



USDA-CSREES 2007 National Water Quality Conference

Preferences for Home Plumbing Materials: Comparison of Analytic Hierarchy Process, Conjoint Analysis

Historically, engineers have employed Analytic Hierarchy Process (AHP), which assesses preferences over a set of competing alternatives by using pair-wise comparison (Saaty, 1980). Economists, on the other hand, have utilized Conjoint Analysis (CA) and Contingent Valuation (CV) analysis, which are used for non-market valuation analysis such as willingness to pay. A comparative analysis of these three methods with respect to their recommendations, validity, and practical applicability can be helpful to researchers in both the economics and engineering disciplines in carrying out non-market valuations. The objective of this research is to evaluate consumer preferences for attributes associated with home plumbing materials (copper, plastic, and stainless steel) and the impact of these attributes on a homeowner's choice of home plumbing material. Three methods are employed for preference elicitation: AHP, CA, and CV. In the U.S., nearly 90% of home drinking water plumbing systems use copper pipes (Lee et al., 2005). Copper pipes tend to be affected by pinhole leak corrosion caused by removal of natural organic matter (Dalton, 2003). Recently, pinhole leaks have become a nationwide problem, with some areas experiencing a 40% pinhole corrosion rate (Kleczyk et al., 2005). Damage from pinhole leaks includes collapse of walls and ceilings. The overall cost of repair from a single leak can range from \$100 to \$25,000 with time spent dealing with the issue ranging from 10 to 100 hours. Additionally, reports of pinhole leaks in a household increase the probability of losing home insurance and endangering health. Pinhole leak occurrences in combination with the above factors cause anxiety to the affected homeowners (Kleczyk et al., 2005; Lee et al., 2005). Home plumbing systems affect the value of the home, which, for the majority of homeowners, is the most financially valuable asset. Plumbing systems can have important impacts on the health, taste, and odor of drinking water. Homeowners have an important stake in finding plumbing systems appropriate for their households. Homeowners require information on plumbing material attributes such as price, health impact, longevity, and corrosion resistance in order to make informed investment decisions about plumbing systems for their homes. For example, health has been found the most important factor in the process of evaluating plumbing material for home use (Lee et al., 2005). In this study, consumer preferences for plumbing materials: copper, plastic, and stainless steel will be evaluated based on the following attributes: price, health impact, odor and taste, corrosion resistance, fire resistance, longevity, and resale home value, using AHP, CA, and CV preference elicitation methods. Undergraduate students attending engineering classes at Virginia Tech will participate in three separate surveys to assess plumbing materials using each elicitation method. The results of the survey will inform

consumers of important attributes of plumbing materials considered in decision-making process while purchasing the appropriate drinking water system.

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