



Innovative Construction Methods of IW hydraulic structures

PROPOSED TECHNICAL WORKING GROUP

TERMS OF REFERENCE

1. Background and Definition of the Problem

It is useful to think about innovation in waterways works, for many reasons, including the new challenges of the world as the adaptation to climate change:

- Innovation has several very useful goals which are relevant for waterways:
 - To reduce environmental impacts,
 - To adapt climate change, improve sustainability, reduce Carbon footprint of construction.
 - To save resources,
 - To better face difficult construction conditions (underwater, ...),
 - To integrate technological advancements (smart technology in construction, new materials and methods),
 - To save money and/or time,
 - To enhance safety and durability,
 - To promote circularity in the processes of port and IW infrastructure,
 - To foster economic benefits beyond cost savings (new job opportunities, stimulation of innovation in related industries).
- Many possibilities of relevant innovations already exist:
 - prefabrication and precast elements,
 - floating structures,
 - pushed structures on site,
 - underwater construction,
 - eco-construction,
 - use of light material (as aluminium and composite material),
- The stakeholders must know the possibilities, opportunities and risks in order to
 - be able to take advantage of opportunities,
 - promote new construction methods,
 - avoid errors and minimise risks.

Usually, innovation gives an economic advantage to the company which uses it, independently of their role as owner, engineer or contractor. In public services, innovation saves money or contributes to a public policy (transition...). The combination of these two kinds of interests can be a challenging opportunity.



2. Objectives

To develop innovation in IW, the two main objectives of the working group are:

- to make recommendations about innovation promotion and management,
- to suggest ideas and technical considerations about possible innovations.

3. Earlier Reports to be Reviewed

There is no PIANC report specifically about innovation. However, a lot of innovation ideas have been already presented in previous PIANC reports (Locks, weirs, material, SHM, etc.).

4. Scope of Work

The scope of work includes IW works (related to locks, weirs, banks) such as building, design, specific uses of new material, operating, maintenance, refurbishment, retrofitting under operation, ... It doesn't include traffic, navigation, boats and river management.

To be successful in innovation, it is not sufficient to have a relevant technical idea, but it is necessary to manage it correctly from the preliminary steps of fostering and promotion to the operational steps of design, risk assessment, contracting and construction.

Two parts will be considered in the WG report:

- A/ Strategies and Methods to develop and manage innovation.
- B/ Technical and practical aspects (new ideas and concepts).

A/ Strategies and methods to develop and manage innovation.

A first contribution will concern a global innovation strategy and its specific management for a specific project, such as:

- To promote innovation (specific studies, contests/awards, helping start-up ...),
- To manage innovative design and to make it successful for a project, using specific contracts (innovation needs time and it could be necessary to explore several ideas),
- To use feedback, real experience and ideas coming from other fields (an innovation in a technical field is sometimes only the adaptation from another field),
- To foster innovation and find new ideas from the needs and the elementary functions (to define precisely the physical function of a lock or weir part can help to look for a new technology),
- To detect of vulnerabilities from existing construction methods to make them better,
- To promote collaboration and knowledge sharing (partnerships with academic institutions and industry leaders, Platforms for sharing best practices and innovative solutions),
- To consider economic and social Impact Assessment,
- To evaluate the economic benefits of innovative construction methods,
- To implement risk management and mitigation strategies (developing strategies to manage risks associated with new technologies, Implementing mitigation measures for potential environmental and social risks),



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- To Integrate sustainable and green building practices, sustainable material sourcing and waste reduction,

B/ Technical and practical aspects (new ideas and concepts).

The goal of this 2nd part is not to list exhaustively all possible and feasible technical innovations but to propose few innovative ideas including concrete suggestions.

The tasks of the working group will be:

- To collect experiences of innovations in:
 - Waterways (PIANC reports, recent projects);
 - Other domains of civil engineering (roads, bridges, dams, ports), which can be relevant for IW,
- To list innovation opportunities and needs,
- To select and analyse some ideas of relevant innovations: description, goals, application, limits

5. Intended Product

The final product will be a report with recommendations, including operational methods and examples of innovative concepts and projects

6. Working Group Membership

Members of Waterways administrations, IW operators and managers, design companies, experts in design and maintenance of IW, infrastructure contractors and universities, are welcome.

7. Target Audience

Members of Waterways administrations, and IW operators and managers, designers and contractors

8. Relevance

8.1. Relevance to Countries in Transition, etc.

Innovations and particularly its implementation aspects will be relevant for countries in transition

8.2. Climate Change and Adaptation

Some innovations will be relevant for the climate change issue

8.3. Working with Nature

Innovations promoting WWN will be considered

8.4. UN Sustainable Development Goals

The UN Sustainable Development Goals will be considered to assess the interest of some specific innovations, as it will be done for climate change and WWN

9. References