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# ASSESSING THE USE OF DEFAULT CHOICE MODIFICATION TO REDUCE CONSUMPTION OF PLASTIC STRAWS

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**ABSTRACT**

There is widespread global interest in eliminating and/or reducing the use of single-use plastics. An increasingly popular target is single-use, plastic drinking straws. Although plastic straws are not a significant component of the wastestream by weight or volume, they are one of the most commonly found items in coastal litter cleanups around the world. In addition, plastic straws are an avoidable product as their use is not essential. This paper examined the impact of an ordinance based on modifying the default choice of straws, which prohibited their distribution unless a customer requested one. Based on a survey of 133 affected businesses, the reported average decrease in straw consumption was 32% (SD=27.5%). For restaurants not using a self-service straw dispenser, the average decrease was 41% (SD=25.2%) The majority of businesses reported no impact to their business, some indicated a small decrease in costs, and others reported some negative feedback from customers. Based on the study's results, the straw-upon-request-only ordinance has been successful in reducing the consumption of plastic straws while minimizing impacts to businesses.

## 1. INTRODUCTION

Plastic waste, especially plastic marine debris, has risen onto the global agenda. Instrumental in this rise are the visceral focusing events involving marine debris that attracted worldwide attention of the public and policymakers. With over 32.6 million views, a viral video of a sea turtle with a straw lodged in its nostrils (Ramey & Tita, 2018) and viral videos of aerial and subsurface views of the Great Pacific Garbage Patch spurred mass and social media worldwide to focus on the problem of plastic marine debris. While these focusing events helped to bring the issue of single-use consumer plastics to the global agenda, plastic straws were the primary target as grassroots efforts worldwide sought to push businesses and governments to respond.

This paper examines local governmental efforts in the US to reduce plastic straw consumption. Aside from bans, the most common approach in the US is to modify the default choice of straws by requiring that straws by provided only upon request by a customer. This paper analyzes the ordinance adopted by San Luis Obispo, California, which modified the default choice of plastic straws.

### 1.1 Plastic Straws in the Environment

Although plastic straws are a very small component of municipal solid waste (MSW) by weight and/or volume, they are emblematic of the disconnect in society's understanding of the environmental consequences of unfettered consumption of disposable single-use plastics. Except for some limited circumstances, such as in health care and individuals with physical limitations, single-use plastic straws are a highly avoidable product. That is, their sole purpose is to convey liquid from a container to the mouth. Aside from the exceptions above, using a straw is about consumer preference as opposed to necessity. They are avoidable in that beverages can be consumed by most people without the aid of a straw. Their use is also culturally arbitrary as some beverages, like soft drinks and water from a glass, are routinely served with straws while using a straw for hot coffee, beer, wine, or bottled water would be considered unusual. Like many single-use plastic consumer items, straws have a short utility measured in minutes because they are no longer needed after the beverage is consumed.

Plastic straws are a common component of litter. The Ocean Conservancy's annual International Coastal Cleanup is a one-day event conducted in coastal areas of 116 countries. During the event, debris is collected by volunteers and is categorized, counted, and weighed. As shown in Figure 1, since 1988, plastic straws have consistently been among

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the top items collected based on item counts during annual cleanup events. For example, as shown in Figure 2, straws and stirrers were the 7th most prevalent item collected globally during the 2017 International Coastal Cleanup.

According to Keep America Beautiful (KAB, 2015), paper-related food packaging, which includes wrappers for plastic straws, is the 7th most littered item on land. Although plastic straws are not a commonly categorized item in litter survey counts in the US, as presented in Table 1, there is some data on land-based straw litter.

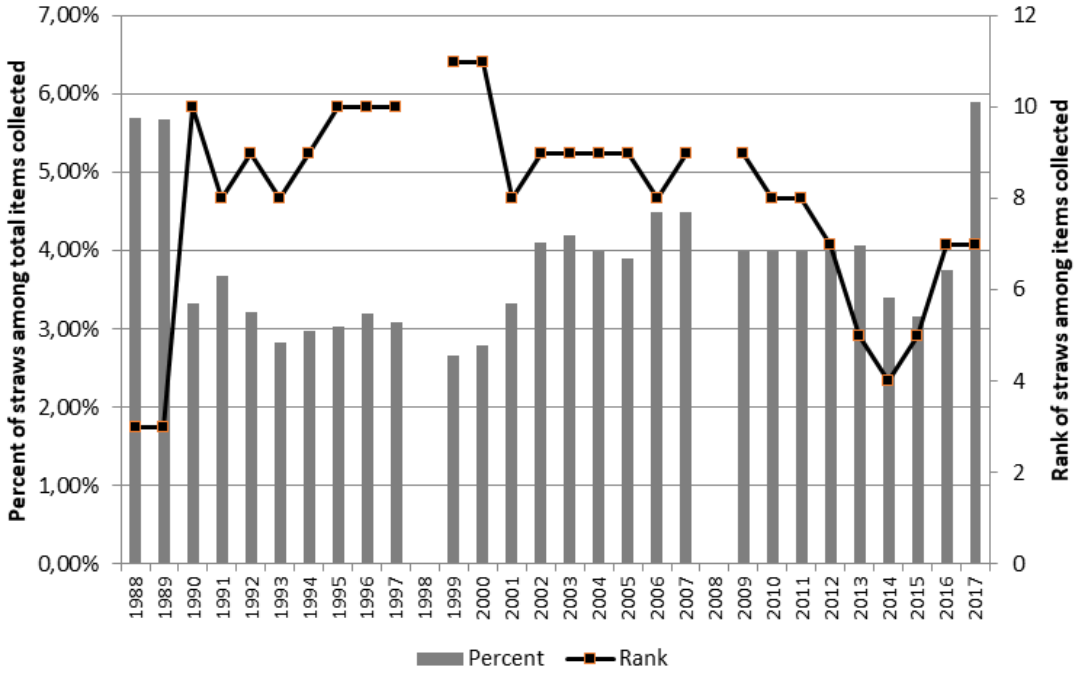


**FIGURE 1:** Coastal litter-plastic straws: percent among total items collected and rank among items collected, 1988-2017.
The left axis is the percent of plastic straws in relation to the total amount of items collected during the annual clean-up events. The right axis is the rank (1 is the highest rank) of the plastic straws in relation to all other items collected.
Notes: In the 1989 and 1990 counts, plastic straws were categorized as plastic eating utensils, which included cups, spoons, forks, and straws. Data from 1988 was for the US only, data from 1989 and 1990 was for North America only, and all data after 1991 is international. Between the 1991 and 2000 counts inclusive, plastic straws were a separate category. Starting in 2001, plastic straws were combined with plastic beverage stirrers. There is no data for 1998 or 2008.
*Source: Annual International Coastal Cleanup Reports. https://oceanconservancy.org/trash-free-seas/international-coastal-cleanup/annual-data-release.*

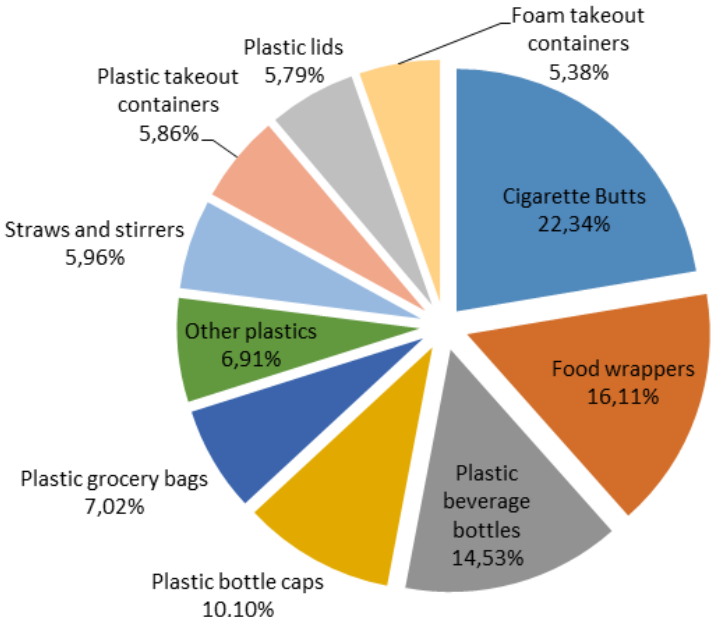


**FIGURE 2:** Breakdown of the top 10 items collected during the 2017 International Coastal Cleanup Event (Ocean Conservancy, 2018).

**TABLE 1:** Summary of litter collection results in the US that included plastic straws.

| Prevalence of Straws as Litter | Geographic Location | Source |
|---|---|---|
| Plastic straws, cups, and lids = 10,7% | Maine | Environmental Resources Planning, 2010 |
| Plastic straws, cups, and lids = 8,5% | New Hampshire | Environmental Resources Planning, 2010 |
| Plastic straws, cups, and lids = 7,1% | Vermont | Environmental Resources Planning, 2010 |
| Plastic straws = 2,5% | Anacostia River Watershed, greater Washington, DC area | Environmental Resources Planning, 2015 |
| Plastic straws = 2,2% | Litter from the curbside collection of recycling bins, Portland, Maine | Wagner & Broaddus, 2016 |

## 1.2 Consumption of Plastic Straws

Single-use plastic drinking straws are made primarily of polypropylene (Resin Identification Code, RIC, #6). In addition, plasticizers, colorants, antioxidants, ultraviolet light filters, and inert fillers are added (Made How, 2018). When designed for individual use at food and beverage establishments, plastic straws are commonly wrapped in paper sleeves and when they are attached to pre-packaged drinks in aseptic boxes or drink pouches, they are wrapped with plastic sleeves (Twede et al., 2014).

Plastic straws are used in a large number of establishments with food and beverages as a primary or secondary business. These include causal and fast-food restaurants, cafes, hotels and motels, theatres, food trucks, kiosks, airlines, cruise ships, bars, night clubs, delicatessens, coffee bars, and sports venues. They also are used at cafeterias in schools and colleges, governments, prisons, hospitals, public facilities, and businesses. And finally, they are used at special events including festivals, fairs, and concerts.

There is no solid data on the consumption of plastic straws because it is not routinely collected as they are generally purchased in bulk quantities, and for businesses, it is generally viewed as proprietary data. The most commonly cited figure, 500 million straws per day consumed in the US, which equates to about 1.6 per person each day for a total of 182.5 billion per year, is erroneous. This number has been cited by numerous environmental organizations, governments, and the media; however, the derivation of this figure has been shown to be highly faulty (Lombardo, 2018).

Straws, when consumed, are most often used when eating out or when purchasing prepackaged drink boxes or pouches. Regarding eating out, 70% of North Americans eat out at least once per week and of this amount, 27% eat out at least 3-6 times per week (Nielsen, 2016). Although the data is old, according to Miller (2001), Americans consumed 17 drink boxes per person per year in 2001. According to Britschgi (2018), based on an industry marketing analysis, Americans consume about 63.875 billion straws per year, which equates to 175 million per day or about 3.73 per person per week. Based on limited data available, we estimate that a more plausible range of plastic straw consumption in the US is 4 billion to 20 billion per year, which equates to 10.95 to 54.8 million per day or about 0.23 to 1.17 per person per week (see also Blackwell, 2010; Lombardo, 2018).

## 1.3 Policy Instruments to Reduce Plastic Straw Consumption

As plastic waste rose sharply on the global agenda, there was a corresponding rise in global grassroots efforts to curb the consumption of plastics. These grassroots efforts focused on governments and local, national, and multi-national businesses to address the problem of plastic waste; plastic straws were especially targeted because they are an easily avoidable product. These efforts have been successful. In North America, for example, there have been many local and national campaigns for consumers and businesses to voluntarily reduce straws including National Skip the Straw Day, Straw Wars, Straws Suck, the Last Plastic Straw, One Less Straw, and No Straw Please. A&W Canada was the first North American restaurant chain to announce a phase-out of plastic straws starting in 2019. One of the largest fast-food restaurant chains in the world, McDonald's, committed to phase-out the use of plastic straws in 1,300 of its restaurants in the United Kingdom and Ireland and Starbucks has announced the same for its 28,000 coffee bars around the world by 2020. KFC halted the use of plastic straws in its Singapore restaurants. Ikea announced a ban on all single-use plastic serving ware including straws by 2020. Carnival Cruise Lines has adopted a straw-upon request only policy and Royal Caribbean is phasing out plastic straws. And, private facilities in the US, such as zoos and aquariums, have also banned or are phasing out the distribution of plastic straws (Rogers, 2017). In May 2018, the European Union proposed the Single Use Plastics Directive to reduce the 10 single-use plastic products, including straws, most often found in marine litter. Jamaica and Grenada have banned plastic straws starting 2019; Belize will celebrate Earth Day 2019 by eliminating single-use plastic straws, bags, and utensils; and India announced a ban on all single-use plastics by 2020.

While the global social movement has focused on corporate social responsibility to reduce or eliminate straws, and a few national governments have acted. In the US, the national government has not acted and only one sub-national (state) government has, California. In the absence of national and state-level actions, it is up to local governments to act should they choose to. Given the intense public and media attention, local governmental efforts to reduce single-use plastic straws have increased as discussed below.

As summarized in Table 2, and explained below, there are five primary public policy instruments that are available to reduce the consumption of single-use plastic straws including bans, taxes/fees, education, default choice modification, and voluntary actions.

### *1.3.1 Ban*

Bans seek to prohibit the distribution or use of plastic straws at specified businesses or properties (e.g., govern-

**TABLE 2:** Major public policy instruments to reduce the consumption of single-use, plastic straws.

| Policy Instrument | Summary | Positive Attributes | Negative Attributes |
|---|---|---|---|
| Ban | Prohibit covered establishments prohibited from providing plastic straws. | Eliminates consumption, easy to enforce. | Eliminates consumer choice. Non-plastic alternatives cost more, which are borne by the establishment unless take-out fee charged. |
| Default Choice Architecture Modification | Provide straws to customers only ifwhen requested. | Reduces consumption, retains consumer choice, small cost decrease to retailer establishment. | Difficult to enforce. If self-service for straws prohibited, could require increased establishment involvement to provide straws. |
| Tax/Fee | Visible, separate tax or fee levied on straws at point of purchase. | Reduces consumption. Relatively easy to enforce. Retains consumer choice | Increased cost (but avoidable) to consumers and increased administrative cost for regulator and establishment. |
| Education | Educating retailers establishments and consumers on need to reduce consumption of straws. | Low or no cost to consumers; does not impose restrictions on consumers. | Not likely to have appreciable impact on consumption or recycling.. May impose some cost to retailer establishment. |
| Voluntary Actions | Adopting resolutions to encourage establishments to voluntarily reduce use of straws. | No cost to consumers; does not impose restrictions on consumers or establishments. | Impact on consumption uncertain and variable depending on breadth and duration of adoption. |

ment facilities, public parks, etc.) thus they are the strongest possible action to reduce the use of straws. Bans, however, tend to be unpopular because they reduce consumer choice (Coulter, 2009). In theory, bans are easy to enforce, but without enforcement, compliance can be spotty. Seattle adopted a ban on single-use plastic bags, but based on a random sample of compliance inspections, small and independent grocery and convenience stores had a low compliance rate (Hoffman, 2016).

A ban on plastic straws is feasible because there are available alternatives including, of course, avoidance--not using a straw. Common substitutes for single-use plastic straws include corn-based polylactic acid (PLA), paper, and pasta, and reusable straws include silicone, stainless steel, glass, and bamboo.

*1.3.2 Default Choice Modification*

The most common default action for the distribution of straws is to provide them to customers automatically with the purchase of a beverage at food service operations regardless whether or not they are desired. (This is also the case with the purchase of many pre-packaged beverages in aseptic pouches and cartons, which have straws attached.) As a result, consumers have become conditioned through this repetitive action such that it has become an automatic expectation. In this case, the default choice architecture is to receive a free straw with a beverage regardless of whether it is desired. The policy approach, then, is to modify the choice architecture to alter consumer behavior (without banning the behavior), by encouraging a preferential selection (Thaler & Sunstein 2008). For straws, the approach is to change the default choice by requiring that straws be provided only upon request.

*1.3.3 Tax/Fee*

Levying taxes or fees at the point of sale through a separate, visible, point-of-sale charge is a mechanism to internalize the cost to the consumer (Bury, 2010). Customers have been conditioned to expect free straws, thus they appear to be without cost as consumers do not see the price of the straw or the social/environmental cost (e.g., litter clean-up costs, reduced tourism, impacts to marine organisms, etc.) imposed by the straw resulting in excessive consumption (Taylor & Villas-Boas, 2016). When a consumer is presented with an additional cost to participate in an avoidable action, consumption tends to decrease. Even a low fee (e.g., $0.05) acts as a visible economic nudge, which is not meant to substantially increase the cost of an item, but to signify to the consumer that they face an economic choice (Rivers, Shenstone-Harris, & Young, 2017). Fees for single-use plastic and paper bags are popular in the US and other countries (Wagner, 2017).

*1.3.4 Education*

Education is traditionally seen as the first-step in seeking to achieve a reduction in the consumption of a straw. If it is sufficiently successful, ordinances could be unnecessary. Ordinances that mandate some form of education generally rely on traditional passive education such as posting signs or notices discouraging the use of straws. The theory is that the behavior can be changed when given accurate knowledge of the impacts of the behavior. Regarding the adoption of education-based ordinances, this generally would require that mandatory signage be placed at self-serve straw dispensers or signage be placed at counters or table tops to encourage customers to forgo the use of a straw. Such education-based ordinances for consumer products typically would require the required posting locations and message content. Education, however, has had only limited success with regards to reducing single-use consumer products (Wagner, 2016).

*1.3.5 Voluntary Actions*

Voluntary actions are primarily cooperative efforts undertaken without government intervention to achieve a certain desired goal. Voluntary-focused actions undertaken by the private sector rely more on social and corporate responsibility although they can be undertaken in an effort to avoid stronger potential government intervention. Individuals and firms generally will engage in voluntary actions if there are also economic benefits such as increased sales or the avoidance of decreased sales. The benefits of voluntary agreements is that they provide flexibility for the government and target population, can achieve the desired results at a lower cost, and can be relatively easily modified or ended. However, because they are voluntary, such an

approach may be limited in its breadth (number of establishments adopting a voluntary straw ban), and the length of time that voluntary bans remain.

### 1.4 Local Plastic Straw Ordinances in the US

In September 2018, California became the first state in the US to enact a plastic straw law. The law adopted the "straw only upon request" approach. It applies only to full-service restaurants; it does not apply to fast-food restaurants, coffee shops, delicatessens, or restaurants serving takeout to customers. (California cities and counties may adopt more stringent ordinances involving straws such as which establishments are covered and the adoption of a ban.) Regarding local ordinances, which are far more prevalent in the US, as of September 2018, there were 31 ordinances that had been adopted by local governments (13 in California, 7 in Florida, 3 in New Jersey, 2 each in Massachusetts and Washington, and 1 each in Minnesota, New York, Ohio, and South Carolina). A shown in Table 3, of these 31 municipal ordinances, 16 are full bans, 6 are partial bans, and 9 default choice modifications. There have been numerous resolutions passed by local governments encouraging businesses to reduce the use of plastic straws, but these are not ordinances as they are suggestive and do not have the force of law.

## 2. METHODS

In this paper, we examined a default choice modification ordinance covering plastic straws enacted by the city of San Luis Obispo, California. This examination sought to answer the following questions regarding default choice modification ordinances: Can it reduce the consumption of plastic straws? What are the impacts to businesses? What is the level of customer acceptance?

San Luis Obispo, located on California's central coast, has a population of just over 47,500 and a population density of over 3,619 people per square mile. The majority of the city's population is Caucasian (84.5%) with Hispanic/Latino (14%), and other races.

On November 7, 2017, the city's straw ordinance was passed unanimously by the city council and become effective on March 1, 2018. An impetus for the ordinance was that plastic straws in the city are not recycled and thus are landfilled or become litter. Plastic litter is a significant problem in San Luis Obispo: 1,363 plastic straws/stirrers were collected during the 2017 SLO Coastal Cleanup Day making plastic straws/stirrers the 10th most collected item and had been among the top items collected over previous annual coastal cleanup days. In addition, the city council had made the elimination of plastic waste a formal objective.

To reduce the consumption of plastic straws, the city of San Luis Obispo enacted an ordinance that modified the default choice of straws. That is, the ordinance specified that restaurants could no longer be automatically handed to dine-in customers; straws could be provided only upon request. The ordinance does not apply to customers who purchase food to take away; they may be handed straws without requesting them. In addition, food trucks are not subject to the ordinance and self-serve straw dispensers were not prohibited.

To assess the impact of the plastic straw ordinance, a 9-question survey was developed (see Table 4). Following pilot testing, in June 2018, a hard copy of the survey was hand-delivered to all 161 restaurants covered by the ordinance. Each owner/manager was requested to complete the survey themselves. If they were unable to at the time, they were re-visited to collect the survey.

## 3. RESULTS

We collected 133 survey responses for a response rate of 82.6%. Of the respondents, 52% were casual/fine dining restaurants, 38% were fast food restaurants, 8% were coffee bars, and 2% were miscellaneous food establishments. Because food trucks and takeaway restaurants were not covered by the ordinance, they were not surveyed. For the purchasing source, 78% of the respondents purchase their straws while for 22%, a corporate or branch office purchases the straws.

As shown in Figure 3, 67% of respondents reported that they distributed fewer than 500 straws per week prior to the ordinance and the most frequent category chosen was fewer than 100 straws per week.

Regarding the question on the percentage decrease of straws since the ordinance, as shown in Figure 4, although 30 (22.5%) respondents stated that the amount was unknown, 103 respondents stated that the average decrease in consumption was 32% (SD=27.47%) and the median decrease was 30%. Of the 14% who reported that the decrease was zero, 63% of these respondents use self-service dispensers for straws. That is, customers do not have to ask for a straw, they can serve themselves,

**TABLE 3:** Summary of current US local ordinances to reduce plastic straw consumption (N=31).

| Policy Approach | Summary |
|---|---|
| Full Ban (16) | Covered establishments prohibited from providing plastic straws to customers.<br>Most of the bans do not cover the sale or distribution of pre-packaged drinks (aseptic boxes and pouches) with straws pre-attached, straws used at schools, use at medical/dental facilities, and for customers with physical limitations. |
| Partial Ban (6) | Bans the use or sale of straws only on or adjacent to public beaches, pubic parks, or city property.<br>Does not ban the use or sale of straws on private property. |
| Default Choice Modification (9) | Plastic straws are allowed at covered establishments, but may only be provided when requested by a customer (the new default choice); they may not be provided without request.<br>Ordinances vary as to the definition of a covered establishment, some exclude take-out restaurants and/or food trucks.<br>Three of these local ordinances authorize or encourage retailers to charge a "take out" fee to cover any additional cost incurred by non-plastic substitutes. |

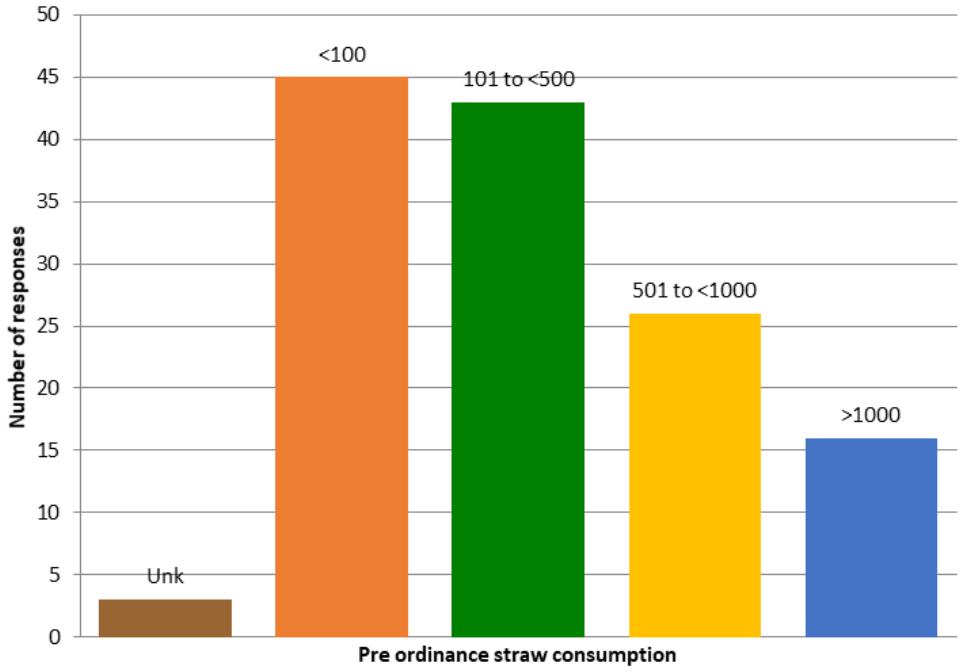


**FIGURE 3:** Reported weekly consumption of straws prior to the ordinance (N=133).

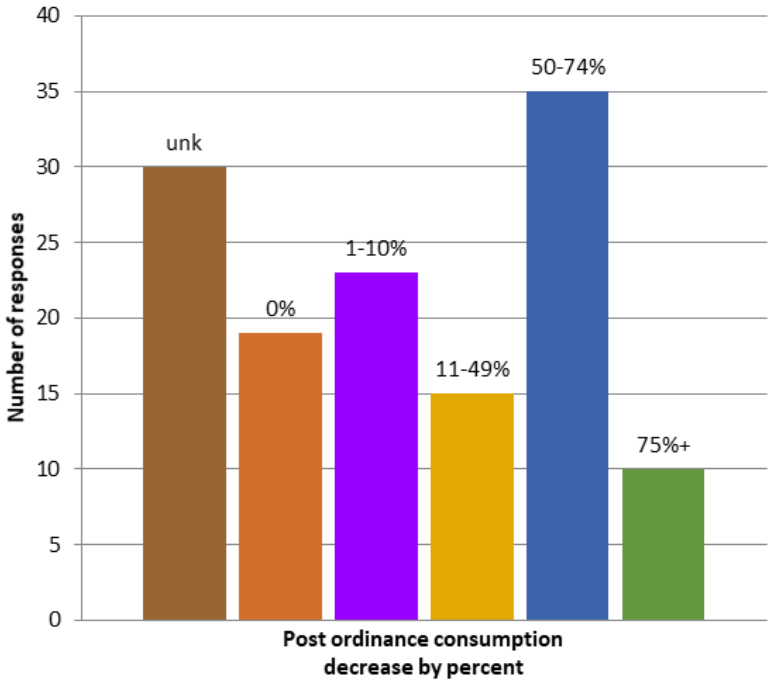


**FIGURE 4:** Reported reduction in consumption of straws post ordinance (N=133).

which is allowed under the ordinance. Nonetheless, of the respondents who use self-service dispensers for straws, the mean reported decrease in straw consumption was 19.8% (SD=25.8%) and the median decrease was 10%. For the respondents who do not use self-service dispensers, the average reported decrease in straw consumption was 41% (SD=25.2%) and the median decrease was 50%. Since the ordinance, 9.8% of respondents no longer offer a self-service option for straws as they removed their dispensers as a result of the ordinance. As presented in Table 5, of the business types reporting a specific percent decrease, casual/fine dining restaurant reported the highest decrease at 39.4%.

As shown in Figure 5, most of the businesses had not switched nor had offered non-plastic straw options while one business offers reusable bamboo straws for purchase.

The two most important open-ended questions sought responses on the impact of the straw ordinance on the business and the feedback to businesses received from custom-

**TABLE 4:** Survey questions to assess the impact of the San Luis Obispo plastic straw ordinance.

**1. Business Type:**

- ☐ Restaurant, fast food
- ☐ Restaurant, casual/fine dining
- ☐ Juice Bar
- ☐ Coffee Bar
- ☐ Supermarket
- ☐ Bar/Lounge
- ☐ Other:

**2. Are your straws provided by a main branch/corporate or do you purchase them for this business?**

- ☐ Branch/corporate
- ☐ Purchased by me
- ☐ Other:

**3. Are straws directly accessible to customers via self-service?**

- ☐ Yes
- ☐ No
- ☐ No, but only since the ordinance
- ☐ Other: _____

**4. Prior to the straw ordinance, how many straws did your business use/provide per week?**

- ☐ <100 a week
- ☐ 101-500 a weekly
- ☐ 501-1,000 a week
- ☐ >1,000 a week

**5. Since the ordinance, what is the percentage decrease in straws used by your business?**

- ☐ _____%

**6. Have you switched to non-plastic straw options?**

- ☐ No
- ☐ Completely switched to non-plastic straw option
- ☐ We offer a non-plastic straw option for customers
- ☐ Other: _____

**7. From your perspective, what has been the most significant impact to your business from the straw ordinance?**

**8. What has been the response from your customers?**

**9. What changes would you suggest to further reduce the consumption of single-use, plastic straws?**

ers. The responses were categorized into common themes based on the responses as presented in Tables 6 and 7.

## 4. DISCUSSION

### 4.1 Survey Findings

Based on the survey results, the ordinance has been successful in reducing the consumption of plastic straws a reported 32% average decrease per business. As noted, there likely would be a higher percentage reduction in straw consumption if self-service straw dispensers were not allowed. One important observation is that the survey was conducted three months after the effective date of the ordinance. Regarding customer feedback, 17.6% of the respondents stated that there was customer confusion over the ordinance as respondents noted many customers expressed ignorance of the ordinance. Some respondents reported increased acceptance following a brief explanation to the customer. This suggests that consumption can likely decrease as knowledge of the ordinance increases. This prediction must be tempered by the fact that this area has a significant tourism industry; visitors are less likely to be familiar with the straw local ordinance.

As time progresses, it will be more difficult to isolate the future impact of the ordinance on straw consumption. This is a result of the positive spillover effect. That is, as a "no straw" normalization is supported by grassroots campaigns, voluntary actions by businesses, and media coverage, this may have a positive effect on customer behavior as opposed to the ordinance alone.

Regarding the impacts to businesses, the number one response (42.5%) was that there was no significant impact while other responses were positive. The second largest impact (21.3%) was that respondents were pleased to report some cost savings in straw purchases and 6.4% expressed positively that there was also some cost savings in producing less waste and/or a positive impact to the environment. Only 23.4% of respondents expressed negative impacts to their business: 14.9% stated that the ordinance added an extra step in service and 8.5% of the respondents expressed concern over customers' perceptions of poor service because they did not receive a straw and were forced to request one. Regarding the poor service perspective, most of the respondents voicing this concern complained that this is due to a lack of customer awareness and suggested that a greater education effort for the ordinance could have reduced this perspective. This suggests that a government considering such an ordinance needs to have a well designed outreach plan to help reduce negative perceptions and impacts on businesses.

Interestingly, a few respondents noted that they have switched to straws wrapped in paper, which are more expensive and wasteful. With wrapped straws, servers can carry straws with them which allow them to reduce an extra step in service when they are requested by customers. Some businesses that switched to non-plastic alternatives noted a cost increase. Others commented on performance issues as consumers complained that paper straws tend to unravel or swell up especially in alcoholic drinks.

This specific ordinance only covers customers who dine-in; take-out restaurants, food trucks, and takeout orders are excluded from the ordinance. While removing

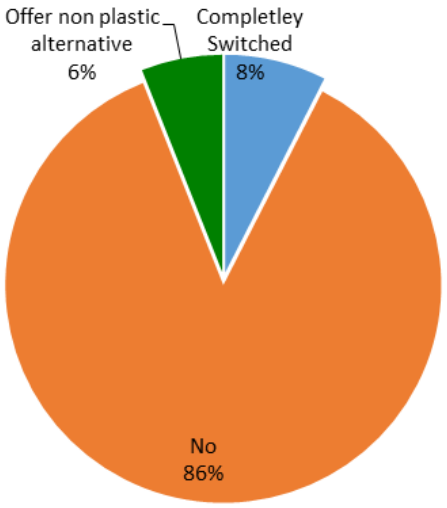


**FIGURE 5:** Response to the question, "Have you switched to non-plastic straw options?" (N=133).

**TABLE 6:** Categorized responses to the survey question: "From your perspective, what has been the most significant impact to your business from the straw ordinance?" (N=94).

| Response Category | Percent Responses |
|---|---|
| No significant impact to the business | 42.5% |
| Saves some money on straw purchases | 21.3% |
| Extra step in customer service | 14.9% |
| Negative, customers assume poor service when straws are not automatically provided | 8.5% |
| Less waste/Good for the environment | 6.4% |
| Miscellaneous impacts | 6.4% |

**TABLE 7:** Categorized responses to the survey question: "What has been the response from your customers?" (N=91).

| Response Category | Percent Responses |
|---|---|
| Mixed feedback (some for and against) | 29.7% |
| No feedback | 24.2% |
| Confusion over ordinance | 17.6% |
| Mostly positive feedback | 14.3% |
| Mostly negative feedback | 12.1% |
| Miscellaneous feedback | 2.1% |

these exemptions would likely have no effect on individual establishments, it is reasonable to presume that such a modification would decrease the overall consumption of plastic straws.

### 4.2 Policy Considerations

In exploring policy options to reduce plastic straw consumption, bans, fees, and default choice modification all have the potential to reduce straw consumption. Bans are likely to have the most negative response from the public, but would be the most effective at reducing straw consumption. Fees/taxes would also be highly effective, but are less popular and thus, more difficult politically. Although this approach has not yet been used for straws in the US, fees and taxes have been very effective at reducing single-use plastic bags (Wagner, 2017). As the survey has shown, in the case of San Luis Obispo, the default choice modification has been successful in reducing straw consumption with minimal impacts to businesses.

Regardless of a ban, fee, or default choice modification, exemptions should be considered for the health care industry, senior citizen facilities, and individuals with physical limitations or disabilities (e.g., paralysis, poor muscle control or contractures, etc.) necessitating the use of a plastic or reusable straw.

As discussed above, with default choice modification, consideration should be given to prohibit self-serving straw dispensers and not excluding take-out customers or restaurants (or phase-out the exemptions over time), which would further decrease the number of straws consumed. However, this would shift some of the burden on to the business by adding an extra step and creating the perception of poor service if one has to request something that previously was automatically provided. An extra step in service represents time opportunity costs for the business. To mitigate this impact, there should be a concerted effort to develop a strong outreach campaign tailored to the community on the importance of the ordinance and the environmental benefits. As this study found, the reduced costs were important to businesses suggesting that this should also be incorporated into an education campaign—positive economics.

While some communities are considering a ban with a goal to shift consumption to non-plastic straws, consideration should be given to the impact of moral licensing, which is when we engage in a socially desirable behavior, we tend to ignore the impacts of non-socially desirable behavior. Researchers have found that offering recycling actually increased the consumption of items offered for free as the moral licensing effect made consumption more acceptable (Catlin & Wang, 2013; Sun & Trudel, 2017). If paper and/or compostable straws are provided, with moral licensing, customers tend to feel okay about using and disposing, including littering, of paper and/or compostable straws. In sustainable materials management, the goal is source reduction rather than more recycling or composting.

## 5. CONCLUSIONS

As noted, plastic straws are not a significant source, by weight or by volume, of the global plastic waste problem, but they are highly visible and avoidable. Given that for most people, straws are basically superfluous, they are perhaps the easiest single-use plastic product that can be targeted for reduction. The global focus on straws represents an initial first step, and because they are avoidable, the relatively easiest step in a strategy to reduce and/or eliminate single-use plastics.

Government regulation often evolves very slowly, which explains why, during a time of high global interest in reducing single-use plastics, especially straws, there currently only a small number of straw ordinances in the US. Nonetheless, private businesses are moving much faster as there have been significant voluntary actions worldwide to reduce straw consumption. It is feasible that a global, no plastic straw normalization could arise that precludes the need for government intervention.

This paper reviewed one specific policy instrument, the default choice modification, which mandated that straws be provided only upon request. This instrument flips the default choice while retaining customer choice. In this study, it was found to be effective in reducing straw consumption with minimal impact to businesses.

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