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BENCHMARKING AS PART OF MODERNIZATION OF BIOTECHNOLOGY EDUCATION AND TRAINING IN TUNISIA

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Abstract

This study explores benchmarking of the best practices as part of national educational reform. We present a case as an example of such benchmarking visit of a Finnish HEI. This benchmarking visit was arranged as part of a work package included in a Capacity Building in Higher Education (CBHE) Erasmus+ project namely '*Modernization of Biotechnology training for better employability of graduates in Tunisia*' (also called BioTech Tunisia). The aim of this study is to elaborate a benchmarking visit of a Finnish higher education institute, as part of Capacity Building Higher Education (CBHE) Erasmus funded project namely '*Modernization of training in Biotechnology with a view to better employability of graduates in Tunisia*' also called Bio-tech Tunisia. The benchmarking visit was held from 25th to 29th September 2023, where 27 delegates including members of the university management, senior researchers, representative of the Ministry of Higher Education and Scientific Research, Tunisia. The results of analysis show that most of the respondents agreed that the overall program of benchmarking visit fits to its purpose in line with the objectives of the work package and that each individual participant had clear understanding of the objectives of the benchmarking visit of TAMK as part of the project. All the project participants had clear understanding of the contents of each day of the benchmarking visit program from 25-29.9.2023. This benchmarking visit provided participants with good contents of theoretical and practical knowledge during the sessions on different topics arranged by TAMK, which in turn improved participants' competence in the field of good practices in the higher education from what they have learnt and experienced during the sessions on different topics and visits to special purpose-built learning environments, facilities and premises arranged by TAMK during benchmarking visit. Besides, this benchmarking visit developed respondent's skills in line with the main objectives of this RD&I project that is the modernization of Biotechnology training for better employability of graduates in Tunisia only a few respondents disagree with the statement. Participants were very much satisfied with the host organization (TAMK) and the arrangements made for the benchmarking visit by the project coordinator from TAMK. The entire Tunisian delegation was very much satisfaction with the host organization in terms of communication and cooperation for the arrangements made for the benchmarking visit of TAMK. This study sheds light on benchmarking best practices in the HEIs and contributes to providing insights related to benchmarking visits. Hence, this study is directly connected with the current body of knowledge related to benchmarking to improve education quality, research, educational reform and teaching related activities at HEIs.

Keywords: modernization, biotechnology, benchmarking, training, employability, higher education institutes.

1 INTRODUCTION

The national educational reform, which aims at improving quality, equity and efficiency of education has become a global trend [1]. Recent studies have examined the most important factors including leadership, innovation and partnerships that influence potential success or possible failure of such national educational reforms [2]. This study explores benchmarking of the best practices as part of national educational reform. We present a case as an example of such benchmarking visit of a Finnish Higher Education Institute (HEI). This benchmarking visit was arranged as part of a work package included in a Capacity Building in Higher Education (CBHE) Erasmus + project namely '*Modernization of Biotechnology training for better employability of graduates in Tunisia*'.

Having its roots in late seventies, benchmarking was used by an American business firm to formally observe and adopt the best practices from partners and competitors alike [3]. Now, this tool is applied in both public and private sectors. At that time, benchmarking was seen as an instrument steering competitive processes [4]. Karlöf and Östblom [5] defined benchmarking as '*a continuing and systematic process which involves confronting the effectiveness measured by productivity, quality and experience with the results of those companies and organizations which can be seen as a model of perfection*'. This study follows the definition of benchmarking proposed by Pieske [6] that '*benchmarking is a method of searching for model solutions to gain the best results by learning from others and benefiting from their experience*'.

Authors consider this definition better than others because it emphasizes the importance of learning from others – in a manner that best practices are identified and then creatively adapted.

A study examining the general concept of benchmarking and its application in higher education [3] states that HEIs globally are indeed interested in benchmarking that serves to identify norms and standards that is comparative data. Within academic settings, benchmarking deals with identification of standards for comparison [7] that are used for accreditation or curriculum review. Most importantly, benchmarking is also serves as a means to identify partnerships with other HEIs [8]. According to Kelly [9] benchmarking acts as a means to improve national and international competitiveness of HEIs and universities in terms of didactics, administrative processes as well as research related activities. At the same time, extent literature shows that through benchmarking, HEIs develop cooperation with potential partners [3].

This study presents an example of such benchmarking visit as part of a long-term project to encourage other project partners to adopt successful best practices and to serve as benchmarks for measuring quality of learning process of Biotechnology students and graduates. The rest of the paper is structured as follows. Details about the project partner institutions are provided next in the context section of this study. The program of benchmarking visit is described in the following section. The methodology of data collection is provided after that. Later, we present the analysis of the collected empirical data and its results. Finally, conclusion of the study is presented in the later part the with limitations and recommendations.

2 METHODOLOGY

A brief description of the context of the study and data collection are presented as follows. This study explores benchmarking of the best practices as part of national educational reform. We present a case as an example of such benchmarking visit of a Finnish Higher Education Institute (HEI). This benchmarking visit was arranged as part of a work package included in a Capacity Building in Higher Education (CBHE) Erasmus+ project namely *'Modernization of Biotechnology training for better employability of graduates in Tunisia'*.

For this study, the primary quantitative empirical data was collected via a survey questionnaire right after the benchmarking visit during October 2023. A detailed questionnaire was created by authors using Webropol 3.0 survey tool for this specific study purpose. The project participants were informed that the participation in the data collection was voluntary, and all responses were anonymous. This study avails a sample of 27 member of project delegation from Tunisia. All the respondents were asked about their own experience and perception of benchmarking visit of TAMK as part of project. The questions asked in the survey are in line with the scope of the objectives of the work package and benchmarking visit. All questions are measured on the scale 1 to 5. Where 1 is for 'disagree' and 5 is for 'agree'.

The authors carefully reviewed the responses and conducted the data analysis. The project participants anonymously submitted their responses through electronic platform by the end of benchmarking visit. Project participants were clearly informed in the beginning that their participation in the research was voluntary and that their answers shall remain anonymous and confidential. The results of the analysis are presented in the next section.

2.1 Project partner universities and number of participants in 'Benchmarking Visit'

This benchmarking visit was arranged as a part of an Erasmus+ funded RDI project namely *'Modernization of Biotechnology training for better employability of graduates in Tunisia'*. The said benchmarking visit was part of one of the six work packages included in this project. There are 5 Tunisian national partners, 3 European partners including Tampere University of Applied Sciences (TAMK). Other European partners are Università Degli Studi Di Tornio, Italy and Universidade Catolica, Portuguese. In addition to that there are Associate national partners from Tunisia. The project coordinator is University of Monastir, Tunisia. The official language of the project is French. The working languages are English, Arabic, and French.

The list of project partners and number of participants in the benchmarking visit are provided in Table 1 as follows:

Table 1. List of project partner universities and number of participants.

| S. No. | Project Partner Universities | Number of delegates |
|--------|---|------------------------|
| 1 | University of Monastir, Tunisia (National Project Coordinator from Tunisia) | 6 |
| 2 | University of Jendouba, Tunisia | 4 |
| 3 | University of Manouba, Tunisia | 3 |
| 4 | University of Sfax, Tunisia | 3 |
| 5 | Ministry of Education and Scientific Research, Tunisia | 4 |
| 6 | Project Associate Partner, Tunisia | 1 |
| 7 | Tampere University of Applied Sciences, Finland (Host and organizer of Benchmarking Visit) | (Several participants) |

2.2 Objectives of the ‘Benchmarking Visit’ and description of the program

There are six Work Packages (WPs) in this project including WP1: Formation and Training, WP2: Research, Development & Innovation (RDI), WP3: Governance, WP4: Quality Control, WP5: Diffusion & Dissemination, and WP6: Administration & Financial Management. TAMK’s role and main contribution in this project are related to the fields of innovation, applied education, forms of efficiently working with companies, and start-ups (SMEs), and entrepreneurship. The objectives of WP 2 include the following: 1) Support for the research and innovation system in the field of Biotechnology, 2) Development of the culture of technology transfer and creation of start-ups, 3) Creation of dedicated spaces to Biotechnology entrepreneurship within partner universities, and 4) Promoting collaboration with technology parks and incubators. The activities and tasks related to this package also include work meetings on i) Technology transfer strategies, ii) Creation of start-ups, iii) European experience in promoting research, and iv) Visit of universities and research laboratories. Besides, TAMK also arranged online trainings and seminars on 1) Promotion of research, and 2) Training of researchers on the creation of start-ups.

Other main activities within this work package include organization of visits and meetings at European partner universities to initiate, present and discuss about the project activities as well as dissemination of good practices and innovative tools from European partner universities to Tunisian institutes. Within the scope of this work package, TAMK’s contribution is towards project aims and objectives related to 1) Learning capabilities in modern work environments and international networks, 2) Adaptation of emerging technologies (in teaching & learning), 3) Sustainable Entrepreneurship and Start-ups, and 4) Collaboration with local municipalities.

The objectives of this benchmarking visit as described as follows and are in line with introducing TAMK’s on-going activities in line with project scope:

- 1 Visit to TAMK’s campuses & learning environments/labs/platforms,
- 2 Peer learning about TAMKs good practices,
- 3 Introduction of entrepreneurship school and its main activities,
- 4 Introduction of regional-level higher education centers, and
- 5 Possible meetings with local industry collaborators

The benchmarking visit was arranged from 25.9. to 29.9.2023 in Tampere, Finland. The program of the benchmarking visit was divided to cover all aspects of the project objectives. Main activities of the entire benchmarking visit are enlisted as follows:

Day 1 started with welcoming project participants at the main campus of TAMK and registration of project delegates over welcome drinks and greetings from the management of the university. Official group photo was taken with coffee. Then introduction of members of Tunisian delegation and TAMK’s Presentation and Benchmarking Visit Program was revealed by TAMK’s project manager and coordinator from Finland. A follow up training session on the topic ‘University-Industry-Entrepreneurship Collaboration in Research’ was conducted. TAMK’s project manager also invited representative of Tunisian Embassy, Honorary Consul of the Republic of Tunisia, to share greetings on behalf of Deputy Head of Mission, Embassy of Tunisia – Helsinki. After lunch, there was another session on the topic of

'Research to business funding for universities in Finland'. A session on 'Joint Learning and Entrepreneurship in higher education' by a team of students was conducted. At the later part of the day, the Tunisian National Project Coordinators gave a speech.

Day 2 started with a session on the topic of 'Student Counselling as best practice in TAMK to support learning in higher education'. After coffee break in which local Media was also invited, TAMK's Customer Relationship Manager gave a presentation on RD&I activities in Africa region. Then a workshop on the topic 'Transformation and modernization of curricula: how such initiative takes place in the Finnish context' was conducted. After lunch, another interactive session on the topic of 'We make the path by walking: An examination and discussion of contemporary pedagogical approaches, their theoretical framework and practical application in 21st century higher education' was conducted.

Day 3 started with visits to the special purpose built laboratories called 'Learning Environment', which is used for healthcare and nursing students. The next visit was to 'Open-lab' and 'Field lab', which are state-of-the-art facilities used for teaching related activities for industrial engineering students. These facilities have robots and 3-D printers. Then the project delegation visited another very advanced learning environment called 'Virtual Lab for Social & Health Care' students. After lunch, the delegation was taken to a 'Start-Ups and Incubation' center, which is a very strong partner of TAMK in activities related to entrepreneurship. Later, the delegation was taken to one of the biggest theaters in Tampere for a session on a topic 'Theatre as a vantage point for management and leadership education'.

Day 4 started with a visit to a special building block in the main campus of TAMK, which is dedicated to entrepreneurship education, where delegation had a chance to listen to real stories of successful student entrepreneurs about their journeys. There was an interactive session on a topic of 'Sustainable Entrepreneurship Education at Tampere Universities' and 'How university support young entrepreneurs'. After coffee break, delegation visited two more special learning environments called 'Talent Factory', which is dedicated for young entrepreneurs and purpose-built laboratories for Built Environment & Bio-Economy students. After the sessions, there was an official interview recording with Tunisian National project coordinator and Finnish Project Coordinator arranged by TAMK Communications Specialist. No visit to Finland could be considered complete, unless there is some local traditional experience. In Finland, the most talked about social activity is 'traditional sauna'. The project participants were taken to a nice summer cottage called 'mokki' next to a lake, where they experienced Finnish sauna with some dips in the cold lake water and having freshly grilled sausages over wooden BBQ. The Tunisian National project coordinator and Finnish Project Coordinator gave a 'Certificate of Participation' to all project members and feedback about project activities.

Day 5 started with a bus journey to visit the Regional Educational Agencies near Tampere region. There was a session on the topic of 'University-Industry Cooperation Patterns'. Next delegation was taken for a lunch in the Finnish wilderness. There was a session on the topic 'Regional-University Cooperation by Municipality'. After that delegation visited a manufacturing facility which acts as a partner of TAMK. There was a session on the topic of 'Students as drivers of innovation for industrial success'. Later that day, delegation was taken to another regional municipal actor, who acts in close cooperation with TAMK in continuous working life education. The local news media representatives interviewed the project coordinators and there was news in the local newspaper about the visit of Tunisian delegation to TAMK during Benchmarking visit.

During the entire Benchmarking Visit of TAMK, a student photographer took the pictures and video clips of speakers and audience participating in project activities. These pictures and videos were published for public-view through TAMK's social media channel and through project's main web page. All project participants were informed about it prior to the events.

3 RESULTS

The collected data was analysed, and results of the study are presented hereunder:

The following Fig. 1 shows the distribution of project participants, who responded to this survey questionnaire.

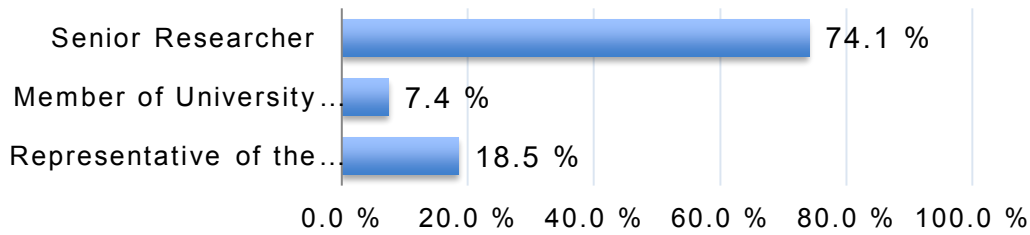


Figure 1. Participants' status in the benchmarking visit

There were 27 responses in total to this question. The mean is 1,44 with deviation value of 0,79. The majority of the responses were senior researchers, then some 20% were representative of the Ministry of Higher Education and Scientific Research, Tunisia. A small number of respondents were members of the university management.

The following Fig. 2 shows the response of project participants regarding the overall program of benchmarking visit fits to its purpose.

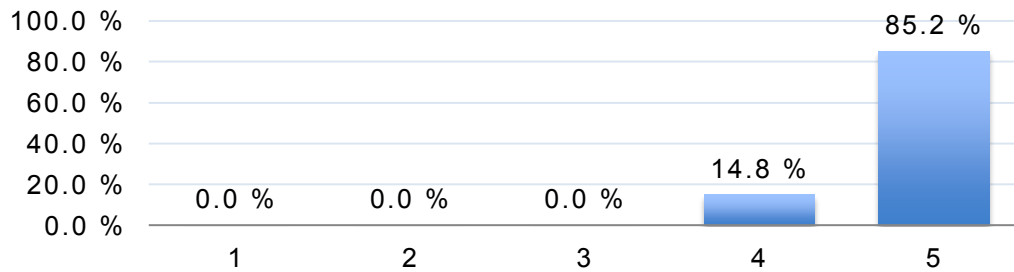


Figure 2. Overall program of benchmarking visit fits to its purpose

There were 27 responses in total to this question. The mean is 4,85 with deviation value of 0,36. Most of the responses were in agreement that the overall program of benchmarking visit fits to its purpose in line with the objectives of the work package.

The following Fig. 3 shows the response of project participants regarding the clarity of objectives of the benchmarking visit to each individual participant.

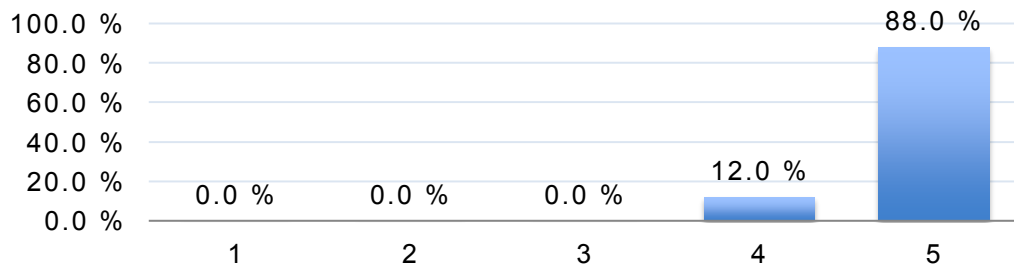


Figure 3. Objective of benchmarking visit was clear to me

There were 25 responses in total to this question. The mean is 4,88 with deviation value of 0,32. Many of the responses were in agreement that each individual participant had clear understanding of the objectives of the benchmarking visit of TAMK as part of the project.

The following Fig. 4 shows the response of project participants regarding the clarity of the contents of each day of the program to each individual participant.

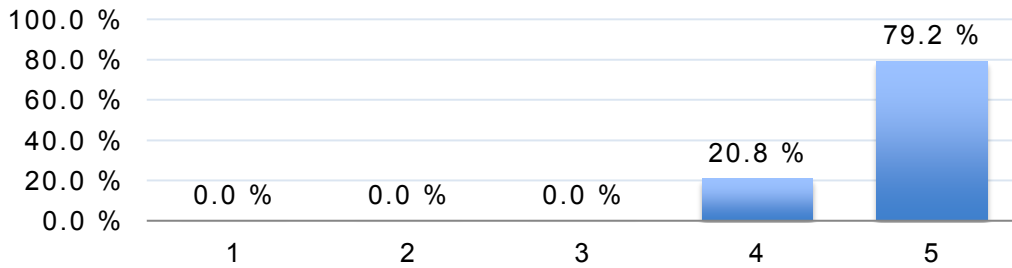


Figure 4. Contents of each day of the program were clear to me

There were 24 responses in total to this question. The mean is 4,79 with deviation value of 0,41. Most of the responses were in agreement that each individual participant had clear understanding of the contents of each day of the benchmarking visit program from 25.9 to 29.9.2023.

The following Fig. 5 shows the response of project participants regarding the content of theoretical knowledge during each day of the program to each individual participant.

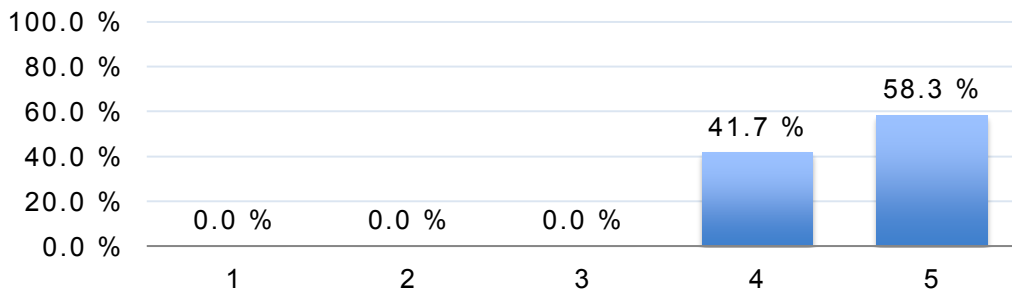


Figure 5. Benchmarking visit provided me with good content of theoretical knowledge

There were 24 responses in total to this question. The mean is 4,58 with deviation value of 0,49. The empirical data shows that more than half of the respondents fully agree to the statement that benchmarking visit provided each of them with good contents of theoretical knowledge during the sessions on different topics arranged by TAMK during benchmarking visit. Around 40% of respondents agreed to the statement.

The following Fig. 6 shows the response of project participants regarding the content of practical knowledge during each day of the program to each individual participant.

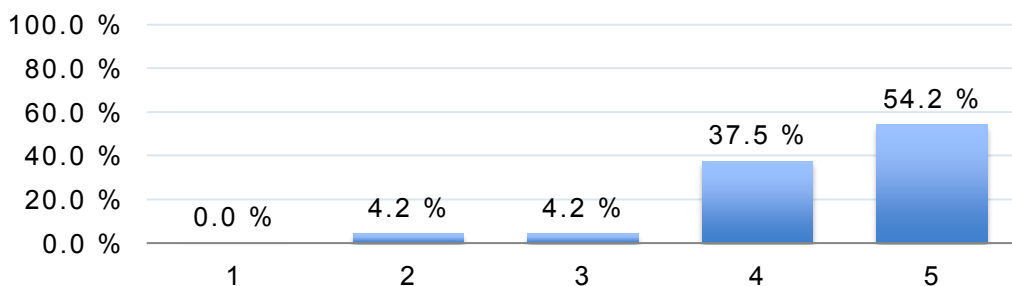


Figure 6. Benchmarking visit provided me with good content of practical learning

There were 24 responses in total to this question. The mean is 4,42 with deviation value of 0,76. The empirical data shows that around 90% of the respondents fully or simply agree to the statement that benchmarking visit provided each of them with good contents of practical knowledge during the sessions on different topics arranged by TAMK during benchmarking visit. Around 10% of respondents gave lower grade to the statement.

The following Fig. 7 shows the response of project participants regarding the good practices in higher education sector to each individual participant.

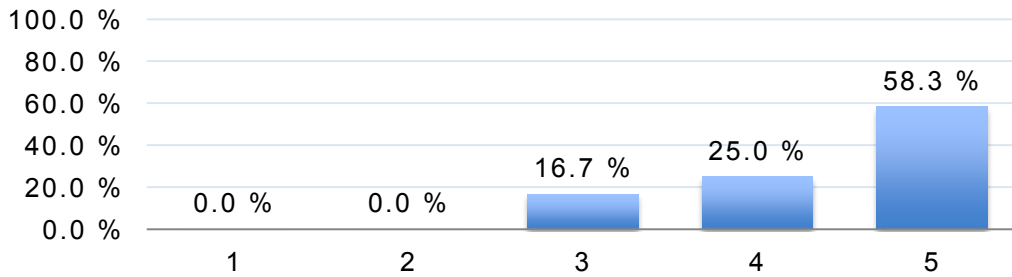


Figure 7. I improved my competence in the field of good practices in higher education

There were 24 responses in total to this question. The mean is 4,42 with deviation value of 0,76. The empirical data shows that around 70% of the respondents fully or simply agree to the statement that benchmarking visit improved respondent's competence in the field of good practices in the higher education from what they have learnt and experienced during the sessions on different topics and visits to special purpose-built learning environments, facilities and premises arranged by TAMK during benchmarking visit. Around 17% of respondents were neutral to the statement.

The following Fig. 8 shows the response of project participants regarding the development of the skills in line with the main objectives of this RD&I project and objectives of the benchmarking visit at an individual level.

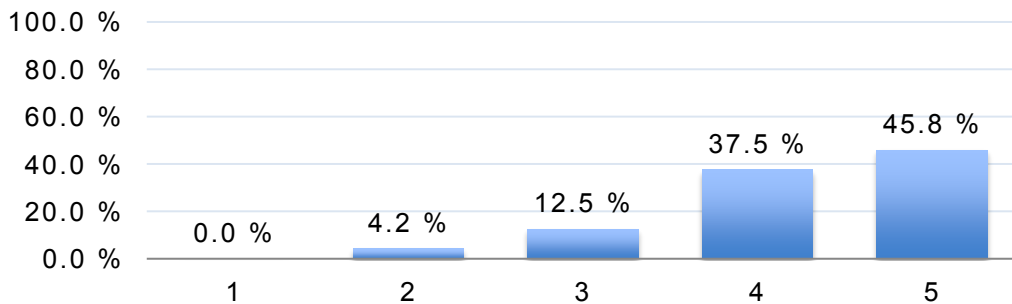


Figure 8. I have developed my skills in line with the main objective of this project

There were 24 responses in total to this question. The mean is 4,25 with deviation value of 0,83. The empirical data shows that around 80% of the respondents fully or simply agree to the statement that benchmarking visit developed respondent's skills in line with the main objectives of this RD&I project that is the modernization of Biotechnology training for better employability of graduates in Tunisia and objectives of the benchmarking visit at an individual level from what they have learnt and experienced during the sessions on different topics and visits to special purpose-built learning environments, facilities and premises arranged by TAMK during benchmarking visit. Around 13% of respondents were neutral to the statement. Whereas around 5% of the respondents disagree with the statement.

The following Fig. 9 shows the response of project participants regarding their satisfaction with the host organization and the arrangements made for the benchmarking visit of TAMK from 25.9 to 29.9.2023.

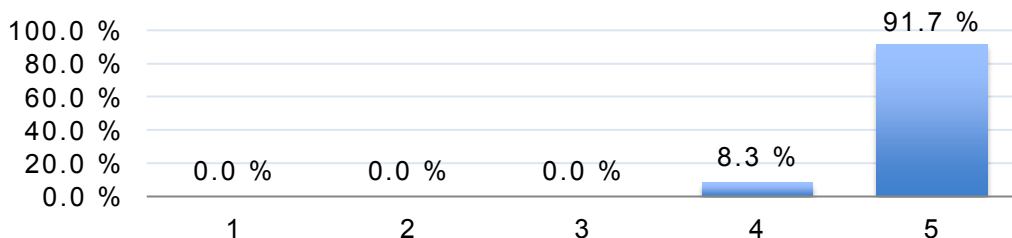


Figure 9. I am satisfied with the host organization and arrangements

There were 24 responses in total to this question. The mean is 4,92 with a very low deviation value of 0,28. The empirical data shows that all the respondents fully or simply agree to the statement. More than 90% were very much satisfied with the host organization that is Tampere University of Applied

Sciences (TAMK), Tampere and the arrangements made for the benchmarking visit of TAMK from 25.9 to 29.9.2023 by the project coordinator from TAMK.

The following Fig. 10 shows the response of project participants regarding their satisfaction with the host organization in terms of communication and cooperation for the arrangements made for the benchmarking visit of TAMK.

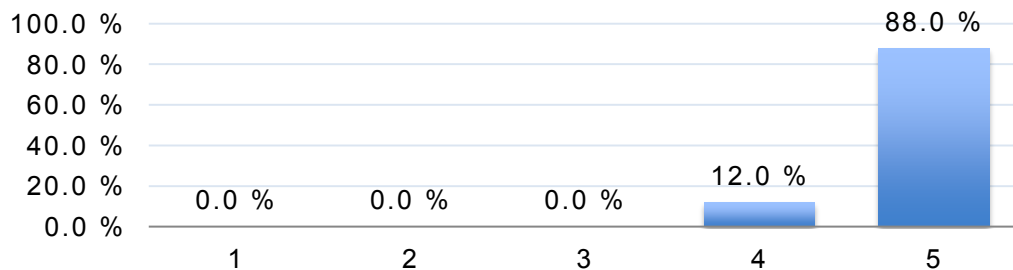


Figure 10. Communication and cooperation with the host coordinator were satisfactory

There were 25 responses in total to this question. The mean is 4,88 with a low deviation value of 0,32. The empirical data shows that all the respondents fully or simply agree to the statement regarding their satisfaction with the host organization in terms of communication and cooperation for the arrangements made for the benchmarking visit of TAMK. The collection of feedback and webropol survey for this study was also part of communication. The conclusion of the study is presented in the following session.

4 CONCLUSIONS

This study explores benchmarking of the best practices as part of national educational reform. We present a case as an example of such benchmarking visit of a Finnish HEI. This benchmarking visit was arranged as part of a work package included in a Capacity Building in Higher Education (CBHE) Erasmus+ project namely *'Modernization of Biotechnology training for better employability of graduates in Tunisia'*.

The analysis of survey sample of 27 respondents provides a clear explanation for this study. The sample had a sufficient number of respondents from each category including members of the university management, senior researchers, representative of the Ministry of Higher Education and Scientific Research, Tunisia. Most of the respondents were in agreement that the overall program of benchmarking visit fits to its purpose in line with the objectives of the work package and that each individual participant had clear understanding of the objectives of the benchmarking visit of TAMK as part of the project. All the project participants had clear understanding of the contents of each day of the benchmarking visit program from 25.9 to 29.9.2023.

Majority of the respondents fully agree that benchmarking visit provided each of them with good contents of theoretical knowledge during the sessions on different topics arranged by TAMK. Similarly, most of the members of Tunisian delegation fully or simply agree benchmarking visit provided each of them with good contents of practical knowledge during the sessions on different topics arranged by TAMK during benchmarking visit. The analysis of empirical data shows that respondent's competence in the field of good practices in the higher education was improved from what they have learnt and experienced during the sessions on different topics and visits to special purpose-built learning environments, facilities and premises arranged by TAMK during benchmarking visit.

Besides, this benchmarking visit developed respondent's skills in line with the main objectives of this RD&I project that is the modernization of Biotechnology training for better employability of graduates in Tunisia and objectives of the benchmarking visit at an individual level from what they have learnt and experienced during the sessions on different topics and visits to special purpose-built learning environments, facilities and premises arranged by TAMK during benchmarking visit. This needs to be noted that only a few respondents disagree with the statement.

Finally, all the project participants were very much satisfied with the host organization that is Tampere University of Applied Sciences (TAMK), Tampere and the arrangements made for the benchmarking visit of TAMK from 25.9 to 29.9.2023 by the project coordinator from TAMK. The entire Tunisian delegation was very much satisfaction with the host organization in terms of communication and cooperation for the arrangements made for the benchmarking visit of TAMK.

With the help of empirical analysis, this study explores benchmarking of the best practices as part of national educational reform. We present a case as an example of such benchmarking visit of a Finnish HEI. This benchmarking visit was arranged as part of a work package included in a Capacity Building in Higher Education (CBHE) Erasmus+ project namely '*Modernization of Biotechnology training for better employability of graduates in Tunisia*'. This study sheds light on benchmarking best practices in the HEIs and contributes to providing insights related to benchmarking visits. Hence, this study is directly connected with the current body of knowledge related to benchmarking as a means to improve education quality and teaching related activities at HEIs. This study utilizes limited empirical data sample of 27 respondents. Therefore, care should be taken in generalizing the findings of study as a limitation to the study. A larger data sample as a potential future direction of this research could be conducted.

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