Produced Water (PW) is the largest volume of wastes that is normally generated during oil and gas production. It has large amounts of contaminants that can cause negative environmental and economic impacts. The management method for PW is highly relying on types and concentrations of these contaminants, which are field dependent and can be varied from one oil field to another. Produced water can be converted to fresh water if these contaminants are removed or reduced to the acceptable drinking water quality level. In addition, increasing oil production rate and reducing amounts of discharged harmful contaminants can be achieved by removing dissolved hydrocarbons from PW. In order to identify the types of these contaminants, effective tools and methods should be used.

Six Sigma DMAIC (Define-Measure-Analyze-Improve-Control) problem-solving approach is one of the most effective tools to identify the root causes of having high percentages of contaminants in produced water. The methodology also helped develop a new policy change for implementing a way by which this treated water may be used.

Six sigma has not been widely implemented in oil and gas industries. This research adopted the six sigma methodology through a case study, which is related to the southern Iraqi oil fields, to investigate different ways by which produced water can be treated. Research results showed that the enormous amount of contaminated PW could be treated by using membrane filtration technology. In addition, a Multi Criteria Decision Making (MCDM) framework is developed and that could be used as an effective tool for decision makers. The developed framework could be used within manufacturing industries, services, education systems, governmental organizations, and others.