:

- to increase the number of students and faculty providing services to the companies,
- to increase the financial benefits for creating new jobs,
- to increase legal help in protecting intellectual property,
- to increase the number of volunteers and
- to increase engineering assistance.

The client companies at the business incubator center at TECHNOPARK assigned the highest priority to the following:

- to incorporate tax-free status for new companies,
- to increase financial benefits for creating new jobs,
- to increase help in business management and accounting,
- to increase engineering help and
- to improve legal assistance (intellectual property, taxes, etc.).

The clients at the CAN-BE business incubator center already receive extensive help from volunteers as well as Penn State faculty and students. However, the highest priority is still assigned to further increase those services.

The client companies at TECHNOPARK business incubator center receives very limited help from volunteers, faculty and students. At the same time, they assigned a low priority to those resources. The reason for that may be the lack of exposure and lack of understanding of those extremely valuable services. (If you never had something, you do not miss it.)

Companies at TECHNOPARK assigned the highest priority to tax free status as well as financial benefits for creating new jobs. Companies in Pennsylvania like CAN-BE already have that advantage. The engineering and legal assistance in protecting intellectual property is a high priority to companies in Hazleton and Gliwice.

## Reference

- Allahar, H., Brathwaite, C., 2016. *Business incubation as an instrument of innovation: the experience of South America and the Caribbean*. International Journal of Innovation, Volume 4, Number 2, 71-85.
- Al-Mubarak, H.M., Busler, M., 2012. *The Incubators Economic Indicators: Mixed Approaches*. Journal of Case Research in Business and Economics, Volume 4, 55-75.
- Al-Mubarak, H.M., Muhammad, A.H., Busler, M., 2015. *Innovation and Entrepreneurship: Powerful Tools for a Modern Knowledge-Based Economy*, Springer International Publishing, New York

- Caiazza, R., 2014. *Benchmarking of business incubators*. Benchmarking: An International Journal, Volume 21, Issue. 6, 1062-1069.
- Calza, F., Dezi, L., Sciafone, F., Simoni, M., 2014. *The intellectual capital of business incubators*. Journal of Intellectual Capital, Volume 15, Issue. 4, 597-610.
- Chiara, C., 2014. *A service incubator business model: external networking orientation*. IMP Journal, Volume 3, 237-285.
- Davies, M., 2009. *Mixed-use Incubator Handbook: A Start-up Guide for Incubator Developers*, Washington, D.C.: Information for Development Program, August, www.infodev.org and www.infodev.org/disc, (2018.09.19).
- Dublin, T., Licht, W., 2005. *The Face of Decline: The Pennsylvania Anthracite Region in the Twentieth Century*, Ithaca, Cornell Press, New York.
- Grebski, M., 2018. *A comparative analysis of the organization and management of business incubator centers in the USA and Poland*. Doctor Thesis written in Silesian technical University, Poland, Gliwice. supervisor R. Wolniak.
- Lose, T., Tengeh, R.K., 2015. *The Sustainability and Challenges of Business Incubators in the Western Cape Province, South Africa*, Sustainability, pp.14344-14357, www.mdpi.com/2071-1050/7/10/14344/pdf.
- Monsson, Ch.K., Jørgensen, S.B., 2016. *How do entrepreneurs' characteristics influence the benefits from the various elements of a business incubator?*, Journal of Small Business and Enterprise Development, Volume 23, Issue. 1, 224-239.
- Olkiewicz, M., Bober, B., Wolniak, R. 2017. *Innowacje w przemyśle farmaceutycznym jako determinanta procesu kształtowania jakości życia*. Przegląd Chemiczny, Volume 11, 2199-2201, doi:10.15199/62.2017.11.3.
- Siemieniuk, Ł. 2015. *Academic Business Incubators as an institutional form of academic entrepreneurship development on Poland*, Institute of Economic Workings Papers, Toruń.
- The Smart Guide to Innovation Based Incubators*, European Commission, Luxembourg, 2010.
- Wolniak, R., 2014. *Relationship between selected lean management tools and innovations*. Zeszyty Naukowe Politechniki Śląskiej. Seria Organizacja i Zarządzanie, Volume 75, 157-266.
- Wolniak, R., 2017. *The Design Thinking method and its stages*. Systemy Wspomagania Inżynierii Produkcji, Volume 6, 247-255.
- Wolniak, R., Grebski, M.E., 2018. *Innovativeness and creativity as nature and nurture*. Zeszyty Naukowe Politechniki Śląskiej. Seria Organizacja i Zarządzanie. Volume 116.
- Wolniak, R., Grebski, M.E., 2018. *Innovativeness and Creativity of the Workforce as Factors Stimulating Economic Growth in Modern Economies*. Zeszyty Naukowe Politechniki Śląskiej. Seria Organizacja i Zarządzanie. Volume 116.
- Wolniak, R., Grebski, M.E., 2018. *Innovativeness and creativity as factors in workforce development – perspective of psychology*. Zeszyty Naukowe Politechniki Śląskiej. Seria Organizacja i Zarządzanie. 116.
- Wolniak, R., Skotnicka-Zasadzień, B., 2014. *The use of value stream mapping to introduction of organizational innovation in industry*, Metalurgia, Volume 53, Issue. 4, 709-712.
- Wolniak, R., Grebski, M.E., 2017. *Functioning of the business incubator center in Gliwice*. Zeszyty Naukowe Politechniki Śląskiej. Seria Organizacja i Zarządzanie. Volume 105, 569-580, http://dx.doi.org/10.29119/1641-3466.2017.105.43.
- Xavier, W.S., Martins, G.S., Lima, A.A., 2008. *Empowering It entrepreneurship: what's the contribution of business incubators?*, Journal of Information Systems and Technology Management, Volume 5, 433-452.
- Nadzeya, K., Mohammad, S.K., Gustafsson, V., 2018. *Born globals and business incubators: a case analysis*, International Journal of Organizational Analysis, Volume 26 Issue: 3, 490-517, https://doi.org/10.1108/IJOA-07-2017-1197.
- Dvoulety, O., 2018. *Are publicly funded Czech incubators effective? The comparison of performance of supported and non-supported firms*. European Journal of Innovation Management, Volume 21 Issue: 4, 543-563, https://doi.org/10.1108/EJIM-02-2018-0043.
- Apa, R., 2017. *The social and business dimensions of a networked business incubator: the case of H-Farm*. Journal of Small Business and Enterprise Development, Volume 24 Issue: 2, 198-221, https://doi.org/10.1108/JSBED-07-2016-0103.
- Ingram, P., Luo, J., Eshun, J.P., 2010. *Institutional rivalry and the entrepreneurial strategy of economic development: business incubator foundings in three states*, n Wesley D. Sine, Robert J. David (ed.) *Institutions and Entrepreneurship (Research in the Sociology of Work)*, Volume 21 Emerald Group Publishing Limited, 127-155.

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## 对美国 和波兰企业孵化器收到的服务满意度的比较分析 – 孵化前和孵化阶段

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### 關鍵詞

客户满意度  
孵化中心  
创新  
孵化阶段  
每个孵化阶段

### 摘要

本文重点关注美国和波兰孵化中心服务对客户满意度的问题。本文的目的是分析企业孵化中心对两个孵化中心（来自宾夕法尼亚州的HazeltonCAN-Be和波兰格利维采的第二个孵化中心）的满意度。分析在预孵育和孵育阶段进行。该分析是在两个孵化中心的调查分析实例中进行的。在取得成果的基础上，我们评估了每个孵化中心客户的优先级。

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