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Dev10 Module 8 Pandas Final Project Report

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**Factors Impacting Adaptations of New Technology**

Introduction: Over the better part of the last 50 years, computer processing power has grown exponentially. Along with this have come myriad innovations in the uses of advanced technology to enhance scientific and business endeavors. With such rapid technological advancement, businesses are asked to constantly adapt to these advances to maintain and potentially increase their market share. Businesses investing in the right technology at the right time could mean the difference between steady growth for years and bankruptcy. Accurate and comprehensive data on how businesses are making these decisions is crucial to predict the next technology trend in each industry. By analyzing data on several different general technology groups, some key trends in this area can be identified.

Datasets: The Annual Business Survey is a yearly survey done by the United States (US) Census Bureau. All responding firms answer questions about their industry, size, employees, owners, annual payroll and market share. The specific table relevant to this project is titled Technology Characteristics of Businesses (US Census Bureau). This table has all the prior mentioned information aggregated over each group. Additionally, this table contains responses about different technologies and the different reasons businesses have for not adapting each technology. The five general categories are Artificial Intelligence, Cloud Based Technology, Specialized Software, Robotics and Specialized Equipment. The firms could respond that no factors had prevented them from adapting the technology, or that the technology was not applicable to their industry. But outside of these responses, they were presented with eight possible factors that prevented them from adapting each technology. The factors were, “Technology was too expensive”, “Technology was not mature”, “Lacked access to required data”, “Required data not reliable”, “Lacked access to required human capital and talent”, “Laws and regulations”, “Concerns regarding safety and security (physical or cyber)” and “Lacked access to capital.” The firms were able to answer as many factors as applicable.

Limitations: This data set is quite general. The values are aggregated because the original data set is much too large to manipulate as is. Because of this, there is only so much analysis that can be done before more data is needed. Additionally, businesses can answer as many factors as they want, so the percentage fields do not add up to 100% which creates some overlap in responses that is difficult to account for. Another limitation, related to the previous, is that the factors listed are not exclusive of each other in terms of the actual cause of the limitation. For example, the reason “Technology was too expensive” happens to be a very common reason. It seems that most businesses checked this, along with at least one other factor. This makes a lot of sense intuitively. Generally, there are no limiting factors if businesses have the money to work around them. So having this as an option made things a little less clear. Some of the other factors overlap with each other as well.

Questions and Hypotheses: Limitations of this dataset aside, some important trends can still be identified. The first question to answer is quite general. What are the most common limiting factors for each technology? Tangential to this, what are the annual payrolls and market shares of companies for companies that responded to each technology? After analyzing these figures, the group decided to drill down to some more specific industry comparisons. The group chose to compare the financial sector to the healthcare sector across the three most relevant technologies in these fields. Do the limiting factors for adapting new technologies look different for these very different sectors? As previously mentioned, the technology being too expensive was a very common response. How does the frequency of this response compare to all other responses? Does this comparison vary by industry? After more examination the group noticed that by far the most prevalent response was that there were security concerns associated with the adaptation of Cloud Based Technology. Is this trend common across all industries, or are there specific industries that are high outliers with regards to security concerns?

**Citations**

US Census Bureau. (2021, October 19). *Annual Business Survey: Technology Characteristics of Businesses* (Version 2019) [Table of firms responses to questions about new technology.]. US Census Bureau. https://www.census.gov/programs-surveys/abs/technical-documentation/api.2019.html