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Collaboration among Science Parks to Grow, Internationalize and Sustain: Science Park Management Academia Association of Turkish Technology Parks Case

Parallel session

Collective thinking to promote collaboration

Authors:

Demet Kartal (demet.kartal@tgbd.org.tr)

Association of Turkish Technology Parks (TGBD), Turkey

Erhan Akin

Hosted by:













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Executive Summary

With the continual transaction and development of economic and industrial activities in the world, aiming innovative high technology production to grow, Science and Technology Parks play a crucial role in the global ecosystem. To act as a team and collaborate have a critical importance to success in this kind of an era. Association of Turkish Technology Parks (TGBD); aiming the collaboration and both knowledge and experience sharing among Technology Parks in Turkey; runs a training program for Technology Park Managements to support them based on human resources development. Within the scope of this program called as TGBD-Academia, 2 trainings have been organized and evaluated. This paper reflects the needs assessment, training organizations and evaluation processes in detail. A discussion of what has been learned along the process and revealing the outputs of the program is available, as well.



Background

In the last decades, the world has been in a changing atmosphere of economy that industrial production needs to be supported by innovative thinking and vision. In this type of an era; economic power depends on how societies can turn knowledge into value and use technology as a development tool. Science Parks and Areas of Innovation are the results of this changing atmosphere and they have been growing all over the world within last 50 years¹.

As the world changes and transforms into a new era based on innovative thinking, where to stand as an economy becomes a critical issue to be discussed and determined. The ongoing terms of being a 'developed, developing or under-developed' country becomes dependent on how to manage being economically powerful by creating the right links between academic knowledge and industrial production². As the global market exists and rises with above par technology solutions; having a global mind and collaborating becomes crucial to produce, grow, internationalize and sustain. In this sense, Technology Parks are the optimum tools to drive high technological production by connecting academic potential with industry for economic transformation purposes.

This paper represents the collaborative approach of Association of Turkish Technology Parks (TGBD) with a national focus and the training program developed through this approach. It reflects the outputs of an experience and information sharing among Technology Parks in Turkey.

Introduction

To increase the innovation and high-technology production capabilities of Turkey, the main tools used are Technology Parks, Areas of Innovation and R&D Centers to make sure Turkey reaches the global market standards on middle and high technology production in the new era of economic change and transition. It is only possible to exist in this global market depending on innovation and high-tech decisiveness with collaborations among actors of the local innovation ecosystem³.

As the association, TGBD aims to be a common platform for its members and support their development by providing communication among them. Accordingly, the main objective is to constitute collaborations and promote experience-sharing among Technology Parks' Management Companies. In the existing ecosystem, Technology Parks are functioning in a variety of levels based on factors such as geographical positioning, dependent universities and other public institutions, economic sector and growth potential of the cities they exist in. Technology Parks in metropoles have better chance to grow fast and step in the international competition market than the other Technology Parks existing in middle and east Anatolia. Therefore, the approach of the association is to transfer knowledge and experience for a collective success of all.

Technology Parks in Turkey: Statistics⁴

Efforts in establishment of Technology Parks in Turkey dates back to 1980s. As a result, in 1990s, within the collaboration framework of Small and Medium Enterprises Development Organization (KOSGEB) and the universities, TEKMERs (Technology Centers) were founded. The legal framework

² Note by the UNCTAD secretariat (2015). Policies to promote collaboration in science, technology and innovation for development: The role of science, technology and innovation parks. Trade and Development Board Investment, Enterprise and Development Commission.

¹ Future Common Strategy of future cooperation for technology participating in the DISKE Project DISKE Project | <u>www.diskeproject.eu</u>

Project co-financed by the European Union

³ Note by the UNCTAD secretariat (2015). Policies to promote collaboration in science, technology and innovation for development: The role of science, technology and innovation parks. Trade and Development Board Investment, Enterprise and Development Commission.

⁴ Derived from Turkey Republic Ministry of Science, Industry and Technology; Science and Technology General Directorate website:



regarding Technology Parks was declared in 2001 with the enactment of Technology Development Zones Law No. 4691. As of 2016, 63 Technology Parks were declared with the Council of Ministers Decision. Of these 63 Technology Parks, 50 are active and the rest is under development.

TECHNOLOGY PARKS IN TURKEY TE

Picture.1

The number of companies operating R&D activities in the active Technology Parks has reached 3.890. Of these companies, 37% are involved in software development, 17% in ICT, 8% in electronics and 6% are involved in manufacturing of machines and hardware. Besides, many companies involved in medical, energy, chemistry, food, defense and automotive sectors are active in the Parks. 890 of the companies are partnered or owned by academicians. In these companies, a total of 40,033 people, 32,686 of which are R&D personnel, are presently employed. As of 2016, the total number of R&D projects in Technology Parks is 27,709. The export volume of technological products of these companies reach to 2.4 billion USD and the major export markets are Japan, Israel, the UK, Germany and the US taking the lead. When considered in terms of foreign capital, the number of enterprises foreign or with foreign shareholders is 177. The number of patents received (national/international) by the companies located in the Parks, until the end of 2015 is accounted as 627.

The legal framework allows the companies located in Technology Parks the benefit of various tax incentives. The companies are officially exempt from corporate tax for their R&D income and their R&D personnel are exempt from income tax. Apart from these, software products are exempt from Value-Added Taxes. Finally, R&D companies can benefit from 50% social security premium exemption for their personnel for a period of 5 years⁵.

Association of Turkish Technology Parks (TGBD)

TGBD is the network of Technology Parks in Turkey. It was found in 2010 to develop cooperation and create union of forces among its members. The association has 41 members as of 2016. Almost all of the active Technology Parks in Turkey are members of TGBD.

The association aims to be a common platform for knowledge and experience exchange within Technology Parks in Turkey. It also acts as a bridge between Technology Parks and relevant institutions such as Ministry, chambers, clusters and business networks. The main focus is to increase Technology Parks' performance and capabilities; to make sure they create high added value services for R&D Companies and they take a significant role in the economic growth of the country.

The main activities of TGBD are organizing meetings to identify and solve problems that encountered in Technology Parks; developing projects to encourage development of Technology Parks; collaborating with relevant institutions through main goals; expressing opinions and suggestions for technology politics and Research and Development policies and organizing Technology Park Management trainings through TGBD-Academia.

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http://www.resmigazete.gov.tr/eskiler/2014/03/20140312-2.htm



Collaboration among Technology Parks: Technology Park Management Academia

TGBD-Academia is a program of TGBD for trainings on Technology Park Management. The program is constructed to fill the needs of "qualified personnel" of the Technology Park Administrations. The main objectives of the program are:

- To obtain a comprehensive training program comprising of Technology Park Management
- To increase management quality of Technology Parks in Turkey and developing their competencies
- To fulfill training needs of Technology Park Management professionals and improve their competencies along with their national networks
- To share good practices and cross-fertilization of ideas
- To provide national and international certification of Technology Park Management professionals





Picture.2

Picture.3

The significance of this program is that; it is the first and only training program in Turkey specifically designed for Technology Park Management. The program not only meets the training needs of management company employees; but also aims to raise professional trainers.

The training topics are determined according to the annual training needs assessment of Technology Park Management Personnel in the scope of the Academia. The training agenda is created and regularly customized based on the survey results and according to the recent developments in the eco-system. The main objective is completing at least 3 trainings each year.

Setting the Training Budget: The trainings offered by TGBD- Academia are subject to fees. The fees collected comprise the budget of the Academia. The budget can only be used for training purposes and expenses. The fee is determined symbolically to guarantee participation of the trainees and the sake of the training program to be perceived seriously by the beneficiaries and also cover the expenses of the trainers if need be.



Picture.4

Determining Trainers: The trainers are chosen among the willing Technology Park Managers according to the experience on the relevant training topic. They can be determined by the evaluation of the Board of the Association requests collected by the training needs survey, as well.



Outsourcing the trainers nationally and internationally with the program budget is also an option such as professionals from different disciplines like finance, accounting etc.

Organization of the Trainings: The organization of the trainings is made by the Association on the condition of trainers' approval. The dates of the trainings are notified to the members. Trainings are generally located in Ankara where the Association headquarters are located. However; the Trainings can be offered elsewhere if the majority of the participants are from another city. The logistic support is provided by the Technology Parks.





Picture.5

Picture.6

Preparing the Content of the Trainings: The contents of the trainings are prepared by the trainers and submitted to the Board of the Association. The board evaluates the content and the final state of the content is prepared by the trainer himself/herself. The main focus of the content generally is best practices and/or topics especially are problematic for newly developing Technology Parks.

Evaluation of the Trainings: The trainings are evaluated by the satisfaction survey to be implied to the participants. The results of the evaluation are shared with the Board of the Association. Only professional trainers are assessed.

Methodology

As a first step, 'training needs' survey has been applied to the members of the association and a need assessment has been made according to the results of the survey. The information on operating years and employee numbers of the companies, terms of employments and educational levels of the workers were collected through survey. A list of training subjects including the functions of a Technology Park was provided and participants were asked to both determine the necessity level of subjects and declare any subject missing on the list. Volunteers to be a trainer were asked, as well.

Sample

First, a survey implemented to the Technology Park Managements Personnel to reveal current statistics of human resources. This study investigates the demographical information of the potential trainees and the backgrounds of the managing companies. The participants included in the study are Technology Park Senior Managers, Mid-level Managers, Experts, Accountants and Administrative Personnel.

Technology Park Managing Companies - Personnel Data						
Total Managing Company Number completed the survey	38					
By 2016;						
Total Personnel Number	531					
Total Manager/Director Number	109					
Total High-School Graduates	175 (33%)					
Total Bachelor's Degree	237 (45%)					
Total Master's/Doctoral Degree	119 (22%)					



Table.1

Table.1 shows that the accessible sample involves 531 employees in total. 109 of them are managers and executives. 237 employees (45%) are university graduates and 119 employees (22%) have masters or doctoral degree. It can be stated that the potential trainees are well-educated and this information is significant since the trainings' level should be based on the educational level of the group.

A second survey has been applied to the same sample group and 174 employees from 28 Technology Parks completed the survey. The purpose of this survey was to understand the background of both the managing companies and employees overall. The information collected with the survey was;

- Years of Operation of the Companies
- Personnel Numbers of the Companies
- Terms of Employment of the Personnel
- Educational Level of the Personnel
- Requested Training Topics
- Requested Training Methods and Timing

Years of Operation of the Companies										
		Frequency	Percent	Valid Percent						
Valid		59	41,5	41,5						
	-1 Year	6	4,2	4,2						
	1-5 Years	23	16,2	16,2						
	5-10 Years	29	20,5	20,5						
	+10 Years	25	17,6	17,6						
	Total	142	100,0	100,0						

Table.2

Table.2 shows that the majority of the companies are in active business for 5 to 10 years. The percentage of companies with more than 10 years background is high, as well. Results also show that there is a considerable amount of companies with 1 to 5 years' experience. This reflects the variety of levels depending on the experience of Technology Parks in Turkey. This information is critical and should be considered during the preparation of the training contents since the participants would be coming from variety of managing companies on experience based.

Personnel Numbers of the Companies									
		Frequency	Percent	Valid Percent					
Valid		60	42,3	42,3					
	1-20	45	31,7	31,7					
	20-40	13	9,1	9,1					
	+40	24	16,9	16,9					
	Total	142	100,0	100,0					

Table.3

According to Table.3, majority of the participants are from companies with less than 20 employees. Moreover, the percentage of participants from companies with more than 40 employees is almost %17. This also shows the variety of companies with large and small-medium ones.



Requested Training Topics, Methods and Timing									
Training Topic	Fairly	Beneficial	Very	Total	ln-	Virtual	Web-		
	Beneficial	(2)	Beneficial		Class		Based		
	(1)		(3)						
Finance and Tax Implementations in	6	20	44	178	40	12	11		
Technology Parks									
Branding and Marketing in Technology	8	17	44	174	41	12	10		
Parks									
Technology Transfer Offices - Structure	7	24	38	169	42	12	9		
and Procedures									

		Frequency	Percent	Valid Percent
Valid		2	3,7	3,7
	- 1 Year	11	20,4	20,4
	1-3 Years	24	44,4	44,4
	3-5 Years	10	18,5	18,5
	5-7 Years	6	11,1	11,1
	7-10 Years	1	1,9	1,9
	Total	54	100,0	100,0

Table.4

As seen on Table.4, almost %45 of the participants is working in their company for 1 to 3 years. The percentage is getting lower while the terms of employment increase. This shows that the experience level in the current companies is low and this information should be taken into consideration while preparing the contents of the trainings.



Strategical Planning in Technology Parks	8	20	40	168	31	20	11
Pre-Incubation and Incubation Centers - Structure and Procedures	9	23	37	166	35	15	13
Entrepreneurship	10	26	34	164	32	15	17
Sectoral Clustering in Technology Parks	5	36	28	161	24	22	16
Regulatory Implementations in Technology Parks	8	19	38	160	30	13	16
Endowment Implementations in Technology Parks	9	24	34	159	29	17	16
Corporate Planning in Technology Parks	9	21	36	159	41	8	10
Developing Business Model for Entrepreneurs	12	24	33	159	32	13	17
Preparing Business Plan for Entrepreneurs	12	28	29	155	32	16	14
Developing Budgeting Systems in Technology Parks	9	28	29	152	35	15	9
Social and Cultural Services in Technology Parks	23	28	15	124	12	22	26
Physical Planning in Technology Parks	17	33	13	122	25	16	20

Table.5

As seen in Table.5, 15 training topics about Technology Park Management Modules were submitted to the participants. These topics have been determined based on the current functions and subprograms of Technology Parks in Turkey together with the common agenda worldwide in innovation ecosystem. The performance criteria determined by the Ministry of Science, Industry and Technology of Turkey for Technology Park Managing Companies are considered to be able to fulfil the needs of them accordingly, as well. They were asked to choose trainings based on necessity level for each one of them and also a method and timing. The majority of the participants chose the in-class training method except for the "Social and Cultural Services in Technology Parks" training. All participants chose weekdays working hours for timing of the trainings; therefore it was not included in the table.

Table.5 reflects that the most requested training topic is "Finance and Tax Implementations in Technology Parks" which includes the rules and regulations originating from Technology Parks Law in Turkey. Technology Parks in Turkey are subjected to this Law and they have several taxational and supervisory obligations for this reason. The result is predictable and explainable in this sense. The other training, that participants of the survey requested to get is "Branding and Marketing in Technology Parks". This result is also expected since Technology Parks in Turkey are newly founded and one of the weakest aspects is developing successful marketing strategies.

Technology Transfer Offices (TTOs) in Turkey are established with a subvention provided by the Scientific and Technological Research Council of Turkey to the universities recently and a rearrangement became a need for Technology Parks since some of them are already initiating TTOs in their own organizational structure. Therefore, the implementation of TTOs is one of highly-requested topics according to the results.

Rating Scale

Nathing Scale									
	Degree of Necessity of the Training								
Fairly Beneficial	Taking this course will be helpful in accomplishing the objectives of the company. It will contribute solving current problems.								
Beneficial	Taking this course will be very helpful in accomplishing the objectives of the company. It will provide solving current problems to a large extent.								
Very Beneficial	Taking this course is indispensible in accomplishing the objectives of the company. It will ensure the current problems to be solved.								
	Method of the Training								
In-class Training	It is the classic training method.								



Virtual Training	It refers to training done by bringing participants and trainers together in an interactive environment whom are in seperate places supported by visual and auditory technologies.
Web-based training	It refers to an individual training done independent from time and place and computers' used as a teaching tool.

Table.6

Instrumentation

3 Likert-type scales used for each Training Topic in which ranges are Fairly Beneficial, Beneficial and Very Beneficial. The values from 1 to 3 were given respectively. A total score was calculated for each topic by multiplying the values with the number of choices. For example; the score for "Finance and Tax Implementations in Technology Parks" training was calculated as seen below:

6 participants chose the topic as "Fairly Beneficial"; 20 chose it as "Beneficial" and 44 as "Very Beneficial".

$$(1*6) + (2*20) + (3*44) = 6 + 40 + 132 = 178$$

According to the calculation, the total score for this topic becomes 178 in total.

Procedures

The results derived from 28 Science Parks and 174 participants have been analyzed and 2 trainings have been organized since. The trainers were selected from experienced Technology Park managers on a volunteer basis. First training was the "Introduction to Academia-Fundamentals of Technology Park Management". 35 employees from 12 Technology Parks were trained. After first training, evaluation of the training has been done via survey implementation. Second Training topic was "Financial-Tax Implementations and Facility Management in Technology Parks" with 40 Trainees from 18 Technology Parks. The main focus was sharing experiences and success stories for both trainings. The training participation statistics of the members have been analyzed to see if the program whether fulfills its purpose or not.

Trainings

2 training programs have been designed and implemented in the scope of Academia. First training was the "Fundamentals of Technology Park Management" which includes the subtopics below:

- Technology Park as a Concept and the Current Situation of Technology Parks in Turkey
- Technology Park Functions and Design: Institutional Units
- Technology Park Services and R&D Company Expectations
- Operational Processes of Technology Parks
 - > Application for R&D Companies
 - Web Portal for Submission of the Mandatory Reports
 - > R&D Project Evaluation
 - Implementation of Tax Allowances
 - Construction and Residential Permits
 - Communication with the Ministry

Subtopics have been determined based on the current programs ran by Technology Park Management Companies and obligations by means of the Ministry.

Second training program was titled as "Facility Management and Taxational Implementation in Technology Parks" with subtopics below;

- Technology Park as a Concept and the Current Situation of Technology Parks in Turkey
- Facility Management in Technology Parks
- Taxational and Financial Implementations in Technology Parks
 - > Panel: Examples of Experiences



The initial subtopic which includes basic concepts repeated for those who had not joined the first training. A panel has been included for experience sharing about tax allowances at the end of the program, as well.

Evaluation

After trainings, an evaluation has been made via satisfaction survey implementation. The subscale consists of 15 statements in total and each subscale includes 5 items. Subscales are; Educational Planning, Acquirements and General Evaluation. 5 Likert-type scales used in which ranges are Totally Agree, Somewhat Agree, Neutral, Somewhat Disagree and Totally Disagree. The values from 1 to 5 were given respectively if the statement is negative and exact opposite were given if the statement is positive. The general reliability of the statements is tested by reliability analysis. As a result of this the reliability factor (Cronbach Alpha) is calculated as α = 0,907 for the Satisfaction Survey. A total score is calculated for each statement by multiplying the number of choices with the value of each scale.

Descriptive Statistics									
No	Statements	N	Min	Max	Mean				
1	I would like to join trainings by the association in the future.	18	4	5	4,56				
2	The organization of the training was successful.	18	4	5	4,5				
3	The training increased my vocational motivation.	17	3	5	4,47				
4	The training contributed positively in my vocational development.	18	2	5	4,33				
5	The content of the training was appropriate for the objectives of the program.	18	3	5	4,22				
6	The method of the training was appropriate in terms of understanding the content.	18	2	5	4,17				
7	I learned new information that I can transfer to my colleagues.	18	2	5	4,17				
8	The training increased my attention on the subject.	18	2	5	4,11				
9	The attention of the participants in the training was adequate.	18	3	5	4,11				
10	I got satisfied with the answers to my questions.	18	3	5	4,11				
11	I gained new abilities that I can implement in my company.	18	2	5	3,94				
12	The timing (date) of the training was appropriate.	18	2	5	3,89				
13	The training documents were adequate.	18	2	5	3,89				
14	An adequate level of exemplification was done in the training.	17	2	5	3,65				
15	The duration of the training was adequate in terms of completing the subject.	18	2	5	3,39				
				Total	4,1				
		•		%	82				

Table.7

Table.7 reflects the results of the first training evaluation. It is seen that the participants are highly satisfied with the association organizing these trainings and majority of them wants to join if they continue. Moreover, it is not a surprise that the organization of the training gained a high score since the association is well-experienced on this matter.

As seen in the Table.7, the lowest satisfaction level belongs to the compatibility of timing and the content. It can be assumed that since this was the first training experience and not any professional service was taken, preparing contents in harmony with timing is a challenge and should be developed. Congruently, the second lowest score was exemplification of the theoretical knowledge. Both aspects are likely to be developed with experience and professional trainer support or similar services.



	Descriptive Statistics										
No	Statements	N	1	2	3	4	5	Т	Min	Max	Mean
1	I would like to join trainings by the association in the future.	33	1	0	1	12	19	147	1	5	4,5
2	The timing (date) of the training was appropriate.	33	0	0	1	18	14	145	3	5	4,4
3	The content of the training was appropriate for the objectives of the program.	33	0	1	3	14	15	142	2	5	4,3
4	The training contributed positively in my vocational development.	33	1	1	2	13	16	141	1	5	4,3
5	The organization of the training was successful.	33	0	2	1	16	14	141	2	5	4,3
6	The attention of the participants in the training was adequate.	33	0	0	3	20	10	139	2	5	4,2
7	The training increased my attention on the subject.	33	0	2	3	15	13	138	2	5	4,2
8	I learned new information that I can transfer to my colleagues.	33	0	3	2	15	13	137	2	5	4,2
9	The training increased my vocational motivation.	33	0	2	4	16	11	135	2	5	4,1
10	I gained new abilities that I can implement in my company.	33	0	2	3	18	10	135	2	5	4,1
11	The method of the training was appropriate in terms of understanding the content.	33	0	4	2	16	11	133	2	5	4,0
12	The duration of the training was adequate in terms of completing the subject.	33	0	3	4	17	9	131	2	5	4,0
13	I got satisfied with the answers to my questions.	33	0	3	10	12	8	124	2	5	3,8
14	An adequate level of exemplification was done in the training.	33	1	4	4	19	5	122	1	5	3,7
15	The training documents were adequate.	33	3	11	6	11	2	97	1	5	2,9
										Т	4,1
										%	82,0

Table.8

Table.8 shows the evaluation results of the second training. Alike the first training, people are likeminded in joining the association's ongoing trainings. The second highest score belongs to the timing of the training. Since the content involved financial implementations, employees in Technology Park Management Companies needed training documents and they reflected the deficiency in this matter. Congruently, the participants were not satisfied with the exemplification in the content, as well.

After both trainings, an analysis of training participation of the association members has been made to see the general interest in this program. The participation lists for both trainings were used to create the statistical analysis below:

Data	
Total Number of Association Members	38
The number of Technology Parks joined in more than one training	12
The number of Technology Parks joined in only one training	8
The number of nonparticipating Technology Parks in the trainings	19
The total number of Technology Parks joined in the Academia Program	20
The total number of individuals joined in the Academia Program	57
The number of individuals joined in more than one training	10
The number of individuals joined in only one training	47



	Analysis
ſ	% of Assocaiton members joined in more than one training.
ſ	18% of Association Members joined in only one training.
Ī	50% of Association Members did not join in the trainings
Ī	18% of the total number of participants of the Academia joined in more than one training.

Table.9

Table.9 reflects the analysis of participation and interest in the Academia Program. These statements are important for the program to be developed and see if the interest is low in the process.

As a result, it was observed that half of the TGBD members have joined the trainings and they were highly satisfied with the program (% 82 satisfaction ratios). A wide range of participants were interested in trainings such as Board Members, Managers, Experts and newly-recruited people. 12 Technology Parks joined both trainings and 57 people in total from 20 Technology Park Managing Companies have been trained so far within the program.

Lessons Learned

Technology Parks are in an ongoing development and changing process in the world in terms of economic and industrial transactions. Likewise, Turkey is a following actor of this changing ecosystem and relevant law and regulation studies are being done continuously. In this sense, the needs of the Managing Company Personnel are vary from today to tomorrow. Therefore; repeating needs assessment at regular intervals in a year is a must to get the most benefit from trainings.

During needs assessment process, the most remarkable aspect was the need for trainings on legal implementations in Technology Park Management; especially focusing on tax allowances. These regulations' being open to different interpretations of accountants could lead Managing Companies into disorder and make the implementation harder than it is. This was a challenge during the trainings since the knowledge and experience of the participants vary from one another. Therefore, it is important to standardize the processes in cooperation with relevant institutions beforehand to make the trainings regarding similar subjects more efficient and beneficiary.

In the process of organization of the trainings, the distribution of participants was from a wide range of experiences and professional seniorities. This led to a disadvantage for participants with more experience and makes it a challenge to prepare the content regarding the level of trainees. For this reason, targeting seniority ranges in organizing the trainings could be the best way out to achieve the main purpose of the program.

The results of the training evaluations showed that; exemplification is crucial for the participants to learn the subject well. Therefore; it would be much more beneficial to follow the content based on success stories, applied programs and practical methods. It is very easy these days to reach theoretical information while practice-based trainings are hard to find. Moreover, exemplifications in the content should be focused on both success factors and challenges, as well.

To sum up, getting the highest output from the trainings for participants is only possible if they will be based on the needs and purposes. The evaluation results showed that the timing and needs assessments should be done properly for the program to be successful and sustainable.