Quantifying the Impact of Culture on Domestic Water-saving

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1. Introduction

Saving domestic water has become one of the most important policy targets to address increasing freshwater shortage worldwide. Culture plays a significant role in people's behaviors including how they use water at home. This study aims to quantify the impact of culture on domestic water-saving. To capture the multi-dimensional roles of culture in individuals' decision-making process, we model their water-saving behaviors by incorporating both local cultural values and cultural ecosystem services into a hypothetical framework of the theory of planned behavior (TPB) and Value-Belief-Norm (VBN) theory.

2. Methodology and Data

The local cultural values and the value of cultural ecosystem services are quantified by the questionnaire survey conducted in Jinan City, China, and performing the CVM on its results.

The questionnaire was designed based on research hypotheses and characteristics of Jinan City. The questions were designed according to the guidelines for constructing a TPB questionnaire (Ajzen, 2002a; Ajzen, 2002b; Ajzen, 2006) and VBN theory (Stern et al., 1999). Based on four protection and restoration projects of the cultural landscape of springs that the Jinan Government planned to implement during 2021-2025 (Jinan Municipal Bureau of Water, 2022), this study designed CVM with payment card as the response format to capture the specific WTP of Jinan's respondents for the CES. The pretest verified the effectiveness of the hypothetical scenario and mitigated the bias.

The street survey was conducted from October 2023 to April 2024, targeting the permanent residents who lived in Jinan City for more than one year. Moreover, this survey was conducted voluntarily and did not collect personal identifying information to ensure anonymity. 572 questionnaires were received, of which 404 were valid. The valid sample size was larger than the minimum sample size, which should equal ten times the number of latent variables (Hair et al., 2011).

This paper used the partial least squares structural equation model (PLS-SEM), which is a method to analyze the cause-effect relations between latent constructs if the data are nonnormal (Hair et al., 2011).

3. Results

Table 1 Results of path coefficients

Path	Path coefficients	t-value	p-value	Results
CES->ATT	0.061	1.84	0.065	Not Supported
CES->SN	0.089	1.805	0.071	Not Supported
CES->PN	0.095	2.413	0.016	Supported
CES->PBC	0.11	2.936	0.003	Supported

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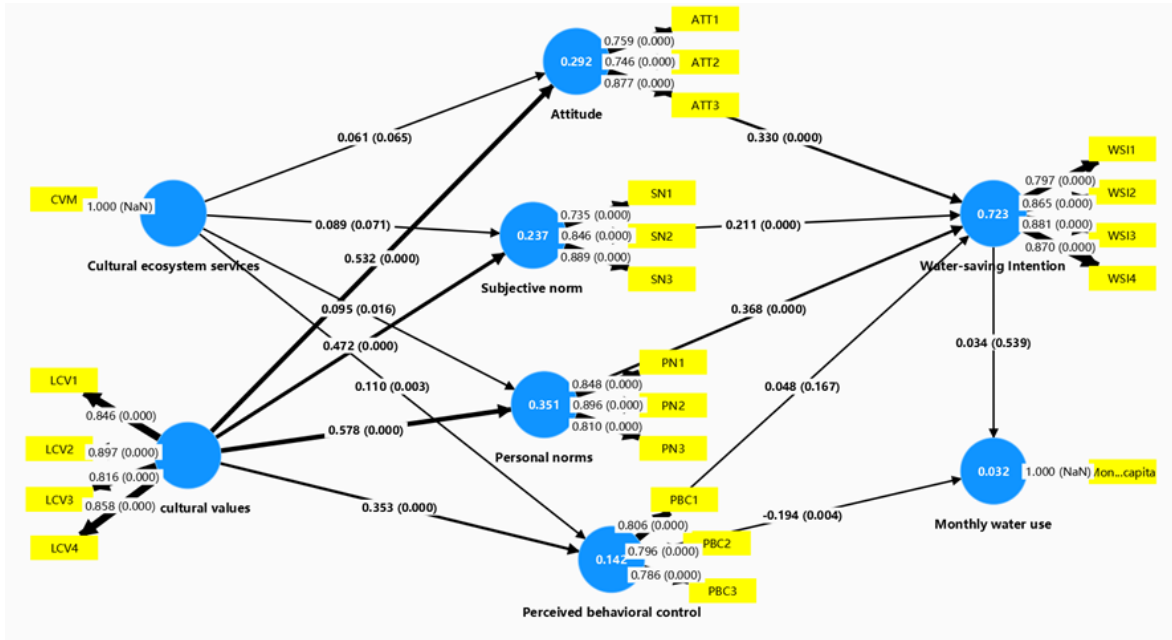|				
LCV->ATT	0.532	7.178	0.000	Supported
LCV->SN	0.472	6.802	0.000	Supported
LCV->PN	0.578	8.443	0.000	Supported
LCV->PBC	0.353	5.376	0.000	Supported
ATT->WSI	0.33	6.761	0.000	Supported
SN->WSI	0.211	3.828	0.000	Supported
PN->WSI	0.368	6.253	0.000	Supported
PBC->WSI	0.048	1.383	0.167	Not Supported
PBC-> Monthly Water Use	-0.194	2.891	0.004	Supported
WSI->Monthly Water Use	0.034	0.614	0.539	Not Supported

Figure 1. Results of the structural equation model of domestic water-saving

4. Conclusion

By estimating the partial least squares structural equation model, we found that: (1) local cultural values and cultural ecosystem services can positively influence residents to reduce water use at home through perceived behavioral control; (2) local cultural values have a positive effect on water-saving intention through attitude, subjective norm, and personal norms; (3) cultural ecosystem services can significantly influence that intention by personal norms; (4) intention has no significant influence on resident to use less water.

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