People Analytics Project on

Factors affecting

Employees Performance

- By Palak Patel

Agenda

1. Research Question-Hypothesis
2. How Remote Work became the Norm (+ Statistical Background from Published Data)
3. The Group Survey
4. Data Exploration
5. Factor Analysis
6. Regression Analysis
7. Chi Square Analysis
8. One Way Anova Analysis
9. Conclusion
10. References

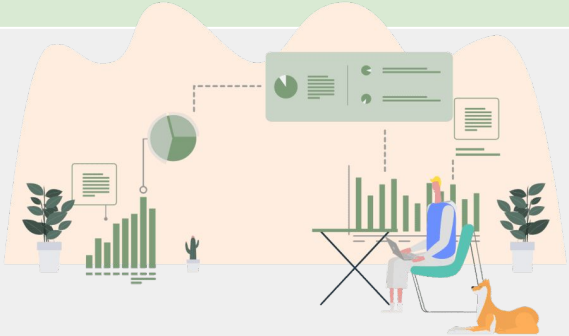
Introduction

Research Statement

Employee performance can be impacted by various factors. One of the factors that has been playing an important role since COVID is the opportunity to work remotely. Remote or In-person **work performance** may or may not depend on personal factors.

Null Hypothesis (HO)

Employees personal factors do not affect employees on-site performance and remote performance



Alternate Hypothesis (HA)

Employees personal factors do affect employees on-site performance and remote performance

How Remote Work Became the Norm

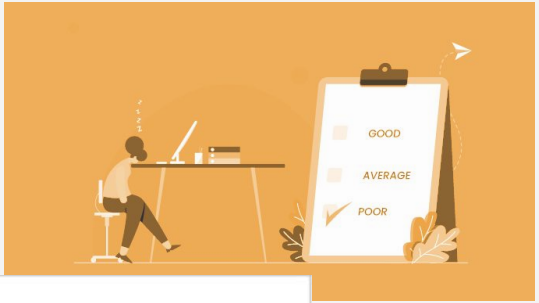
- Prior to COVID-19, remote work was approx 15% of the workforce
- Since then, the workforce has slowly come back to optional In-Person, Remote or Hybrid work environments
- Most employees (88%) agree that the **flexibility** to work from home or the office has increased their job satisfaction. (Robinson, Forbes, 2022)

- Studies have shown, While men and women who work remotely agree that they are more productive—and tend to work more hours—women reported being more productive than men (40 percent and 35 percent, respectively).
- Are men and women sharing the burden of work and home responsibilities or is there still an unequal distribution with remote and in-person, that may affect their work performance?

The Survey Group Data

	Name	Type	Width	Decimals	Label	Values	Missing
1	Timestamp	Date	40	0		None	None
2	FirstandLastName	String	32	0	First and Last Name	None	None
3	Gender	Numeric	8	2		None	None
4	Age	Numeric	3	0		None	None
5	City	String	13	0		None	None
6	State	String	15	0		None	None
7	Country	String	14	0		None	None
8	Experienceinyears	Numeric	3	0	Experience (in years)	None	None
9	MaritalStatus	Numeric	1	0	Marital Status	{1, Single}...	None
10	ModeofWorking	Numeric	1	0	Mode of Working	{1, In-Perso...	None
11	Preferredmodeofworking	Numeric	1	0	Preferred mode of working	{1, In-Perso...	None
12	HomeP	Numeric	1	0	Overall Work Performance while working from home	{1, Very Go...	None
13	OnsiteP	Numeric	1	0	Overall Work Performance while working On-Site	{1, Very Go...	None
14	Neutral	Numeric	1	0	My performance is not dependent on working from home	{1, Strongly ...	None
15	WorkLifeBalance	Numeric	1	0	Working remotely allows one to attend to the needs of a family and/or pets, p...	{1, Strongly ...	None

The Survey Questions

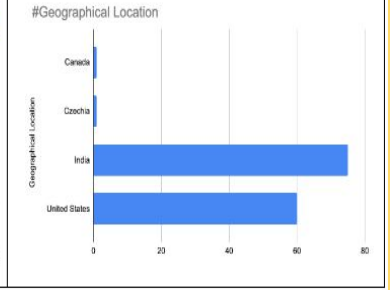


Overall Work Performance while working from home
In person work environments allow for impromptu collaboration between teams and individuals, more so than remote work.
People can collaborate and work even while working from home
I currently work in-person but I would prefer to be able to work remotely.
Working from home benefits both employees and company
Overall Work Performance while working from Onsite
Prolonged work from home can decrease performance
Working from home contributes creates too many distractions which reduces work performance
My work performance is high when working from home
My performance is not dependent on working from home
Remote meetings are ineffective and eventually reduce work performance
If my company made in-person working mandatory, I would consider switching to a different job
Myself and/or my team should be able to decide when to work from home and when to work in-person
Remote work saves money and positively impacts morale and performance
While working from home I get to take short breaks more than during in-person, which refreshes the mind and positively impacts the ...

Data Exploration

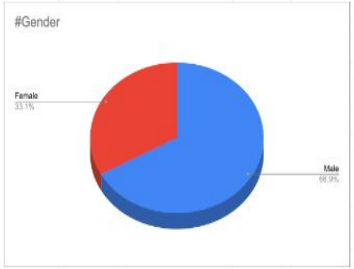
1) **Geographical Location**: our major respondents are from India and United states of America

Geographical Location	
Canada	1
Czechia	1
India	75
United States	60
Total	**137**



2) **Gender**: Collected gender information as part of a survey. It's a mixture of Female and Male ratio.

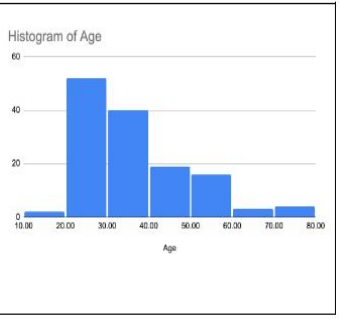
Gender	
Male	Female
85	42



Data Exploration

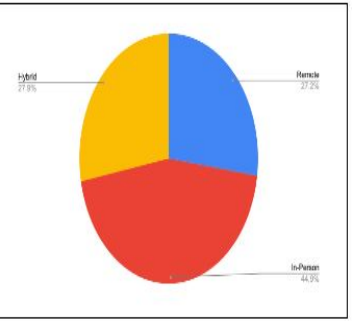
3) **Age distribution:** during our survey, we wanted to identify the age also. This can help us to analyze what people think about performance while working from home based on his/her age.

Age Distribution	
Bucket	Frequency
10	2
20	61
30	33
40	19
50	14
60	7



4) **Current mode of working:** Survey also captured the current mode of working condition

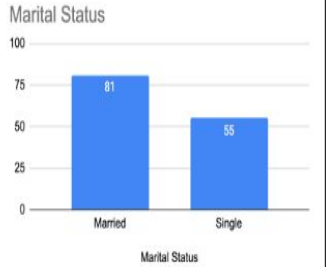
Current mode of working	
Remote	37
In-Person	61
Hybrid	38



Data Exploration

5) **Marital status:** Survey also covered about Marital status based on the total population of the dataset.

Marital Status	
Married	81
Single	55



6) **Survey Response:** We had 2 different types of survey response.

- 1 = Very Good
- 2 = Good
- 3 = Moderate
- 4 = Bad
- 5 = Very Bad

- 1 = Strongly Agree
- 2 = Agree
- 3 = Neutral
- 4 = Disagree
- 5 = Strongly Disagree

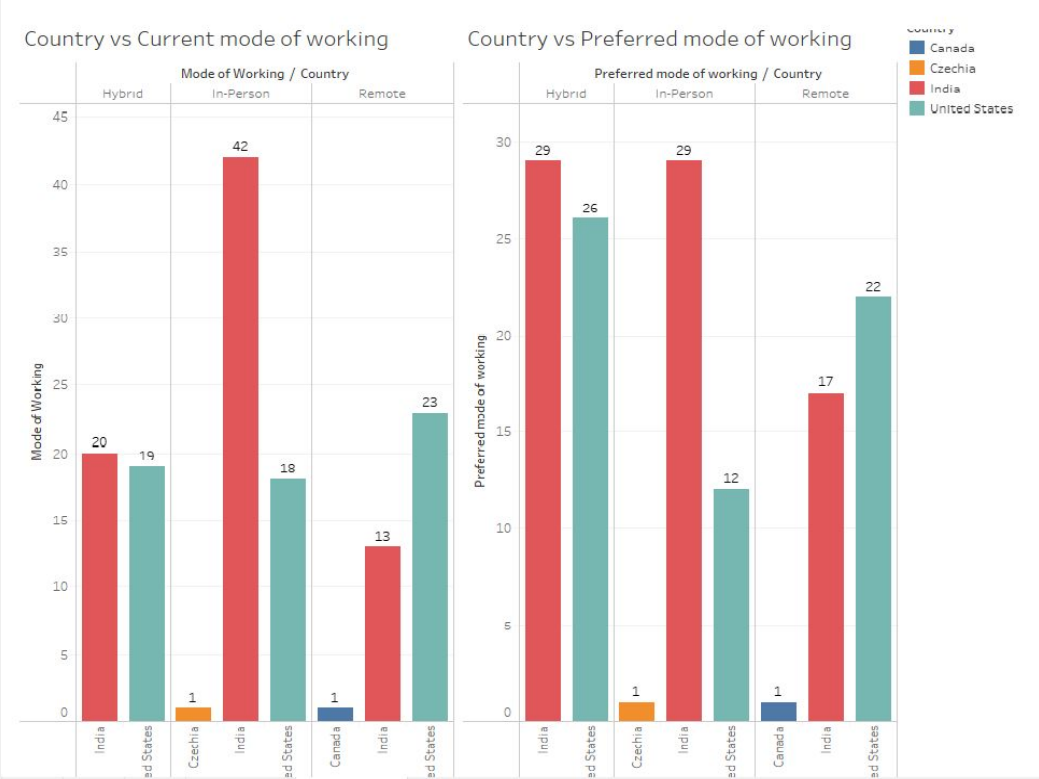
Data Exploration

Current Mode of working:

- Similar no of people working in hybrid setup are from India/USA
- Highest no of people working in person mode are from India

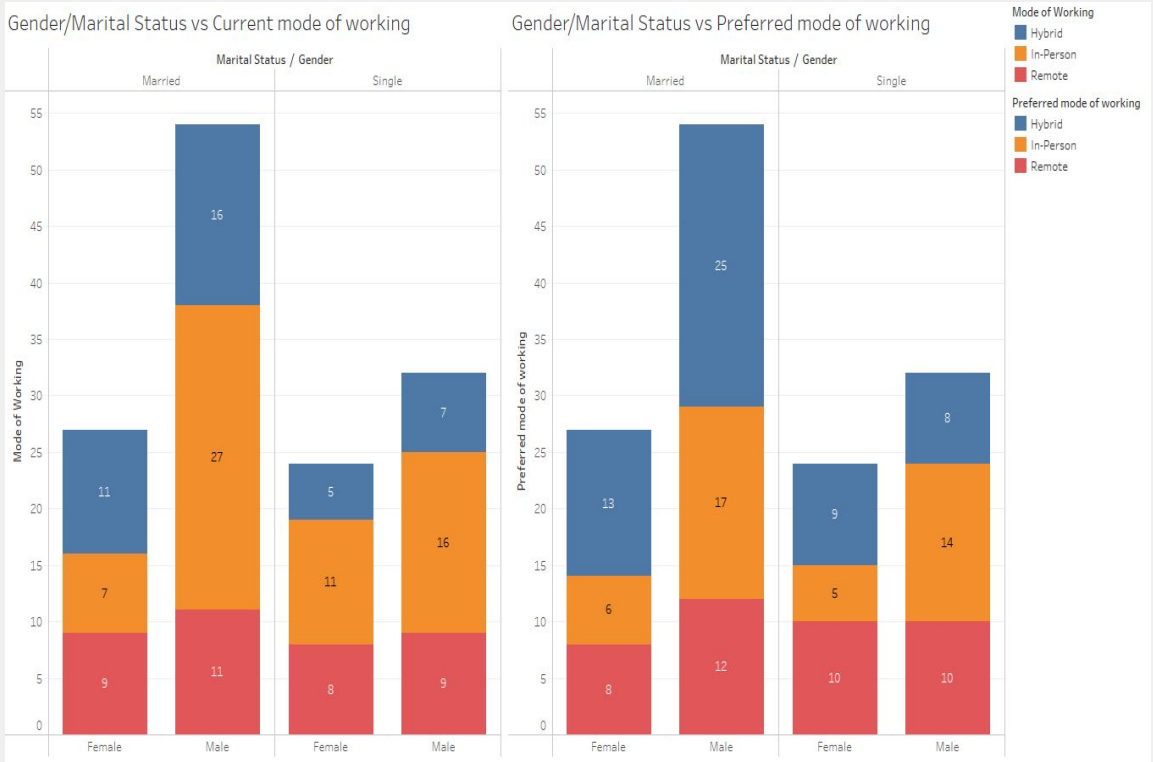
Preferred Mode of working:

- Highest no of people from India prefer working in hybrid mode, with USA not far behind
- Less no of people from USA prefer working in person



Data Exploration

- Married male tend to prefer Hybrid mode of working more than in-person.
- Single male seem happy working in-person.
- Single female would prefer Hybrid mode of working.



Factor Analysis

- Analysis examines the pattern of responses of respondents to questionnaire items to see if the responses follow a particular pattern.
- Here, SPSS has calculated the eigenvalues for each of the 16 factors.
- Looking at all the 4 components, the cumulative percentage value tells us that they account for **63.69%** of the variances in all the items.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.086	39.364	39.364	7.086	39.364	39.364
2	1.845	10.251	49.615	1.845	10.251	49.615
3	1.405	7.804	57.419	1.405	7.804	57.419
4	1.128	6.267	63.686	1.128	6.267	63.686
5	.835	4.642	68.328			
6	.802	4.457	72.785			
7	.675	3.750	76.535			
8	.630	3.503	80.038			
9	.618	3.434	83.472			
10	.535	2.972	86.443			
11	.464	2.579	89.023			
12	.429	2.382	91.405			
13	.400	2.223	93.628			
14	.366	2.032	95.660			
15	.306	1.702	97.361			
16	.257	1.425	98.786			
17	.218	1.214	100.000			
18	-9.410E-16	-5.228E-15	100.000			

Factor Analysis

- The figures show the loadings of each item on each factor after rotation.
- Possible values range = -1 to +1.
- Using option blank (0.30), which tells SPSS not to print any of the correlation values that are less than 0.3

Rotated Component Matrix[a]

	Component			
	1	2	3	4
Overall Work Performance increases while working from home	.868	.302		
SMEAN (OverallWorkPerformanceincreaseswhileworkingfromhome)	.868	.302		
People can collaborate and work even while working from home	.760			
My work performance is high when working from home	.704			.344
Working from home benefits both employees and company	.588	.394		.446
I currently work in-person but I would prefer to be able to work remotely.	.505			.501
Working remotely allows one to attend to the needs of a family and/or pets, positively impacting their work performance		.785		
Myself and/or my team should be able to decide when to work from home and when to work in-person		.700		.331
Remote work saves money and positively impacts morale and performance		.676		.393
If my company made in-person working mandatory, I would consider switching to a different job		.634		

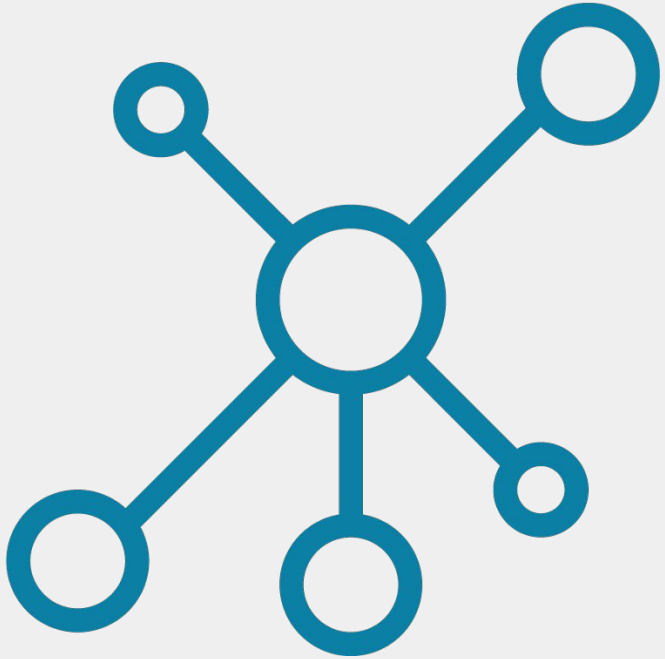
Rotated Component Matrix[a]

	Component			
	1	2	3	4
While working from home I get to take short breaks more than during in-person, which refreshes the mind and positively impacts the performance	.318	.587		
Commuting to office is stressful and impacts negatively my performance	.449	.564		
In person work events conducted throughout the year help increase the performance more so than remote events			.765	
In person work environments allow for impromptu collaboration between teams and individuals, more so than remote work.			.650	
Remote meetings are ineffective and eventually reduce work performance			.648	
Prolonged work from home can decrease performance	-.547		.556	
Working from home contributes creates too many distractions which reduces work performance	-.524		.529	
My performance is not dependent on working from home				.815

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Factor Analysis



We derived four factors:

- Component 1 - Work from home performance
- Component 2 - Work life balance
- Component 3 : OnSite - On Site Work Performance
- Component 4 : Neutral

Chi-Square Analysis (Gender)

Gender vs On-site Performance

Row Variable(X) : Gender

Column Variable (Y) : On-site Performance

Chi- Square Statistics

- Chi-Square : 1.653
- Degree of Freedom : 4
- p-value : 0.799

Conclusion - The hypothesis tests, “employee performance doesn’t depend on an employee’s personal factors”. The p-value is 0.799 which is greater than 0.05, indicating this test cannot be used.

			Overall Work Performance while working On-Site					
			Very Good	Good	Moderate	Poor	Very Poor	Total
Gender	0	Count	10	24	11	5	1	51
		Expected Count	8.6	22.0	13.0	6.3	1.1	51.0
		% within Gender	19.6%	47.1%	21.6%	9.8%	2.0%	100.0%
		% within Overall Work Performance while working On-Site	43.5%	40.7%	31.4%	29.4%	33.3%	37.2%
		% of Total	7.3%	17.5%	8.0%	3.6%	0.7%	37.2%
	1	Count	13	35	24	12	2	86
		Expected Count	14.4	37.0	22.0	10.7	1.9	86.0
		% within Gender	15.1%	40.7%	27.9%	14.0%	2.3%	100.0%
		% within Overall Work Performance while working On-Site	56.5%	59.3%	68.6%	70.6%	66.7%	62.8%
		% of Total	9.5%	25.5%	17.5%	8.8%	1.5%	62.8%
Total		Count	23	59	35	17	3	137
		Expected Count	23.0	59.0	35.0	17.0	3.0	137.0
		% within Gender	16.8%	43.1%	25.5%	12.4%	2.2%	100.0%
		% within Overall Work	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.653[a]	4	.799
Likelihood Ratio	1.670	4	.796
Linear-by-Linear Association	1.360	1	.244
N of Valid Cases	137		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 1.12.

Chi-Square Analysis (Gender)

Gender vs Work from Home Performance

Row Variable(X) : Gender

Column Variable (Y) : Work from Home Performance

Chi- Square Statistics

- Chi-Square : 9.664
- Degree of Freedom : 4
- p-value : 0.046

Conclusion - The hypothesis tests, “employee performance doesn’t depend on an employee’s personal factors”. The p-value is 0.046 which is smaller than 0.05, indicating this test can be used.

			Overall Work Performance while working from home					
			Very Good	Good	Moderate	Poor	Very Poor	Total
Gender	0	Count	8	21	16	4	2	51
		Expected Count	7.8	15.3	14.9	9.3	3.7	51.0
		% within Gender	15.7%	41.2%	31.4%	7.8%	3.9%	100.0%
		% within Overall Work Performance while working from home	38.1%	51.2%	40.0%	16.0%	20.0%	37.2%
		% of Total	5.8%	15.3%	11.7%	2.9%	1.5%	37.2%
	1	Count	13	20	24	21	8	86
		Expected Count	13.2	25.7	25.1	15.7	6.3	86.0
		% within Gender	15.1%	23.3%	27.9%	24.4%	9.3%	100.0%
		% within Overall Work Performance while working from home	61.9%	48.8%	60.0%	84.0%	80.0%	62.8%
		% of Total	9.5%	14.6%	17.5%	15.3%	5.8%	62.8%
Total		Count	21	41	40	25	10	137
		Expected Count	21.0	41.0	40.0	25.0	10.0	137.0
		% within Gender	15.3%	29.9%	29.2%	18.2%	7.3%	100.0%
		% within Overall Work Performance while	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.664[a]	4	.046
Likelihood Ratio	10.324	4	.035
Linear-by-Linear Association	5.223	1	.022
N of Valid Cases	137		

a. 1 cells (10.0%) have expected count less than 5. The minimum expected count is 3.72.

Chi-Square Analysis (Experience)

Experience vs On-site Performance

Row Variable(X) : Experience

Column Variable (Y) : On-site Performance

Chi- Square Statistics

- Chi-Square : 130.865
- Degree of Freedom : 164
- p-value : 0.973

Conclusion - The hypothesis tests,"employee performance doesn't depend on an employee's personal factors". The p-value is 0.973, which is greater than 0.05, indicating this test cannot be used.

Crosstab

		Overall Work Performance while working On-Site					
		Very Good	Good	Moderate	Poor	Very Poor	Total
1	Count	1	6	4	1	0	12
	Expected Count	2.0	5.2	3.1	1.5	.3	12.0
	% within Experience (in years)	8.3%	50.0%	33.3%	8.3%	0.0%	100.0%
	% within Overall Work Performance while working On-Site	4.3%	10.2%	11.4%	5.9%	0.0%	8.8%
	% of Total	0.7%	4.4%	2.9%	0.7%	0.0%	8.8%
4	Count	2	6	3	1	0	12
	Expected Count	2.0	5.2	3.1	1.5	.3	12.0
	% within Experience (in years)	16.7%	50.0%	25.0%	8.3%	0.0%	100.0%
	% within Overall Work Performance while working On-Site	8.7%	10.2%	8.6%	5.9%	0.0%	8.8%
	% of Total	1.5%	4.4%	2.2%	0.7%	0.0%	8.8%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	130.865[a]	164	.973
Likelihood Ratio	129.136	164	.980
Linear-by-Linear Association	.728	1	.393
N of Valid Cases	137		

a. 208 cells (99.0%) have expected count less than 5. The minimum expected count is .02.

Chi-Square Analysis (Experience)

Experience vs Work from Home Performance

Row Variable(X) : Experience

Column Variable (Y) : Work from Home Performance

Chi- Square Statistics

- Chi-Square : 158.711
- Degree of Freedom : 164
- p-value : 0.602

Conclusion - The hypothesis tests, “employee performance doesn’t depend on an employee’s personal factors”. The p-value is 0.602, which greater than 0.05, indicating this test cannot be used.

Double-click to

		Overall Work Performance while working from home					
		Very Good	Good	Moderate	Poor	Very Poor	Total
1	Count	1	4	5	2	0	12
	Expected Count	1.8	3.6	3.5	2.2	.9	12.0
	% within Experience (in years)	8.3%	33.3%	41.7%	16.7%	0.0%	100.0%
	% within Overall Work Performance while working from home	4.8%	9.8%	12.5%	8.0%	0.0%	8.8%
	% of Total	0.7%	2.9%	3.6%	1.5%	0.0%	8.8%
4	Count	3	6	2	1	0	12
	Expected Count	1.8	3.6	3.5	2.2	.9	12.0
	% within Experience (in years)	25.0%	50.0%	16.7%	8.3%	0.0%	100.0%
	% within Overall Work Performance while working from home	14.3%	14.6%	5.0%	4.0%	0.0%	8.8%
	% of Total	2.2%	4.4%	1.5%	0.7%	0.0%	8.8%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	158.711[a]	164	.602
Likelihood Ratio	162.286	164	.523
Linear-by-Linear Association	3.505	1	.061
N of Valid Cases	137		

a. 210 cells (100.0%) have expected count less than 5. The minimum expected count is .07.

Chi-Square Analysis (Marital Status)

Marital Status vs On-site Performance

Row Variable(X) : Marital Status

Column Variable (Y) : On-site Performance

Chi- Square Statistics

- Chi-Square : 3.085
- Degree of Freedom : 4
- p-value : 0.544

Conclusion - The hypothesis tests,"employee performance doesn't depend on an employee's personal factors". The p-value is 0.544, which is greater than 0.05, indicating this test cannot be used.

			Overall Work Performance while working On-Site					
			Very Good	Good	Moderate	Poor	Very Poor	Total
Marital Status	Single	Count	8	28	12	6	2	56
		Expected Count	9.4	24.1	14.3	6.9	1.2	56.0
		% within Marital Status	14.3%	50.0%	21.4%	10.7%	3.6%	100.0%
		% within Overall Work Performance while working On-Site	34.8%	47.5%	34.3%	35.3%	66.7%	40.9%
		% of Total	5.8%	20.4%	8.8%	4.4%	1.5%	40.9%
	Married	Count	15	31	23	11	1	81
		Expected Count	13.6	34.9	20.7	10.1	1.8	81.0
		% within Marital Status	18.5%	38.3%	28.4%	13.6%	1.2%	100.0%
		% within Overall Work Performance while working On-Site	65.2%	52.5%	65.7%	64.7%	33.3%	59.1%
		% of Total	10.9%	22.6%	16.8%	8.0%	0.7%	59.1%
Total		Count	23	59	35	17	3	137
		Expected Count	23.0	59.0	35.0	17.0	3.0	137.0
		% within Marital Status	16.8%	43.1%	25.5%	12.4%	2.2%	100.0%
		% within Overall Work Performance while	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.085[a]	4	.544
Likelihood Ratio	3.078	4	.545
Linear-by-Linear Association	.007	1	.932
N of Valid Cases	137		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 1.23.

Chi-Square Analysis (Marital Status)

Marital Status vs Work from Home Performance

Row Variable(X) : Marital Status

Column Variable (Y) : Work from Home Performance

Chi- Square Statistics

- Chi-Square : 1.180
- Degree of Freedom : 4
- p-value : 0.881

Conclusion - The hypothesis tests, “employee performance doesn’t depend on an employee’s personal factors”. The p-value is 0.881, which greater than 0.05, indicating this test cannot be used.

			Overall Work Performance while working from home					
			Very Good	Good	Moderate	Poor	Very Poor	Total
Marital Status	Single	Count	10	17	17	9	3	56
		Expected Count	8.6	16.8	16.4	10.2	4.1	56.0
		% within Marital Status	17.9%	30.4%	30.4%	16.1%	5.4%	100.0%
		% within Overall Work Performance while working from home	47.6%	41.5%	42.5%	36.0%	30.0%	40.9%
		% of Total	7.3%	12.4%	12.4%	6.6%	2.2%	40.9%
	Married	Count	11	24	23	16	7	81
		Expected Count	12.4	24.2	23.6	14.8	5.9	81.0
		% within Marital Status	13.6%	29.6%	28.4%	19.8%	8.6%	100.0%
		% within Overall Work Performance while working from home	52.4%	58.5%	57.5%	64.0%	70.0%	59.1%
		% of Total	8.0%	17.5%	16.8%	11.7%	5.1%	59.1%
Total		Count	21	41	40	25	10	137
		Expected Count	21.0	41.0	40.0	25.0	10.0	137.0
		% within Marital Status	15.3%	29.9%	29.2%	18.2%	7.3%	100.0%
		% within Overall Work Performance while	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.180[a]	4	.881
Likelihood Ratio	1.196	4	.879
Linear-by-Linear Association	.957	1	.328
N of Valid Cases	137		

a. 1 cells (10.0%) have expected count less than 5. The minimum expected count is 4.09.

Regression Analysis - Remote

Independent Variable(X) : Age & Experience

Dependent Variable (Y) : Overall Work Performance while working from home

Strong Correlation :

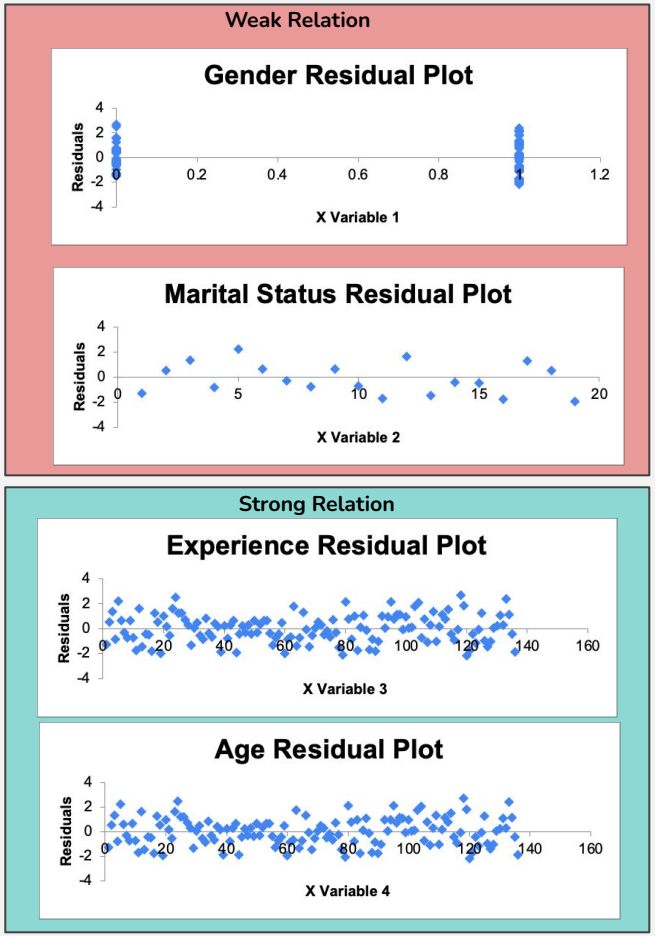
- Experience vs Overall Work Performance while working from home

Regression Statistics

- **R Square :** 0.033 (3.3%)
- **Adjusted R Square :** 0.018
- **p-value :** 0.113

Result

The hypothesis tests if employee performance doesn't depend on an employee's personal factors. The p-value is 0.113 which is greater than 0.05, indicating this model cannot be used



Regression Analysis - Onsite

Independent Variable(X) : Age & Experience

Dependent Variable (Y) : Overall Work Performance while working On-Site

Strong Correlation :

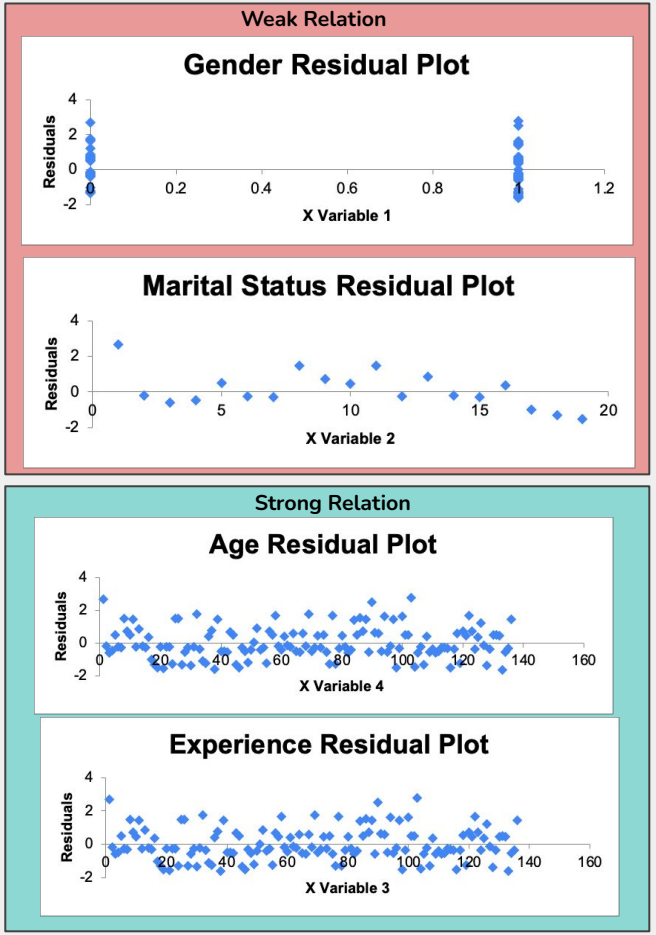
- Experience vs Overall Work Performance while working On-Site

Regression Statistics

- **R Square :** 0.009 (0.9%)
- **Adjusted R Square :** -0.006
- **p-value :** 0.548

Result

The hypothesis tests if employee performance doesn't depend on an employee's personal factors. The p-value is 0.548 which is greater than 0.05, indicating this model cannot be used.



One Way - ANOVA

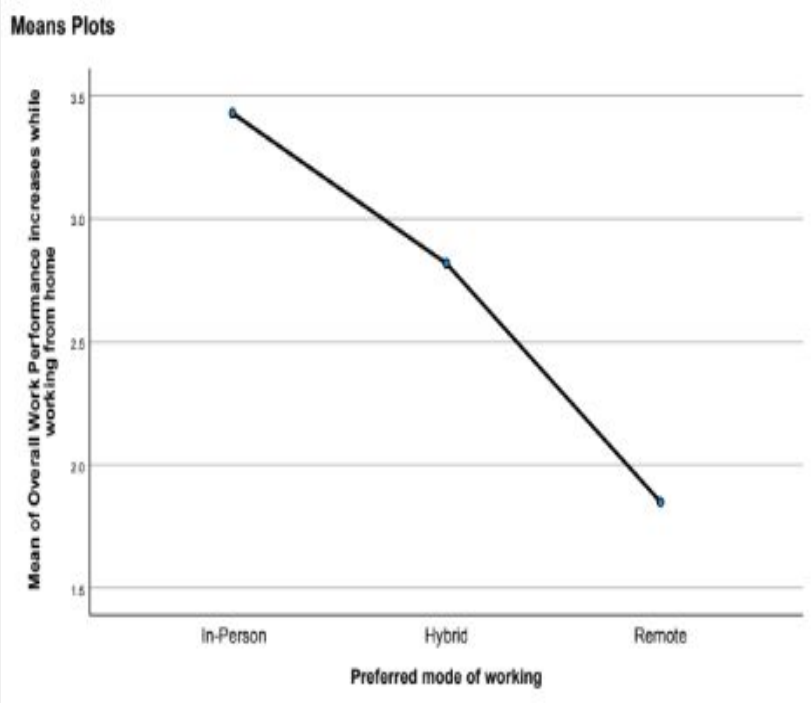
Independent Variable(X) : Preferred Mode of Working

Dependent Variable (Y) : Overall Work Performance while working from home

ANOVA Statistics:

- **F-Value: 27.254**
- **p-value: <0.001**

Result: The significance value is < .05, we reject the null hypothesis and conclude that there is a statistically significant difference between work categories. We further performed the post doc analysis and found that the different group combinations are also statistically significant having p< 0.05.



One Way - ANOVA

Independent Variable(X) : Actual Mode of Working

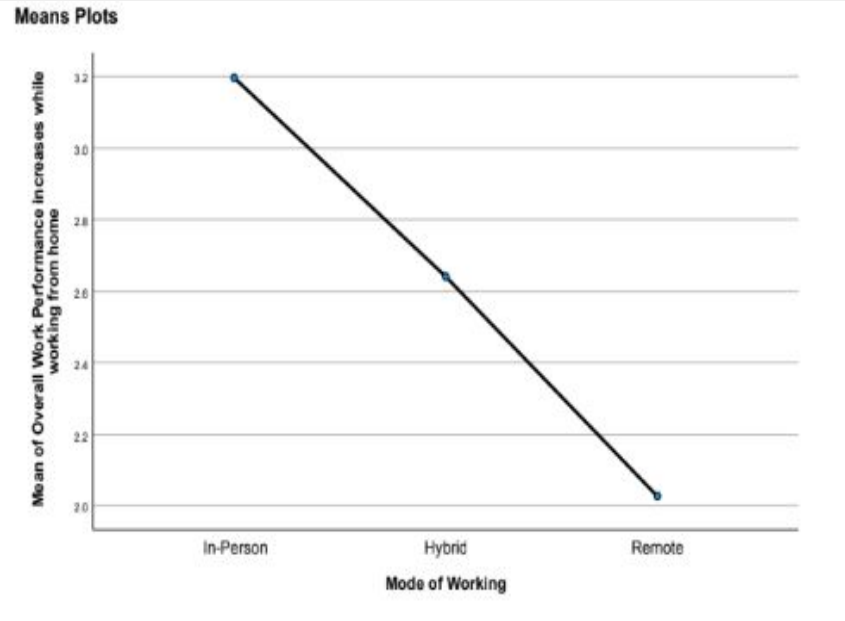
Dependent Variable (Y) : Overall Work Performance while working from home

ANOVA Statistics:

- F-Value: 14.469
- p-value: <0.001

Result: We reject the null hypothesis and conclude that there is a statistically significant difference in work categories. The post doc analysis suggests that the different group combinations are also statistically significant having p< 0.05.

The means plot suggests that remote employees feels the overall increase in work performance is not increased much while working from home. Opposite to which, the in person employees feels that the performance is increased while working from home.



Conclusion

Based on the analysis done, only Gender seems to have a relationship with the Work Performance while working remotely. Other factors like Age, Experience and Marital Status do not seems to have any relationship with the Work performance. Another relationship that was found was with Mode of working and Preferred mode of working in correlation with Work performance while working remotely/on-site.

These results may conclude that personal factors do not necessarily affect the performance of either mode of work. This does preclude more future research in mode of work versus location of remote or in-person work among home locations worldwide.

Thank you!