



Social trust, risk perceptions and public acceptance of recycled water: Testing a social-psychological model



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ARTICLE INFO

Article history:

Received 6 August 2013

Received in revised form

11 January 2014

Accepted 17 January 2014

Available online 4 March 2014

Keywords:

Recycled water

Risk

Fairness

Identification

Trust

ABSTRACT

Faced with a severe drought, the residents of the regional city of Toowoomba, in South East Queensland, Australia were asked to consider a potable wastewater reuse scheme to supplement drinking water supplies. As public risk perceptions and trust have been shown to be key factors in acceptance of potable reuse projects, this research developed and tested a social-psychological model of trust, risk perceptions and acceptance. Participants ($N = 380$) were surveyed a few weeks before a referendum was held in which residents voted against the controversial scheme. Analysis using structural equation modelling showed that the more community members perceived that the water authority used fair procedures (e.g., consulting with the community and providing accurate information), the greater their sense of shared identity with the water authority. Shared social identity in turn influenced trust via increased source credibility, that is, perceptions that the water authority is competent and has the community's interest at heart. The findings also support past research showing that higher levels of trust in the water authority were associated with lower perceptions of risk, which in turn were associated with higher levels of acceptance, and vice versa. The findings have a practical application for improving public acceptance of potable recycled water schemes.

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1. Introduction

Positive public perceptions and acceptance of water reuse are now recognized as key factors for the successful introduction of wastewater reuse projects (Dolnicar and Hurlimann, 2011; Dolnicar et al., 2011, 2010; Friedler and Lahav, 2006; Nancarrow et al., 2008). Regardless of the strength of the scientific evidence, public opposition can cause wastewater reuse projects to fail at any stage of their implementation (Friedler and Lahav, 2006; Uhlmann and Head, 2011). There is ample evidence of this from potable water (i.e., for drinking water purposes) reuse projects that have failed to be implemented in the U.S. and Australia. For example, in the 1990s the San Diego County Water Authority's plans to mix recycled water with the drinking water supply was subject to negative

public campaigns highlighting the health risks associated with the project and dubbing it "Toilet to Tap" (Po et al., 2003). Despite significant investment the project was abandoned (Hurlimann and McKay, 2004). In South East Queensland, Australia, in particular, where the combination of rapid population growth and prolonged drought placed pressure on the government to seek out rainfall-independent water supplies, there have been a number of noteworthy examples of proposed potable wastewater reuse schemes that have failed to be implemented.

During the mid-1990s, potable recycled water projects proposed by the Maroochy and Caloundra councils in Queensland were both strongly opposed by their communities and ultimately rejected (Uhlmann and Head, 2011). Public opposition to the projects was fuelled by campaigns from opposition groups such as CADS ("citizens against drinking sewage") who warned of alleged health risks associated with drinking recycled water. In 2006, in the drought-stricken regional city of Toowoomba, Queensland, a referendum was held for a proposed potable reuse scheme to augment dam supplies. The proposed scheme created intense opposition and publicity from the CADS group, who cited health risks and a negative impact on Toowoomba's image as their opposition to the

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project. The project became politicized, and as noted by the mayor of Toowoomba at the time, moved the focus from water to politics and vested interests (Hurlimann and Dolnicar, 2010). Even with severe water shortages and dam levels dropping to record lows of only 23%, the scheme was abandoned after 62% of residents voted against it (Hurlimann and Dolnicar, 2010).

More recently, the Western Corridor Recycled Water Project in South East Queensland (the largest water project to be built in the Southern Hemisphere), was put on hold, despite completion of \$2.5 billion of infrastructure. Extensive media speculation regarding possible health risks impacted significantly on community confidence (Roberts, 2008) and in response to the drop in public confidence (as well as unexpected rainfall which restored dam levels) the government changed its policy so that recycled water would only be introduced to drinking water supplies in an emergency, that is, when combined dam levels in the region drop to below 40% (Queensland Water Commission, 2009).

Given the critical importance of public perceptions to the implementation of potable reuse schemes, the current study examines the factors that are related to public risk perceptions and acceptance of recycled water. Specifically, the study develops a model that investigates the role of trust in predicting risk perceptions and acceptance and the factors that help to promote trust. In doing this the study makes an important theoretical contribution to the literature on the social dimensions of recycled water management and also contributes more broadly to the study of environmental management and to the social psychological literature on trust.

2. The hypothesized model

Below we outline the theoretical and empirical basis for relationships proposed in the hypothesized model.

2.1. Risk perceptions, trust and acceptance

A strong body of research has shown the centrality of social factors in water management (Dolnicar et al., 2010; Dolnicar and Schäfer, 2009; Hurlimann et al., 2009; Lienert et al., 2013). In the failed reuse cases discussed above, the public perceived the possible health risks associated with recycled water as unacceptable despite the reassurances provided by authorities and by scientists (Dolnicar et al., 2010; Hurlimann and Dolnicar, 2010; Uhlmann and Head, 2011). The conclusion that perceived risk is a key predictor of acceptance of recycled water management schemes accords with the broader risk literature that shows a clear relationship between risk perceptions and acceptance (Eiser et al., 2002; Mankad and Tapsuwan, 2011; Robinson et al., 2012; Siegrist et al., 2007).

In turn, in the risk communication literature, it is generally agreed that trust in authorities to manage risk is a critical factor in the perception and acceptance of risks (Earle et al., 2007; Lofstedt and Cvetkovich, 2008). Trust is a multidimensional, complex construct (Fischhoff, 1999; Grabner-Kräuter and Kaluscha, 2003), but in the current study we use a specific operationalization drawn from the literature (Frewer et al., 1996; Lewicki et al., 2006; Rousseau et al., 1998; Siegrist et al., 2000): *a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behaviour of the authority responsible for the recycled water scheme.*

Siegrist et al. (2000) have argued that many individuals lack the resources such as knowledge, time and interest to make decisions and take action in relation to science and technology and therefore they rely on trust in the relevant authorities or government agencies to make decisions. In the context of urban water

management, it has been argued that in order for water management schemes to be successful, the community requires trust in the responsible authorities to deliver them a safe water supply (Hurlimann and McKay, 2004; Marks and Jadoroznyj, 2005). The relationship between trust, risk and acceptance has been empirically explored in the risk communication literature in the context of new technologies (Eiser et al., 2002; Pavlou, 2003; Siegrist, 2000; Siegrist et al., 2007), and more specifically in relation to public acceptance of potable reuse (Hurlimann et al., 2008; Nancarrow et al., 2009). Thus, past research and theory provide a strong foundation for the hypothesis that greater trust in the water authority to deliver safe recycled water will be associated with lower risk perceptions and greater acceptance of the recycled water scheme.

What past research has not explored though, are the factors that underpin trust in a water authority. This is a critical question given that water resources are likely to become more vulnerable in the future and water authorities will need to explore alternative water sources, including recycled water (Dolnicar and Hurlimann, 2011; Hurlimann et al., 2009). Understanding how trust can be developed will be essential information to aid in this process. In the present model, we explore three inter-related antecedents: perceived procedural fairness, social identity, and source credibility. We focus on these variables as, theoretically, they have been linked to trust, although these linkages have not previously been tested in relation to recycled water.

2.2. Predictors of trust: fairness, identity, credibility

According to the procedural justice literature, the belief that one has been treated fairly by authorities enhances acceptance of legal decisions, obedience to laws, and evaluations of public policies; while the belief that one has been treated unfairly prompts protest behaviour (Lind, 2001; Tyler, 2001; Van den Bos and Lind, 2002). Within the context of water management, there is evidence that fair procedures are a major predictor of acceptability of the schemes and compliance with urban and rural water management and policy issues (Hurlimann et al., 2008; Nancarrow et al., 2002; Syme et al., 1999), including community intentions to drink water from potable reuse schemes (Nancarrow et al., 2009). Hence, past research suggests that the more community members consider a recycled water scheme to be fair, the greater their acceptance of the scheme.

The relational model of authority (Tyler and Lind, 1992) provides a theoretical explanation for these findings, proposing that people care more about how decisions are made than they do about the actual decisions because procedural treatment provides them with important information about their relationship with authorities (Skitka and Mullen, 2002). Tyler and Degoey (1996) suggest that the way people are treated by authorities provides them with information about whether they are respected members of the group and whether they should feel pride in the group as a whole. In other words, fair procedures indicate to community members whether and how much they share an identity with authorities. Shared social identity in turn increases the likelihood that group members trust an authority and accept their decisions (Tyler and Degoey, 1996; Williams, 2001).

Hence, according to the relational model of authority, shared social identity is a key mechanism by which fair procedures influence trust in authorities. It was therefore hypothesized that perceiving that the water authority treats community members fairly predicts a greater sense of shared identity between community members and the water authority. In the current study shared social identity is reflected by the extent to which people see the water authority as a member of their group (i.e., the community)

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