HW15

Question 1) Create a PLS path model using SmartPLS, with the following characteristics:

a).Create a PLS path model using SmartPLS, with the following characteristics:

1. Measurement of constructs by items
2. Trust in website (TRUST): reflective construct with items TRST1-4
3. Perceived security of website (SEC): reflective construct with items PSEC1-4
4. Reputation of website (REP): formative construct with items PREP1-4
5. Investment in website (INV): reflective construct with PINV1-3
6. Perception of policy (POL): reflective construct with items PPSS1-3
7. Familiarity with website (FAML): single-item construct measured by FAML1
8. Interaction between REP and POL (use orthogonalized product terms)
9. Structural paths between constructs (shown as causal models -- note direction of arrows):
10. SEC ← REP + INV + POL + FAML + REP.POL
11. TRUST ← SEC

library(seminr)

##   
## Attaching package: 'seminr'

## The following object is masked from 'package:base':  
##   
## structure

sec = read.csv("security\_data.csv")  
  
# Measurement Model   
sec\_mm <- measure(  
 form("REP",multi\_items("PREP",1:4)),  
 reflect("INV", multi\_items("PINV",1:3)),  
 reflect("POL", multi\_items("PPSS",1:3)),  
 reflect("FAML","FAML1"),  
 reflect("TRUST", multi\_items("TRST", 1:4)),  
 reflect("SEC",multi\_items("PSEC",1:4))  
)  
  
#interaction term  
sec\_intxn <- interact(  
 interaction\_ortho("REP","POL")  
)  
  
#Structural Model  
sec\_sm <- structure(  
 paths(from = c("REP","INV","POL","FAML","REP.POL"), to = "SEC"),  
 paths(from = "SEC", to = "TRUST")  
)  
  
#run PLS  
  
sec\_pls <- estimate\_model(data = sec,  
 measurement\_model = sec\_mm,  
 structural\_model = sec\_sm,  
 interactions = sec\_intxn)

## Generating the plsm model

b). Show us the following results in table of figure formats:

1. Loadings of reflective factors / Weights of formative factors

sec\_pls$outer\_loadings

## REP INV POL FAML REP.POL SEC  
## PREP1 0.5623877 0.0000000 0.0000000 0 0.0000000 0.0000000  
## PREP2 0.8723808 0.0000000 0.0000000 0 0.0000000 0.0000000  
## PREP3 0.9127721 0.0000000 0.0000000 0 0.0000000 0.0000000  
## PREP4 0.7500201 0.0000000 0.0000000 0 0.0000000 0.0000000  
## PINV1 0.0000000 0.9034426 0.0000000 0 0.0000000 0.0000000  
## PINV2 0.0000000 0.9248641 0.0000000 0 0.0000000 0.0000000  
## PINV3 0.0000000 0.8546257 0.0000000 0 0.0000000 0.0000000  
## PPSS1 0.0000000 0.0000000 0.8678161 0 0.0000000 0.0000000  
## PPSS2 0.0000000 0.0000000 0.8931576 0 0.0000000 0.0000000  
## PPSS3 0.0000000 0.0000000 0.9110954 0 0.0000000 0.0000000  
## FAML1 0.0000000 0.0000000 0.0000000 1 0.0000000 0.0000000  
## TRST1 0.0000000 0.0000000 0.0000000 0 0.0000000 0.0000000  
## TRST2 0.0000000 0.0000000 0.0000000 0 0.0000000 0.0000000  
## TRST3 0.0000000 0.0000000 0.0000000 0 0.0000000 0.0000000  
## TRST4 0.0000000 0.0000000 0.0000000 0 0.0000000 0.0000000  
## PSEC1 0.0000000 0.0000000 0.0000000 0 0.0000000 0.8106163  
## PSEC2 0.0000000 0.0000000 0.0000000 0 0.0000000 0.8652285  
## PSEC3 0.0000000 0.0000000 0.0000000 0 0.0000000 0.8680697  
## PSEC4 0.0000000 0.0000000 0.0000000 0 0.0000000 0.8094425  
## PREP1.PPSS1 0.0000000 0.0000000 0.0000000 0 0.5836738 0.0000000  
## PREP1.PPSS2 0.0000000 0.0000000 0.0000000 0 0.5125196 0.0000000  
## PREP1.PPSS3 0.0000000 0.0000000 0.0000000 0 0.5088870 0.0000000  
## PREP2.PPSS1 0.0000000 0.0000000 0.0000000 0 0.5134612 0.0000000  
## PREP2.PPSS2 0.0000000 0.0000000 0.0000000 0 0.4244352 0.0000000  
## PREP2.PPSS3 0.0000000 0.0000000 0.0000000 0 0.3398300 0.0000000  
## PREP3.PPSS1 0.0000000 0.0000000 0.0000000 0 0.2395725 0.0000000  
## PREP3.PPSS2 0.0000000 0.0000000 0.0000000 0 0.5576592 0.0000000  
## PREP3.PPSS3 0.0000000 0.0000000 0.0000000 0 0.4690182 0.0000000  
## PREP4.PPSS1 0.0000000 0.0000000 0.0000000 0 0.9011031 0.0000000  
## PREP4.PPSS2 0.0000000 0.0000000 0.0000000 0 0.8363827 0.0000000  
## PREP4.PPSS3 0.0000000 0.0000000 0.0000000 0 0.8599362 0.0000000  
## TRUST  
## PREP1 0.0000000  
## PREP2 0.0000000  
## PREP3 0.0000000  
## PREP4 0.0000000  
## PINV1 0.0000000  
## PINV2 0.0000000  
## PINV3 0.0000000  
## PPSS1 0.0000000  
## PPSS2 0.0000000  
## PPSS3 0.0000000  
## FAML1 0.0000000  
## TRST1 0.8997565  
## TRST2 0.9092024  
## TRST3 0.9045716  
## TRST4 0.8381919  
## PSEC1 0.0000000  
## PSEC2 0.0000000  
## PSEC3 0.0000000  
## PSEC4 0.0000000  
## PREP1.PPSS1 0.0000000  
## PREP1.PPSS2 0.0000000  
## PREP1.PPSS3 0.0000000  
## PREP2.PPSS1 0.0000000  
## PREP2.PPSS2 0.0000000  
## PREP2.PPSS3 0.0000000  
## PREP3.PPSS1 0.0000000  
## PREP3.PPSS2 0.0000000  
## PREP3.PPSS3 0.0000000  
## PREP4.PPSS1 0.0000000  
## PREP4.PPSS2 0.0000000  
## PREP4.PPSS3 0.0000000

sec\_pls$outer\_weights

## REP INV POL FAML REP.POL SEC  
## PREP1 -0.2434963 0.0000000 0.0000000 0 0.00000000 0.0000000  
## PREP2 0.4418170 0.0000000 0.0000000 0 0.00000000 0.0000000  
## PREP3 0.5144356 0.0000000 0.0000000 0 0.00000000 0.0000000  
## PREP4 0.3759155 0.0000000 0.0000000 0 0.00000000 0.0000000  
## PINV1 0.0000000 0.3633141 0.0000000 0 0.00000000 0.0000000  
## PINV2 0.0000000 0.3949797 0.0000000 0 0.00000000 0.0000000  
## PINV3 0.0000000 0.3585944 0.0000000 0 0.00000000 0.0000000  
## PPSS1 0.0000000 0.0000000 0.3604446 0 0.00000000 0.0000000  
## PPSS2 0.0000000 0.0000000 0.3947092 0 0.00000000 0.0000000  
## PPSS3 0.0000000 0.0000000 0.3673192 0 0.00000000 0.0000000  
## FAML1 0.0000000 0.0000000 0.0000000 1 0.00000000 0.0000000  
## TRST1 0.0000000 0.0000000 0.0000000 0 0.00000000 0.0000000  
## TRST2 0.0000000 0.0000000 0.0000000 0 0.00000000 0.0000000  
## TRST3 0.0000000 0.0000000 0.0000000 0 0.00000000 0.0000000  
## TRST4 0.0000000 0.0000000 0.0000000 0 0.00000000 0.0000000  
## PSEC1 0.0000000 0.0000000 0.0000000 0 0.00000000 0.2708136  
## PSEC2 0.0000000 0.0000000 0.0000000 0 0.00000000 0.3163641  
## PSEC3 0.0000000 0.0000000 0.0000000 0 0.00000000 0.3064275  
## PSEC4 0.0000000 0.0000000 0.0000000 0 0.00000000 0.2974225  
## PREP1.PPSS1 0.0000000 0.0000000 0.0000000 0 0.23907580 0.0000000  
## PREP1.PPSS2 0.0000000 0.0000000 0.0000000 0 0.03097791 0.0000000  
## PREP1.PPSS3 0.0000000 0.0000000 0.0000000 0 0.02135493 0.0000000  
## PREP2.PPSS1 0.0000000 0.0000000 0.0000000 0 0.04728616 0.0000000  
## PREP2.PPSS2 0.0000000 0.0000000 0.0000000 0 -0.10299005 0.0000000  
## PREP2.PPSS3 0.0000000 0.0000000 0.0000000 0 -0.22637248 0.0000000  
## PREP3.PPSS1 0.0000000 0.0000000 0.0000000 0 -0.33874387 0.0000000  
## PREP3.PPSS2 0.0000000 0.0000000 0.0000000 0 0.09519373 0.0000000  
## PREP3.PPSS3 0.0000000 0.0000000 0.0000000 0 0.10857661 0.0000000  
## PREP4.PPSS1 0.0000000 0.0000000 0.0000000 0 0.44220480 0.0000000  
## PREP4.PPSS2 0.0000000 0.0000000 0.0000000 0 0.38056606 0.0000000  
## PREP4.PPSS3 0.0000000 0.0000000 0.0000000 0 0.27087812 0.0000000  
## TRUST  
## PREP1 0.0000000  
## PREP2 0.0000000  
## PREP3 0.0000000  
## PREP4 0.0000000  
## PINV1 0.0000000  
## PINV2 0.0000000  
## PINV3 0.0000000  
## PPSS1 0.0000000  
## PPSS2 0.0000000  
## PPSS3 0.0000000  
## FAML1 0.0000000  
## TRST1 0.2820685  
## TRST2 0.2803331  
## TRST3 0.2856284  
## TRST4 0.2779270  
## PSEC1 0.0000000  
## PSEC2 0.0000000  
## PSEC3 0.0000000  
## PSEC4 0.0000000  
## PREP1.PPSS1 0.0000000  
## PREP1.PPSS2 0.0000000  
## PREP1.PPSS3 0.0000000  
## PREP2.PPSS1 0.0000000  
## PREP2.PPSS2 0.0000000  
## PREP2.PPSS3 0.0000000  
## PREP3.PPSS1 0.0000000  
## PREP3.PPSS2 0.0000000  
## PREP3.PPSS3 0.0000000  
## PREP4.PPSS1 0.0000000  
## PREP4.PPSS2 0.0000000  
## PREP4.PPSS3 0.0000000

1. Regression coefficients of paths between factors

print\_paths(sec\_pls)

## SEC TRUST  
## R^2 0.44 0.37  
## REP 0.30 .  
## INV 0.17 .  
## POL 0.32 .  
## FAML 0.01 .  
## REP.POL -0.11 .  
## SEC . 0.61

1. Bootstrapped path coefficients: t-values, p-values (are any paths not significant at p=5% ?)

boot\_pls <- bootstrap\_model(data = sec,  
 measurement\_model = sec\_mm,  
 structural\_model = sec\_sm,  
 interactions = sec\_intxn,  
 nboot = 1000)

## Bootstrapping model using simplePLS...

print\_paths(boot\_pls)

## SEC PLS Est. SEC Boot Mean SEC Boot SE t value Pr(>|t|)  
## REP 0.30 0.31 0.06 5.48 0.00  
## INV 0.17 0.17 0.05 3.06 0.00  
## POL 0.32 0.32 0.05 5.95 0.00  
## FAML 0.01 0.01 0.05 0.18 0.86  
## REP.POL -0.11 -0.04 0.27 -0.13 0.90  
## SEC 0.00 0.00 0.00 0.00 0.00  
## TRUST PLS Est. TRUST Boot Mean TRUST Boot SE t value Pr(>|t|)  
## REP 0.00 0.00 0.00 0.00 0  
## INV 0.00 0.00 0.00 0.00 0  
## POL 0.00 0.00 0.00 0.00 0  
## FAML 0.00 0.00 0.00 0.00 0  
## REP.POL 0.00 0.00 0.00 0.00 0  
## SEC 0.61 0.61 0.04 16.82 0

From the above table, we can find out that FAML and REP.POL are insignificant paths.