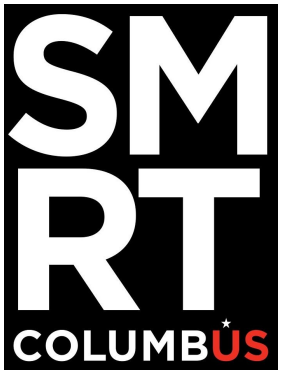

THE OHIO STATE UNIVERSITY

COLLEGE OF FOOD, AGRICULTURAL,
AND ENVIRONMENTAL SCIENCES

Telecommuting: Smarter Workplaces

Spring 2020

Alyssa Barbuto, Alyssa Gilliland, Rilee Peebles, Nicholas Rossi, Turner Shrout

AEDE 4567: Assessing Sustainability Capstone Course

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Executive Summary

This semester, our team collaborated with Smart Columbus to evaluate the potential of telecommuting to be permanently integrated into the workplace. Telecommuting is defined as an arrangement between employee and employer wherein the employee works outside of the traditional work environment, such as in working from home. This paper reviews the existing telecommuting literature and research regarding the benefits it offers to employers, employees, and the environment. Our recommendations will highlight some of the "best practices" for the creation of long-term teleworking programs that benefit both employers and employees.

Summary of Telecommuting Benefits

Existing research has identified ways in which telecommuting benefits employers, employees, and the environment. Through our literature review, we found that companies that allow for remote work experience 25% less turnover than companies that do have such programs. Additionally, on average companies based in major urban areas could save roughly $2,000 a year per employee working from home. What is more, employees that work from home are 4% more productive on-average than their office working coworkers. Studies also find that employees with flexible work plans tend to be healthier, both physically and emotionally, with remote workers experiencing happiness levels up to 29% higher than on-site workers. Further, employees cited the benefits of the time and money saved by not having to commute daily.

In addition to the organizational benefits, existing research indicates that the widespread adoption of telecommuting can potentially lead to an increase in individual environmental awareness and cost savings from reduced energy use. Furthermore, it can lower CO2 emissions and lead to an increase in overall air quality as the number of cars on the road decreases. In some

instances, telecommuting could mean reductions in heating and cooling needs for office space. This in turn would lead to further reductions in CO2 emissions and further improvements in air quality.

Summary of Potential Benefits for Columbus

Our research focused on understanding the significance of cost savings and other benefits associated with telecommuting. We did not do a Columbus-specific analysis. However, based on the research we reviewed and summarized we made some approximate estimates for the impact of wide scale telecommuting on some of the employee costs (e.g. gasoline) as well as CO2 emissions. If 20% of annual commuting days were replaced by telecommuting we estimate Columbus employees fuel (gasoline costs) would be reduced by **$235 million** per year. CO2 emissions in Columbus would be reduced by **965 thousand** U.S. tons per year.

Summary of Recommendations

Based on our review of the existing literature, we developed several best practices that can help employers develop successful telecommuting programs within their own companies. We found that successful telecommuting programs included (1) employees being consulted and actively involved in the creation of telework programs and telecommuting policy (2) teleworking being a team activity where employees (or employee teams) telecommute on the same days and (3) actively monitoring the results and acceptance of telecommuting programs so they can be modified as appropriate. However, workplaces, companies and organizations are inherently different. Thus, there is no “one size fits all” telecommuting plan.

Introduction

Telecommuting is not the future of the smart workplace − it is the present. Telecommuting, also known as remote work or telework, is an arrangement between employee and employer wherein the employee works outside of the traditional work environment, such as working from home. In response to the current COVID-19 crisis, companies have had to rapidly implement long-term telecommuting programs, most of which have not offered any kind of remote work programs before. In light of these circumstances, Smart Columbus partners have reported that they are prepared to work remotely for at least the next four months. As employees become accustomed to this new work structure, questions are being raised about what shape remote work will take once they can return to their offices.

Telecommuting provides clear benefits to all vital components of a businesses' success. This literature review will outline improvements in employer retention and costs, employee productivity and wellbeing, and even the environmental impact of the company as a result of implementing remote work programs. From this information, we offer Smart Columbus the tools to reinvent the workplace. Our recommendations will serve as best practices for companies to use in the establishment of permanent teleworking programs after stay at home sanctions are lifted.

Research Goal and Objective

The goal of this report is to provide Smart Columbus with a foundation of research and recommendations on telecommuting that can be used to persuade their corporate and other organizational partners to implement permanent telework programs.

The objective of this report is to identify the benefits that telecommuting provides to

Columbus employers, employees, and the environment, and from them recommend best practices for establishing permanent telecommuting programs within a company.

Purpose and Motivation of Research

The synthesis of literature pertaining to telecommuting will be an essential tool for Smart Columbus and their partners once employees can return to their offices. The purpose of this report is to offer research on the attitudes toward telecommuting and benefits for employers, employees, and the environment. Our motivation is to help persuade companies and organizations to use this research to implement permanent telecommuting programs within their workforce.

Summary of Findings and Recommendations

Through our literature review, our findings illustrate how telecommuting provides substantial benefits to employers, employees, and the environment. Based on these benefits, we recommend that Smart Columbus encourage companies to adopt a permanent telecommuting program. Our recommendations suggest that the best practices for creating such programs should include an evaluation of the specific needs of a company and their employees, with emphasis on supporting clearly outlined policies addressing performance monitoring and established schedules and lines of communication.

Benefits of Telecommuting

Telecommuting provides clear benefits to employers, employees, and the environment. Based on a review of scholarly articles and case studies, telecommuting reduces employer costs, improves the productivity and wellbeing of employees, and enhances a company's environmental stewardship.

Employer Benefits

To evaluate the benefits for employers, we examined three case studies. The first case study by Harvard Business School demonstrated immense cost savings due to telecommuting measures. The study, conducted by associate professor Prithwiraj Choudhury, examined the US Patent and Trademark Office (USPTO) and the outcomes of telecommuting arrangements on a group of employees. The team began the Telework Enhancement Act Pilot Program in 2012 and for 2 years the team trained patent examiners how to effectively work from home. Choudhury studied the productivity of 600 patent examiners in comparison to employees still working from the office. Choudhury and his team found that productivity of the organization had increased 4.4% with telecommuting options. This increase in productivity led to a gain in value of $1.3 billion to the U.S. economy per year (Senz, 2019). The USPTO also saved $38.2 million in office costs, this was from reduction in needed real-estate at their headquarters space. Choudhury also urges the use of current technological tools for supervision needs, gradual training and a slow transition from traditional work environments to full remote working (Choudhury, 2019).

The second case study by Stanford University demonstrated a more productive workforce. Stanford professor Nicholas Bloom worked with China's largest travel agency to help them implement a telecommuting program. Bloom compared a control group of employees to

employees working remotely (Bloom et al, 2015). The study showed an increase in productivity for telecommuting employees equivalent to one full day of work per month. Telecommuting employees also worked more consistent 8-hour workdays. The telecommuting employees were less likely to be late or leave early. Telecommuting employees' attrition decreased by 50%, meaning they took shorter breaks, took less time off and were less likely to take sick days compared to the traditional employees. The company also saved $2,000 per employee in reducing the headquarters' rental space (Mautz, 2018).

The third case study done by OWL Labs demonstrated the growing market of telecommuters in America. OWL Labs surveyed 1,202 full-time United States workers aged from 22 to 65 years old. Nearly 50% of United States workers will telecommute at least once a week, 30% of those people being full-time employees. OWL Labs found that the top reason employees choose to work remotely is increased productivity and better focus. OWL Labs also found that companies that have thorough telecommuting plans and policy take 33% less time to hire new employees than traditional companies, reducing the amount of time wasted on relocation issues or other hiring complications. Companies offering telecommuting also experience a 25% increase in employee retention and 71% of respondents say they will choose one company over another if they can work remotely (OWL Labs, 2019).

These three studies demonstrate that when employees work remotely, they are performing more productively and have more focus. Telecommuting results in the company's operations being more efficient. Employers benefit from the improved efficiency of employees, their greater job satisfaction (e.g. lower employee turnover and reduced recruiting costs) and

lower employee costs at work (e.g. real-estate costs). This means company and organizational costs are reduced and companies become more valuable.

Employee Benefits

Not only do employees want to work remotely, but they gain many benefits both professionally and personally from doing so. Figure 1 displays that 99% of employees surveyed said they, "would like to work remotely, at least some of the time". Going even further, 95% of people surveyed said they would encourage others to work remotely (OWL Labs, 2019).

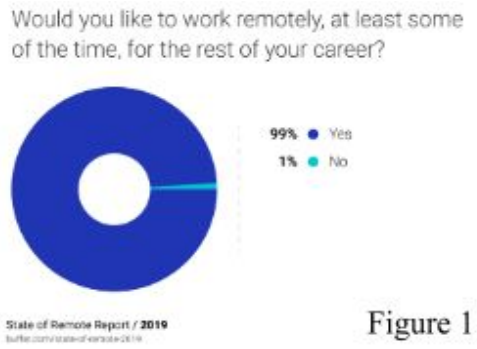

Figure 1

Additionally, there is significant evidence to suggest that working remotely is beneficial to employees both physically, mentally, and financially. A common misconception is that an employee's desire to work remotely is simply to avoid the hassle of commuting (Bernardino, 2017). However, research has shown that there is no significant relationship between commute length and the frequency of telecommuting, nor a significant relationship between commute time and an employee's decision to adopt telecommuting (Mokhtarian, 2004). In fact, when surveyed employees list a more flexible schedule as the largest benefit of telecommuting. As shown in Figure 2, 40% of employees surveyed listed a flexible schedule as the biggest benefit to working remotely, followed by working from any location and time with family.

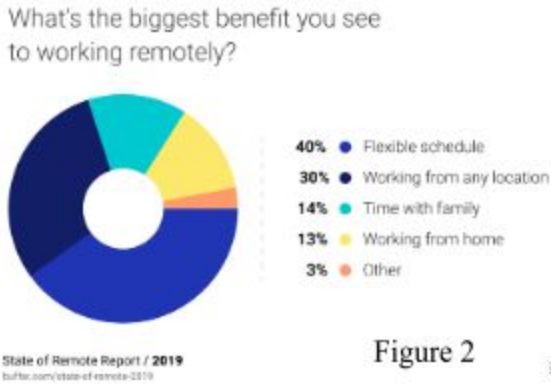

Figure 2

A study by the Sloan Center at Boston University showed 78% of respondents claimed that access to telework programs contributes to their success as employees to a "moderate or great extent". In the same survey, 90% of respondents said that having flexible work options positively contributed to their quality of life also to a "moderate or great extent". From their research, the Sloan Center promotes that overall, employees with flexible work plans are found to be healthier, both physically and emotionally (Pitt-Catsouphes et al., 2009).

The changing priorities in the labor force have also increased the demand for telecommuting. The increasing number of women in the workforce, as well as the changes in the shape and sizes of traditional families create the need for more flexible work options (Bernardino, 2017). Though telecommuting is not a perfect substitute for childcare, the flexibility it allows "contributes significantly to the cohesion of family" and has the potential to relieve some of the financial burden of daycare. Additionally, an increase in home vs. work conflict is seen for both men and women. Employees report turning down promotions and new opportunities at work in order to avoid increasing work/life conflict and millennials are significantly less likely to relocate for a job promotion than earlier generations (Bernardino, 2017). Telecommuting has the potential to ease family/work tension and help employees not have to choose between family and work.

However, telecommuting does not come without disadvantages for employees. As shown in Figure 3, 22% of employees surveyed by OWL Labs found that they had trouble separating work and personal life, as well as 19% stating they struggled

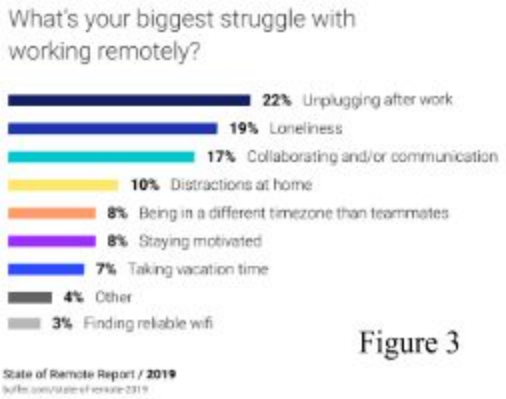

Figure 3

with loneliness when working remotely. Amir Salihefendic, the CEO of Dosit, a remote work company dedicated to the creation of task manager tools, stated that, "we need to acknowledge that isolation, anxiety, and depression are significant problems when working remotely, and we must figure out ways and systems to resolve these complex issues" (OWL Labs, 2019).

Overall, telecommuting offers employees significant benefits with the greatest benefit being workplace flexibility. When implemented correctly, telecommuting can increase the overall happiness of employees by improving both their mental and physical health. It can decrease work and family conflicts and help facilitate an even greater increase in the number of women joining the labor force. Yet, there are many complex issues that surround the relationship between employees and remote work. Telecommuting is a rapidly evolving field and its true benefits and shortcomings are still being discovered.

Environmental and Energy Benefits

Telecommuting provides environmental benefits to society at large, as well as reduces energy usage on a business and individual level. Key improvements include employee/employer environmental awareness, improvements in local air quality and significant decreases in carbon emissions, as well as reductions in energy use and costs:

- ➔ Cost Savings: When compared to their habits in an office setting, teleworkers are more conscious of the amount of water they are using, outlets being used, and fossil fuels being burned within their own home because they are more aware of their [personal utility] costs (Pasini, 2018). In addition to energy bills, teleworkers are saving costs on gasoline. In 2007, "The US Patent Office's telework program…consisting of 3,609 home workers [saved] over 613,000 gallons of gas"

which led to $1.8 million savings in fuel costs. Companies such as Cisco and Bell Canada (Pinola, 2019) have also reported that telecommuting lowers various employee costs.

- ➔ Improved Air Quality: When less cars are on the road, there are less pollutants being emitted into the air. Driving emissions produce volatile organic compounds, or VOCs, which include substances such as nitrogen dioxide that are known to cause respiratory infections and irritate or cause asthma (Pasini, 2018). In 2017, the EPN reported that cars on the highway systems contributed to 13.1% of total VOC emissions (Our Nation's Air, 2017). Widespread implementation of telecommuting programs has the potential to make substantial improvements to air quality as less people are required to commute to work on a daily basis.
- ➔ Greater Environmental Awareness: From a less quantitative perspective, working from home introduces the ability for an improved awareness of one's environment. The flexibility that telework provides introduces the opportunity for an employee to have lunch or even work outside. This can lead to improved attitudes and more deliberate actions when it comes to the way people interact with the environment.
- ➔ Lower Carbon Emissions: Carbon emissions are the leading contributor to climate change. The Telework Research Network reports that one day of telecommuting in the U.S. could prevent 423,000 tons of greenhouse gasses from being released into the atmosphere (Pinola, 2019). Reports have found that commuters in the United States drive an average of 30 miles per day for work meaning that

telecommuting has the potential to reduce 3.2 metric tonnes of carbon dioxide each year per person if widely implemented (Pasini, 2018).

- ➔ Energy: Sun Microsystems, an American technology company, reports that working from home uses only half of the energy that doing the same work in an office does. Additionally, a 2018 Sun Microsystems report finds that eliminating commuting two and a half days a week could reduce an employee's energy usage by 5,400 kilowatt hours per year (Sun Microsystems…, 2008). In addition to these statistics, the Consumer Electronic Association (CEA) also reports that telecommuting is an innovative solution to climate change, as its potential could be to save 9 to 14 billion kilowatt-hours of energy per year (Pinola, 2019).
- ➔ Pollution: Telecommuting not only reduces air pollution, but energy, plastic, and paper waste as well. Virtual Vocations, a resource dedicated to help workers find telecommuting jobs, offers the ways in which these types of waste are lessened through telework. This source finds that telecommuting eliminates a large majority of the on average 10,000 sheets of paper that each office worker uses. as well as reports a reduction in plastic waste in that there is less need to consume packaged foods, coffees, etc. because one can make food at home and refill their coffee pots (Pasini, 2018). Telecommuting contributes greatly to the reduction of plastic and paper waste.

Understanding the environmental benefits associated with expanding telecommuting programs is a valuable tool for companies to not only improve their environmental stewardship, but their public image as well. In this way, telecommuting can be used to frame, expand, and

promote a company's commitment to their social corporate responsibility and sustainability goals.

Potential Benefits for Columbus

Though unable to conduct a Columbus-specific analysis, we were able to calculate approximations for the impact of wide scale telecommuting in Columbus. We examined specific Columbus employee costs (e.g. gasoline) as well as CO2 emissions for Columbus. All quantitative data used in the rest of this section is from 2015. Columbus commuters travel 27.7 million miles a day on local highways and streets (Lomax, 2015). We evaluated the potential impact if 20% of the annual 261 working days, telecommuting replaced employees. Based on an average of 24.8 MPG per vehicle (Durbin, 2016) and an average cost of gasoline of $2.41 per gallon (EIA, 2020), we determined the following savings in commuter costs:

- Fuel (gasoline costs) would be reduced by **$235 million** per year (Figure 4)
- CO2 emissions in Columbus would be reduced by **965 thousand** U.S. tons per year (Figure 5)

However, it is important to note that these are estimates, and only include some of the potential cost savings and environmental benefits to the City of Columbus.

Recommendations

Our research can serve as a foundation for Smart Columbus to persuade its partners to continue telecommuting at some level even after normal workplace operations have resumed. Our recommendations provide a starting point for best practices in the creation of long-term teleworking programs that benefit both employers and employees.

Our recommendations are as follows:

- Smart Columbus should encourage their partners to expand telecommuting within their organizations after the State of Ohio allows employees to return to office spaces.
- Smart Columbus should encourage employers to survey employees regarding their attitudes and experience with telecommuting.
- Employers should develop a long-term telework policy where eligible employees can work from home at agreed upon times. Development of the program should include the following criteria:
    - ➔ Employees should be consulted and actively involved in the creation of the telework policy.
        - ◆ According to the Society for Human Resource Management, "asking team members to discuss and achieve consensus on solutions [for teleworking] can help the team become more invested in making a teleworking initiative a success" (Tarallo, 2018).
    - ➔ If possible, make telework a team activity where team members generally work from home on the same days.

        - ◆ This allows for simple facilitation of team meetings and allows employees to stay connected on office workdays (Tarallo, 2018).
    - ➔ Monitor Performance Results
        - ◆ Measure changes in employee behavior such as how number of sick days change. This can assist in determining effectiveness of telework (Tarallo, 2018).
- Employers should evaluate, update, and expand existing telework policies based on the following elements. We examined policies and telecommuting forms distributed by The Ohio State University, US Acute Care, and Workable to develop the following 7 elements:
    1. Scope of employees that the policy applies to
    2. How to determine employee eligibility for telework
    3. Requesting work from home procedure
    4. How working hours are decided and documented
    5. Equipment & Technology Access
    6. Security & Confidentiality
    7. Compensation and benefit changes if applicable
- Employers should communicate general best practices to employees of how to successfully work from home. Below are best practices for employees working from home based on Caroline Castrillon's article in Forbes:
    - ➔ Set a work schedule and stick with it

- ➔ Set up consistent lines of communication with managers, set aside time to stay connected to colleagues
- ➔ Take breaks

Limitations

Time and resource constraints posed limits on our ability to conduct all the research initially planned. Due to our interrupted research period, we were unable to conduct in person interviews or employee surveys, and instead had to rely solely on online research to conduct our analysis of telework. This may lead to our recommendations being broad. Best practices for employees are based on individuals who have experience with telework rather than quantitative evidence, so methods may differ for employees based on individual needs and strengths. Additionally, research on the environmental effects of telecommuting varies in scope. This means that calculations of greenhouse gases from a specific study will not directly translate into the same savings for other organizations. Another limitation to this project is that the post-COVID-19 time period is uncertain. The effects this pandemic will have on society and the economy are uncertain, leaving individuals and businesses in survival mode until it passes; thus, as new information comes to light, this "post COVID-19" may become outdated.

Conclusion

Literature pointing to the benefits of telecommuting has accumulated over past decades, but no substantial effort by the greater business community to adopt telework policies into their work structure is being made until now. COVID-19 has made it necessary to study and synthesize this knowledge into effective telecommuting programs that will promote the evolution of the post-pandemic workplace. Through this literature review, we have identified the benefits of telecommuting, including the increase in efficiency and decrease in workplace costs for employers, the improvement in the productivity and wellbeing of employees, and the enhancement of a company's environmental stewardship. Our recommendations use this research to suggest best practices for the creation of long-term teleworking programs that benefit both employers and employees, including an evaluation of the specific needs of a company and their employees, with emphasis on supporting clearly outlined policies establishing performance monitoring, schedules and responsibilities, and strong lines of communication.

Through this report, we hope to facilitate a better understanding of how telecommunication offers expansive benefits to companies when implemented. Our research and recommendations on telecommuting can be used by Smart Columbus as a tool for encouraging the continued implementation and further expansion of permanent remote work programs for their partners. As the world waits out the COVID-19 crisis, we propose this research could be expanded to examine the impacts that telecommuting on society in 2020. Telecommuting is a rapidly evolving field and we hope this review enables employers and employees to better understand telecommuting.

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Appendix

Figure 1:

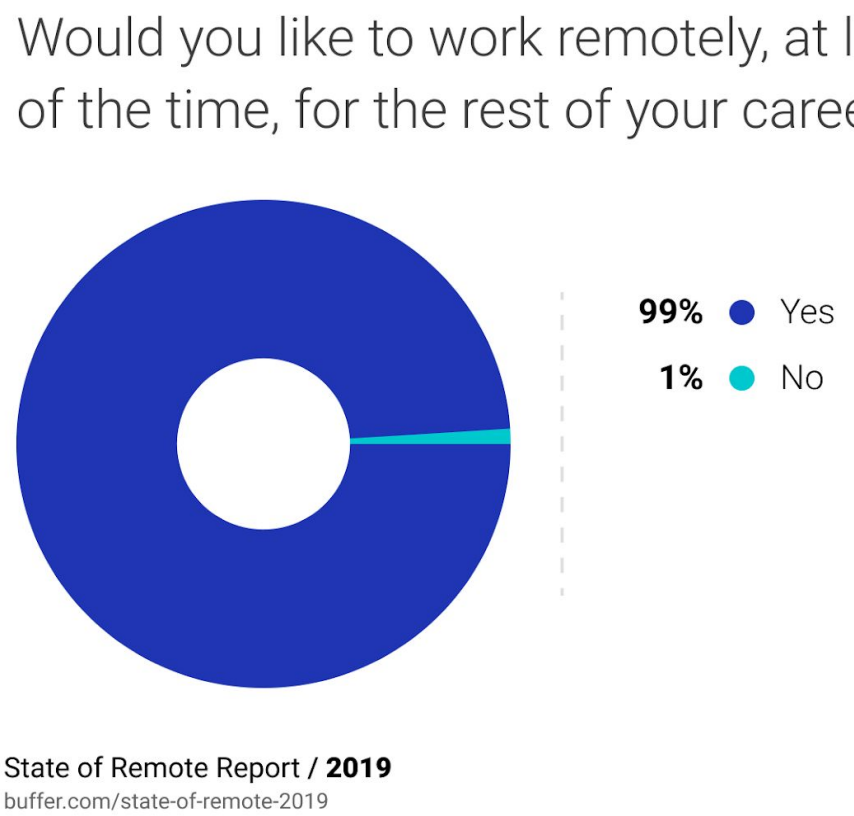

Figure 1 showcases the results of a 2019 State of Remote Report that answers "Would you like to work remotely at least some of the time, for the rest of your career?"

Figure 2:

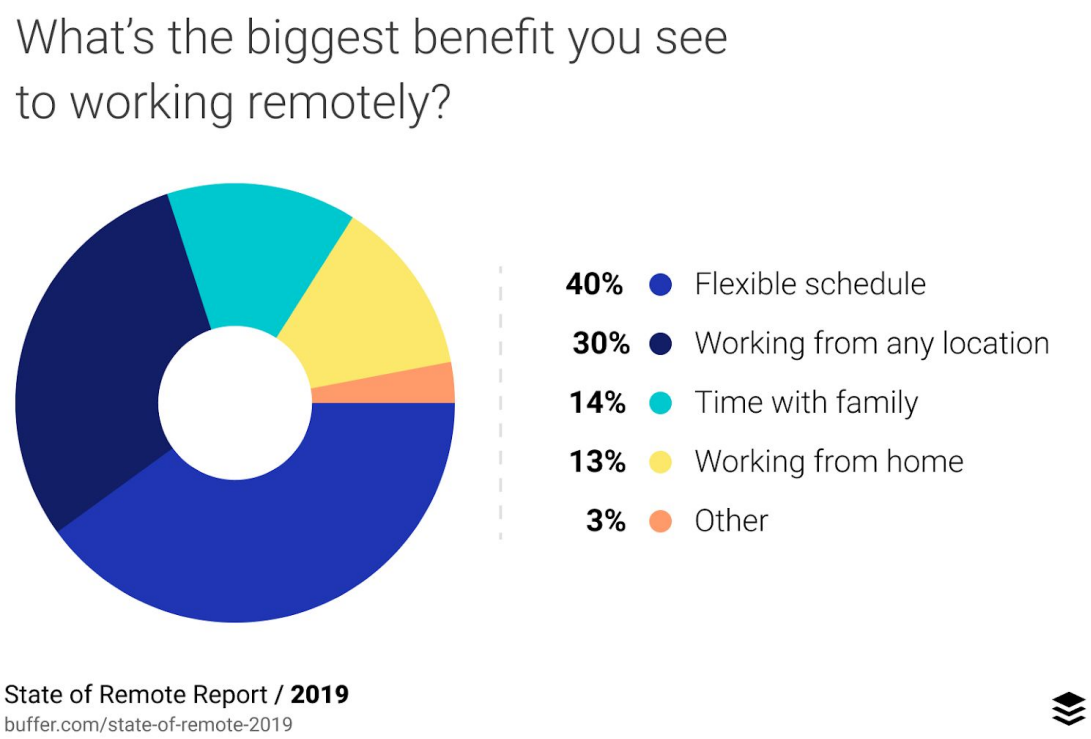

Figure 2 showcases the results of a 2019 State of Remote Report that answers "What's the biggest benefit you see to working remotely?"

Figure 3:

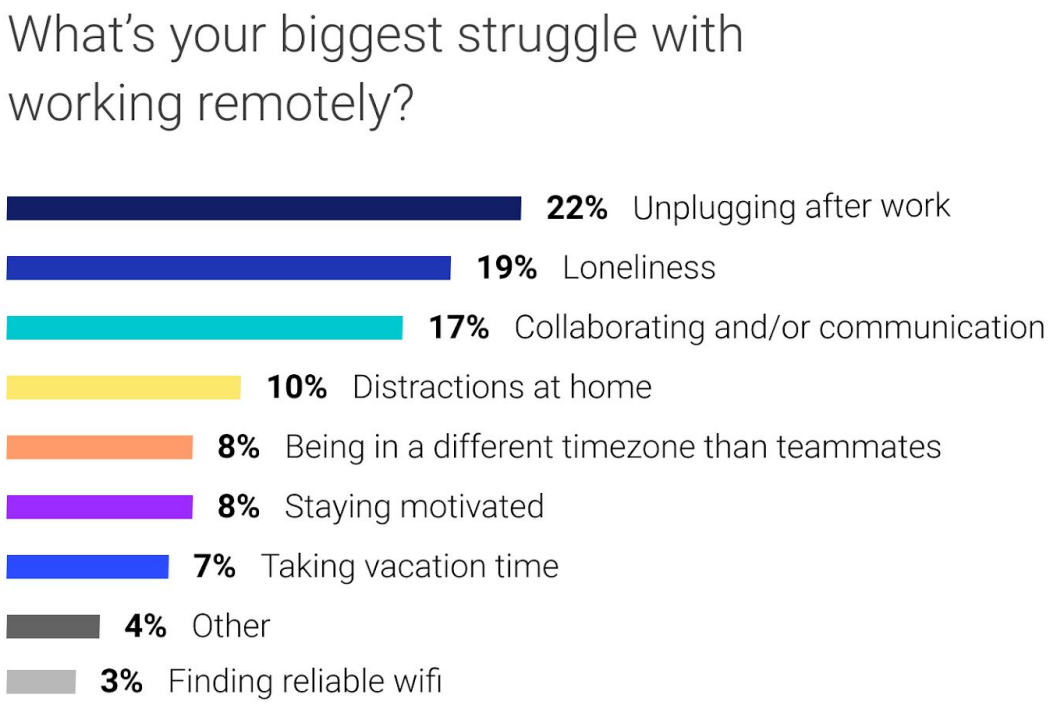

Figure 3 showcases the results of a 2019 State of Remote Report that answers "What's your biggest struggle with working remotely?"

Figure 4:

Fuel Cost Savings Calculation:

27,700,000 miles/day x 261 work days/year = 7,229,700,000 miles/year

7,229,700,000 miles/year / 24.8 MPG = 291,520,161gallons/year

291,520,161 gallons/year x 2.41 dollars/gallon = 699,648,387 dollars/year

After 20% reduction in commuting days

27,700,000 miles/day x 172.8 work days/year = 4,786,560,000 miles/year

4,786,560,000 miles/year / 24.8 MPG = 193,006,451 gallons/year

193,006,451 gallons/year x 2.41 dollars/gallon = 465,145,548 dollars/year

$699,648,387-$465,145,548 = $234,502,839 in potential savings

Figure 4 shows the calculations made in the Potential Columbus Benefits Section. There were 261 work days in 2019.

Figure 5:

CO2 Emissions Savings Calculation:

(291,520,161 gallons/year x 19.60 pounds of CO2/gallon) / 2000 pounds/US ton =

2,856,897.58 US tons of CO2/year

After 20% reduction in commuting days

(193,006,451 gallons/year x 19.60 pounds of CO2/gallon) / 2000 pounds/US ton =

1,891,463 US tons of CO2/year

2,856,897.58 - 1,891,463 = 965,434 US tons of CO2/year saved

19.60 pounds of CO2 per gallon of gasoline is the US EPA standard.

Figure 5 shows the calculations made in the Potential Columbus Benefits Section. 19.60 pounds of CO2 per gallon of gas is the US EPA standard.