Turning the tide: informal institutional change in water reuse

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Abstract

This paper examines the impact of public opinion, time, and the ‘yuck’ factor in influencing the formation of water reuse norms based on an analysis of newspaper content observed in two locations: Singapore and Queensland, Australia. A simple regression analysis shows that time and the ‘yuck’ factor were significant factors in norm formation but, surprisingly, public opinion was not found to be a significant factor. The results show that public opinion, long held to be an important factor, may not be significant in the sense in which it is commonly conceived. It also shows how perception can be shaped to promote water reuse policies in the urban sector. The formation of water norms was found to be crucial in determining the different outcomes in the implementation of water reuse policies in the two countries.

Keywords: Institutional changes; Media; Norm formation; Water reuse

1. Introduction

Failed attempts to implement water reuse policies in cities around the world have often been blamed on public non-acceptance of the option. That is to say, if water reuse policies have to be aborted by public utilities, despite their economic, hydrological and social rationale, it has been claimed that this is to do with public non-acceptance of using reused water. This paper takes a closer look at the idea of ‘public acceptance’ and the role it plays in the formation of norm-based informal water institutions.

The paper represents a departure from past analyses in three ways. First, it takes an empirical, multi-disciplinary approach, combining current debates in the fields of water governance, institutional theory, and media analysis to study the issue of public acceptance through the lens of norm formation. That is to say, the notion of public acceptance is investigated, not by taking samples or by interviews but by regarding the issue of water reuse as presented by the media as a proxy. The authors examine this issue in two countries: in Singapore, which has successfully implemented such a policy, and in Queensland, Australia, where an initial attempt at such a policy failed and another attempt is now being made. Newspaper articles found in these two countries over a 12-year period during 1997 to 2008 form the basis of this research.

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Second, this study takes perception, or social construction, as the centre piece of its analysis. While there has been some recognition that institutions are very much social constructions (Saleth & Dinar, 2004), little has been done to explore the role of media in norm formation, especially related to water reuse. This paper assumes that, everything else remaining equal, the media has a role both in influencing and constructing such social norms. There are, of course, many other factors influencing the media itself (including, among others, political regime, media ownership, and communications budgets) but this paper limits itself to the examination of social construction of norms by the media, rather than influences on the media itself.

Third, the paper attempts a more precise understanding of what causes a positive rather than a negative construction or presentation of water reuse policies by the public or by the media. Many studies have assumed that public opinion is an important determinant. This study shows that this need not necessarily be the case. Other variables such as time and representation of the ‘yuck’ factor are equally, if not more, significant.

Finally, from a methodological perspective, this paper also makes a contribution in terms of its use of the mass media as a proxy for the ‘perception’-based norm or informal institution related to water reuse policy. It also contributes to the debate by showing that public opinion, which was long held to be an important factor, may not be significant, at least not in the sense in which it is commonly conceived. If public perception can be considered as a tide in public water reuse, then this paper shows how this tide can be turned to promote water reuse policies in the urban sector.

2. Perception and water institutions

Institutions are often conceived as structures that humans impose on their economic and social interactions. North (1993) says that ‘institutions are the humanly devised constraints that structure human interaction. They are made up of formal constraints (rules, laws, constitutions), informal constraints (norms of behaviour, conventions, and self-imposed codes of conduct), and their enforcement characteristics’. Together, he says, these institutions define the incentives in society.

In their seminal study on water institutions, Saleth & Dinar (2004) see institutions as ‘subjective constructs’. North suggests this when he writes of institutions as ‘mental constructs’ or ‘subjective models’ (North, 1996), and he goes on to explore this part of institutions in theories of learning and cognition. With this recognition, we see that there is a gap in current literature, i.e. the role of perceptions in institutional change. As Saleth & Dinar (2004) point out, it is not information per se, but the perception of information that accounts for how institutions are constructed and changed.

Given the importance of perception in institutional change, what would be a good way for capturing and evaluating the perception on water reuse? One way is to rely on surveys and interviews, which is the standard method for gauging public perception. Another is to look at the images presented by the media, as a construction of the rules of the game, or the social norm, relating to water. But, it is important to understand first in what sense the media create or lead to the formation of a water norm or informal water institution. It is equally also important to see whether such a constructionist approach is legitimate.

2.1. The media as a creator of social norms

The importance of media in shaping public perception and opinion has been evidenced by the growth of communications ‘experts’ employed by the public sector over the past few decades. The power
relations between message creators or opinion-makers and recipients, the increasing role that the media plays in politics (what is often called the ‘mediatisation’ of politics), and the transformative power of journalism are all well-established (Hartley, 2006; Gelders et al., 2007; Groeling & Baum, 2008; Harvard, 2008). What speaks most loudly of the issue under consideration is, however, whether and how the media has the power to create knowledge and shape social norms for water reuse. Here, Crozier’s (2007) idea of ‘recursive governance’ is useful. He notes: ‘The capacity for action, whether of governments, businesses or other societal actors, depends on their ability to engage in and manage open informational loops’. More importantly, it is in such loops that ‘power and knowledge’ are generated. The government gives inputs to the media, who, in turn, shape inputs to the government, and so on, in a recursive process. What this process creates in the end may be variously called perception or opinion but, in Crozier’s framework, is defined as ‘knowledge’ (Crozier, 2007).

There is, more interestingly, a sense in which institutions are merely ‘codified knowledge’ and so knowledge and institutions can be regarded as substitutes (Saleth & Dinar, 2004). Even if information is imperfect, institutions are still useful substitutes for knowledge because they provide the basis for making sound decisions. Saleth & Dinar (2004) locate the creation of this new knowledge within the framework of institutional economics by postulating a ‘perceptional convergence’. For them, this occurs when there is wide consensus, or ‘the articulation or solidification’ of the demand for institutional change. Such convergence provides political entrepreneurs with the incentives to lobby for change, and can occur ‘even in the face of factors creating divergence such as ideology, bias, and information gaps’. They write that cultural influences, the persuasive power of moral authorities, as well as information flow and learning also increase such a convergence.

In this paper, the authors build on Saleth and Dinar’s research of subjective construction and perception. We rely first on the fact that the mass media fulfills all of the characteristics that Saleth & Dinar (2004) have outlined for perception convergence. That is, the mass media is a powerful way of both representing and creating such a convergence, and hence, is a valid unit of analysis. Second, we take as our research question: ‘how does knowledge creation or perception convergence result when considering an informal institution such as water reuse norms?’ In our analysis, we take the construction of a perception (whether positive or negative) about water reuse as the dependent variable. The main independent variables are time, public acceptability, and the ‘yuck’ factor. This ‘yuck’ factor is a visceral response to what a person perceives to be an unthinkable act—such as drinking recycled or sewage water. The sections below justify our investigation of each independent variable.

2.2. Time

Institutions are not immutable but change through time. North (1996) has presented a theory of institutional change in which he says that the ‘agent of change is the entrepreneur, the decision-maker in organisations’. He argues further that ‘it is usually some mixture of external change and internal learning that triggers the choices that lead to institutional change’. He suggests that formal and informal institutions change differently and due to different factors governing them.

Formal institutions change because of a change in the process by which such institutions are formed. ‘As a result of legislative changes such as the passage of a new statute, of judicial changes stemming from a court decision that alters the common law, of regulatory rule changes enacted by regulatory agencies, and of constitutional rule changes that alter the rules by which other rules are made’. Informal institutions change for the same reason but ‘they occur gradually, and sometimes quite subconsciously as
individuals evolve alternative patterns of behaviour consistent with their newly-perceived evaluation of
costs and benefits’. The agent of change is the decision maker (or leader) in different organizations.

North (1993) seems to think that informal institutions change relatively slowly. But, in public policy,
change in political institutions both formal and informal has been noted to progress through ‘punctuated
equilibrium’ (PE), i.e. periods of relative stability, punctuated by crisis and change. This theory has been
borne out by empirical work, for example, by Jones et al. (1993). They found that, for American political
institutions, ‘the result over time has been institutionally reinforced stability interrupted by bursts of
change’. The weight of evidence (data from 1947 to 1999) is impressive. Most of the time, they argue,
political systems are stable and operate by means of ‘policy monopolies’. These monopolies do not endure
forever and they ‘can be constructed and they can collapse’. This work has also been replicated by other
theorists and it appears incontrovertible that political regimes go through ‘punctuated’ stages of change.
Time appears to be an important factor to investigate and thus forms part of our investigation in this paper.

The work of Baumgartner & Jones (1991) also speaks about the dynamics of change. They write that
what accounts for policy change is the interaction of beliefs and values concerning a particular policy
(‘policy image’) and the prevailing set of political institutions (‘policy venue’). This interaction can lead
to the ‘rapid creation, destruction and alternation of policy subsystems’ (Baumgartner & Jones, 1991).
The examination of perception in this regard is interesting because it feeds into the belief systems. The
policy image may be negative or positive—and this informs our tagging of the variables in our analysis
later on.

At a first glance, however, the work of Baumgartner & Jones (1991) appears to modify North’s theory
by asserting that crises have a power to bring about large and fast changes in informal institutions. But,
while this PE theory is able to give a good descriptive account of the issue from a macro-perspective, it is
only able to tell us that change happens during a crisis; it cannot tell us how. Baumgartner & Jones
(1991) also acknowledge that a weakness of the theory is that it is almost entirely post facto, i.e. ‘we can
only know after the fact what successful mobilizations were’.

In this context, employing a different but more micro level of analysis may help. Culpepper (2008)
deconstructs the process of institutional change into three stages: crisis, experimentation and
consolidation. In a study of union negotiations, where new ideas and new facts bring about a change in
entrenched positions, such crises are seen as ‘common knowledge events’, which lead to the ‘emergence
of shared ideas in a highly contested area such as wage bargaining’. So, it is seen here that during crises
there is creation of knowledge and an accelerated rate of learning.

This knowledge creation relies on a constructivist approach, in the fact that there are agents and actors
who create such knowledge (Finnemore, 1996; Risse, 2000; Schimmelfennig, 2001). Culpepper says this
process is a ‘political act’ which depends on the use of reasoned argument about cause and effect ‘in a
context of shared experience’.

From this approach to institutional change, we see, then, that once a crisis has been identified, the
second stage is ripe for learning and the creation of new norms. ‘Common knowledge creation, if it
happens at all, takes place during the period of institutional experimentation, and the process of
persuasion is central to it’ (Culpepper, 2008: 6).

Under this model, therefore, the creation of new, cooperative institutions does not ‘require a particular
history’. That is to say, as long as there is a shared sense of crisis, the creation of common knowledge can
move parties from having ‘highly incommensurable views’ to a ‘convergent set of views’ (Culpepper,
2008). Culpepper’s analysis is made in the context of the economy and wage bargaining but serves
equally well for water reuse policies.
That is to say, the analysis that crisis presents an opportunity to create knowledge and change to informal institutions does not turn on a ‘particular history’ or policy context, but can be applied generally. Taking this specifically to water reuse policies, we see that informal institutions such as water norms are formed by the personal beliefs and convictions of the people affected. This, in turn, is influenced by the rate of learning which, in turn, is affected by the sense of crisis and the ability of actors or leaders to effect the change in personal beliefs and convictions of the people affected by the institutions.

2.3. Public acceptability and turning ‘wow’ into yuck

One often mentioned perception of reused water is the ‘yuck factor’. This feeling of distaste is a well-known effect in water reuse and has been variously defined as a ‘psychological repugnance’, ‘disgust’, or ‘profound discomfort’ (Marks et al., 2008). Paul Rozin, a professor of psychology at the University of Pennsylvania, observes the characteristic facial expression: ‘There’s a grimace, the lower jaw drops, the tongue sticks out, and the nose wrinkles’ (Schmidt, 2008). Accompanying this feeling of disgust is usually a feeling of fear.

In his article on the ‘wow to yuck trajectory’ of science, Kulinowski (2004) noted that what is astonishing and wondrous to scientists and, sometimes, to laymen, can soon degenerate into something unacceptable. For example, genetically-modified food was once hailed as the solution to world hunger but has now been vilified as a destroyer of the natural order. In the same way, nanotechnology holds much promise for many of the world’s problems. It is natural, he argues, that any technology that promises so much change is bound to generate controversy, ‘because with such awesome power comes the capacity to push beyond boundaries that society has deemed acceptable’. In other words, ‘societal and ethical concerns can rapidly turn wow into yuck’ (Kulinowski, 2004).

This is exactly the issue with recycled water. Science can wipe out every microcosm of dirt and urine from the water, but it cannot wipe out the mental association. For the scientist, as a scientist, there is no rational basis for this ‘yuck’ factor. But the scientist as a human being may shudder at having to drink molecules from his own urine.

Until recently, the reason for implementation failure of water reuse policies has been laid at the door of the ‘yuck’ factor (Stenekes et al., 2006). Sensational news stories have centred on the potential health risks and scare tactics used by politicians to score points.

Researchers in Australia’s Commonwealth Scientific and Industrial Research Organisation (CSIRO) (Po et al., 2005) have isolated this ‘yuck’ as one of the few statistically significant factors in influencing water reuse policies. As a result of this and other empirical studies, scholars have concluded that water reuse is limited by the public’s willingness to drink water that has been recycled. The argument has been framed that ‘public acceptance’ still has to be won in those countries or states which have faced problems in implementing water reuse. So, we have the simple proposition that in Singapore (since 2001), and California (since 1962), the public have accepted water reuse and hence, such policies can be implemented smoothly, whereas in many states in Australia, these policies have been rejected because the public cannot accept them.

However, formulating the problem this way is unhelpful. As Stenekes et al. (2006) point out, ‘there has been inadequate exploration of the reasons for the lack of success of water recycling by the water industry or what this means for water management institutions’.

But what do we mean by public acceptance? How do we measure it, and is a unanimous acceptance by the public a necessary condition for the success of water policies? First, we see that a review of empirical studies so far (Margolis, 1996) demonstrates that there is a wide disparity in the percentage of people
who support water reuse across different studies. Among those who oppose water reuse, there are those who adopt their point of view based on an inadequate (or erroneous) understanding of the science behind water recycling.

Kulinowski writes of the downward trajectory of this route—scientific breakthroughs usually starting out with strong public support, with what he calls the wow factor because of the potential benefits to the economy, human health or the quality of life. But this happy stage is followed, sometimes, by ‘a profound discomfort with human attempts to outsmart Mother Nature’. In the case of genetically-modified food, this discomfort rose to a height when the gene of a cold-water fish was spliced into that of a tomato, to help the latter withstand frost. ‘In a sense, this industry (GM food) went from ‘wow’ to ‘yuck’ to nearly bankrupt’ (Kulinowski, 2004).

In his discussions, Kulinowski writes of a ‘wow’ and ‘yuck’ index but does not ground this in any empirical data. However, he did point to the media and public acceptance as playing parts in this change in perception. His advice, therefore, is for sound technical data to be made available and for ‘open dialogue with all stakeholders’ (Kulinowski, 2004).

Russell & Lux (2009) bring Kulinowski’s work further on from psychological analysis to locating the debate in cultural and social domains. They say that ‘there appears to be no compelling argument or evidence that negative reactions to recycled water cannot change with opportunities to learn about the issue’. These reactions, they point out, can shift as conditions, practices, meanings and values change (Russell & Lux, 2009).

3. Water reuse in Singapore and Australia

Since independence in 1965, Singapore has been dependent on its neighbour Malaysia for much of its water supply. Over the past four decades, the two countries have had many disagreements over this arrangement, despite the signing of two water agreements.

In 1997, Singapore publicly stated that it was aggressively looking at alternative sources of water. This was precipitated by the difficulties with Malaysia over the price of raw water, with the Malaysians threatening to increase prices by at least six times and with no set formula to peg to future increases. In 1998, Singapore began studying wastewater as a source of raw water. The water would go through a purification and treatment process using membrane and ultraviolet technologies. Drinking water would be produced by a procedure known as Planned Indirect Potable Use (or Planned IPU). Three years later, the reused water was ready for non-potable use—for wafer fabrication processes, non-potable applications in manufacturing processes, as well as for air-conditioning cooling towers in commercial buildings. In 2003, the reused water, named NEWater, was introduced into water reservoirs. The amount makes up about 1% of total daily water consumption at the time of writing in July 2009 and will be increased progressively to about 2.5% of total daily water consumption by 2011.

Australia experienced the same sense of crisis in the late 1990s. At the time, it was facing a chronic water shortage due to drought and below-average rainfalls. The Queensland State Government initiated the Caloundra/Maroochy Strategic Wastewater Management Strategy, including plans to introduce reused water into the drinking supply. The Queensland State Government also initiated the Queensland Water Recycling Strategy (QWRS).

One of the most drought-stricken communities was Toowoomba in south-east Queensland. In 2006, the government held a referendum to recycle waste water for drinking water supplies. In reaction,
a group of citizens collected some 10,000 signatures for a petition opposing the project. Not surprisingly, in the referendum, residents of Toowoomba voted against the wastewater scheme. Today, the issue of water reuse remains high on Australia’s national agenda—not surprisingly as it is the driest inhabited continent in the world.

4. Data and methodology

Research data on desalination and water recycling in Queensland was obtained from Lexis-Nexis with the search terms ‘Queensland, recycled water and desalination’ covering period during 1997–2008. Reports were taken from five major Australian newspapers: The Australian, The Courier Mail, The Sydney Morning Herald, The Age, and The West Australian. In Singapore, the database used was ‘Newslink’, created and managed by Singapore Press Holdings. The search terms used were: ‘recycled water, NEWater and desalination’ covering a period during 1997–2008. Reports were taken from the three major English newspapers in Singapore, i.e. The Straits Times, The Business Times, and The New Paper. In the case of both locations, each report was tagged according to whether they were supportive of water reuse (positive), hostile to it (negative) or neither (neutral). They were also categorised according to two types of story, i.e. whether they were news stories (which were merely reporting events) or commentaries (which reflected the views of the writers). The distinction is important because the first type of story is often thought to be from a more neutral point of view. There is a question of whether news stories are more objective than commentaries—this is a difficult question and one which we cannot answer here, save to say that commentaries are written with a certain point of view, whereas news stories are, or ought, not. The stories were also examined to see whether and how they portrayed ‘yuck’ (positive or negative), and how this impacted on the slant of the story as a whole. Public opinion was also tagged.

To test the hypothesis on water reuse norms and the role of media on shaping it, appropriate proxy variables for the dependent and independent variables were selected, and regression analysis was then conducted to understand the underlying relationships. Also, a descriptive statistics and time trends were observed to better grasp the overall context of the data. As this is a comparative study between Singapore and Queensland, Australia, all the regressions and supplementary analysis were done separately for both countries. The story line of the reports was chosen to represent the dependent variable—the social norm toward water reuse. The possibilities were investigated in terms of attitude towards water reuse—supportive (positive), hostile (negative) or neutral.

For the independent variables, the characteristics of a report, including the description of ‘yuck’, and the cumulative and ongoing tone of the media on water reuse were selected for the reasons cited in the section above. The candidates were: (1) the three ‘yuck’ dummy variables (Yuck-Negative, Yuck-Neutral, Yuck-Positive); (2) the time factor as represented by the Public Momentum to Reuse in terms of the tide of opinion toward water reuse (cumulative percentage of positive stories by the media up to a time when a report was made), representing the evolution of the social norm toward water reuse; (3) the type of stories (news or commentary); and (4) the public opinion (whether public opinion on water reuse was represented in the story or not). Table 1 presents the variables.

The expected signs of the model coefficients reflect common sense, i.e. (1) Yuck-Negative would be more likely to lead to negative story lines, and Public Opinion would be negative for the country that does not support water reuse and positive for the country that does; and (2) as Public Momentum...
(the cumulative percentage of positive stories over time) becomes more favourable, there would be a stronger momentum toward the acceptance of water reuse by the media, and the resulting story lines would be more inclined to be positive in tone. For other variables, the hypothesized sign is not so clear. The most interesting variable would be Yuck-Positive, the ‘positive’ mention of ‘yuck’, because the empirical evidence on this variable may reveal whether positive mentions of ‘yuck’ is better than ‘no mention’ of ‘yuck’ at all. Since the dependent variable (Story Line) is of ordinal data type, ordinal logistic regressions were employed for the multivariate analysis. The regressions were run separately on the two different data sets representing Singapore and Queensland, Australia.

Although Singapore and Queensland are both water sensitive and share the same impetus to adopting water reuse than do other less water sensitive regions in the world, they differ considerably in social, economic, climatic, physical, and hydrological properties. The independent variables investigated in this paper relate specifically to the investigation at hand, namely, the construction of the institution of water reuse by the mass media. For a broader investigation on the impact of this institution on public acceptance, and the eventual success of the policy, we would need to employ a more diverse set of independent variables.

5. Discussion and analysis

The descriptive statistics for both countries are illuminating (see Tables 2, 3 and 4). First, it is worthwhile noting the pattern of the dependent variable, Story Line, observed in the two study regions. Interestingly, the pattern is different for the two regions. In the case of Singapore, for instance, the dataset shows that there is more inclination towards ‘positive’ story lines than in the case of Queensland. This is indicative of the emergence of a relatively more favourable social norm toward water reuse by

<table>
<thead>
<tr>
<th>Category</th>
<th>Variable</th>
<th>Values</th>
<th>Expected sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent</td>
<td>Story Line</td>
<td>Negative, neutral, positive</td>
<td></td>
</tr>
<tr>
<td>Independent</td>
<td>Yuck-Positive</td>
<td>0, 1</td>
<td>+/-</td>
</tr>
<tr>
<td></td>
<td>Yuck-Neutral</td>
<td>0, 1</td>
<td>+/-</td>
</tr>
<tr>
<td></td>
<td>Yuck-Negative</td>
<td>0, 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Public Momentum to Reuse</td>
<td>Cumulative % of positive story line by the media, up to a time when a report was made (tagged to each report)</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Report Type</td>
<td>News, commentary</td>
<td>+/-</td>
</tr>
<tr>
<td></td>
<td>Public Opinion</td>
<td>0, 1</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Comparison of dependent variables.

<table>
<thead>
<tr>
<th>Story</th>
<th>Singapore</th>
<th>Frequency</th>
<th>Queensland</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>4</td>
<td>9</td>
<td>34.3</td>
<td>70</td>
</tr>
<tr>
<td>Neutral</td>
<td>19.3</td>
<td>43</td>
<td>37.8</td>
<td>77</td>
</tr>
<tr>
<td>Positive</td>
<td>76.7</td>
<td>171</td>
<td>27.9</td>
<td>57</td>
</tr>
<tr>
<td>Total</td>
<td>76.7</td>
<td>223</td>
<td>100</td>
<td>204</td>
</tr>
</tbody>
</table>
Singaporeans when compared to Queensland, Australia. However, an interesting pattern arises when comparing independent variables. Despite the wide gap in the dependent variable, the two countries show surprisingly similar characteristics in many of the independent variables. For example, in Yuck-Positive and Yuck-Neutral, the proportions of ‘positive’ and ‘neutral’ mention of ‘yuck’ are almost identical for the two regions. Yuck-Positive was 13% and 17.65%, respectively, for Singapore and Queensland. Similarly, Yuck-Neutral was 2.69% and 2.45%, respectively.

Notably, the proportions of categories in Report Type were nearly identical for the two regions. For Singapore, the portions of news and commentary were 85.76% and 14.35%, respectively. Likewise, the portions of the same two items were 85.78% and 14.22%, respectively, for Queensland. The same pattern was observed for public opinion (Public-Opinion). Public opinions were cited in 8.07% of the reports in Singapore and 10.29% in Queensland. Using this evidence, one can deduce that the overall characteristics of the reports are, more or less, similar for both regions.

How then can such similarity produce vastly different outcomes? One reason could be due to the two remaining variables, that is, Public Momentum and Yuck-Negative. These two variables are quite different for the two regions. Yuck-Negative, the negative mentions of ‘yuck’, was more frequent in Queensland compared to Singapore. The proportions were 22.55% for the former and 2.24% for the latter. As for Public Momentum (the cumulative percentage of the ‘positive’ story line by the media tagged to each report), the result was much higher in Singapore, where the average was 76.7%, compared to only 29.4% in Queensland. These observations reveal an overall pattern—the characteristics of the reports in the two countries were similar in most dimensions except for these two variables. Hence, these two factors need to be understood more by policy makers interested in influencing the construction of a water reuse institution, whether negatively or positively.

This sets the stage for our discussion of media coverage over the years. As shown in Figure 1, media interest begins building up between 1997 and 2001 and then peaks in 2002, before a gradual decline for Singapore. For Queensland, little media coverage existed between 2001 and 2005 and then suddenly

Table 3. Comparison of similarly behaving independent variables.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Singapore %</th>
<th>Count</th>
<th>Queensland %</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yuck-Positive (= 1)</td>
<td>13</td>
<td>29</td>
<td>17.65</td>
<td>36</td>
</tr>
<tr>
<td>Yuck-Neutral (= 1)</td>
<td>2.69</td>
<td>6</td>
<td>2.45</td>
<td>5</td>
</tr>
<tr>
<td>Report Type (news)</td>
<td>85.76</td>
<td>191</td>
<td>85.78</td>
<td>175</td>
</tr>
<tr>
<td>Report Type (commentary)</td>
<td>14.35</td>
<td>32</td>
<td>14.22</td>
<td>29</td>
</tr>
<tr>
<td>Public-Opinion (= 1)</td>
<td>8.07</td>
<td>18</td>
<td>10.29</td>
<td>21</td>
</tr>
</tbody>
</table>

Table 4. Comparison of independent variables.

<table>
<thead>
<tr>
<th>Public momentum to reuse</th>
<th>Yuck-Negative (= 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (%)¹</td>
<td>%</td>
</tr>
<tr>
<td>Singapore</td>
<td>76.7</td>
</tr>
<tr>
<td>Queensland, Australia</td>
<td>29.4</td>
</tr>
</tbody>
</table>

¹The mean value of Public Momentum to Reuse: The cumulative % of positive stories by the media up to a time when a report appears is derived for each report. This value becomes Public Momentum to Reuse and is tagged to each report. An average of this variable is taken and termed “mean”.

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peaks in 2006 and again in 2008. Hence, for Singapore, the first ‘crisis phase’ can be seen in 1997–2001. In this phase, the stories were overwhelmingly positive, with 84% of the reports on the topic being positive and none being negative, as can be seen in Table 5. On the other hand, in the same phase in Australia, the media perception was neutral in Queensland: 53% of the reports were positive and 33% negative. Given this, therefore, we see that the media representation of the issue during the early phase may have a significant impact for norm formation. This is observed by contrasting the proportions of ‘negative’ and ‘positive’ mention of ‘yuck’, Yuck-Negative and Yuck-Positive, before the media interest peaks for the two countries.

Taking the example of Australia, it may be useful to look at some actual samples of stories. In Australia, some of the vocabulary used included ‘treated effluent’, ‘toilet to tap’ and ‘shit water’, the latter used even by politicians who were actually supportive of the scheme. Many policy makers also used emotive language, which was unhelpful in creating a rational discussion and, crucially, there was a confusing use of negative terms to describe reused water even by leaders who supported the cause. One newspaper pointed out: ‘It doesn’t help when politicians, both for and against recycling water, confuse the debate by suggesting people will be drinking human waste’ (Sydney Morning Herald (Australia), 5 September 2005).

5.1. Regression

The results of the multivariate analysis are illuminating. The variables Yuck-Positive, Yuck-Negative, and Public Momentum to Reuse were all significant. Public Opinion and Report Type were significant

Table 5. Comparison of early media tone toward reuse.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% Count</td>
<td>% Count</td>
</tr>
<tr>
<td>Yuck-Positive (= 1)</td>
<td>84 16</td>
<td>53 8</td>
</tr>
<tr>
<td>Yuck-Negative (= 1)</td>
<td>0 0</td>
<td>33 5</td>
</tr>
</tbody>
</table>
only for the Singapore case. Only Yuck-Neutral was insignificant in both cases. As expected, when the Yuck-Negative was present, the chance of a ‘negative’ or ‘neutral’ story line compared to a ‘positive’ jumped enormously – 6 times for Queensland and 158 times for Singapore. Similarly, on the opposite side, as Yuck-Positive becomes true, the chance of a ‘negative’ or ‘neutral’ story line compared to a ‘positive’ one dropped considerably to 93% for Queensland and 68% for Singapore. The implication of Yuck-Positive is interesting here because it means that mentioning ‘yuck’ positively is more likely to be associated with the improved public acceptance of water reuse than not mentioning it at all.

The variable Public Momentum to Reuse, the lingering and building tone of the media, showed that, as the cumulative percentage of ‘positive’ story lines increases by one unit, the chance of ‘negative’ or ‘neutral’ story lines compared to ‘positive’ ones reduces slightly, with a 7% drop for Queensland and 17% drop for Singapore. In Report Type, the ‘news’ type seems to be associated with a higher chance of ‘positive’ or ‘neutral’ story lines compared to ‘negative’. However, this relationship is significant only in the case of Singapore. For the remaining variables of Yuck-Neutral and Public Opinion, the direction of the effect was in the opposite direction for the two countries. For Singapore, Yuck-Neutral meant a higher chance of a ‘negative’ or ‘neutral’ story line compared to a ‘positive’ one; it was exactly the opposite for Australia, which is to say that a neutral mention of yuck was more likely to result in a positive story for Australia. This is a weak correlation, but we think it is worth further investigation. In any case, in the context of the present analysis, this weak correlation demonstrates that engaging the ‘yuck’ issue is not necessarily bad: that is to say, there is considerable room for scientific and rational discussion in the public realm and the mass media on this issue.

The most surprising finding lies in the fact that Public Opinion was found to be not at all significant for both countries, even at the relaxed significance level of 0.15. At a more general level, this variable was found to be weakly significant in Singapore. This weak correlation shows that stories with Public Opinion had a lower likelihood of being a ‘negative’ or ‘neutral’ story in Singapore. The opposite is true for Australia. This flies in the face of conventional wisdom which, as discussed previously, holds public acceptance to be an important factor in determining the success of water reuse policies. As far as the representation of the issue in the media is concerned, there does not seem to be any correlation. That is to say, according to the empirical analysis, the fact whether public opinion is absent or present in a story does not seem to have any bearing on whether it has a negative or positive effect (see Table 6).

Table 6. Ordinal logistic regression on story line.

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Singapore</th>
<th>Queensland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yuck-Positive</td>
<td>0.32(^*)</td>
<td>0.07(^\dagger)</td>
</tr>
<tr>
<td>Yuck-Neutral</td>
<td>1.48</td>
<td>0.58</td>
</tr>
<tr>
<td>Yuck-Negative</td>
<td>158.17(^\dagger)</td>
<td>6.13(^\dagger)</td>
</tr>
<tr>
<td>Public Momentum to Reuse</td>
<td>0.83(^\dagger)</td>
<td>0.93(^\dagger)</td>
</tr>
<tr>
<td>Public Opinion</td>
<td>0.25(^\dagger)</td>
<td>1.73</td>
</tr>
<tr>
<td>Report Type (base = commentary)</td>
<td>0.43(^*)</td>
<td>0.76</td>
</tr>
</tbody>
</table>

\(^*\alpha = 0.10.\)
\(^\dagger\alpha = 0.05.\)
\(^\ddagger\alpha = 0.15.\)
This is somewhat counter-intuitive because we would expect public opinion to be significant. In other words, it would sway the story in the positive direction for a country that supports water reuse but in the negative direction for a country that does not support water reuse. There are two possible reasons. First, the portion of Public Opinion being true was too small (being 8% and 10%, respectively, for Singapore and Queensland) and hence the lack of meaningful inferences drawn. This can be resolved with a future investigation involving a larger sample size. Second, and more interestingly, public opinion as represented in the mass media is really an insignificant variable in the formation of social norms. Even if we cannot make this statement with much confidence at the moment, we can at the very least say that there are other variables that are more significant than Public Opinion, namely Yuck-Positive, Yuck-Negative, and Public Momentum to Reuse.

6. Conclusions and implications

Our analysis has shown that the ‘yuck’ factor, whether positively or negatively mentioned, together with public momentum were significant factors in determining the storyline and, hence, the social construction of water reuse by the mass media. Somewhat surprisingly, public opinion was not significant.

This analysis holds some theoretical, policy, and methodological implications. First, this paper has illustrated the use of a constructivist approach to theories of institutional change and illuminated the dynamics of informal institutional change. In this respect, the idea of Public Momentum, which shows the role of time in institutional change, is important.

We have shown that influencing the direction of institutional change can take place even at early stages of the policy process. A time trend analysis shows that there are three distinct stages in the media coverage of both countries, which are depicted in Figure 1. By noting the frequency of media coverage on water reuse, which started slowly, gaining momentum, and then peaks before stabilizing, one can see quite clearly the stages of institutional change, which reflect Culpepper’s framework of ‘crisis, experimentation and consolidation’ (Culpepper, 2008).

Culpepper says that during normal times, entrenched institutions are not easily displaced. During crises, however, a large number of players or actors upset the ‘cognitive bases’ for such institutions. The search then begins for a new equilibrium, a phase which he calls ‘institutional experimentation’. Such experimentation is characterised by ‘deep uncertainty’ which places a premium on persuasive argument to create new knowledge. This process of creation also turns on a constructivist approach (Finnemore, 1996; Risse, 2000; Schimmelfennig, 2001).

This study also shows that, contrary to North’s idea that informal institutions change relatively slowly, the speed of change can vary, depending on perception convergence (North, 1993). This exception to the rule has already been postulated by Saleth & Dinar (2004) and this study provides empirical support. In addition, it has been found that factors such as a positive representation of ‘yuck’, as well as social momentum, can make a difference to the speed at which social norms are formed.

Referring to Culpepper’s framework again, where crises are seen as ‘common knowledge events’ leading to the ‘emergence of shared ideas’, so we have seen here that during crises there is creation of knowledge and an accelerated rate of learning. In this sense, it is easier to turn the tide of public opinion if the tide is still young.
One clear policy implication, therefore, is to set the right tone and to catalyze the shift in social norms before the major public interest, urgency, or crisis strikes. In terms of policy implications, governments’ active role in early stages and making a persuasive case for the initiative may be indispensable.

While this exposition is limited, given the important role of perception in the issue of water reuse, and role of the mass media in this area, this methodology represents an efficient and meaningful way by focusing on media and underlying perceptive factors as key explanatory variables.

Briefly, therefore, in terms of policy implications, our investigation shows that the media does not often refer to public opinion in its reporting. Second, the regression shows that public opinion as an independent variable does not appear to have a significant influence. As a preliminary conclusion, we can suggest that policy makers, lobby groups, or those with access to the media, can influence norm formation significantly, especially early in the process of social construction. This is one important entry point for policy makers who want to turn the tide of public opinion—before it assumes a full swell.

Another important finding was that the input factors are very similar between the two countries. However, the outcome is very different. This shows that the two factors—the representation of the ‘yuck’ factor, as well as the public momentum, was important in determining the difference in the kind of water reuse institution that emerged at the end.

Hence, it is important for us to look more closely at these two input factors as they clearly influenced the construction of a hostile water reuse norm in Australia, whereas the reverse was true in Singapore.

With regards to negative mentions of the ‘yuck’ factor, Baumgartner & Jones’ work (1991) in policy change is instructive as they give an account of informal institutional change as changes in ‘public and elite understandings’ of a certain policy. A policy image, for example, can change from being positive to negative and vice versa. For some complex subjects such as nuclear power, they write, the discourse can be portrayed as either technical problems or social questions. If the first, then experts can dominate the decision-making process, but if the latter, a ‘much wider range of participants can suddenly become involved.’ This analysis appears to apply equally well to the issue of recycled water. While more work is needed on content analysis, a preliminary look at our data shows that Singapore stories tend to focus on the technical and strategic point of recycled water, whereas the social and health dimensions dominated the Queensland discourse. The process of decision-making, and the impact of different frames on this process, represents a fruitful area for future research.

For now, however, we have already seen how the time dimension is important because attitudes solidify as time goes on. In terms of policy implications, governments’ active role in the early stages in communicating accurate scientific facts and making a persuasive case for the initiative may be indispensable.

Finally, this paper makes a methodological contribution by showing how perception can be measured, not just by surveys and interviews of members of the public but by the norms constructed by the mass media.

References


