1. Solution

Text

Description automatically generated

Variable shortcuts:

S – Security Breaches

C – Cybersecurity Training Hours

E – Email Encrypted

H – High Value Asset

The omitted variable “high value assets” has a positive effect on Security Breaches. The more attractive of the high value asset is, the more hackers will try to breach the company security.

Then, β3 > 0

Assuming the variable “Cybersecurity Training Hours” has a positive effect on the omitted variable “high value assets”. Because we want to increase our training hours for the employee to protect the high value assets.

Then, δ1 > 0

Omitted Variable Bias 1 – β1  = β3 δ1

1 – β1  > 0

Therefore, the omitted variable bias is away from zero.

1. Solution

Text, letter

Description automatically generated

Variable shortcuts:

S – Security Breaches

C – Cybersecurity Training Hours

E – Email Encrypted

H – High Value Asset

True structural equations:

S = β0 + β1 C + ε1

C = γ0 + γ1 S + ε2

The variable “Cybersecurity Training Hours” has a negative effect on the variable “Security Breaches”. Because the more training the employees take, their ability to stop security breaches will increase, and the number of cases of security breaches will be less.

Then, β1 < 0

The variable “Security Breaches” has a positive effect on the variable “Cybersecurity Training Hours”.Because when the number of cases of security breaches increases, the company will let their employee take more training to prevent security breaches.

Then, γ1 > 0

Therefore, this is negative feedback.

1 < β1

The direction of bias is away from zero.

1. Solution

Diagram

Description automatically generated with medium confidence

The variable “Cybersecurity Training Hours” has a positive effect on the variable “Email Encrypted”. Because after employees take training, they will protect the information by email encryption.

The variable “Email Encrypted” has a negative effect on the variable “Security Breaches”. Because when email is encrypted, there is less chance to leak the information and the number of cases of security breaches will decrease.

Therefore, there is an outcome variable on the right-hand side.

When we remove the outcome variable “Email Encrypted”, the coefficient on Cybersecurity Training Hours will decrease. Because the variable “Email Encrypted” has a negative effect on the variable “Security Breaches”, the coefficient for the variable “Email Encrypted” is negative, after it is removed, its negative effect on the variable “Security Breaches” will be absorbed into the coefficient on Cybersecurity Training Hours. Therefore, the coefficient on Cybersecurity Training Hours will decrease.

1. Solution

The company should invest in cybersecurity training.

From the regression estimate, the coefficient on Cybersecurity Training Hours is 0.052 and the coefficient on Email Encrypted is = -1.23. So the effect of variable “Email Encrypted” on outcome variable “Security Breaches” is greater than 20 times the effect of variable “Cybersecurity Training Hours” on variable “Security Breaches. When the variable “Cybersecurity Training Hours” increases, even if it seems like it will increase the variable “Security Breaches” a little bit, it will simultaneously increase the variable “Email Encrypted”, which will higher decreases the variable “Security Breaches”. Therefore, overall the number of cases of Security Breaches will decrease.