

## **Expert opinion**

### **on the dissertation thesis written by René Fernando Lara Cervantes on the topic "Water Quality in Mexico: An Assessment of the Impacts of Urbanization and Economic Growth in a Framework of Decentralization of Water Management"**

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The dissertation thesis by René Fernando Lara Cervantes is focused on a very hot topic related to water management. In addition, the issue of water consumption, the quantity and quality directly affects the public sector, the private sector and households. The quality and quantity of the water is also on a global scale in the forefront as a result of climate change. Water management is therefore reflected in the range of adaptation measures. The submitted dissertation considered one of the solutions to this important area in the mentioned region, which could be an example of water management on the international level.

The thesis has four chapters and is presented in 152 pages, including appendices. The structure of the submitted thesis is clear, and in terms of the content of each chapter, it is balanced. Formally, it meets all the requirements for the dissertation.

The introduction describes the situation with regards to water management in Mexico. The stated goal is divided into two parts. The first is to provide a historical perspective of Mexico's policy and the second is an assessment of the factors linked to water quality and quantity. Besides the goals, two hypotheses are set, which are aimed at the public administration of the centralistic approach which increased the resistance to institutional and policy changes linked to the water management issues and at the influence of the impacts of the economic activities and the increasing urbanization. The objective is formulated rather brief and the detailed focus of the work is evident from the chapters.

The aim of the work can be regarded as being fulfilled. Regarding the hypothesis, it is not explicitly stated whether they were confirmed or refuted. I request an explanation of this in the course of the defence.

The methodology of the work is mentioned briefly in the introduction and towards the end (Chapters 4.1 and 4.3). For example the methodology consists of the estimation of the OLS regression models to weigh the relevant factors of water quality and scarcity. I would like to know what was the reason for selecting this particular model?

In the first chapter, the theories about the institutions and natural resource management and sustainable development are described. Is it possible to explain why you choose the problem

with the institutions and the definition of sustainable development? However, it is true that the institutional arrangement has a key impact on water management. The second part of this chapter is devoted to sustainable development and the related theoretical concept. Chapter 1.4 Sustainable development and decentralization of water management is very important in terms of focus of the thesis. I would consider sustainable water management, as a topic, should be more detailed, because it is targeting solutions in water management. Can it therefore be concluded what the parameters of sustainable water management are? The significance of the management of natural resources is shown in the examples of international activities. It may be recalled in a number of OECD publications on water management <sup>1</sup>. Of great significance in terms of the focus of the thesis is the last part of the first chapter - 1.4.2. Privatization and market approach to water management. There are two examples of private companies in Mexico. In this context the author documents that the private firms of water services are more prone to show distortions of a monopolistic type in particular.

The author illustrates the historical development of water management in Mexico in the second chapter. The changes in the policy, institutions and legal framework in the transition from the centralization to the decentralization of water management are shown. This chapter also provides a comprehensive description of the changes in the Mexican water institutions. The physical, economic, policy and institutional dimensions of water, which are critical for the water sector performance are described. The key part is in subchapter 2.5 Implications of the relationship between the policy, institutional, physical and economic dimensions. However, it could be more detailed.

In chapter three - Water scarcity and environmental problems of urbanization in Mexico, the main challenges of water management in urban areas are presented. The problems of three regions are quantitatively and qualitatively evaluated. The consequences of urbanization on the water resources in Mexico have been serious. The decentralization process in Mexico was aimed at modernizing water management to face the challenges of water pollution and scarcity. According to Saltiel (2008) many municipalities lacked the technical and financial capacities to assume these new duties. Thus, the decentralization of the water services was only partial. In 2007, the average cost of producing a cubic meter of water in Mexico was €0.32, without considering the treatment costs (the average tariff was €0.24 per cubic meter). If we look at Figure 9 - Maximum water tariffs for domestic use per m<sup>3</sup> (the currency is not

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<sup>1</sup> OECD. Water Governance in OECD Countries. London, GB: IWA Publishing, 2013. ProQuest ebrary. Web. 1 August 2016. Meeting the Water Reform Challenge. London, GB: IWA Publishing, 2013. ProQuest ebrary. Web. 1 August 2016. Water Security for Better Lives. London, GB: IWA Publishing, 2013. ProQuest ebrary. Web. 1 August 2016. Etc.

mentioned) very large differences are evident (3.35 – 22.96). This is why the water consumption is relatively high (380 l/day). From this perspective, I consider the scenarios of population important (Pineda et al. 2010) which would result in maintaining the current method of water management including tariffs, an increase of 55% in consumption by 2030. As the author notes, water tariffs are currently subjected to political and electoral interests, since they are fixed in the state legislatures. But why, then, are there significant differences in the tariffs? It's true that the strengthening of the water company's finances will be crucial to improve water management by introducing more sustainable practices to promote water conservation as well.

In chapter four - An Assessment of the Policy and Institutional Changes in Water Quality of the Most Productive Hydrological-Administrative Regions, the factors of water pollution are analysed. The chapter describes the main features of the three most productive regions. Afterward, the factors of water stress are quantitatively tested. Three regression models are calculated, each corresponding to one region, and the results are compared against the existing quantitative literature.

Subchapter 4.1 Previous studies about water management modelling, comprises the research of sustainable water management focuses on different topics linked to water scarcity. Subchapter 4.2 is focused on the normative criteria and monitoring of water quality in Mexico. For the water quality assessment, the information about the quality of the groundwater resources would be preferred. However, the statistical information available on superficial water resources is more abundant.

With respect to the description of the problem and key features of the three most productive hydrological-administrative regions, I would like to know why these three regions were selected?

The author states that the collection of water rights is a source of income for the federal government. This is crucial for investment into the infrastructure for sustainable water management. Does this mean that the government only uses those funds and not funds from the state budget?

A key chapter of the dissertation is 4.3 Methodology, data and model specification. The data include variables of pollution of water resources, size of population, GDP share, wastewater treatment and economic resources for investment. The author indicates that the selection of the indicator BOD better suits the needs for analyses. Why?

The results of the analysis are given in chapter 4.3.1. The estimation and interpretation of the results for the Hydrological-Administrative Region XIII Waters of the Valley of Mexico. The result is that the model is the most contradictory of the three regions. The selection of variables and regression results were presented through a questionnaire to three experts. Although the regions had features that made them comparable, the outcomes of the regression analyses are very different for each case. The author indicates that this fact stresses the need to develop more reliable statistical information to perform quantitative studies. According to the recommendations of expert no. 2, the search was performed in order to consult the database of each basin administrative organism in order to consult more specific data. The results for “HAR VIII Lerma Santiago Pacific” had the opposite expected effect. Is it possible to state some opinion about these results?

In the conclusion recommendations and the focus of future research are given. I consider it important to continue solving the problems of water management in Mexico.

In the dissertation, bibliographic references are used consistently. My own review of the literature suggests a detailed study of the issue (119 items). From the survey, it is obvious that the author based the info on both the theoretical literature and practical documents (government documents).

The output in the form of the proposed methodology for assessing the effectiveness of water management is an important theoretical basis for practical application. As stated in the conclusion with regards to the following research work, I recommend the author continue in his work and contribute to the deepening of the economic analysis and greater efficiency of water management.

I evaluate the presented dissertation very positively. For its topicality and practical application, the dissertation can be a benefit to professionals and the general public. It can be stated that the thesis meets the conditions for independent creative scientific work and I recommend it for defence. I suggest that the author responded to the comments made in the text of my opinion during the defence.

In Prague August 2, 2016

Doc. Ing. Miroslav Hájek, Ph.D.