
Role of Higher Education for Circular Economy Related Capacity Building

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Abstract

At the general level, Capacity Building was implemented for improving the strengthening of the human resources capabilities in a Public Administration. This paper aims to highlight the significant role of the Capacity Building projects, as well as advantages and disadvantages of them and provided a useful framework to design Capacity Building approaches for the Circular Economy (CE) at a meso scale.

Particularly, since 2019, the Department of Economics, Management and Business Law of the University of Bari Aldo Moro, sited in Apulia (Southern Italy), set an active role in Capacity Building, through a partnership with the Agriculture Department of the Apulia Region, to provide a project for implementing Circular Economy in the Agri-food sector.

We adopted a methodology based on a qualitative analysis to verify how the Capacity Building tool interacts with the research and reveal the underlying strategies applied on MoDEC, a project based on the relationship between university and institutional administration.

Some provisional results highlight that the Capacity Building of this public department has been significantly strengthened in terms of the CE in a regional economy. The monitoring measures were undertaken through a bottom-up approach that involved various stakeholders of the agricultural supply chain.

The approach applied in the MoDEC is replicable and allows the transfer of knowledge and good practices to widespread digital learning and a soft culture among stakeholders, creating a virtuous network to be implemented, not limited to the Circular Economy, within the macro-scale Mediterranean and the Euro-Asian corridor.

Keywords

Capacity Building, High Level Education, University-based model, Circular Economy.

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Introduction

To address the European 2030-2050 strategy, a transition from Linear Economy (LE) to Circular Economy (CE) models needs in order to achieve greater efficiency and effectiveness in the use of resources. CE aims to reduce inputs and reuse waste, not only in the context of production processes, but in a systemic way. This new economic approach addresses the creation of a new management system that is increasingly sustainable from an environmental, social and economic point of view.

It should be emphasized how much in this fundamental transition process has to carry out too by Public Administrations (PA) and by universities or public research institutes. Generally, PA is delegated to

face a necessary renewal and adaptation, especially with a view to the efficiency and effectiveness of the regional economic policies to be adopted. For this purpose, the research centers, especially universities, must support this process of innovation and change also to address the financing measures of the so-called “Recovery Fund” and to relieve the member countries in the post-pandemic period.

Lately, therefore, a path of “Capacity Building” has gain visibility, although it is an approach born more than 30 years ago. It refers to the ability of public structures to identify and solve problems by collaboration with high levels of education, with the general objective of building an environment of renewal and change.

The strengthening Capacity Building projects carried out within the European Programmes, such as Alfa, Edu-link and Tempus, were aimed at fostering cooperation between the EU and member countries, supporting partner countries in addressing management and governance challenges, ensuring the improvement of the quality of education and training, modernization of education systems through reform policies and promotion of cooperation in different regions of the world and through joint initiatives too (EACEA, 2021).

European Commission forecasts two types of Capacity Building projects for the members states:

- 1) Joint projects, aimed at organizations to improve curricula, governance and strengthening relations between higher education systems;
- 2) Structural projects, to promote reforms in higher education systems, modernize policies, governance and strengthen the relationships between higher education systems and the economic and social context.

Furthermore, Capacity Building projects can be implemented both at national and transnational levels.

The European Commission platform dedicated to Education, Audiovisual and Culture Executive Agency activities have been published in recent years several calls, as we can see in Table no.1, in order to incentivize adherence to programmes of Capacity Building for the master graduates of the EU members states:

Table no. 1. The European programmes in Capacity Building

| Beneficiaries Spaces/ Call for proposal | Actions | Call reference |
|---|--|----------------|
| Capacity Building in the Field of Higher Education 2020 | Erasmus+; Key Action 2: Cooperation for innovation and the exchange of good practices; Capacity-Building in higher education | EAC/A02/2019 |
| Capacity Building in the Field of Higher Education 2019 | Erasmus+; Key Action 2: Cooperation for innovation and the exchange of good practices; Capacity-Building in higher education | EAC/A03/2018 |
| Capacity Building in the Field of Higher Education 2018 | Erasmus+; Key Action 2: Cooperation for innovation and the exchange of good practices; Capacity-Building in higher education | EAC/A03/2017 |
| Capacity Building in the Field of Higher Education 2017 | Erasmus+; Key Action 2: Cooperation for innovation and the exchange of good practices; Capacity-Building in higher education | EAC/A03/2016 |
| Capacity Building in the Field of Higher Education 2016 | Erasmus+; Capacity-Building in higher education | EAC/A04/2015 |
| Capacity Building in the Field of Higher Education 2015 | Erasmus+; Capacity-Building in higher education | EAC/A04/2014 |

Source: Authors' elaboration on data EACEA, 2021.

Therefore, nowadays, master graduates in engineering, agronomy, food science, food technology, biochemistry, biology, veterinary, economics and so on, who are looking for an innovative job in the agri-food industry, such as the provision of CE models, are faced yet with a lack of practical experience in the field required by employers. Then, for the overcoming gap between higher education and job, it is

fundamental to adopted Capacity Building programmes (Jack, Anderson and Connolly 2014; Becot, Conner and Kolodinsky, 2015).

In particular, we presented “MoDEC Apulia: Circular Economy models for a new regional economy” project, funded by a structural project implemented at the national level according to the European Commission initiative and focuses on a Capacity Building improvement of PA through the support of scientific research. This project provided for the advanced training of a master graduate, through the provision of a research fellowship (Gustafsson, Díaz-Reviriego and Turnout, 2020), in the fields of Economics, Sustainability and CE. This human resource has collaborated with a public department in order to develop a model and an approach for green agriculture. This project, indeed, supported the adoption of CE models for the agricultural sector in the Apulia region of Southern Italy.

Therefore, MoDEC has considered two general objectives: the innovation in the transfer of knowledge on the issue of CE to the Apulia Region and the professional and scientific improvement of an Apulian master graduate through the funding of a research program.

For this reason, MoDEC has to strengthen the development of this public institution in the field of environmental and economic protection and research, as well as the international cooperation, aiming at improving the skills of the staff, in particular enhancing the organizational effectiveness /efficiency and improving the quality of the services provided.

This paper is organized into five different sections:

- in the 1st section the Capacity Building approach was dealt with;
- in the 2nd section a review of scientific literature was presented, in order to highlighting the level of interest on this topic;
- the 3rd section described the methodology behind the MoDEC project;
- the 4th section analyzed the main findings of the implementation of MoDEC project;
- in the 5th section a general conclusion, limitations and future implications of the study was described.

Review of scientific literature

In the literature, there is a lot of discussion about Capacity Building, that is an approach born more than 30 years ago. Among the first authors dealing with this topic, Blomquist and Ostrom (1985) suggested that the adoption of Institutional Capacity Building is necessary to achieve common objectives for the development. Capacity Building was defined as the creation of an enabling environment based on the adoption of an appropriate policy framework providing institutional development through community participation and the strengthening of managerial systems (Alaerts, Blair and Hartvelt, 1991). Later, since the second half of the 1990s, Capacity Building has become a frequent theme in political discourses around the international development (UN, 1997; Goodman, et al., 1998; UNDP, 1998; Hunt, 2005; Verity, 2007).

At the international level, according to a UNEP definition (1997, p. 5), “the term *capacity* generally referred to the ability of individuals and institutions to perform their assigned functions efficiently, effectively and sustainably”. The concept of “Capacity building” also extends to the process of improving individual capacities or strengthening the competence of an organization or set of organizations to undertake specific tasks. The most inclusive view of this concept was contained in UNCED Agenda 21, according to which Capacity Building implied the development of a country's human, scientific, technological, organizational and institutional capabilities (UNCED, 1992). For this purpose, the UNCED (1992) considered fundamental the cooperation between government, national research institutes, non-governmental organizations and local communities for analyzing problems and evaluating the policies to be strengthened.

In general terms, Capacity Building is a necessary tool to achieve the sustainable social change, empowering all the stakeholders involved in the transition to CE, such as populations, organizations, communities and nations (Chaskin, 2001; Hunt, 2005; Craig, 2007).

Moreover, according to Cole, et al. (2014), the phenomenon of closing the loop, as a result of the transition from a LE model towards a CE, becomes a particular institutional problem, especially with reference to waste management. The CE requires the adoption of new business models in collaboration with public authorities, which must create adequate support through policies, environmental legislation and economic and market instruments. For this reason, public and private partnerships should build a path to strengthen institutional capacities in achieving CE. Online platforms are already a tool to support companies in visualizing conversion paths from waste to resources and promoting synergies (De Abreu and Ceglia, 2018).

Some authors in the past also investigated the concept of Institutional Capacity Building, until paradigm shift in Capacity Building, highlighting that, different capabilities are needed to establish circular models (De Abreu and Ceglia, 2018). Furthermore, this dimension involved three elements of Institutional Capacity: knowledge resources, relation resources and mobilization capacity to contribute to the transition from linear economy to CE through industrial symbiosis initiatives (De Abreu and Ceglia, 2018).

For example, Srinivas (2019) considered Capacity Building as a process related to education and training, therefore as an added value. In 2020 Gustafsson, Díaz-Reviriego and Turnout defined Capacity Building significant for the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) starting from a concept theorized by UNEP (2010, pp. 5) according to which this approach is fundamental to strengthen the science-policy interface towards the conservation of biodiversity, long-term human well-being and sustainable development. Additionally, Yan (2021) highlighted that the gap in space Capacity Building between developed and developing countries has increased over the past sixty years.

In particular, the cooperation can improve Capacity Building, close the gap in the scientific capacity and bring greater socio-economic benefits by accumulating technology, finance and human resources for developing countries. Accordingly, Yan (2021) Capacity Building approach involved simultaneously the development of scientific and technological capacities, human resources, organizational development and space policy and law.

Nowadays, there is a need for courses to deliver adequate Capacity Building training for all types of employees who have to adapt or supplement their work with new knowledge and flexibility; furthermore, higher training courses must also be adapted to the broad reach of the workforce of local companies in order to better address needs at meso-scale level. The need is to develop a toolbox to implement these processes, including successful models already implemented by some companies (FoodDrinkEurope and EFAAT, 2016; Lazaro-Mojica and Fernandez, 2020).

Finally, we have proposed this analysis because most of the previous studies have not addressed the Capacity Building approach in the field of Circular Economy, so we fill the gap and raise awareness of the innovative and fundamental scope of this approach.

Research methodology

The aim of our research is to reveal the underlying strategies applied in a real Capacity Building model, such as the MoDEC project. In order to analyze this project, we adopted a methodology based on qualitative analysis to verify how the Capacity Building tool interacts with the research and to understand the construction of the model adopted too.

The methodology used is based on the Stakeholders Engagement and aims to understand their expectations in terms of policies and strategies, clarity in reporting activities of data and information, development of an innovative framework to address the sustainability issue. During the specific investigation and research process, the direct observation method mainly used, based on interviewing project managers and regional supervisors. The sample involved in this first step was composed of the staff from the Department of Agriculture of Apulia Region, in particular the Section of Agri-food Chains Competitiveness, for public stakeholders, and of some components of the sectoral associations for private ones.

We focused on skill and level of knowledge of the participants, level of interaction between the various stakeholders, clarity of communication, flexibility, knowledge of the subject, organization of training/meeting, use of materials, learning techniques, demonstrations, plans, brochures, manuals, newsletters. Based on the results of the primary observations, the Kyutech approach (Polansky and Cho, 2016) influenced researchers in the design of this project. This approach must be based on five elements (figure no. 1):

1. Assessment of local conditions, infrastructures and resources,
2. Education and human resource development,
3. Official agreements to stimulate collaboration,
4. Low cost proof test and fast delivery,
5. Assistance with model implementation opportunities (Polansky and Cho, 2016).

Therefore, in 2018 the Department of Economics, Business and Law (DEMEDI) of the University of Bari Aldo Moro, designed an innovative model for the partnership between University and PA, based on Kyutech approach with the aim of strengthening of Capacity Building. Then, accordingly Polansky and Cho (2016), DEMEDI started from an evaluation of the state of the art of the agriculture sector in Apulia region in order to designed the single step for implementing a CE approach. Subsequently, in partnership with Adisu Puglia, the agency for the university right of study, it was awarded a research grant for educating and training a highly specialized human resource in studies on sustainability and CE to support the identified PA, that is the Department of Agriculture of Apulia Region. Therefore, DEMEDI and the research fellow on MoDEC have entered into various collaborations, especially with the Section Competitiveness of Agri-food Chains of Department of Agriculture, Rural and Environmental Development in order to investigate some key elements fundamental for planning and programming funding on CE. In terms of project testing, the section of Department involved has conducted several meetings, on online platform too, and elaborated a survey in collaboration with the section of PA in order to map their need in terms of activities to be carried out. This survey is intended to be an extended version of the primary qualitative analysis undertaken for the elaboration of MoDEC, involving a larger sample of private and public stakeholders, such as regional agencies of services for agriculture, regional authorities for water resources, local public administrations, agricultural consortia and professional associations. The first results of this collaboration will be presented at the International Conference on Digital Agriculture – EFITA 2021. The final objective will be the model implementation of the CE approach for the Apulian agriculture.

Therefore, to conduct an effective implementation of the model, education and building skills require new approaches based on a better integration of competences among the different stakeholders. The measures adopted include support to the public institution with the aim of improving its capacity for planning and providing services, as well as skills in the design, monitoring and execution of government strategies and development policies local and sectoral in a perspective of CE.

For this purpose, the academic-scientific part of the project supported and planned some specific activities, also on the basis of the skills and experience gained by the research team itself: training, accompaniment and development of human resources (e.g. research fellow), creation of management and process structures, elaboration of procedures manuals, both for individual institutions and at inter-institutional and multisectoral level, strengthening of technical-scientific skills and methods of providing services through an appropriate and targeted transfer of knowledge and specific experiences.

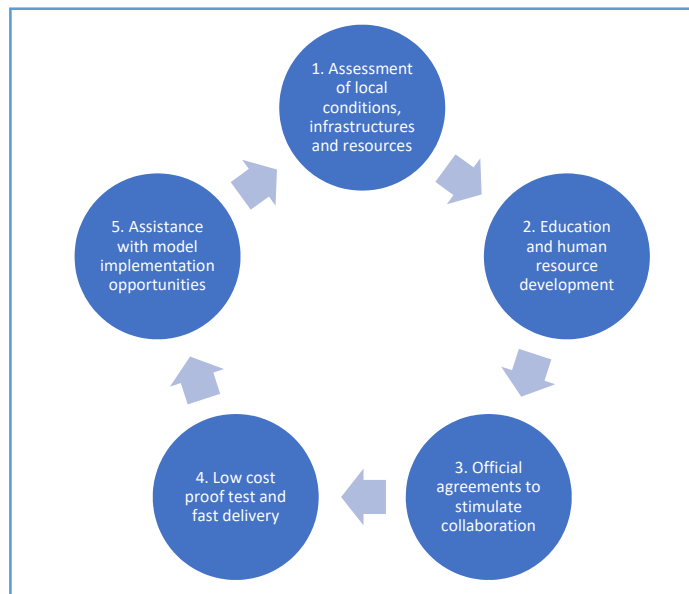


Figure no. 1. The Kyutech approach of Capacity Building

Source: Polansky and Cho, 2016.

Results and discussion

In the European agenda, the issue of the Circular Economy is significant and deeply felt. Currently, indeed, it is fundamental moving towards this type of approach, working together, exchanging the acquired knowledge and the experiences gained in order to identify solutions to territorial problems, improve the ability to conduct monitoring and forecasts on climate change too and adopt the best adaptation measures to the environmental issues. In this context, the role of human resources departments is not easy, since the search for personnel often does not meet the needs and does not hire the suitable skills, with the consequence of loss in resources and time (Lazaro-Mojica and Fernandez, 2020).

The results deriving from the first qualitative analysis of the public and private stakeholders sample, were used for the MoDEC elaboration. This analysis revealed that most of the stakeholders involved in agriculture are unable to gather data and information, because they are not systematized; moreover, many farmers want to be trained on the issues of the Circular Economy. Generally, there is a shortage of information on sustainability indicators and territorial and climatic conditions as well, as highlighted also by results derived from the qualitative analysis.

MoDEC was aimed at implementing good practice models of CE, which can also be replicated in the Medi-terranean macro-area. On the basis of the international and EU guidelines on CE, the academic-scientific partner carried out the technical-scientific activities and supported the administrative and institutional action of the Agriculture, Rural and Environmental Development Department of the Apulia Region, in the correct application of all regulatory instruments and implementation procedures. This activity was conducted through the use of technical and regulatory tools useful for the pursuit of correct economic and environmental management, in a perspective of CE, through a capillary training and information campaign, also oriented to the job technical assistance.

The research fellow has participated in scientific training events and according to a bottom-up approach, improved the analysis, evaluation and research activities for the purpose of a correct implementation of the new CE models. All the Capacity Building activities to be carried out were characterized by the protection of the environmental characteristics of naturalness, the landscape characteristics of the territory and the cultural identity of the territories in order to create better conditions for the quality of life of the resident population and guests.

To do this, the role of environmental technical-scientific information, based on technical-scientific data and the best technologies available, contributed to more environmental protection through specific initiatives. To achieve these objectives, already existing approaches and techniques are applied that contribute to sustainable innovation for the environment and whose impact is strongly enhanced by new technologies and digitization.

MoDEC project provides real and detailed guidelines to achieve training and knowledge in the field of CE and to address the issues revealed from the first qualitative evaluation. The innovation consists of the feasible application of these methodologies both for communication and dissemination and for procedures and regulations.

The starting point was the exploration and analysis of the most recent developments and the most widely used methods, on the wave of the thrust of technological development in this field of the CE, for the knowledge transfer as the dissemination of information and disclosure of new sustainability practices.

The tools to support Capacity Building can be numerous, but the most important and versatile ones adopted by MoDEC fall within participation in international conferences, elaboration of reports for "non-professionals" and distance learning.

During MoDEC, some results were achieved: firstly, it was conducted a systematically and statically mapping of the agricultural production with the aim of mainly undertaking the state of the art of the water use in Apulia; secondly, it was analysed the water consumption in the agri-food sector by source; thirdly, a digital CE framework in this sector was modelled. The first and second results were achieved at the university. Conversely, for the realization of the third products, the university and regional department worked closely together for identifying a data-set model in order to enable stakeholders to know the most suitable sustainability indicators and finally to implement the best CE model. This new framework can improve the stakeholders' decision-making process (Wolfert, et al., 2017), achieve a CE approach, lead to a greater cooperation in the agricultural supply chain. Furthermore, the application of this CE knowledge model enables to overcome obstacles in data procurement (Newton, Nettle and Pryce, 2020).

From a scientific point of view, the fundamental activities included: the activation of knowledge-sharing dynamics, the exchange of good practices and the enhancement of cooperation between stakeholders, the dissemination of the "culture of sustainability", promoting it at all levels (business, civil society, institutions, research).

Through the actions carried out, the sensitivity and knowledge of the subject have been increased to 360 degrees so that the so-called "good practices" can become a concrete and measurable reality. Technological innovation, therefore, through the results of the most recent research and experiences, has contributed to starting an improvement of the same Capacity Building activities through the adoption and development of the most advanced tools and methodological and procedural aspects, including 4.0.

Conclusions

The transfer of scientific knowledge deriving from research activities for the institutional strengthening of structures and entities undergoing reorganization, development and strengthening can capitalize the results of the relationship between technological innovation and consolidated experiences at different institutional levels, from the regional, national, European and Mediterranean.

The new approaches to information and technical-scientific dissemination in environmental matters and CE can trigger useful virtuous circles for environmental protection linking to international networks, as they are multipliers of new technologies and space for continuous comparison with the most critical territorial realities. This approach was applied in the MoDEC, a replicable project capable of transferring the knowledge of good practices, including through the implementation of European and/or transnational projects within the Mediterranean macro-area and the Euro-Asian corridor.

Specifically, the results obtained through a qualitative analysis undertaken for the elaboration of MoDEC revealed the significance of the dynamic and interdependent relationship between several

activities, such as monitoring of territorial and climatic conditions, elaboration of data set based on sustainable indicators, training of the stakeholders involved into the agricultural sector, in order to implement strategies, tools and actions for the transition from LE to CE.

Therefore, the various collaborations of the host university allow the exchange of ideas and approaches by making their own high skills available, with the aim of addressing issues and developing ideas and concepts. MoDEC, therefore, could become a “virtual mentor” for public administrations, young people, research institutions and private sector dealing with important decisions about the implementation of new models of CE.

Given the scope of the project and its implications, the dialogue with companies operating in this area was fundamental because the development of a circular model requires constant collaboration between different sectors, not only with the world of research and the PA. The main result derived from the implementation of this project has been the modelling of a common language of data collection, the identification of the information gaps to be filled and planning CE strategies in agriculture.

For this reason, MoDEC Apulia has been able to build and disseminate the trademark of the “Apulian Circular Economy”. All the benefits that will derive from this project will be in terms of competitiveness, innovation, environment and employment.

Capacity Building is the key for public administrations and companies to forge alliances with universities and research centers and training institutes to optimize programmes that provide the right skills and competences for human resources. Likewise, the building of a replicable framework allows to widespread a digital learning and soft culture among stakeholders, creating a virtuous network to be implemented in the Mediterranean area. Furthermore, scholars, stakeholders and public administration can use this framework presented to design a common language of data collection, identify the information gaps to be filled and plan CE strategies not only in agriculture, but in all economics sector.

Finally, among the medium and long period goals of MoDEC Apulia, we will set up innovative and new industrial districts of the CE, in the field of the agro-industry for instance, which can implement biorefineries to use biomass, even residual one, and produce active ingredients and thermal energy and cogeneration.

Finally, this research will be useful to the university and/or research of department and public administration involved in the transition from LE to CE and other stakeholders who pay attention to an environmental issue.

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