

Application of fourth industrial revolution technologies to marine aquaculture for future food: Imperatives, challenges and prospects

ABSTRACT

This study was undertaken to examine the options and feasibility of deploying new technologies for transforming the aquaculture sector with the objective of increasing the production efficiency. Selection of technologies to obtain the expected outcome should, obviously, be consistent with the criteria of sustainable development. There is a range of technologies being suggested for driving change in aquaculture to enhance its contribution to food security. It is necessary to highlight the complexity of issues for systems approach that can shape the course of development of aquaculture so that it can live-up to the expected fish demand by 2030 in addition to the current quantity of 82.1 million tons. Some of the Fourth Industrial Revolution (IR4.0) technologies suggested to achieve this target envisage the use of real-time monitoring, integration of a constant stream of data from connected production systems and intelligent automation in controls. This requires application of mobile devices, internet of things (IoT), smart sensors, artificial intelligence (AI), big data analytics, robotics as well as augmented virtual and mixed reality. AI is receiving more attention due to many reasons. Its use in aquaculture can happen in many ways, for example, in detecting and mitigating stress on the captive fish which is considered critical for the success of aquaculture. While the technology intensification in aquaculture holds a great potential but there are constraints in deploying IR4.0 tools in aquaculture. Possible solutions and practical options, especially with respect to future food choices are highlighted in this paper.