Project Report

Group 2

October 11, 2021

Introduction

This report aims to explore the demographic features of businesses and business owners in the United States. Our group worked to answer and explain the following questions based on the data used:

- Does the number of employees increase the longer the company exists?
- What are the sizes of companies across the country
- Is a college degree required to start/own a business?
- What is the most common age of business owners?
- How many businesses are female-owned for each level of revenue?
- What percentage of businesses are owned by non-US citizens and those born outside of the United States?
- In which states do employees in black-owned companies earn the most? How does their pay compare to workers in those states overall?
- In which states do employees in veteran-owned companies earn the most? How does their pay compare to workers in those states overall?
- Which business types do employees in black-owned companies earn the most? How does their pay compare to workers in those industries overall? What about veteran-owned companies?
- What number of businesses do not use certain technologies?
- What number of businesses have certain issues producing cloud based technology?

Data Source

This project makes use of the United States Census Bureau's Annual Business Survey (ABS) APIs (2021). The link that includes all four APIs can be found at the end of the report in the References section.

Analysis

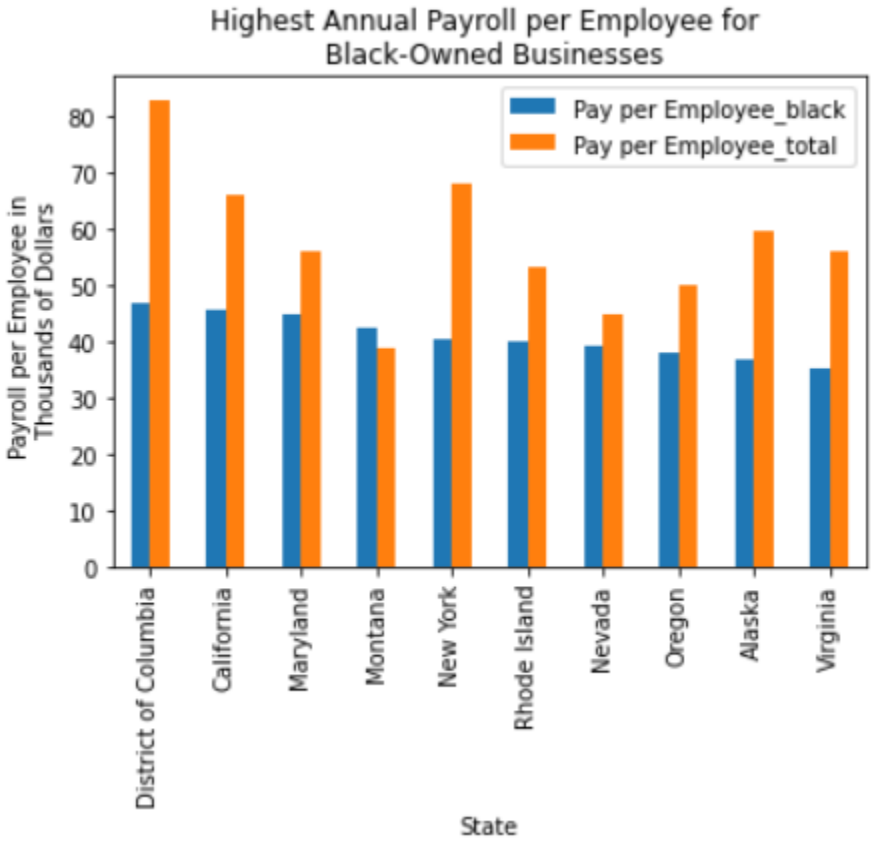
In order to answer the questions proposed, the group utilized Python to extract and transform the APIs to be analysed. After initial exploration, adjustments to the ETL process were made after

receiving feedback, and our final ETL Report, published as a Jupyter Notebook file, can be found in the GitHub repository.

Results and Discussion

Douglas

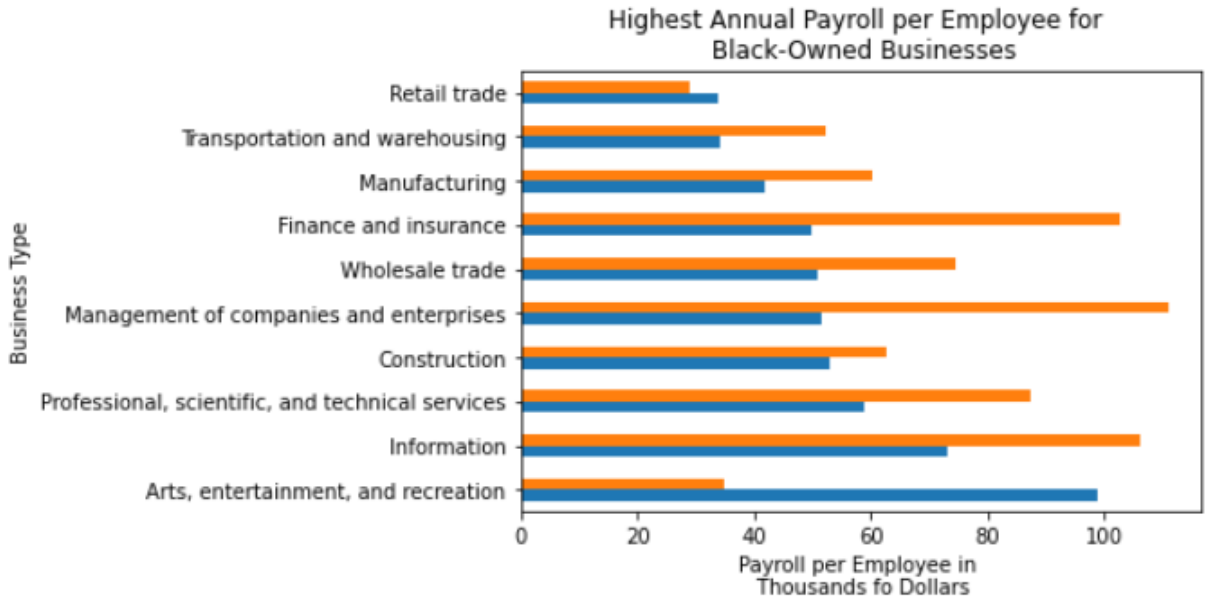
Douglas chose to examine payroll allocation per employee for black-owned and veteran-owned businesses, and see how that compared to payroll allocation per employee of businesses overall. The first bar chart displays the top 10 states in payroll per employee, in thousands of dollars, for



black-owned businesses side by side with the payroll per employee for all businesses.

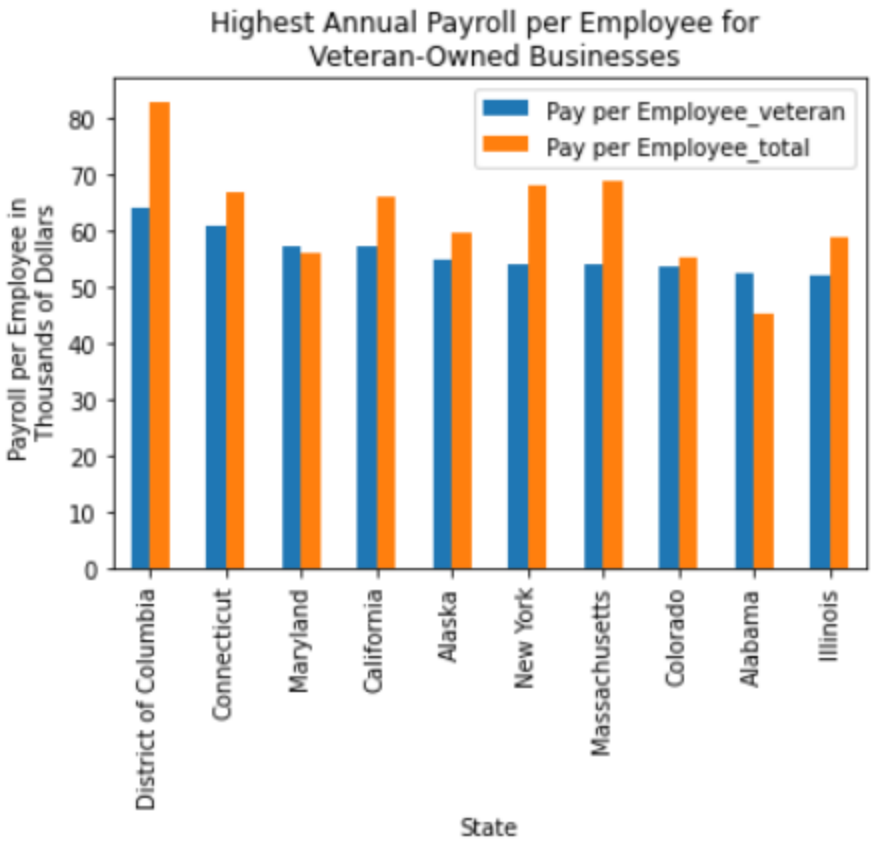
For the most part, the disparity between pay per employee in black-owned companies and all companies is quite large, even in the states, or D.C., in which the pay per employee is the highest. Montana clearly stands out as the only state in the top 10 of pay per employee in black-owned companies where the overall pay per employee is less than that of black-owned businesses. Interestingly enough, Montana is also a considerably more rural state than the surrounding states of California, Maryland, and New York. However, we also see Alaska, a fairly rural state in its own right, with a quite large gap between the two categories.

The next graph looks at the same relationship of payroll allocation per employee for both black-owned businesses and overall, but this time with respect to what type of business category the company is classified within.

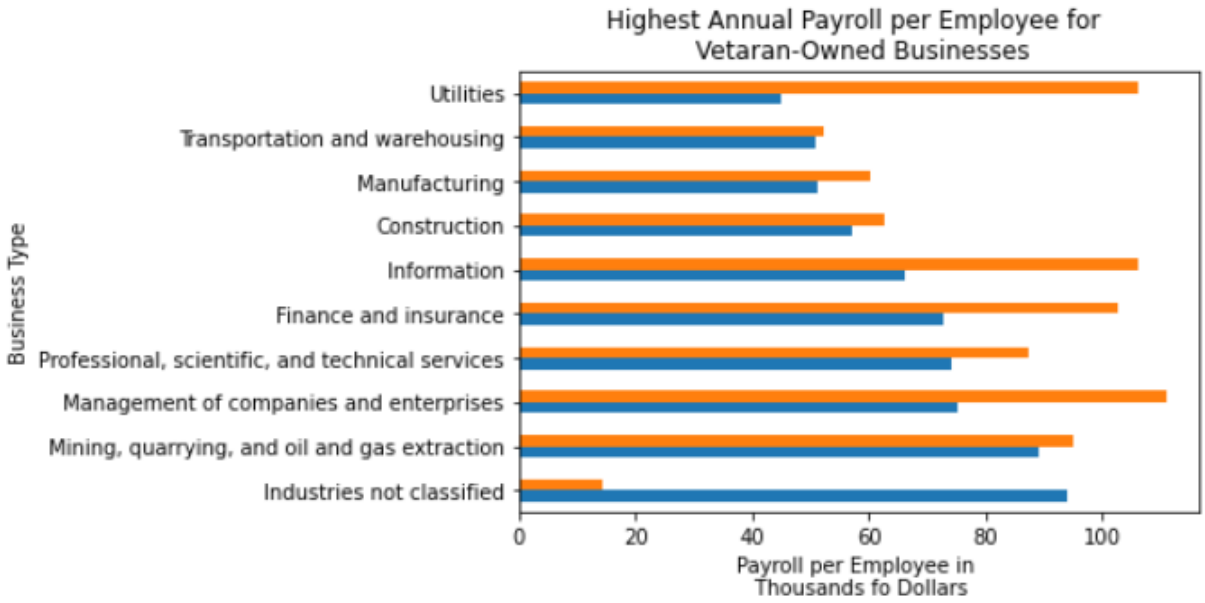


Arts, entertainment, and recreation stands out as not only the industry with the highest average payroll per employee for black-owned businesses, but also the second lowest overall average payroll of the industries displayed, which leads to the largest positive gap of any business category between black-owned businesses and the overall demographic. Inversely, there are incredibly large gaps in favor of the overall totals in both management and finance/insurance, which, being traditionally dominated by white individuals, is both unsurprising, but also encouraging to see that those business categories still fall within the top 10 for black-owned businesses.

The next two charts will follow the same pattern as the two previous ones, but instead of examining black-owned businesses, this next section will explore veteran-owned businesses.



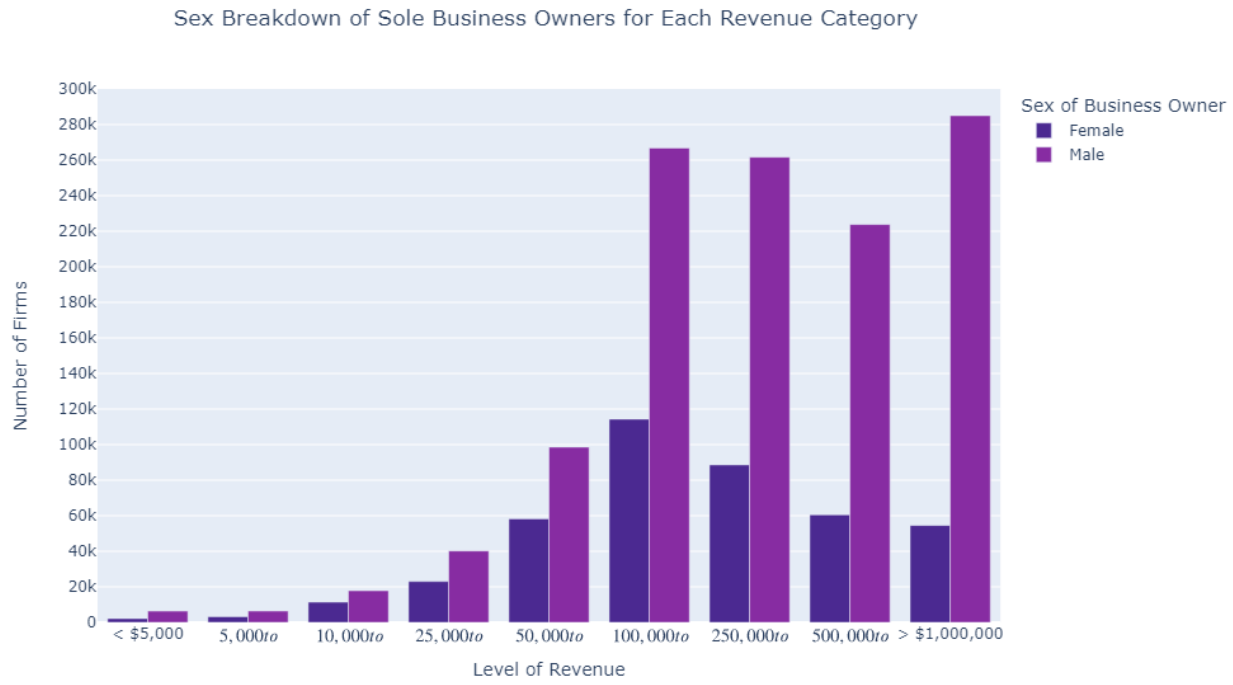
Five of the top ten states for payroll allocation per employee for veteran-owned businesses (D.C., Maryland, California, Alaska, and New York) are also present in the top ten for average pay per employee for black-owned businesses. This could easily be a coincidence, but this could also have a connection to these states having higher average pay overall or being states with multiple large businesses present (California, New York). Also, more rural states find their way into the top ten of this list, with Colorado and Alabama joining Alaska in the top ten. There are also more instances of states where average pay in veteran-owned businesses is higher than the average pay overall (Maryland, Alabama).



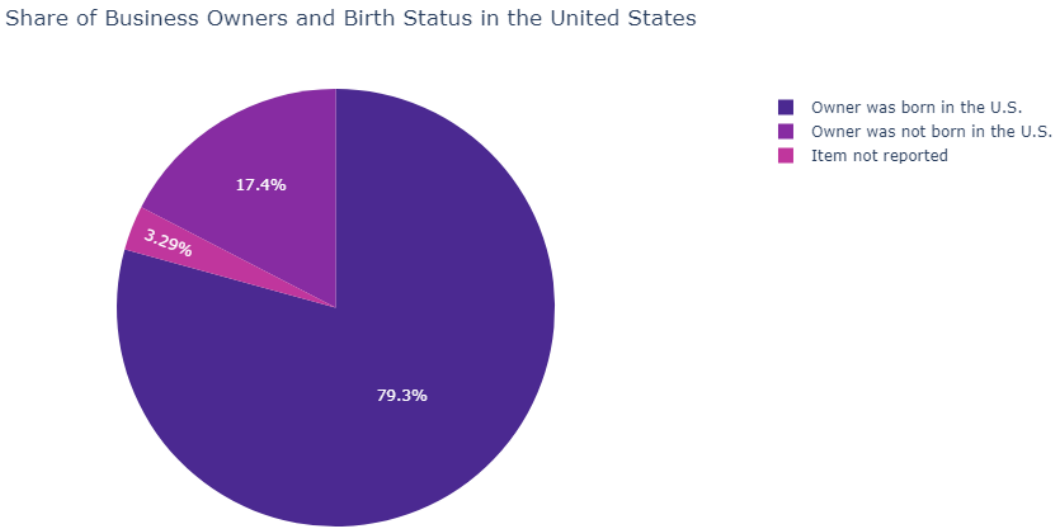
Unfortunately, for the sake of analysis, the business category with both the highest average annual pay per employee for veteran-owned businesses and the category with the largest difference between the total and veteran-owned businesses is the 'Industries not classified' industry. This could be a result of these unclassified businesses being smaller companies with either a very skewed or very concentrated average payroll allocation per employee. Potentially, the high value for veteran-owned businesses combined with the large disparity between the two groups in the unclassified category could be a byproduct of niche companies with veterans as a target audience being more profitable for veteran owned companies. We also see more labor-based industries being very prevalent, with mining, quarrying, and oil/gas extraction being the highest earning category that isn't unclassified, and construction, manufacturing, and warehousing all also within the top ten. These labor-based jobs also show the smallest difference in pay per employee between veteran-owned businesses and the overall demographic.

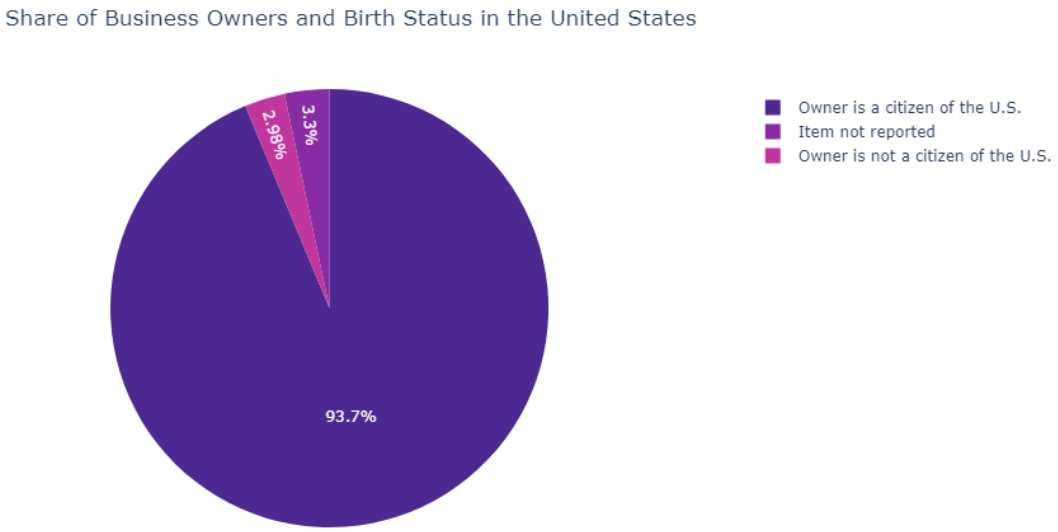
Nicole

Nicole explored how sole female-ownership varies by revenue. The bar chart below demonstrates the breakdown of sole business owners for each level of revenue by sex. The results show that the number of male business owners is higher than female business owners for every revenue level. Female ownership takes on a more normal distribution than male ownership, with the number of firms owned by males exhibiting a negatively-skewed (left) distribution. This suggests that females generally own businesses that make less revenue than males, though the question as to whether this coincides with the gender wage gap should be further explored in future research.



Nicole also examined the share of business ownership by birth and citizenship status in the United States. Based on the results below, business ownership in the United States is largely dominated by those born in the country as well as U.S. citizens, which is to be expected as the country provides low barriers to entry in business ownership. However, there appears to be a notable share of business owners born outside of the United States compared to business owners who are simply not U.S. citizens, which suggests that immigration provides a significant contribution to the country's economy.

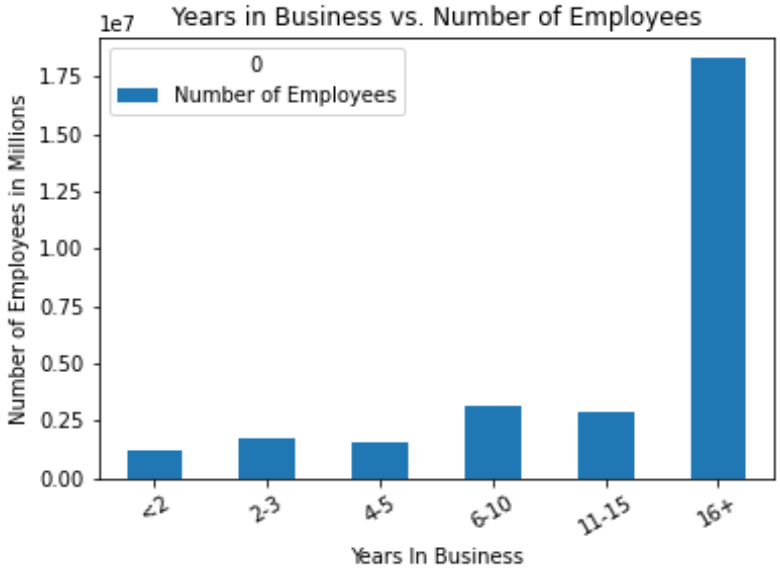




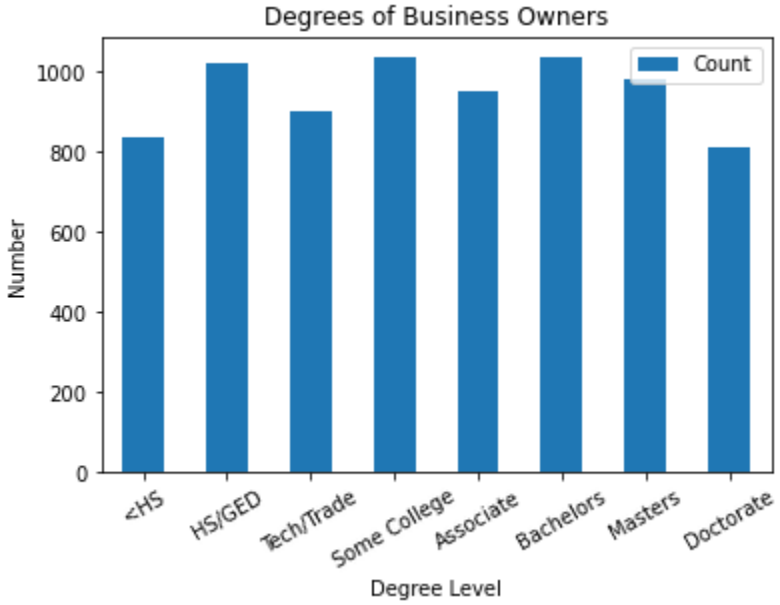
Chris

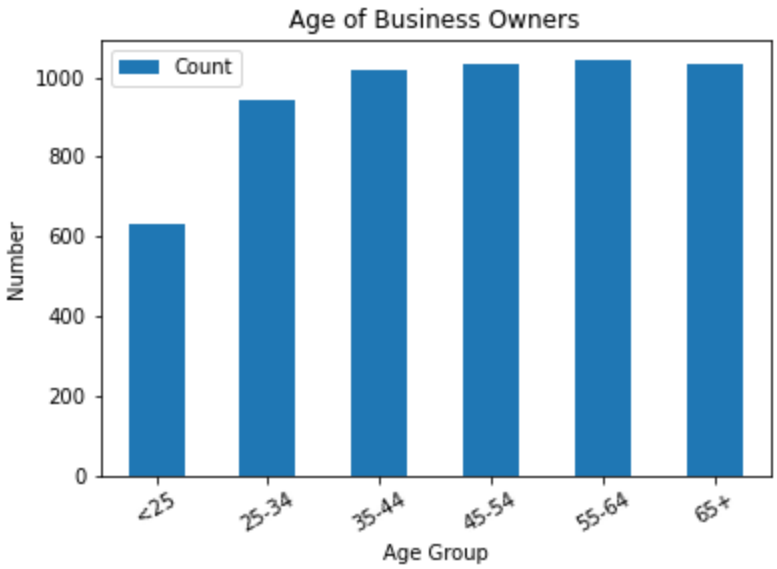
Chris chose to look into if a company's number of employees increases with the company's age, and a look at business owner's statistics such as their highest education level obtained when opening or owning a business and the current age of business owners. The first graph below shows all of the company's average number of employees based on how long the company has existed. Here we can see a gradual increase as the company ages. One thing to note is the obvious "16+" years column. This column includes companies with 30, 50, and even 100 year old companies that could've amassed a huge employee count which brings this column up so

high. If the study was broken down further into “16-20”, “21-25”, “26-30”, etc. onward to “95-100” then it is likely we would see a steadily increasing graph.



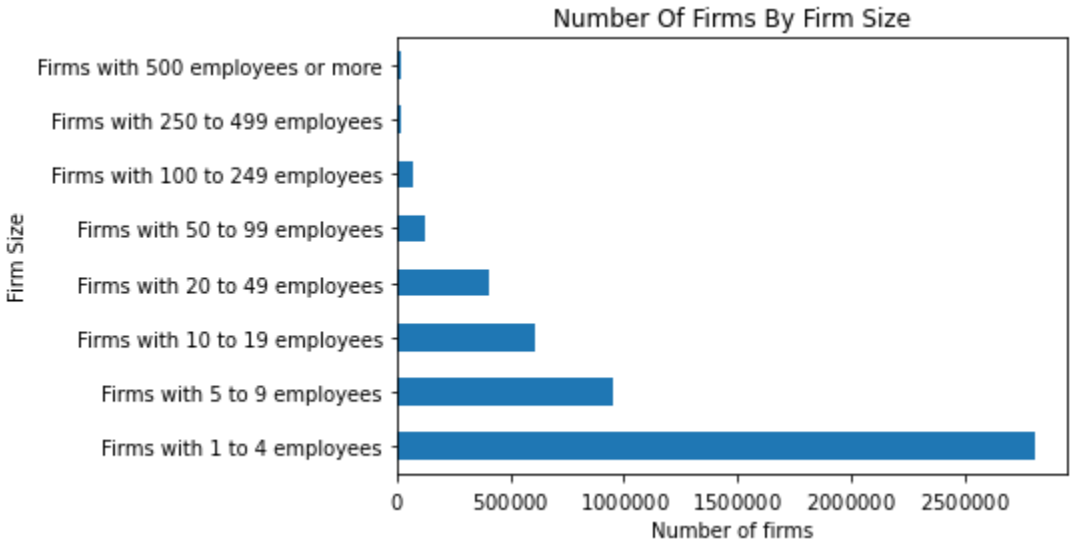
These next two graphs look at information pertaining to the business owners. The first is about their highest education degree achieved and we want to know if a college degree is required to start and own a business. Looking at the graph, we notice that all education levels ranging from high school dropout all the way to doctorate degree all have values ranging from 800 to 1,000. This suggests that a college degree is not required in order to start or own a business. The second graph counts the age of business owners as of December 31st of 2018 by age group. Here, we can see that most of the values are similar after “35-44.” We can infer that most businesses are started when the owner is in their 30’s.





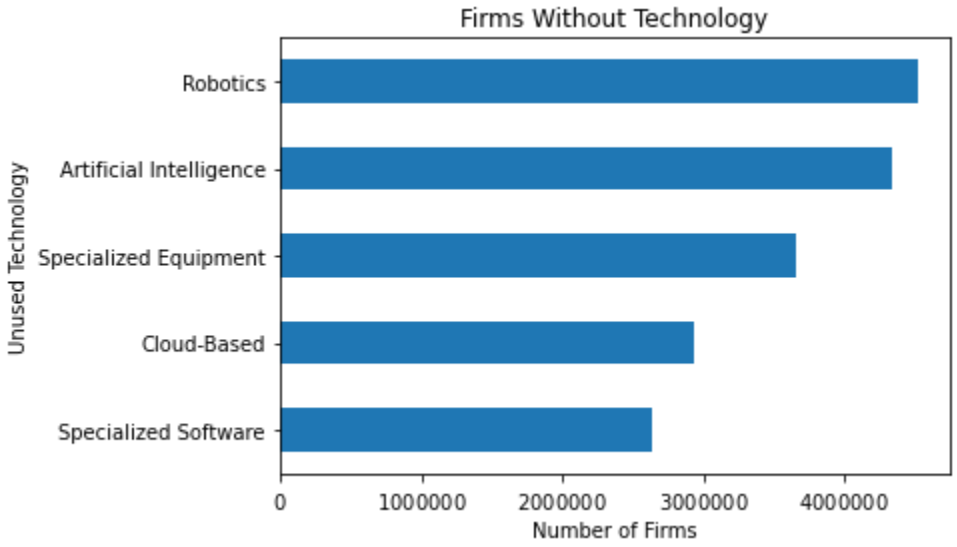
Dan

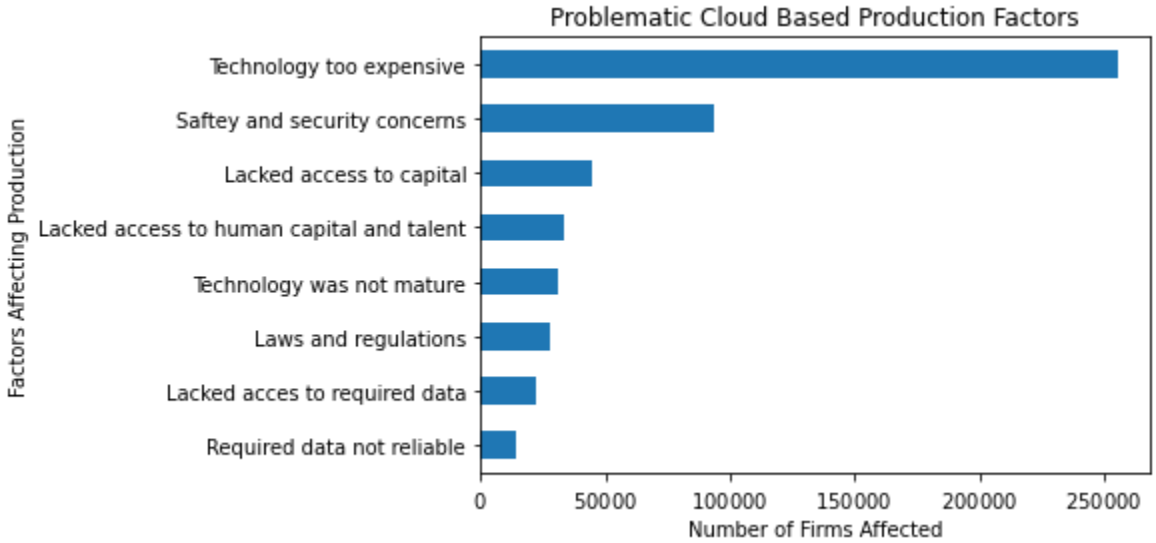
Dan decided to look into firms and their technology usage and factors that affect technology production. To start Dan looked at the overall sizes of firms across the country to get a base for what kinds of businesses are currently operating within the country.



Based on the graph above it was clear that smaller firms dominated the firm size demographic in the country. Taking in this information Dan wanted to see how the use of technology was different across firms in the country. Looking specifically at firms that did not use certain technologies Dan discovered that Robotics and AI were two most unused technologies across all companies. Understanding the use of AI and robotics was uncommon for the average business, a

deeper look into cloud-based technologies was taken as cloud technologies can be useful for any business. Looking specifically into the factors why cloud based technologies were being unused it was discovered that the leading factor was the cost of the technology. Many firms simply did not have the capital to implement and continuously use cloud based technologies. Along with cost, the concerns of security were the second most common factor for not using the technology. Many firms are not comfortable using cloud-based technology due to its perceived lack of security for the data being put into it.





Conclusion

This report dove into all four datasets from the Annual Business Survey (ABS): Company Summary, Characteristics of Business, Characteristics of Business Owners, and Technology

Characteristics of Business, and answered a variety of questions about each of them. Though the information and visualizations were insightful, the data wasn't always 100% accurate due to many fields in the dataset remaining blank because the company did not disclose certain information since the survey is voluntary. It is also important to keep in mind the scope of the survey itself. Certain business categories, such as crop and animal production and private postal services, were excluded from the sample space. The survey was also limited to businesses with at least $1,000 in reported receipts/sales during the previous year. Accompany the somewhat limited scope of the survey with the potential nonresponse errors and the potential sampling error built into the tabulation of the numeric values within the dataset, and there are definitely limitations to the ability to extrapolate the results of our study out to all businesses and firms in the United States. Nonetheless, we can still begin to form preliminary conclusions and analyses from our data and our results to continue to search for answers to the question we have already posed here, as well as continue to find new questions to answer based on the results we reach.

References

United States Census Bureau. (2021). *Annual Business Survey (ABS) APIs* [API]. Retrieved from https://www.census.gov/data/developers/data-sets/abs.2019.html.