Factors Influencing Cybersecurity Risk Among Minority-Owned Small Businesses

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Abstract

Small businesses are increasingly becoming targets of cyberattacks. Minority-owned small businesses may face additional challenges when it comes to cybersecurity, due to factors such as limited resources and lack of awareness. Therefore, it is important to understand the specific factors that influence cybersecurity risk among minority-owned small businesses in order to develop effective strategies to protect them from cyber threats. This study aimed to identify the factors influencing cybersecurity risk among minority-owned small businesses. The variables examined were lack of resources, lack of awareness, use of outdated technology, limited training, and targeted attacks. A multiple regression analysis was conducted with a sample size of 252 minority-owned small businesses. The results showed that all of the variables were statistically significant in predicting cybersecurity risk. Lack of resources, lack of awareness, and use of outdated technology were found to be significant predictors of cybersecurity risk. Limited training and targeted attacks were also significant predictors. These findings suggest that minority-owned small businesses are vulnerable to cybersecurity risks due to a combination of factors, including limited resources, lack of awareness, outdated technology, and inadequate training. It is important for small business owners to prioritize cybersecurity and invest in the necessary resources and training to protect their businesses from cyber threats.

Introduction

Minority-owned small businesses play a crucial role in the American economy. According to the U.S. Census Bureau, there were 8 million minority-owned businesses in the United States in 2018, generating over $1.4 trillion in revenue. These businesses not only provide employment opportunities for their communities, but they also bring innovation and diversity to the marketplace. However, despite their contributions, minority-owned small businesses often face unique challenges, including limited access to capital, discriminatory lending practices, and lack of access to resources and networks.

One of the biggest challenges facing minority-owned small businesses is limited access to capital. According to a report by the National Community Reinvestment Coalition, minority-owned small businesses are three times more likely to be denied loans than non-minority-owned small businesses. This disparity can be attributed to a variety of factors, including racial bias in lending practices, lack of collateral, and lower credit scores. Without access to capital, minority-owned small businesses may struggle to grow and compete in the marketplace.

Discriminatory lending practices are another challenge that minority-owned small businesses face. Many minority-owned small businesses operate in communities that are traditionally underserved by banks and other financial institutions. This can lead to higher interest rates, shorter loan terms, and more stringent lending criteria. Additionally, minority-owned small businesses are often subject

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to redlining, a practice in which financial institutions refuse to lend to businesses located in certain neighborhoods based on race or ethnicity.

Despite these challenges, there are many resources available to help minority-owned small businesses succeed. Federal, state, and local governments offer a variety of grants, loans, and tax incentives to help minority-owned small businesses access the capital they need to grow. In addition, there are many nonprofit organizations and community groups that provide resources and networking opportunities to help minority-owned small businesses thrive. By supporting minority-owned small businesses, we can help build a more diverse, equitable, and inclusive economy.

In addition to the economic benefits of supporting minority-owned small businesses, there are also important social and cultural benefits. Minority-owned small businesses often reflect the unique perspectives and experiences of their owners, bringing a wealth of diversity to the marketplace. These businesses also serve as important anchors in their communities, providing goods and services that are tailored to the specific needs and interests of local residents. By supporting minority-owned small businesses, we can help to create a more vibrant and inclusive community.

Furthermore, minority-owned small businesses can serve as important role models and sources of inspiration for future generations. By seeing successful business owners who share their racial or ethnic background, young people can be encouraged to pursue entrepreneurship and become leaders in their own communities. This can help to break down the systemic barriers that have traditionally limited opportunities for minority groups and create a more diverse and inclusive society.

LGBTQ-owned small businesses are an important and growing segment of the American economy. According to a report by the National LGBT Chamber of Commerce, there are an estimated 1.4 million LGBTQ-owned businesses in the United States, generating over $1.7 trillion in economic impact. These businesses contribute to their communities by creating jobs, providing goods and services, and promoting diversity and inclusion in the marketplace. However, LGBTQ-owned small businesses still face unique challenges, including discrimination, limited access to capital, and lack of access to resources and networks.

One of the most significant challenges facing LGBTQ-owned small businesses is discrimination. LGBTQ-owned businesses may face discrimination from potential customers, vendors, and even lenders, which can limit their growth and success. Discrimination can take many forms, from outright harassment and exclusion to more subtle forms of bias, such as microaggressions and implicit bias. These barriers can prevent LGBTQ-owned small businesses from fully participating in the marketplace, and can even threaten their very existence.

Another challenge facing LGBTQ-owned small businesses is limited access to capital. According to the National LGBT Chamber of Commerce, LGBTQ-owned small businesses are less likely to receive loans and investment capital than non-LGBTQ-owned businesses. This disparity can be attributed to a variety of factors, including bias in lending practices, lack of collateral, and lower credit scores. Without access to capital, LGBTQ-owned small businesses may struggle to grow and compete in the marketplace.

Despite these challenges, there are many resources available to help LGBTQ-owned small businesses succeed. The National LGBT Chamber of Commerce provides certification and networking opportunities for LGBTQ-owned businesses, as well as access to capital and resources. Additionally, there are many nonprofit organizations and community groups that provide resources and support to help LGBTQ-owned small businesses thrive. By supporting LGBTQ-owned small businesses, we can help to promote diversity and inclusion in the marketplace and create a more equitable and inclusive society.

In addition to the economic benefits of supporting LGBTQ-owned small businesses, there are also important social and cultural benefits. LGBTQ-owned businesses can serve as important role models and sources of inspiration for future generations, showing that LGBTQ individuals can succeed and thrive in the business world. These businesses also contribute to the cultural richness of their communities, bringing new perspectives and experiences to the marketplace. By supporting LGBTQ-owned small businesses, we can help to promote acceptance and understanding of LGBTQ individuals and create a more inclusive and welcoming society for all.

Method

This study uses multiple regression analysis. Multiple regression analysis is a statistical method that examines the relationship between a dependent variable and two or more independent variables. It is a popular technique in social sciences, business, and engineering, where researchers are interested in understanding the complex relationship between various variables. The goal of multiple regression analysis is to identify the independent variables that have the strongest relationship with the dependent variable and to estimate the strength of that relationship. The results of this analysis can be used to make predictions, test hypotheses, and inform decision-making. There are several important considerations when conducting multiple regression analysis. One of the most important is the selection of the independent variables. Researchers must carefully choose variables that are relevant to the dependent variable and that are not highly correlated with each other. This helps to ensure that the model is accurate and that the results are interpretable. Another important consideration is the distribution of the data. Multiple regression analysis assumes that the data are normally distributed and that there are no outliers. If these assumptions are not met, the results of the analysis may be inaccurate or misleading. Additionally, researchers must be careful to control for the effects of confounding variables. Confounding variables are variables that may influence the relationship between the independent and dependent variables, but that are not themselves included in the analysis. Finally, researchers must carefully interpret the results of the analysis. They must be aware of the limitations of the model and the potential for spurious correlations. Table 1 presents the list of independent variables. The dependent variable of the regression model is the cyber security risk.

Table 1. Variables

Factors	Impact on Minority-owned Small Businesses
Lack of resources	Limited ability to implement strong cybersecurity measures
Lack of awareness	Insufficient understanding of cybersecurity importance and risks
Use of outdated technology	Increased vulnerability to cyberattacks due to lack of up-to-date security features
Limited training	Higher likelihood of security breaches due to employee mistakes
Targeted attacks	Increased risk of cyberattacks due to perceived weaker security measures

Results

The output in table 2 presents the results of a multiple linear regression model where the dependent variable is CYBER, and the independent variables are AWARENESS, RESOURCES, TARGETED, TECHNOLOGY, TRAINING, and C. The model was estimated using the least squares method with a sample size of 252 observations.

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The table displays the coefficients, standard errors, t-statistics, and probabilities for each of the independent variables. The coefficients represent the estimated effect of each independent variable on the dependent variable, holding all other variables constant.

The t-statistics indicate the size of the estimated coefficients relative to their standard errors. If the t-statistic is large (in absolute value), the corresponding coefficient is significant at a high level of confidence (e.g., 95% or 99%), which is represented by the probability (Prob.) column.

Table 2. Regression results

Dependent Variable: CYBER
Method: Least Squares
Date: 04/21/23   Time: 23:12
Sample: 1 252
Included observations: 252

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AWARENESS	1.165681	0.085013	13.71185	0.0000
RESOURCES	0.993051	0.090939	10.91994	0.0000
TARGETED	0.879953	0.089763	9.803087	0.0000
TECHNOLOGY	1.090586	0.085703	12.72516	0.0000
TRAINING	1.079483	0.087057	12.39974	0.0000
C	0.889192	0.101029	8.801379	0.0000

In this model, all independent variables are significant predictors of the dependent variable, as their probabilities are reported as zero. The coefficient of determination (R-squared) is not shown in this output.
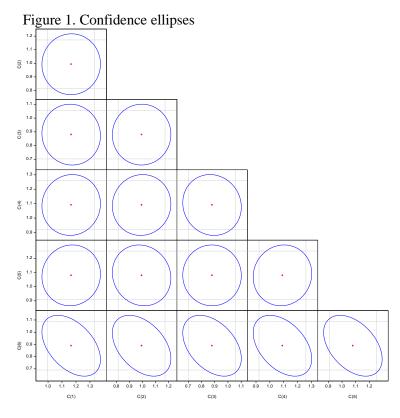
This output presents the results of a multiple linear regression model. The R-squared value of 0.744722 indicates that the model explains approximately 74.47% of the total variation in the dependent variable, CYBER. The adjusted R-squared value of 0.739533 suggests that the model fit is still good, even after adjusting for the number of independent variables included in the model. The mean value of the dependent variable is 3.503511, and its standard deviation is 0.769800. The standard error of regression (S.E.) is 0.392875, which indicates the average distance that the observed values deviate from the fitted regression line.
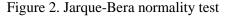
Table 3. Residuals analysis

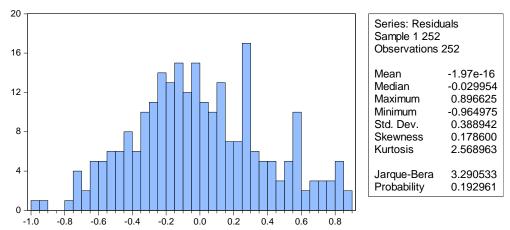| R-squared	0.744722	Mean dependent var	3.503511
Adjusted R-squared	0.739533	S.D. dependent var	0.769800
S.E. of regression	0.392875	Akaike info criterion	0.992871
Sum squared resid	37.97028	Schwarz criterion	1.076905
Log likelihood	-119.1017	Hannan-Quinn criter.	1.026684
F-statistic	143.5309	Durbin-Watson stat	1.834688
Prob(F-statistic)	0.000000		

The Akaike information criterion (AIC) and Schwarz criterion (SC) are measures of the quality of the model's fit, with lower values indicating a better fit. The AIC is 0.992871, and the SC is 1.076905. The sum of squared residuals (SSR) is 37.97028, which measures the total amount of

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variability in the dependent variable that is not explained by the model. The log likelihood is -119.1017, which is used to compare models, with higher values indicating a better fit.

Figure 1. Confidence ellipses

The F-statistic of 143.5309 indicates that at least one of the independent variables has a significant effect on the dependent variable. The p-value for the F-statistic (Prob(F-statistic)) is zero, indicating that the overall model is statistically significant. The Durbin-Watson statistic of 1.834688 is used to test for the presence of autocorrelation in the residuals. A value close to 2 suggests that there is no autocorrelation in the residuals, while values significantly different from 2 suggest the presence of autocorrelation.

Figure 2. Jarque-Bera normality test

Series: Residuals	
Sample 1 252	
Observations 252	
Mean	-1.97e-16
Median	-0.029954
Maximum	0.896625
Minimum	-0.964975
Std. Dev.	0.388942
Skewness	0.178600
Kurtosis	2.568963
Jarque-Bera	3.290533
Probability	0.192961

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Conclusion

The results of the multiple regression analysis conducted on a sample size of 252 minority-owned small businesses reveal the significant predictors of cybersecurity risk. The study found that lack of resources, lack of awareness, and the use of outdated technology were all significant predictors of cybersecurity risk. Minority-owned small businesses may face these challenges more acutely, given their often limited access to resources and the technology required for effective cybersecurity measures. Without adequate resources and training, small businesses may be unable to keep up with the rapidly evolving threat landscape and thus more vulnerable to cyberattacks. Therefore, it is crucial for minority-owned small businesses to recognize the importance of investing in cybersecurity measures to safeguard their businesses against cyber threats.

One of the significant predictors of cybersecurity risk is the lack of resources. The findings suggest that limited financial resources may hamper small businesses' ability to implement adequate cybersecurity measures. Small businesses may struggle to allocate resources to secure their systems and data properly, making them more susceptible to cyber threats. Therefore, it is essential for small businesses to prioritize cybersecurity and invest in the necessary resources to protect their businesses from potential cyber attacks.

Another predictor of cybersecurity risk is the lack of awareness. Small businesses may lack the necessary knowledge and awareness to understand the severity and impact of cyber threats. As a result, they may not take the necessary precautions to safeguard their systems and data. Small businesses must invest in employee training and awareness programs to ensure that their staff understands the importance of cybersecurity and the risks associated with cyber threats.

The use of outdated technology is also a significant predictor of cybersecurity risk. Many small businesses may not have the necessary funds to keep their technology up to date, making them more susceptible to cyber attacks. Hackers often exploit vulnerabilities in outdated software and systems to gain access to sensitive data. Therefore, small businesses must ensure that they are using up-to-date technology to mitigate the risk of cyber threats.

Limited training is also a predictor of cybersecurity risk. Small businesses may not provide sufficient training to their employees to help them understand the importance of cybersecurity measures. Lack of training may lead to errors and negligence that could expose the business to cyber threats. Small businesses must provide their employees with adequate training on cybersecurity measures and policies to minimize the risk of cyber threats.

Finally, targeted attacks were found to be a significant predictor of cybersecurity risk. Small businesses that are part of a minority group may be more vulnerable to targeted attacks due to their perceived lack of resources and inadequate security measures. Therefore, it is essential for small businesses to implement targeted security measures and policies to protect their systems and data from targeted attacks. In conclusion, the findings of this multiple regression analysis suggest that small businesses face several challenges that increase their vulnerability to cybersecurity risks. Small businesses must invest in adequate resources, employee training, and up-to-date technology to mitigate the risk of cyber threats.

Small businesses face numerous challenges in today's fast-paced business environment. While they have the advantage of being more agile and adaptable than larger organizations, they also have limited resources and often must operate with a lean staff. Unfortunately, this can make them particularly vulnerable to cyber attacks. Small businesses are often targeted by hackers because they have less robust security measures in place, making them an easier target for cybercriminals. Moreover, small businesses are likely to have fewer resources available to address a breach if one

occurs. Therefore, it is essential for small businesses to prioritize cybersecurity measures and policies to protect themselves from targeted attacks.

One of the most significant challenges for small businesses is to develop an effective cybersecurity policy. This involves identifying potential threats, assessing risks, and implementing measures to mitigate those risks. Small businesses must also consider the impact of cybersecurity on their operations and customer relationships. They need to balance security needs with customer expectations, ensuring that their security measures do not cause inconvenience or frustration for customers. Small businesses must also take into account the regulatory requirements for data protection and privacy, which can be complex and time-consuming to navigate. Another key challenge for small businesses is to educate employees about cybersecurity risks and best practices. This is particularly important because human error is one of the most common causes of data breaches. Small businesses must provide regular training to employees on topics such as phishing scams, password management, and social engineering. They must also develop policies and procedures for responding to security incidents and make sure employees are aware of these procedures. Moreover, small businesses must ensure that their employees follow cybersecurity best practices, such as regularly updating software and implementing multi-factor authentication for access to sensitive information.

Cybersecurity is a critical concern for small businesses, and they must prioritize it to protect their systems and data against potential cyber attacks. Small businesses face unique challenges when it comes to cybersecurity, including limited resources, regulatory requirements, and employee education. However, by recognizing and addressing these challenges, small businesses can develop effective cybersecurity policies and measures that reduce the risk of a breach and protect their business, customers, and reputation. Therefore, it is essential for small businesses to be proactive in implementing cybersecurity measures and policies to safeguard their business against cyber threats.

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