

Permanent Time as an Alternative to Counter the Detrimental Effects of DST on Canadian Society

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ABSTRACT

Daylight saving time (DST) is a practice that shifts the perceived time one hour forward in the spring and one hour behind in the fall, effectively granting more sunlight in the evenings of springs and summers. In recent years, an increasing number of people have been dissatisfied with this method of keeping the time for a variety of reasons. To begin with, DST no longer saves energy because artificial illumination no longer contributes to the majority of energy expenditure in the current Canadian society. Secondly, DST affects many different forms of economy, varying from farming and manufacturing to family owned businesses. DST also damages the well-being of Canadians by increasing the risks of health problems from every time change. From an online survey study to investigate the public opinion on the timekeeping ways, most participants have shown that they do not want the current DST arrangement; Around three-quarters indicated that they prefer one of the permanent time schemes, one that they do not need to change clocks twice a year. The method to keep time is one that affects everyone, and may have major impacts on the socioeconomic well-being of a society. Therefore, it is imperative that the significance of the current DST scheme on society be clarified and the people's opinions be heard in subsequent survey studies that include more participants.

Introduction

Daylight saving time (DST) is a practice proposed by Benjamin Franklin which advances clocks during the spring and summer months so that darkness falls later. DST is practiced throughout all 24 time zones and utilized by 70 nations. Many people think they know the basics of DST, but it is a more complicated topic than just moving an hour forward in spring and an hour back in the winter. Ontario, like many other provinces in Canada, follows DST. This means that the sun rises around 5-6 am and sets around 8-9 pm in the summer, rises around 7-8 am, and sets around 4-5 pm in the winter. Two-time switches during the year cause frustration due to an hour of lost sleep during the switch in spring and result in many traffic accidents and reduced productivity in the office. In light of this hardship, politicians have argued that keeping to the same time all year round would be a much better option. One of the two options that are currently on the table is permanent DST, which means that the sun would rise around 5-6 am and set about 8-9 pm in the summer, then rise around 8-9 am and set about 5-6 pm in the winter. The other option is the permanent standard time, which is one hour ahead of daylight savings time. This paper investigates the economic effects of these two-time schemes in close detail, explicitly focusing on electricity consumption and economic profits made by industries. Data from the past and present is analyzed with a recommended conclusion at the end based on evidence.

Arguments

The Current Practice of DST No Longer Saves Energy in Canada

DST has long been argued to help conserve energy, but it has been found in recent years that the current DST arrangement may result in more energy consumption in the current age. In the 1800s, when Benjamin Franklin first proposed the concept of DST, artificial illumination was the primary source of electricity consumption. Switching clocks saved electricity because an extra hour of sunlight in the evenings meant that people could turn their lights on later in the evening. The researchers at Yale found that decreased need for electrical lighting was offset by higher demand for heating and cooling power from the ubiquitous use of air conditioning as it has tripled since 2001. (Kotchen & Grant, 2010). Thus, the current DST scheme needs more energy for air conditioning since the sun sets later at night (around 10 pm during the summers), increasing the evening temperature (Kotchen & Grant, 2010). This increase in energy usage counteracts the savings received from lighting, thus potentially suggesting that the main concept of DST is outdated.

In another study on a national scale, it was shown that an extended DST saved a significant amount of energy. Jeff Dowd, a senior analyst of the US Department of energy and his colleagues investigated the effect it might have on national energy consumption, looking at 67 electric utilities across the country. In their October 2008 report to Congress, they concluded that the four-week extension of daylight time saved about 0.5 percent of the nation's electricity per day, or 1.3 trillion watt-hours in total. Such an amount is enough to power 100,000 households for a year. If energy could be saved from an extension of DST, making DST permanent could thus save even more energy.

The Current DST has Various Effects on Different Sectors of the Canadian Economy

The second major concern for deciding whether to stay in DST involves determining whether it does good for the economy. DST has been found to have calamitous effects on the economy, especially on farmers and retailers. Farmers have long opposed the current DST scheme since it disrupts their schedules and their livestock's circadian rhythm after the change. Shifting an extra hour of sunlight in the evenings, especially the initial shock that comes with it, has adverse effects on farm productivity. Farmers historically faced one frustration: they had to wait an extra hour in the morning for dew to evaporate to harvest hay. This results in one less hour worked on that day, thus delaying productivity and lowering the revenue. (Klein, 2022). Another issue is that cows are usually milked at 5 am, so the raw dairy products may be promptly shipped out. Losing an hour in the night that the current DST scheme induces in springtime, however, the original 4 am becomes 5 am, but the cows' circadian rhythms are unable to adjust to this change on the day of the shift, making them not yet ready to be milked at 5 am after the shift, as their internal clocks still think that it is 4 am. Consequently, shipping schedules for raw dairy products are not guaranteed to be met during the week of the shift, resulting in potential profit loss and delays in supply (Klein, 2022).

In contrast, retailers involved with sports and recreation have historically argued the hardest for extending daylight time. For example, golf industry representatives told Congress in 1986 that an extra month of daylight saving was worth up to \$400 million annually in additional revenue (Greenstein, 2021). There is little evidence that DST has any significant impact on big corporate businesses because there are too many confounding variables regarding their revenues and profit margin compared to the effects of losing or gaining one hour during the switch. For example, from the Loblaw's corporate earning report for 2019-2022, the revenues did not change drastically when DST switched the time, which may have been due to more significant effects of the holiday season (Loblaw's, 2022). For example, the most revenue was observed in the 4th quarter (October to December) due to the Christmas holidays (Loblaw's, 2022).

One other form of business, the 24/7 convenience stores such as McDonald's or Tim Horton's, is negligibly affected by the change as they operate all day. Indeed, some scientific studies have found minimal shopping behavior changes after the DST time switch, but these changes are not significant on a larger scale. For example, the University of British Columbia professor Charles Weinburg said that people use "sleep-inhibiting substances or stimulants" such as caffeine-related products like coffee and tea to increase alertness throughout

the day to combat sleep deprivation (Weinburg, 2022). However, such changes in shopping behavior on a few specific products do not significantly impact the stores' revenue.

In addition, family-owned small businesses do not lose customers when DST switches the time because customers shop when the sun is up and down alike. While their revenue remains unimpacted by DST, however, they face more electrical bills due to the increased heating need in winter and cooling need in the summer, as mentioned before.

Therefore, with the discussions above on how DST impacts various sectors of the economy, making DST permanent would solve the issues that farmers have been protesting about, increase the golf industry's profits, and reduce electricity bills for small-scale family-owned businesses while leaving big corporate businesses and 24/7 stores almost unaffected.

The Current DST Practice Is Detrimental to the Well-Being of Canadians

The last major concern of the current DST scheme is personal health. Many would physically or psychologically suffer from changing clocks, with consequences varying from lowered productivity, traffic accidents, and other health problems that would increase the risk of death. For instance, a 5.7% increase in workplace injuries had been observed during the time switch and is believed to be caused by humans' internal clocks not adjusting fast enough (Buckle, 2022). Another study showed that heart attacks were 25% more frequent on the Monday after the time switch because the sudden change in the circadian rhythm increases the blood pressure in the human body (Lego, 2022). The multitude of negative effects that changing clocks impose on people's biological systems may subject heart disease patients and those with prior medical conditions to a greater risk of complications immediately after a sudden change in time (Sandhu, 2014).

Methods

Taking into consideration the risks mentioned above regarding energy consumption, the economy, and the health of individuals in Canada resulting from the current practice of DST, it would be instrumental in obtaining a clear picture of how the community thinks about DST and whether there is a strong incentive for change. Therefore, a survey was conducted in various communities, including high schools in Toronto, online public forums on Discord, and followers of an influencer who reposted the survey on Instagram. The survey asked the respondents if they wanted to abrogate daylight savings completely, maintain the status quo, or have another preferred form of daylight saving. Specific options in the survey included Permanent Daylight Saving Time, the current DST method, Permanent Standard Time, No Opinion, and, lastly, Permanent Daylight Saving Time or Permanent Standard Time as long as there is no longer an annual change of time. 85 online questionnaires were collected in total, and the results were summarized via Google Forms and presented in the section below.

Results

As presented in Figure 1, the survey results showed that 30.6% of respondents preferred the last option, which states that as long as the clock is not changing, they are fine with either choice of permanent time. One response highlights: "There's no purpose for it anymore, it's an archaic system that was born out of war-time frugality, and is no longer needed. It's not particularly bothersome, but there's no purpose for it, so it should be eradicated." A good portion of their explanations include that they experience adverse events during the clock change, such as lower productivity and disrupting sleep cycles. One respondent explained how, "Driving is hard early and late after the clocks change... the hour just gives us too much change from what to expect in the mornings and at night."

However, it should also be noted that not all of the respondents are aware of the true nature of the issue. For instance, one reply in support of permanent standard time states: "I live in est and it's the best one and it's name is standard so it should be the standard time". Such comments reflect that there are also less informed people in the larger picture of Canadian citizens who do not base their opinion on scientific facts.

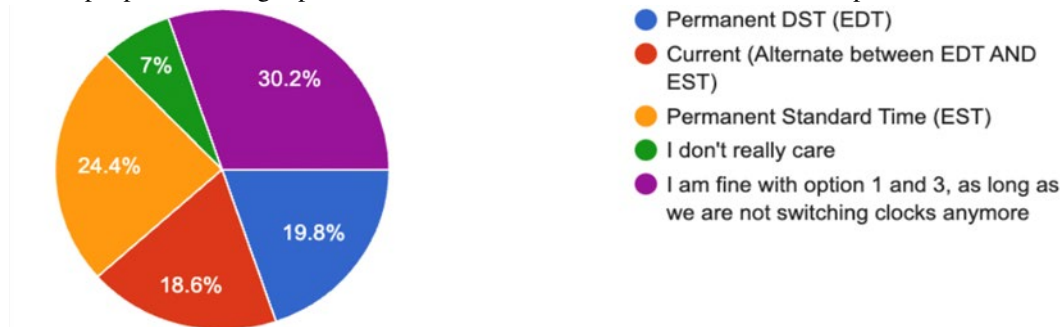


Figure 1. A pie chart generated by google forms showing the proportion of respondents' choices in the survey that was sent out to various communities.

Ranking second, 21 out of 85 respondents (24.7%) prefer the permanent standard time option. Ranking third, 17 out of 85 respondents (20%) choose the permanent DST option.

Discussion

75.3% of the respondents would like to stop switching clocks and maintain a permanent time, which is more than four times the number of respondents who want to keep the current time scheme. From this result, it can be seen that most respondents want to change from the current time scheme to either of the two options listed above.

Other larger scale online sources provide similar results: in a poll of around 800 participants of varying ethnicity and educational background conducted by Monmouth University, 61% were found to be willing to abolish the biannual practice of changing clocks, compared to the 35% who wanted to keep the status quo (Murray,2022). Similarly, in another survey conducted by YouGov, a global public opinion and data company, it was found that out of the 2234 participants surveyed, 59 percent expressed willingness to see daylight saving time made permanent, compared to 19 percent who would not (Yougov, 2022). The indication of public opinion clearly points to a majority who would like to get rid of the biannual time switch induced by our current DST practice.

Limitation

While some clear trends can be seen from this study's results, this survey study's limitations should be addressed. To begin with, since the respondents from the survey were not chosen with a randomized sampling technique, the sample may be biased towards particular groups, such as online communities that do not include many people of older age. Also, a voluntary sample was used as respondents filled out the forms only if they wanted to do so. There could be more people who did not respond to the survey who cared little about this topic, even though it does not affect the overall trend much. Another concern is that it is possible that respondents do not read or completely understand the background information at first. For example, one respondent chose the permanent standard time option only because it has the word "standard" inside the option. Lastly, in a survey study, the risk of invalid answer options is always present, especially when a respondent does not fully read the background information and chooses an option randomly.

Conclusion

As the topic of abolishing DST increases in popularity and becomes more controversial, it is time to show concrete actions instead of being stalled in the debate stage and keep suffering from the consequences of time switches. Regardless of whether we should go into permanent daylight time or standard time, it is clear that our current practice must be stopped before more harm is done. With the usage of air conditioning surpassing artificial illumination, with two hundred and fifty thousand farmers being affected annually from side effects from DST, with drastically lowered revenues and productivity, and with many health risks due to the inability for the circadian rhythm to adapt after a time switch, overwhelming evidence presented above suggests that DST is outdated today. Transitioning to a permanent DST time scheme would make less trouble for the public, improving the quality of life of most of the 38 million people who are currently residing on Canada's soil. If some would still argue that switching how we keep the time may have unforeseen detrimental effects, it is clear that the current DST method has already caused much damage to public health, induced frustrations and inconveniences, and increased energy consumption, and thus the environment; therefore, to mitigate the effects of unforeseen circumstances, smaller scale experiments in areas close to the difference in time zones over the same longitude should be conducted to gather precious data while minimizing the negative consequences of time differences induced by traveling before a final decision is made.

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