

Testing the waters in Korea: Nudging toward the tap

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Abstract

The negative internalities of personal cost and the externalities of environmental sustainability are important factors in the decision to purchase bottled water. Given the provision of safe and virtually costless tap water by the government, a preference for bottled water must be explained by an individual's taste and biases. This research examines the extent of those tastes and biases in the context of South Korea, where the tap water is globally recognized to be of high quality, yet the population continues to consume bottled water at a sustained rate of growth. A convenience sample of university students were subjects in an experiment and survey to understand the behavior. The results show that the taste preferences are negligible, yet biases persist. Nudge policy opportunities are discussed to discourage bottled water consumption.

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Keywords

nudge — bottled water — heuristics — consumerism — Korea

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Introduction

Despite official information that the tap water in South Korea (hereafter, Korea) is safe for drinking and all other usual purposes (arisu.seoul.go.kr), many Koreans harbor reservations about drinking water from the tap. Some of this is attributed to a longstanding and outdated belief that the water is still delivered to faucets by rusty old pipes. People also worry that the water is not properly treated, while some think that the smell or taste is off-putting. While the latter objection is purely a matter of opinion, the first two reasons are instances when the lack of correct information have inspired a widespread bias, inciting risk aversion in the population. This can be aggrandized by social and consumer behaviors to the effect that bottled water is considered the norm in Korea and people frown upon the idea of drinking from the tap. The rapid urbanization and density of Korea has also put a premium on safety and convenience as social norms, feeding into the default decision to buy bottled water (and even have it delivered in bulk to your door!). The commercial sector has supported this trend as it enjoys continued growth of bottled water sales and ever-increasing conveniences for bottled water delivery and water purifier leases with lucrative service contracts.

Under the tenets of behavioral economics, the existence of biases that inhibit rational decision-making is grounds for using nudges. Nudges are non-invasive approaches to change people's behavior for improved decision outcomes. Situations where better information (or alternative means of presenting information, i.e. framing) would change people's behavior to improve internalities or externalities are reasonably easy nudges that governments can integrate into policy design and

implementation. In the case of drinking tap water, the Korean population's hesitation appears to be a prime opportunity to employ nudges that will change their decisions to improve their own financial interests and environmental sustainability.

This research attempts to provide an understanding of Koreans' biases against drinking tap water in order to offer countermeasures that may increase tap water consumption and reduce bottled water purchases. The benefits of tap water include much lower costs to consumers as well as reduced negative externalities in the form of environmental harm from bottled water production, distribution, and especially waste (van der Linden, 2015). While an individual's perception of the taste or smell of water cannot necessarily be addressed by policy campaigns (Doria, 2010), the other factors that lead one to choose bottled water may be significantly mitigated through information that addresses the primary biases of this situation, namely, risk aversion and convenience. In many ways, this study is a regional follow-up to other research, such as Hu et al. (2011) and van der Linden (2015). The modest expectation of the research is to offer a knowledge base for implementing nudge policy that addresses the contextual factors of drinking bottled water in Korea.

The purpose of this study is to determine the following: 1) do Koreans really prefer the taste of bottled water over tap water; and 2) are there biases that actively influence their decisions to consume bottled water? These research questions lead to two hypotheses:

H1 : People prefer the taste of bottled water.

H2 : The risk aversion bias affects drinking water choices.

It should be noted that the first hypothesis is posed in a way to challenge the prevailing assumption about the bad taste of tap water and, therefore, highlight an irrational bias. The second hypothesis deals with the misunderstandings and prevailing notions about tap water safety that are unfounded, yet continue to affect consumers out of fear. For the purpose of this research, there is the expectation that the first hypothesis is not supported and the second hypothesis is. These hypotheses may then lead to further inquiry as to what information Koreans use in their decisions about drinking tap water and the potential nudges approaches to rectify the situation by alleviating the risk aversion and reframing the convenience of tap water.

A combination of experiment and survey was designed to establish taste preferences, reveal biases, and illuminate information shortcomings. Following the approval of the Institutional Review Board to conduct the experiment and survey, a convenience sample of university students was recruited to be subject-respondents for the research. The evidence was analyzed and integrated into behavioral theories to complete the picture of Koreans' drinking water preferences. Although the hypotheses are not categorically settled in this research, they present the logic of the objective: to nudge people toward the tap.

Background and context

In preliminary interviews and informal polling, Koreans gave a number of reasons that they did not drink tap water. These anecdotal rationales formed the basis for the argument that there are active biases against drinking tap water. The reasons included: bad taste and/or smell, unpleasant color (from rusty pipes), lack of information about the quality of water (an assumption that tap water is not clean and bottled water is good for you), and a distrust of government water agency reporting. These concerns are not unique to Korea; indeed, they have been subject to research around the world (e.g. Doria, 2006; Doria, 2010; Ferrier, 2001; Hu et al., 2011; Saylor et al., 2011; van der Linden, 2015; Wilk, 2006). Some people also enjoyed the convenience of bottled water in the absence of other trusted water sources. Other people were concerned about their relative status among peers; drinking tap water would suggest a low class or provincial "dirtiness" that does not adhere to acceptable behavior.

These sentiments about tap water reflect some common, powerful, and well-established behavioral biases, including affect heuristics, availability bias, risk aversion, and social norms. Yet there is more than ample evidence that the water in Seoul –if not all of Korea– is safe and of a high quality for consumption. In 2003, the UNESCO World Water Development Report ranked Korea eighth worldwide for water quality. While there have been ups and downs in Korea's environmental impact since then, the water processing capacities have continued to improve, as described by various governmental reports (seoulsolution.kr/en/arisu). The 2018 Environmental Performance Index for drinking water

(epi.envirocenter.yale.edu/) ranks Korea at 26, a favorable position among its regional peers (Singapore=19, Japan=25, New Zealand=29, China=37). The concern of rusty pipes is also a red herring insofar as all municipal water supply vectors are quite modern; any discoloration in the water comes from private property fixtures that are beyond service life which, in Korea, is becoming increasingly rare since the rapid re-development of nearly all properties in the past few decades.

The benefits of purchasing bottled water for consumption are greatly diminished by the costs. Beyond the actual price paid out of pocket by consumers over the comparatively fractional cost of tap water, there are numerous environmental externalities that are not adequately accounted for in the price. The energy footprint and pollution attendant in producing the bottles, transporting for sales distribution, and waste disposal (separate from recycling returns) is not normally a factor in the individual consumer's decision to obtain water (Gleick & Cooley, 2009; van der Linden, 2015). This lack of oversight is compounded by the fact that a significant portion of bottled water is, in fact, just tap water that has legally affixed the label of "natural mineral water" according to government guidelines (Yoo, 2013). In some cases, the bottled water may be imported from other countries (e.g. China) with even less regulatory quality control than Korea's own domestic rules. These issues are often dismissed as being built into the market balance mechanisms and beyond the individual's realm of concern.

The nonchalance about what is actually in the bottle is validated by the strong growth of the Korean bottled water market. Shim (2017) reports the average annual growth of the bottled water market in Korea at 6.7% this decade. This outpaces the country's GDP growth by a factor of two and greatly exceeds the population growth, which has been near zero during the same time period. Korea has developed a taste for bottled water that appears to be growing without end, despite continual improvement in tap water service at all levels, as decreed by the 1995 Ministry of Environment Management of Drinking Water Act. The general trend of consumerism in Korea has carried bottled water's popularity, as well; as Koreans spend more time and money away from home, they are spending more on consumable goods.

Additional insight into Korea's culture is described by Geert Hofstede's "Dimensions of National Culture" (hofstede-insights.com). Hofstede's model attributes high levels of uncertainty avoidance, long-term orientation, collectivism, and restraint in the dimensions of Korean culture. These dimensions speak to the behavioral biases of risk aversion and adherence to social norms that play into Koreans' decision making, insofar as they are wont to follow established customs and are conservative about changing their habits. These characteristics are also echoed in the Confucian traditions that prescribe a high respect for hierarchical authority and deference to the communal good over singular objectives. In other words, the behavioral profile portrays Koreans as somewhat habitual and cautious. There has also been a history of distrust in govern-

ment institutions due to corruption, although that sentiment is dynamic and on the upswing in recent years (OECD, 2018).

Experiment and survey methodology

The experiment and survey were developed to collect data with respect to three factors in Koreans' drinking water preferences: taste, biases, and information (that is, awareness of tap water quality). These factors correspond to the aforementioned research questions and hypothesis of this study. People's taste preferences were established through a double-blind taste test and their inherent biases and level of information about drinking water were informed by five substantive questions (Appendix 1).

The experiment and survey were conducted over the course of two days. The research team – consisting of interviewers, recorders, and facilitators – set up a single research station at a location of high student traffic on the campus of the researchers' university. Interviewers asked passers-by if they were willing to help a research study with a couple minutes of their time. Upon agreement, the subject-respondents confirmed that they had not participated in the study before (Q1) and that they understood the privacy and disclosure statement presented to them (Q2). The facilitator then poured two small samples of water into recyclable paper cups from behind a barrier. One sample was water from an unmarked two liter bottle that had been filled from a convenient bathroom sink and the other sample was the store-bought “mineral spring water” in its original two liter bottle with the label removed. The facilitator presented the water samples to the subject and recorded which water was placed into which position (the cups were randomly placed in either a green circle or a blue circle marked on the table). Neither the interviewer nor the subject was able to know which cup held which sample of water, thus ensuring the double-blind protocol. The interviewer then asked the subject to taste each water and indicate their preference (Q3). The recorder took note of all answers in a data log.

The interviewers then proceeded to ask the survey questions (Q4-Q8), which were duly entered into the data log by the recorder. The nature of the research –to understand preferences for bottled water over tap water– was not directly revealed to the respondent-interviewees at any time. Obviously, the survey questions gave a hint to the research objectives and were therefore administered after the experiment. The facilitator oversaw the experiment and survey to ensure its quality and consistency. Upon completion of the experiment and survey, the subject-respondents were thanked for their time and offered some candy, but no other incentives were provided. The effort yielded a study sample of 101 subject-respondents: 50 female and 51 male. Table 1 shows the aggregated data of their water preferences and survey answers.

Analysis and discussion

The most important finding is that only 42.6% of subject-respondents had a preference for bottled water, while 32.7% had no preference between the samples and 24.8% preferred the water straight from the faucet of the bathroom sink. While the sample is not large enough or diverse enough to generalize the findings to the entire population, it can be reasonably applied to the population of Seoul –which is served by the Arisu municipal water agency– with a confidence interval of 10% ($p = 0.05$). In other words, there is no distinct preference for bottled water over what the city provides essentially for free. This is particularly interesting as almost 80% of the subject-respondents indicated that they do not regularly drink tap water for whatever reasons. A chi-square test revealed that there is no significant difference in taste preferences (Q3) or importance concern (Q7) for water according to gender. Single factor ANOVA showed that differences between groups were significant.

This research does not purport to show causal relationships between water preference and other factors, nonetheless there were several interesting correlations in the data with statistical significance ($n = 101$, $p < 0.05$, coefficients are adjusted to reflect positive correlations where data values indicate inverse relationships). Female respondents showed a tendency to be more concerned with safety ($r = 0.197$) and less worried about the cost ($r = 0.20$) of water (Q7). Those who had no preference between the samples in the experiment (Q3) were less concerned with the taste ($r = 0.195$) of water (Q7) and were correlated with the lowest cost willingness ($r = 0.237$) (Q8). Those who frequently drink water from the tap (Q4) were willing to carry a reusable bottle ($r = 0.231$) (Q5) but were not in favor of a bottle tax ($r = 0.21$) (Q6). While not a significant finding, it is interesting to note that 27% of males admitted to regularly drinking tap water while only 16% of females reported drinking tap water (Q4).

Speaking directly to the hypotheses set out in this research, the results confirm the expectations. The first hypothesis –that people prefer the taste of bottled water– is not supported as the experiment did not demonstrate respondents to have a clear preference for bottled water. This could be construed as a good result in regards to the normative goals of the research; people are not shying away from the tap based on valid taste preferences and, for all intents and purposes, the tap water does not taste bad.

That respondents prioritized the quality/safety of drinking water over cost, convenience, and taste reflects a tendency toward risk aversion, supporting the second hypothesis; there is indeed an active bias affecting drinking water choices. The follow on inquiry, proposing that informational nudges may influence drinking water choices, is not directly addressed by the research. The survey findings can inform further experimentation for the idea, but it would not be a simple effort. Short of a computer simulation, testing that hypothesis would require an intervention at the point of purchase or implementing a public nudge campaign and monitoring bottled water

Question	Results
Q3. Which water sample do you prefer?	Bottled: 42.6% Tap: 24.8% No Preference: 32.7%
Q4. Do you regularly drink tap water?	Yes: 21.8% No: 78.2%
Q5. Would you be willing to carry a hygienic reusable water bottle?	Yes: 60.4% No: 39.6%
Q6. Would you support a 100 won/liter tax on bottled water to offset the environmental costs of bottled water?	Yes: 60.4% No: 39.6%
Q7. What is most important to your water drinking? Rank all of the characteristics: 1 is most important, 4 is least important. (Results are mean ranking for the four characteristics by all respondents).	Safety/Quality: 1.69 Cost: 2.51
Q8. Knowing that it is recommended to drink about 2 liters of water per day, how much would you be willing to spend on drinking water per year?	1,000,000 won: 12.9% 500,000 won: 38.6% 100,000 won: 35.6% 50,000 won: 12.9%

Table 1. Data collected from the experiment and survey. 1USD=1125KRW at time of study.

sales (and tap water consumption rates) to assess the efficacy. Nonetheless, it seems plausible that Koreans may respond to information nudges about the true cost of bottled water, as well as better presentation of the safety and quality characteristics of tap water.

Conclusion

As Korea and other wealthy nations turn their attention to concerns of sustainability and social welfare (as opposed to a singular focus on economic development), there is a growing need to address the behaviors that impede such progress. The tendency to choose bottled water over tap water—particularly when the tap water is safe, clean, and readily available—is a situation where the environmental impacts and personal costs are not adequately accounted. The negative externalities of consuming bottled water against a more economically rational alternative deserves attention. This research sought to understand why Koreans would choose bottled water under the assumption that there are behavioral biases at play.

The biases demonstrated by Koreans in regards to drinking tap water include risk aversion, convenience, and social norms (or herd behavior). Many Koreans follow the guidance and practices of their parents as an artifact of the Confucian value of filial piety, and thus they boil the water before consuming and/or drink a variety of brewed beverages instead of plain tap water. Distrust in the government's claims of safety has kept people away from the tap, as well. The dearth of public drinking fountains has not assuaged the common belief that

the water is risky, confirmed by the much more common presence of filtered water dispensers in many public and private establishments.

The survey questions included in this research raise the prospect of nudge concepts that may counter these biases, such as commitment, consistency, and framing (in the case of annual water costs). The questions prompted respondents to assess their own willingness to drink more tap water if its safety/quality was assured and if it was convenient, such as in a hygienic reusable bottle. Economic and environmental concerns are also raised, as respondents appear willing to pay a moderate amount for their annual drinking water supply while also supporting a tax to offset environmental externalities. To these ends, a public information campaign that played to Koreans' concerns for reducing bottled water waste, saving money, and supporting the public water agencies may be effective. Providing people with the information about how much water they should drink each day, how much it would cost per year to buy that water, and then prompting them to take alternative actions (e.g. buy a good reusable bottle and fill it from the tap) could work, especially if paired with approaches that leverage Confucian value of moderation. This may be supplemented with social proof nudges, such as employing celebrities and social influencers to demonstrate the safety and benefits of tap water.

In terms of direct implications and policy approaches to nudge people toward the tap, the findings suggest that it is worthwhile to employ strategic framing of information about



Figure 1. A large banner posted in a Seoul neighborhood touting the quality of tap water (Photo by author, 16 September 2018).

the safety and quality of the tap water, paired with the tactical placement of such information. Korea has made efforts of late to install more public water fountains with signage indicating the high quality of the water in an attempt to change people's default mindset against tap water. A mildly stigmatizing sign placed near the bottled water section of stores or a mandate to offer reusable water bottles before ringing up a bulk bottled water sale could be introduced to counteract the consumption. As governments are increasingly pressured to act for climate change and improve sustainability, policies for the regulation of bottled water should highlight their environmental impact with labels that provide simple information about the “true” costs of various water sources. Municipal water departments can leverage the fact that people's taste preferences are negligible when pushing for more resources to improve and promote tap water quality.

An intriguing nudge approach may leverage Koreans' pride in their phenomenal economic development as compared to other countries. Taking the position that a highly developed society should be safe and secure in its welfare institutions and infrastructure, such as transportation, education, and public works, then it would be a matter of national pride to be able to drink the water without fear. A Korean might be encouraged to drink tap water as a show of confidence (and superiority) to regional competitors whose water quality is questionable.

The research employed convenience sampling and limited inquiry into subject-respondents' demographics and characteristics. The double-blind experimental method is an effective means of ensuring unbiased results, yet it is inefficient and somewhat unwieldy in a casual setting for obtaining a large sample. The limitations of this study in regards to the sample

selection and size could be addressed by replicating studies in different contexts over longer periods. The research could contribute to a broader effort for comparative studies between societies with distinct behavioral bias profiles.

There is more experimentation needed to fully understand the particularities of the biases and inform policy approaches that would reduce Koreans' consumption of bottled water. This study makes preliminary steps toward that objective by showing that people's taste preferences are at least partially a result of their unfounded biases against the tap water in Korea. As the country is settling into its role as a global leader of economic development, it is also incumbent on Korean society to confront the issues of environmental sustainability that have accompanied its wealth and influence. In the meantime, it is viable to promote the safety, quality, and cost savings in order to quench the bias against tap water.

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