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Towards a Foresight Methodology for Adriatic-Ionian Port Areas Focusing on the Energy Sector

Nikolaos Koukovinos[a], Fotis Stergiopoulos[b,*], Chrysovalantou Ziogou[c], Spyros Voutekakis[c], Ifigeneia Metaxa[a], Marco Padula[d], Francesca Picenni[d], Roberto Malvezzi[d]

[a]Atlantis Engineering SA, Ant. Tritsi 21, 570 01, Thessaloniki, Greece,
[b]Department of Automation Engineering / Alexander Technological Educational Institute of Thessaloniki, PO Box 141 57400, Sindos, Thessaloniki, Greece
[c]Laboratory of Process Systems Design and Implementation / Centre for Research and Technology Hellas, PO Box 60361 57001, Thermi, Thessaloniki, Greece
[d]Institute for Construction Technologies / National Research Council of Italy, Via Lombardia, 49 - 20098 San Giuliano Milanese (MI), Italy
foster@cperi.certh.gr

In the Adriatic-Ionian (ADRION) area, cultural borders and political rifts caused a lack of cooperation and development as well as a weak application of EU policies. This, combined with small dimensions & infrastructural limits of the ADRION ports, made them lose their historical mission as places of exchanges, and suffer from low modernization rate, inadequate smartness level and unsolved issues related to sustainability and urban regeneration needs. On the other hand, ADRION ports are still complex ecosystems, offering the perfect substrate for becoming again actors of the development in this area. In this framework, the project PoWER: "*Ports as Driving Wheels of Entrepreneurial Realm",* funded under the INTERREG V B ADRION Programme 1st call, aims to support the evolution of ports into Innovation Hubs, able to act as new "transmission belts" between ports and regions, and to exploit their untapped entrepreneurial potential. To do so, an action-based foresight methodology is proposed, used to smoothen the transition of a total of six (6) ADRION ports into such 'Innovation Hubs'. This methodology encompasses five (5) interconnected steps, starting at a highest-level planning and ending in the strategic design of a common transition framework. The tools used to support the ports' transition into innovation hubs do not differ from the common tools used in any other foresight activity, but are highly adjusted to the maritime sector. To this extent, an investigation to set the benchmark was conducted, whose results will be used to nurture a foresight process especially focused on the creation of reference scenarios for orienting the PoWER transition approach. Such framework does thus not only set the ground for a smoother transition of the ADRION ports, but will also support them to predict, pursue, and prepare for the potential opportunities, as well as threats, that the future holds.

1. Introduction

In the last decades, the port sector has pivoted from a clearly industrial model, aiming solely in transporting goods and passengers effectively, to a more sustainable and innovative model. This transition originates from the latest European initiatives aiming on environmental protection, efficient management of energy and "smart" use of technological means to achieve greater performance and accomplish operational goals. With the Europe 2020 strategy having a great impact on the port sector, port authorities should prepare to be ready to handle this transition towards the "Innovation hub" model. To support this transition in the ADRION area, the PoWER project has created a foresight methodology focusing on providing support to the ports of the region under the project's scope. This methodology is comprised of a common framework that is established by the port authorities and can help pave the way towards the transition of the ports towards the 'Innovation Hub' model.
An innovation hub is a place which provides infrastructure and opportunities to nurture new ideas and help develop inquisitive initiatives. To this extent, ADRION ports present a wide spectrum of issues that constitute

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the ground where innovative ideas can be implemented. Fields like environmental performance, energy resources efficient management, and smart operations are exceptional fields for developing unique practices. Furthermore, innovation tested on port sites may produce positive spill-overs in form of new and more efficient solution to issues and problems affecting the wider urban ecosystems in which ports are places, thus allowing a closer interaction between urban and port realms.

2. Foresight Methodology: The PoWER approach

A foresight Study is in its essence a transdisciplinary activity, that belongs to the more general field of the so-called Future Studies, that seeks to anticipate, create, and manage change in a variety of domains (scientific, technological, environmental, economic, political, societal, etc.), and on a variety of scales (personal, organizational, societal, global, universal, etc.). To achieve this, a variety of specialties are being used, such as theoretical models and methodologies as the one presented in this paper. The basic assumption underpinning all foresight activities is that if one can create robust vision of the future, the likelihood of achieving a desired outcome is increased.

Given that the strategic foresight deals with reducing the effect of unknown factors, by handing uncertainties in the decision-making process, it is evident that these are directly linked with innovation policies. Thus, it is safe to assume that a foresight activity can provide all necessary means to guide, develop, and shape innovation systems or sectors. Foresight activities also serve as instruments to improve the effectiveness of stakeholders' engagement, to enhance and further tighten industry-university links, to develop innovation partnerships, and to multiply entrepreneurial opportunities.

Based on the above definition, PoWER has created a detailed workflow of a foresight activity, specifically tailored for transforming ports into innovation hubs and to outline future visioning. The methodology presented is based on the approach proposed by the European Parliamentary Research Service (EPRS) (EPSRS STOA, 2015), which has been adapted and applied for the first time to the maritime sector and port areas thanks to the mix of advanced experience and techniques carried out by the PoWER consortium and further literature practices on the subject matter. The PoWER foresight approach is thus especially devoted to support urban regeneration and development in port areas, mainly addressing energy related challenges that ports are facing in their day-to-day activities respecting the relationship between the port and the surrounding ecosystem.

The PoWER methodology is divided in five phases or steps, each producing a set of results that feed the next phase in sequence creating in this way a uniform strategy. These phases are discriminated based on their overall content and purpose, namely titled:

1. Preparing the ground;
2. Horizon scanning;
3. Envisioning;
4. Scenarios development;
5. Strategy co-design.

To provide a more synthetic and self-evident explanation of the overall process structure, another level of discrimination is deployed to the above phases. Each of the above sub-activities may be further categorized into three main sections:

a. Explorative**:** referring to a short- to long-term period perspective. Examples of foresight activities that fall under this category are benchmark analyses, Strengths-Weaknesses-Opportunities-Threats (S.W.O.T.) analyses, gap analyses, etc.;
b. Visionary**:** referring to a bottom-up approach for gathering indications aimed at the outcome of the foresight activity such as questionnaires, workshops, etc.;
c. Strategic Synthesis: referring to recommendation and proposal arising from each activity, which should be under consideration for implementation.

The division of the PoWER foresight methodology into phases and sub-categories is schematically presented in Figure 1. Each phase presented in the figure is thoroughly analyzed in the following sections.

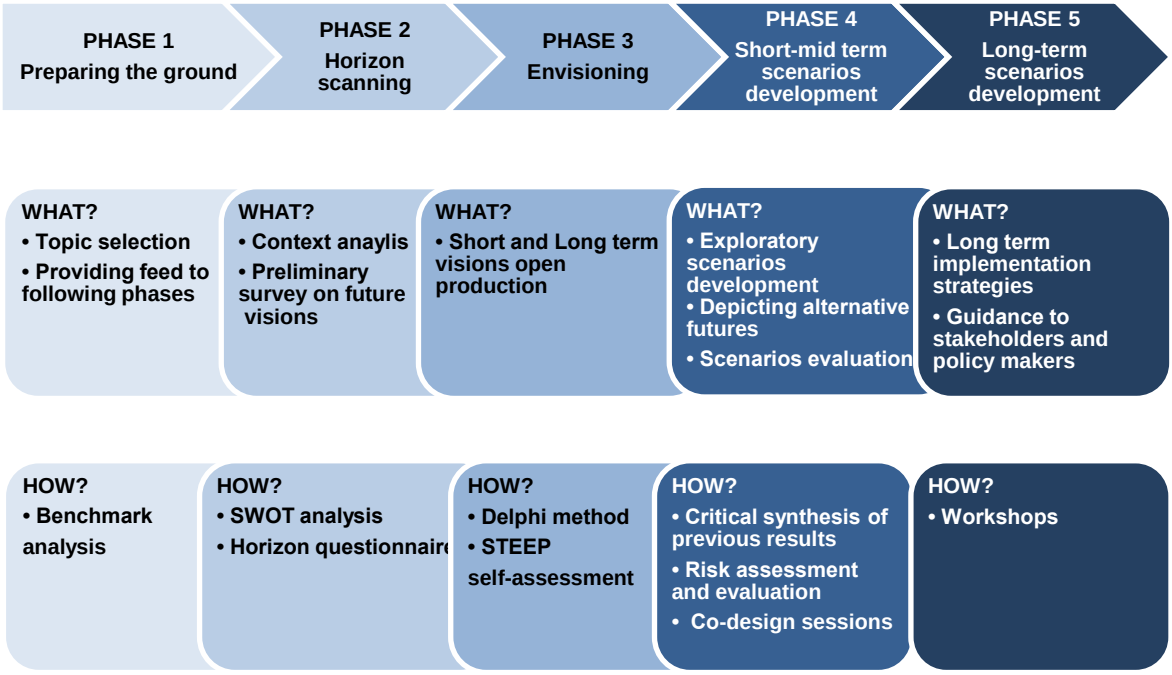

Figure 1: PoWER methodology phases

2.1 Phase 1: "Preparing the ground"

This phase is aiming to select the topic on which to carry out the foresight activity, and to identify the preliminary material for feeding the following steps. In general, the study scope focuses on the energy related management and consumption of the case study ports. Thus, this phase is mainly addressing energy centered activities at which the case study ports fall short to meet the baseline requirements. To identify the gap of the ports studied and the average performance in this preliminary phase of the methodology, a benchmark analysis is conducted. The benchmark analysis includes, among others, an in-depth exploitation of the urban regeneration processes related to port areas at a European level. The results of the analysis act as a comparative norm for ports' performance, as well as providing feed to the next phases of the foresight workflow. The basic results that this activity provides are:

a. Historical trends of the main issues addressed by the main European ports, which are related to their energy performance and are publicly available;
b. The energy usage and energy management trends on port areas and in maritime sector in general;
c. Attributes that define an Innovation Hub, such as the relationship with the local ecosystem;
d. Baseline performance results, as defined by European standards on energy and environmental management (e.g. ISO 50001, ISO 14001, etc.).

2.2 Horizon scanning

The horizon scanning phase of the PoWER foresight methodology mainly focuses on addressing in a preliminary manner the objectives the case study ports need to achieve, as well as the ways of achieving those objectives, to successfully evolve into 'Innovation Hubs'. Initial input in this phase is provided by the results of the benchmark analysis. The results are analyzed and assessed, in order to exploit trends and indicators pointing out the areas of focus for the ports studied. Although the benchmark analysis results are a valuable asset for gathering initial reference, they cannot act alone in supporting the transition of the ports to a more sustainable and viable operation lifecycle. Thus, a need arises to indicate the ways and paths needed to be followed for a smooth transition. To achieve this, first, port authorities need to fully understand their port's potential, the areas the port is underperforming, the threats they are facing, or they may face during the transition period, etc. This is achieved by the PoWER methodology through a two-step process. First the port authorities are asked to provide and "undisturbed" scenario, based on the current port situation and performance. "Undisturbed" means that the port will continue to operate in the same way and with the same performance for the next 10 - 20 y

without taking into account external factors, such as European financial programs, sustainable integrations in the port's infrastructure, etc. By doing this, the port authorities are being put in a position that they fully understand how the situation will be in the future if no act is taken towards a more sustainable and efficient performance. Secondly, to help port authorities become part of forming the transition framework, a "Strengths, Weaknesses, Opportunities, and Threats" (S.W.O.T.) analysis exercise is performed. To save time, effort and finance expenses, in the PoWER foresight methodology, during the S.W.O.T. analysis the case-study ports are divided in groups based on their inherent characteristics (i.e. port size, financial wealth, position, cargo handling capacity, energy consumption, etc.) and an individual S.W.O.T. analysis is conducted for each group or category. Input for the analysis is taken directly from the port authorities, and supporting enhancements are being proposed by subject matter experts, either individuals or enterprises, being active on each port's local ecosystem, by submitting a dedicated Horizon Questionnaire including open-end and multiple-choice questions. The S.W.O.T. analysis is then conducted with respect to the S.T.E.E.P. framework (Social-Technological-Environmental-Economic-Political) ensuring that no aspect is prioritized over the other.

2.3 Envisioning

As mentioned previously in Section 2, the PoWER methodology is designed in a way that each phase is producing results that feed the next phase in sequence. Thus, in the Envisioning phase the results of previous phases are being used and processed to create feasible ideas and solutions that act as a common vision of potential future outcomes for the pilot port areas. Those scenarios are created by a group of specialists and subject matter experts on both technical matters (i.e. engineers, environmental scientists, etc.), and social affairs and humanitarian issues. Creating a group with high experience on every aspect of the S.T.E.E.P. framework ensures the smooth transition of the ports into 'Innovation Hubs' taking into consideration every factor that may affect future outcomes. The experts' discussion process is facilitated using the Delphi Method, a method deemed most appropriate for such a methodology that allows pilot partners of the PoWER consortium to select PoWER panels independently from the necessity of meeting in physical locations, simplifying logistics and increasing the range of engagements, both on regional and on national level.

2.4 Short-midterm scenarios building

The results of the previous phases are used to describe a future thematic scenario, focused on the energy-related issues involved in the ports evolution into 'Innovation Hubs', and cast on a short-mid term time horizon. Such thematic short-mid term scenarios will be by operational approach. Developing exploratory scenarios provides a plurality of possible future outcomes; by using them, the methodology ensures the exploration of a wide range of alternatives, and provides an evaluation of desired and undesired outcomes. In further details, these short-mid term scenarios will base on the output of previous phases of the methodology, making sure that no aspect affecting future alternatives is considered. A preliminary economic evaluation of those outcomes is also included in this foresight activity, alongside with a risk analysis of the factors that may affect them. The short-mid term scenario building is a two-level procedure. At local level, local partners will care the synthesis of the materials produced both as inputs and as outputs of this step; at the consortium level, the operation will be coordinated centrally by an editing board, to guarantee the homogeneity of inputs and outputs. Such double-level editorial work will be supporting the core activity of this step, that is the scenario co-design which will be entrusted to the PoWER Local Thematic Committees (LTC). LTCs will gather the experts engaged in the Foresight Panels (step 3), as well as local stakeholders engaged during the previous phases of the project implementation, and interested in the development of this (energy-related) thematic scenario (e.g.: entrepreneurs from the port areas, shipping companies, service providers, etc.; cognitive institutions such as schools and Universities; Public Bodies such as Municipalities and Port Authorities). LTCs will meet in physical co-design workshops, organized in pilot port cities and facilitated by local partners. In this proper case, the scenario co-design will be energy-related, but the same methodology will hold true also for the co-creation of short-mid scenarios related to all the further thematic layers of the transition strategy which will be addressed in step 5. The phase will be paralleled by the production of Scenarios Implementation Support Tools (SISTs), acting on three different levels:

1. Regional energy innovation suggestions (regulatory level);
2. Agreements for the implementation of short-mid term scenarios (operational level);
3. Business Simulation Tool (business level).

2.5 Long-term scenarios building

The last phase of the PoWER foresight is aiming to produce a long-term scenario in which all the thematic sectors are addressed that may contribute to the evolution of ports into Innovation Hubs. Such a long-term

scenario will assume a strategic character, providing guidance to stakeholders and policy makers involved in the ports transition process. Strategy co-design is entrusted to Local Strategic Committees (LSC), which will meet in physical co-design workshops, once more organized in pilot port cities and facilitated by local partners of the project. LSCs will encompass the entrepreneurial and stakeholders community of interest with a direct interest in cooperating for the elaboration of PoWER Strategic Scenarios: therefore, they probably will consist in an enlarged version of the Thematic Committee, LSC will meet physically according to a facilitation framework analogous to LTCs'. Once more, the two-level Foresight Board will be responsible of distilling the outputs of the LSCs into organic and homogeneous strategic documents. The PoWER strategic scenarios building is not a one-step action: it is rather assumed as an incremental work, which will be nurtured by the progressive creation of independent short-mid term scenarios related to different thematic layers, each new one interacting with the previous ones. A consequence, the PoWER Thematic Committees will be flexible entities, to be composed in a variable geometry fashion, according to the operative interests of the stakeholders of local ecosystems on the discussed themes, while the Strategic Committees are expected to be more stable groupings, since they will focus not on specific themes and direct operational aspects, but rather on synergies and long term visioning about the different themes to be addressed within a comprehensive and long term transition strategy. The final objective of this phase is the development of the joint PoWER Strategy for evolving ports into Innovation Hubs. Such Strategy will be produced by the PoWER consortium, and will be the joint document on which the innovation Hubs Network will be created. In particular, the PoWER Strategy will describe the evolution pathway of ports into Innovation Hubs empowered by tackling the relevant thematic issues (starting from the energy-related ones) individuated in the PoWER case studies; to this regard, the activities carried out at local level will nourish this common and integrated road map, where priorities will be defined following a g-local approach, with the aim of meeting both the territorial needs & the EUSAIR main strategic objectives.

3. Conclusions

To sum up, PoWER has developed a foresight methodology using as a basis, common theories for foresights activities and field applications, tailoring those to support the ADRION region ports on their evolution towards the 'Innovation Hub' model. This methodology consists of sequential steps which are strategically designed in way that the results of each phase act as feed to the next. This novel aspect ensures a thorough inspection of all matters that can affect the transition phase both positively or negatively. The methodology will be mainly tested to tackle the energy management and environmental challenges the ports have to overcome on this transitional period, but will be then enlarged to tackle other strategic issues, in an incremental scenarios building framework, The energy focus mainly originates from the latest European trends of the port sector, which indicate the shift towards a more environmentally friendly and self-sustainable operation lifecycle. Alongside with the framework provided with the PoWER foresight methodology, the project is supporting case study ports with high level external consulting, which in turn urges Port Authorities to take actions in order to comply firstly on the common set of rules in place, formed by the European Union, and secondly to their own set goals in order to achieve a smoother evolution and make their port act as an 'Innovation Hub' for the local ecosystem. Interactions between the PoWER foresight methodology and such high-level networking and consulting activities are actually under implementation, and will allow to extend and to further develop the PoWER foresight methodology into a thorough, effective and integrated innovation process support tool.

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