

Role of Office Furniture in Office Ergonomics & Employee Performance: Evidence from Faculty of Higher Educational Institutes of Karachi

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Abstract

Office ergonomics is treated as one of the most important aspect for maintenance of employees' job satisfaction. Most of the times studies based on office ergonomics are trying to uncover impact of several elements in a single study. Although it has evident that office furniture is the element which affects employee performance and health in a most critical manner. One of the studies in Pakistan indicated that office furniture is affecting employee performance even when other elements are seems to be absent. Hence this results conduction on more research on effect of office furniture, not only in Pakistan but all over the globe. Although most of the researchers specially from developing countries like Pakistan are still conducting studies on hybrid of office design elements. Hence the study which specifically focus on the most potent variable of office design is seems to be mandatory. The purpose of this study is focused extensively on effect of office chairs' and office tables on employee productivity. Initially the data collected for evaluation of these variables was evaluated through reliability testing through SPSS but for detailed inferential analysis Smart PLS has been used as the tool of analysis. Results of the study indicated office chairs has significant impact on employee performance although desks does not have the significant impact. On the other hand, moderation of gender is potent in creating effect of office design elements.

Key Words: Office Furniture, Office Chairs, Office Tables, Employee Performance and Office -Ergonomics

1. Introduction

Use of furniture is a tradition since Stone Age when rocks are used to craft tables and chairs (Oyewole, Haight & Freivalds, 2010) & its purpose is to make people more effective. Although office furniture is not ben designed to address individual concerns and needs (Adu Adu and Effah, 2014). It is also a requirement of management that furniture must be ergonomically sound to make employees motivated (Sarode & Shirsath, 2012). Reason being employees spend 50% percent of their life at work and thus furniture is potent enough to affect performance, mental status, actions and abilities (Sundstrom, 1994). Therefore, condition and relevance of office furniture is treated as immensely important for managing issues associated with employees' productivity and health (Mat, Yusof, Said & Ali, 2017 & Pickson, Bannerman & Ahwiring, 2017).

Moreover, office furniture is also potent for the increase in level of organizational productivity (Mat et al., 2017) and thus company even hire ergonomics experts to make their workplace better (Sarode & Shirsath, 2012).

2. Purpose and Problem Other Research

Study of Adu et al (2014) indicated that studies on role of office furniture are potent in making management inclined towards enhancement of office design facilities. Study also indicated that optimization of office design facilities resulted in saving extra production hours and legal proceedings against company etc. Study conducted by Jaffri (2015) indicated that furniture is the element which is critically affecting employee performance even when other elements are absent. Similar findings were found by the study of El-Zeiny (2012) that performance has been affected most by office furniture. In fact study conducted specifically on role of office furniture in India also highlighted the importance of furniture in optimization of employee satisfaction.

Thus there is also a requirement of studies which will focus exclusively on the role of furniture on employee performance. Especially, in Asian countries where physical aspects of work environment are not treated properly hence there it is legitimate to evaluate relationship between office furniture and employee productivity (Singh, 2018). These postulates are legitimate to believe as in Pakistan employee have to spend eight to nine hours in offices which resulted in constant interaction with office furniture (Riaz, Shoaib & Sarfraz, 2017 & Sultan, Zafar & Anila, 2016). Hence Riaz et al (2017) recommended to purchase ergonomically sound furniture's for offices which aids in making employee gel with the environment (Sarode & Shirsath, 2012).

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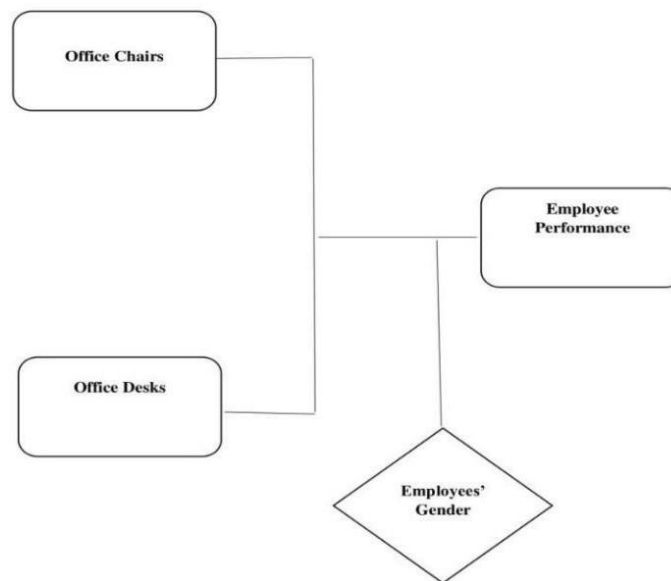
3. Theoretical Framework and Delimitations

Studies on office ergonomics mostly try to identify the impact of office design elements on employee's performance e.g. Jaffri (2015), Ojo Bailey Chater and Hewson (2018), Riaz et al (2017) and Sultan et al (2016). Although none of the prior studies tries to evaluate impact of office furniture in depth on performance of employees, although El-Zeiny (2012) indicated it is most potent variable among office design elements. However, some studies like Adu et al (2014) in Ghana, Adum Ebeze Ekwugha and Okika (2016) in Nigeria and Singh (2018) in India solely based on impact of office furniture. Although Adu et al (2014) extensively focused on office chairs, Adum et al (2016) focused on hybrid of office furniture and office equipment & Singh (2018) conducted generically on office furniture (hybrid of desks and chairs). Therefore, thought process generated from Adu et al (2014), Adum et al (2016) and Singh (2018), was correlated with other studies on office design elements, especially with those which are from Pakistan. The Process indicted that chairs and Desk (Table) are the potent variable included in the construct of office furniture. Although Saha (2016) indicated that office furniture includes desks, chairs, filing system, shelves and drawers but there are almost no studies regarding the filing system, shelves and drawers. Therefore, the upcoming literature will highlight exclusive the impact of desks and chairs used in faculty rooms of HEIs on employee performance with respect to higher educational institutes (HEIs) of Karachi city. There are mainly four (4) reasons for selecting HEIs (Asghar, 2019).

- a) Higher education sector is treated is most important sector for the development of any economy
- b) The sector is dominated by the presence of HEIs in Pakistan.
- c) In our country HEIs are also keen to invest in development of infrastructure facilities.
- d) Although products of the sector are not performing as per the requirement of the market. Hence there is significant requirement to check level of satisfaction of teachers in HEI, especially with those elements with which they are in continuous contact.

Moreover, office furniture affects performance of different genders study of Hameed and Amjad (2009) indicated furniture affect performance of males more as compared to their counterparts. Contrary to this, El-Zeiny (2012), indicated that female workers are more affected by internal office environment and lesser satisfied with the office design facilities in private sector organizations of Egypt Similarly study of Brand (2008) indicated the difference in impact of office ergonomic due to different gender and variation in weights. Therefore gender is used as the moderating variable in this study to check the impact of office furniture exclusively on the performance of both the genders.

3.1 Research Model



3.2 Research Hypotheses

H_{1A}: There is a relationship between office chairs in Higher Educational Institutes of Karachi and performance of faculty

H_{2A}: There is a relationship between office desks in Higher Educational Institutes of Karachi and performance of faculty

H_{3A}: Gender does moderates the relationship of office chairs and performance of faculty in Higher Educational Institutes of Karachi

H_{4A}: Gender does moderates the relationship of office desks and performance of faculty in Higher Educational Institutes of Karachi

3.3 Significance of the Study

Manggo (2014) indicated that it is requirement of recent era that administrative managers must have knowledge regarding impact of ergonomics furniture on performance of employees. Supplemented with the indication of Jaffri (2015) this study would be significantly impactful for administrative managers of HEIs. Through this study administrative managers might became able to convenience top management for more budget and might also gain appreciation from faculty and staff members. Moreover, this study is also beneficial for enhancement of research work on role of office furniture in other form of organizations, especially in government sector as Jaffri (2015) highlighted the significance with respect to employees of NADRA. Furthermore, this study is also potent in highlighting the perception of faculty regarding office ergonomics which might also be used by Human Resource and administrative managers to deal with the issues of productivity especially in higher education sector of Pakistan.

3.4 Literature Review

Sehgal (2012) highlighted the importance of office furniture as it might optimize productivity of employees as well as organization (Riaz et al., 2017). Although office furniture needs to be ergonomically sound as it will aid people in getting gel with the working environment (Sehgal, 2012). Use of ergonomically sound furniture results in positive feelings from employees and diminishes probability of incidents. Hence the performance rises directly with the motivation of employee which aids in better organizational performance (Sultan et al., 2016). Therefore, the upcoming literature will provide detailed review of literature associated with these two elements of office furniture.

3.5 Office Chairs:

In the era of industrial revolution the concern towards optimization of employee comfort has been increased significantly with special concern towards office chairs. In recent times lot of research work is underway to design effective office chairs in order to boost employee morale through better facilities and working conditions (Noshin, Sen Gupta & Kibria, 2018). Chair plays a significant role in job performance as most of the developed countries, 75% of office work are performed in the state of sitting (Adu et al., 2014). Therefore, a good chair is necessary which is capable of providing optimal support to back, legs, buttocks and arms & can also reduce stress ad exertions while working (Adum, et al., 2016).

Sitting posture is also associated with comfort and reduction of stress as good posture will produce lesser stress on buttocks, back and arms of employee (Adu et al., 2014), thus good chair is necessary to induce employee performance. These findings looks true as office chairs might reduce musculoskeletal function and benefit those who used to sit on the office chairs for longer period of time (Van Niekerk, Louw & Hilier, 2012). . Moreover, a good ergonomic chair must have adjustable seat and arm rest as both of these elements varies from one person to another and aid significantly in employees' comfort (Adum et al., 2016). Study of Nnanna Chukwunoso Geoffery and Otuu, J. B. (2016) also highlighted that adjustable office chairs are designed in a manner that their height might be adjusted as per the requirements of different sizes of human body. Similar found true by Noshin et al (2018) that adjustable chairs are preferred in office due to their ability to get adjusted with different physical structures.

3.6 Office Desk

Effectively designed chairs and desks are required to provide comfort to employees through linking concepts of human psychology and physiology. Study further indicated that desk must be simple and light and the surface must not be too dark or too polished (Klein, 1982). Although the appropriate height of desk cannot be estimated without knowledge about height of seat and seat pan angle (Brand, 2008). This indication is important as mismatch heights of elbow point of seat and desk might result in pain in employee's neck and shoulder (Grimes & Legg, 2004). Although effectively designed desks are the source of motivation through their support to elbow and larger space for legs (Sarode & Shirsath, 2012). Supported by Nnanna et al (2016) that adjustable office desks are recommended to optimize the productivity of workers having different body sizes.

3.7 Research Methodology

Research Methodology is treated as the manner to connect all the important points of research (Brannick & Roche, 1997). Therefore, this study combines all the important parameters highlighted by famous scholars like Saunders Lewis Thornhill and Wilson (2009) and Sekaran and Bougie (2016) etc. with the research gaps and requirement associated with office furniture in Pakistan. Though prior studies did not focus on distinguished office design elements on separate bases, therefore authors of other countries e.g. Adu et al (2014) and Singh (2018) etc. are taken into account to conduct research exclusively on impact of office furniture.

3.8 Research Design

The aim of the study is to foster knowledge regarding the impact of various elements included in office furniture therefore the philosophy indulged with it is epistemology (Saunders et al., 2015). The philosophical stance is post-positivism as the study is combining variables, indications, techniques and method so to challenge existing knowledge (John & Gray, 2010). Ponterotto (2005) indicated that the real use of post-positivism is to falsify the theory. This is coherent with this study as the study, as this study aimed to clarify the impact of office chairs and desk rather than hybrid of furniture. Strategy to conduct research is survey while method of data collection is mono-method (Saunders et al., 2015).

The study setting is non-contrived, unit of analysis is individual, researcher interference is moderate (Sekaran & Bougie, 2016) and time horizon is cross-sectional (Saunders et al., 2015 & Sekaran & Bougie, 2016). Study also follows indication of Vimalanathan and Babu (2017) to manage reliability through analyzing data descriptively before applying inferential statistics to indicate correlation among different variables, which is also the real purpose of the study (Sekaran & Bougie, 2016). Study also uses SMART PLS as this is the best software to deal with issue of theory building and small sample (Hwang, Malhotra, Kim, Tomiuk & Hong, 2010). This is the another point which assures the use of post-positivist as the philosophical stance, s prior studies on office design uses SPSS or AMOS as previous work is for theory testing.

3.9 Sampling Design

Sampling makes data collection convenient, as this is less time consuming and less costly (Sekaran & Bougie, 2016), thus this study uses simple random sampling to proceed. This method has already been used by Jaffri (2015), Mat et al (2017), Parveen Sohail Naeem Azhar and Khan, (2012), Singh (2018), Sultan et al (2016) etc for conducting research on office design elements. Although for analyzing effective sample size study uses the criterion of Parveen et al, (2012) and sample of the study is based on 150 responses (from faculty of HEI in Karachi), while the prior studies collected the data from teaching as well as non-teaching staff.

Hence this will also make this study indifferent as compared to the other nad legitimize the use of software which might aid in theory building approach. The sample has been collected from top tier higher educational institutes of Karachi include IoBM, SZABIST, KASBIT and PAF-Kiet etc. Although in order to manage with the tough schedule of faculty researchers opted to use Google Docs to send questionnaire via email to faculty. Regardless of that the data collection was not easy and it takes almost one and half month i.e. from January 2020 to February 2020.

3.10 Questionnaire

As indicated in theoretical framework there are minimal studies which specifically focused upon office furniture and most of the studies examine the impact of office design in general. Thus, in order to work specifically on elements of office furniture self-administrative questionnaire has been used in this study through transforming questions on office furniture in to specific questions associated with office chairs and office desks. More specifically researchers followed criterion of Amirazar Azarbayjani Day Thariyan Stearns and Brentrup (2017) and Parveen et al, (2012) and link the given criteria with Adu et al (2014), Singh (2018) and Ulker Yuksel Erdem (2015). The linkage was specifically developed to transform questions related with office chairs and office desks to likert scale which is treated as best option of scaling for several constructs (Revilla, Staris & Krosnick, 2014).

Although these questions were never been tested separately for office chairs and office desks therefore there was a need to check internal consistency via Pilot Testing. Litwin (1995) and Sekaran and Bougie (2010) highlighted Cronbach's Alpha is best to evaluate internal consistency of the data. Although due to some objections Cronbach's Alpha is valid only for evaluation of different constructs separately and this study is using Cronbach's Alpha as evaluator or internal consistency for different constructs separately (Tavakol & Dennick, 2011).

3.11 Statistical Testing and Evaluation

Sample size for pilot testing is of 35 respondents and the results of pilot testing have been highlighted that values for Cronbach's Alpha are more than 0.60 in every case (Table 1). Therefore it is legitimate to declare pilot testing successful and legitimate for further testing (Maiyaki & Mohd Mokhtar, 2011). Although value of Cronbach's Alpha must be 0.70 or above for further testing (Pietersen & Maree, 2007). Hence the Cronbach's Alpha has been again evaluated with the sample of 120 respondents and values are highlighted through table 2. As mentioned earlier SMART PLS has been incorporated for detailed inferential testing and also to comply with theory building approach (Hwang et al., 2010). Though there are some objections on the use of software for larger data sets (e.g. Hoyle, 1995) but according to Wong (2013), software is capable of analyzing larger data sets.

Table 1 Values of Cronbach's Alpha for Pilot Testing

Reliability Statistics		
	No of Items	Cronbach's Alpha
Office Chairs	5	0.622
Office Desks	5	0.615
Employee Performance	5	0.727
Employee Gender	3	0.650

Table 2 Values of Cronbach's Alpha for Reliability Analysis

Reliability Statistics		
	No of Items	Cronbach's Alpha
Office Chairs	5	0.709
Office Desks	5	0.760
Employee Performance	5	0.877
Employee Gender	3	0.770

Table 3 Outer Loadings for every question through SMART PLS

	Office Chairs	Office Desks * Gender	Office Desks	Office Chairs * Gender	Gender	Emp Per
Office Desks1			0.747			
Office Desks2			0.791			
Office Desks3			0.762			
Office Desks4			0.741			
Office Desks5			0.730			
Office Desks * Gender		1.000				
Office Chairs1	0.740					
Office Chairs2	0.742					
Office Chairs3	0.761					
Office Chairs4	0.757					
Office Chairs5	0.731					
Office Chairs * Gender				1.000		
Employee Gender 1					0.760	
Employee Gender 2					0.870	
Employee Gender 3					0.781	
Employee Per 1						0.901
Employee Per 2						0.802
Employee Per 3						0.890
Employee Per 4						0.763
Employee Per 5						0.779

Table 3 indicated that values of outer loading for every case is more than 0.708 which is minimal required values of outer loading (Ringle and Mena, 2012). Although elements having outer loading values lesser than 0.4 must always be deleted to improve overall composite reliability (Ab Hamid, Sami & Sidek, 2017). Researcher might also delete elements having outer loading values in between 0.4 and 0.7 to composite reliability and average variance expected (AVE) (Hair Jr, Hult, Ringle & Sarstedt, 2016).

Quality Criteria

Table 4 Quality Criteria through Values of R-Square (Predictive Accuracy)

R Square		
	R Square	R Square Adjusted
Employee Performance	0.630	0.604

Table 4 highlighted that the value of R-Square is 0.630 as the minimum acceptable value for R-Square is 0.26 (Cheah, Memon, Chuah, Ting & Ramayah, 2018). Although 0.26 is the least acceptable value and value of 0.5 is treated as moderate and value equal to or greater than 0.75 are retreated as substantial (Hair, Ringle & Sarstedt, 2013). Hence the model developed to check impact of office furniture is slightly better than moderate fit. Though researchers did not try to improve the model fit as most of the times office design studies are conducted through hybrid of variables and very few studies highlight the effect of office furniture in isolation. Therefore, it is bit difficult to make respondents understand the

significance and use of the study, although the value is said to be extremely important predictor of by exogenous variables on endogenous variables (Cheah et al., 2018).

Table 5: Construct Reliability and Validity (Convergent Validity)

Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Office Chairs	0.731	0.754	0.844	0.634
Office Chairs * Employee Gender	1.000	1.000	1.000	1.000
Office Desks	0.829	0.850	0.999	0.759
Office Desks * Employee Gender	1.000	1.000	1.000	1.000
Employee Performance	0.904	0.923	0.956	0.727
Employee Gender	0.770	0.785	0.819	0.621

Ab Hamid et al (2017), indicated that convergent validity is the tool which highlight the correlation of different indicators of the similar construct. Study also indicated that convergent validity is actually a hybrid of factor loadings, composite reliability and average variance explained (AVE). Although Ahmed and Omar (2017) uses the citation of Fornell and Larcker (1981) to indicate composite reliability and average variance explained (AVE) are the two basic and essential measure of convergent validity. Table 5 also includes Cronbach's Alpha (α) and Dillon-Goldstein's rho as the predictors of reliability. Cronbach's Alpha (α) is treated as lower level predictor of reliability (Sijtsma, 2009) and rho is treated as better indicator of reliability as compared to Cronbach's Alpha.

Cronbach's Alpha provides average correlation among the indicators of particular construct with least acceptable value of 0.70 therefore values of rho must be more than 0.70. (Ravand & Baghaei, 2016). Furthermore, AVE is one of the important element in determination of reliability of the construct and its minimum value must be 0.50 (Hair Jr. et al., 2016)

Table 6: HTMT (Heterotrait-Monotrait Ratio) Discriminate Validity

	Office Chairs	Office Chairs * Employee Gender	Office Desks	Office Desks * Employee Gender	Employee Performance	Employee Gender
Office Chairs						
Office Chairs * Employee Gender	0.350					
Office Desks	0.412	0.446				
Office Desks * Employee Gender	0.336	0.434	0.227			
Employee Performance	0.261	0.519	0.401	0.462		
Employee Gender	0.307	0.112	0.545	0.261	0.552	

Hair Jr et al (2016) posited that the purpose of discriminant validity is to highlight the difference lies among the constructs of the study. The maximum range for HTMT (association of variables with each other) is lesser than 0.85 and any value more than that indicated the constructs are overlapping each other (Alarcon, Sanchez, Olavide, 2015 & Hair Jr, Sarstedt, Ringle & Gudergan, 2017).

Table 7: Indicated Fornell and Larcker (1981) criterion associated with Discriminate Validity **Fornell and Larcker (1981) Criterion**

	Office Chairs	Office Chairs * Employee Gender	Office Desks	Office Desks * Employee Gender	Employee Performance	Employee Gender
Office Chairs	0.614					
Office Chairs * Employee Gender	0.314	1.000				
Office Desks	0.462	0.635	0.877			
Office Desks * Employee Gender	0.209	0.341	0.426	1.000		
Employee Performance	0.453	0.149	0.513	0.533	0.491	
Employee Gender	0.219	0.390	0.352	0.332	0.405	0.825

Hair Jr et al (2016) highlighted that square root of each construct's in the model must yield higher values of AVE than its correlation with other constructs.

Therefore, it is right to declare the Fornell and Larcker (1981) citation appropriate enough for testing as the diagonal values are indicating higher values as compared to the other values in its range of y-axis (diagonal values).

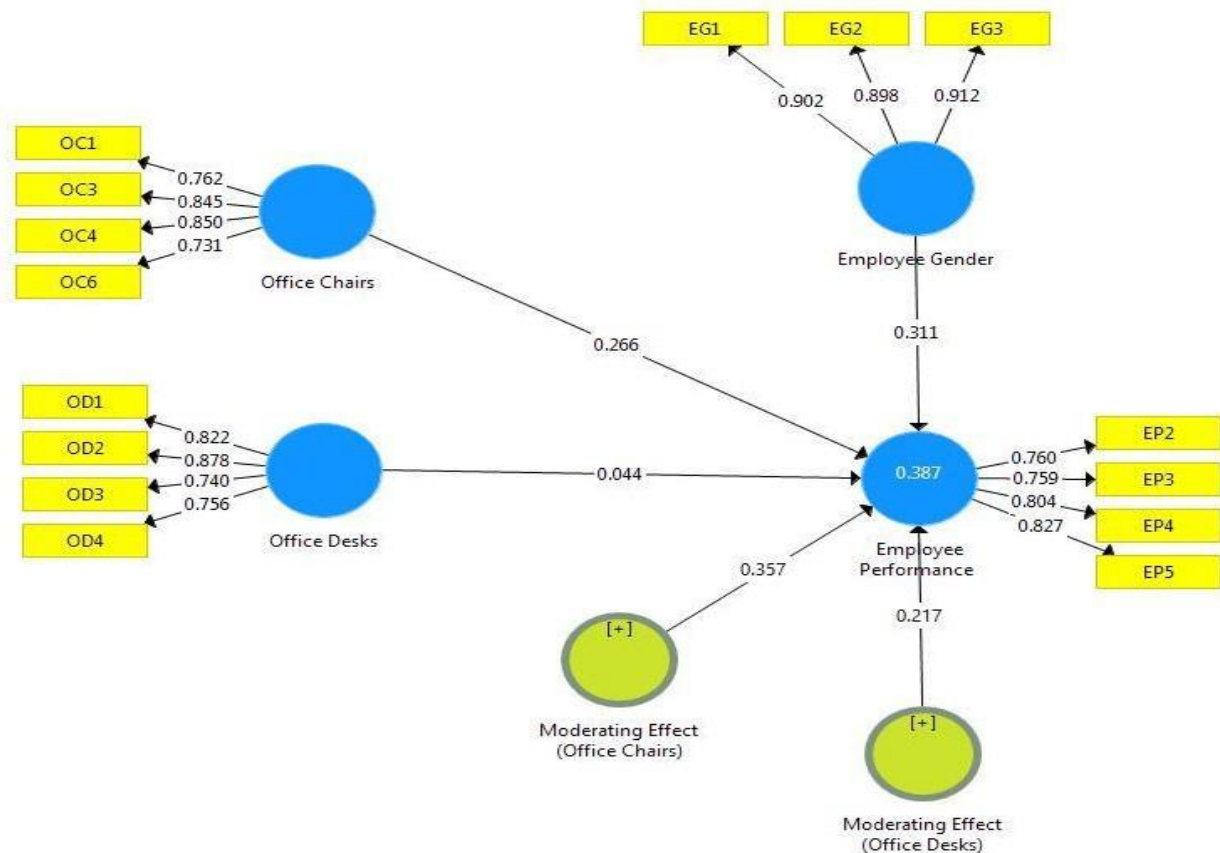


Figure 1: Research Model with outer loadings and regression weights for all the construct through SMART PLS.

Through the help of figure (1 and 2) and with the table 6 it has been indicated that the office furniture is creating significant impact on the performance of employees (i.e. Faculty members of HEIs). Office chairs are producing significant impact on the performance of both genders although office desks are only creating impact with the moderation of employee's genders. Table 6 is also reflecting the same with t-values and p-values and among all the variables (Table 6) employee gender has the most significant value to declare effect on employee performance.

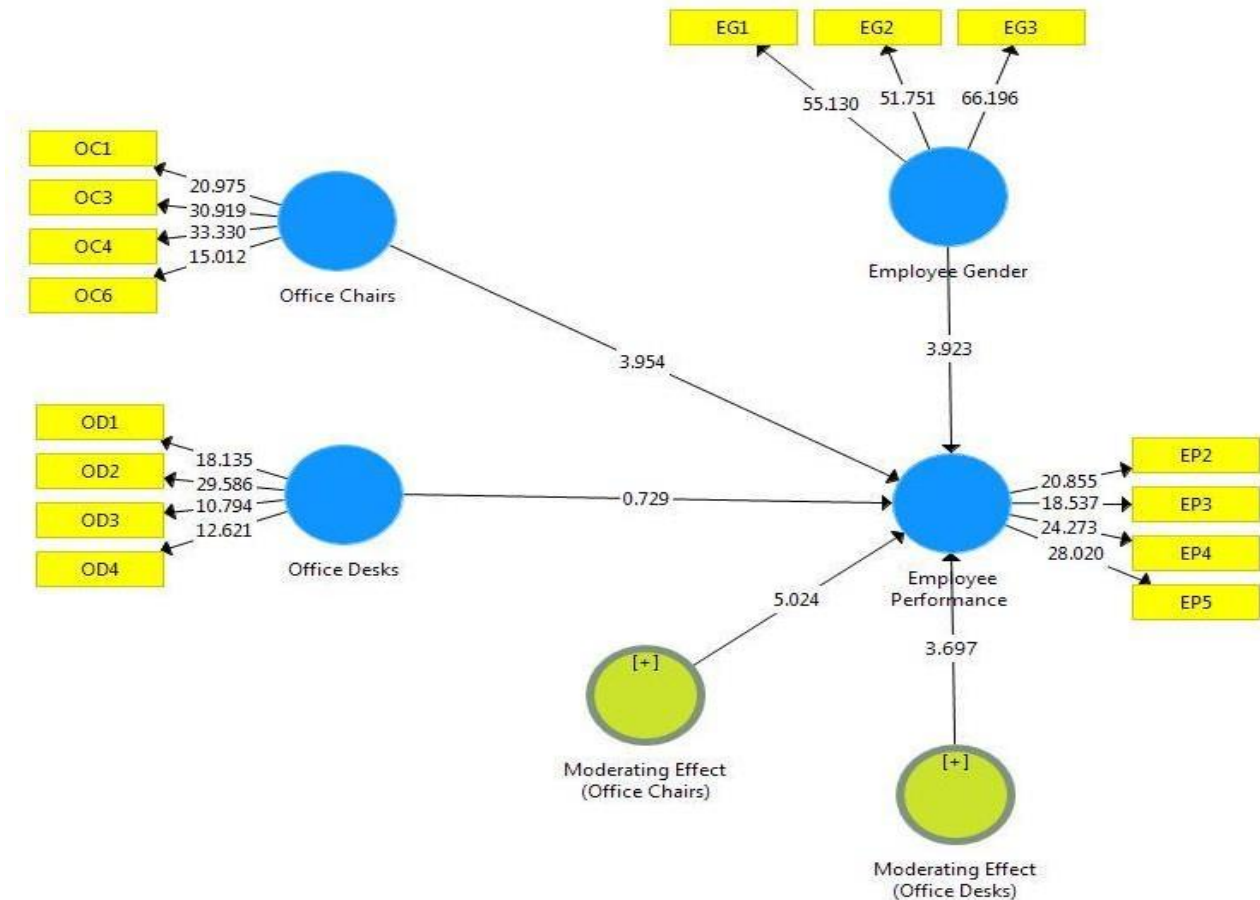


Figure 2: Research Model with t-values for all the construct through SMART PLS.

Table 8: Indicating Total Effect through Path-Coefficient with the help of t-values and p-values Mean, STDEV, T-Values, P-Values

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Employee Gender -> Employee Performance	0.311	0.308	0.079	3.923	0.000
Moderating Effect (Office Chairs) -> Employee Performance	0.352	0.250	0.050	5.024	0.000

Moderating Effect (Office Desks) -> Employee Performance	0.217	0.043	0.060	3.697	0.001
Office Chairs -> Employee Performance	0.266	0.273	0.067	3.954	0.000
Office Desks -> Employee Performance	0.044	0.049	0.061	0.729	0.467

4. Conclusion and Discussion

Study concluded that office chairs are treated as more important element of office furniture in comparison to office desks as variable of chair is found to be effective even without moderation of employees' gender. This is also relevant with the literature of prior studies even those who haven't check the impact of office furniture with respect to different elements e.g. Adu et al., (2014) and Adum et al (2016), El-Zeiny (2012), and Hameed and Amjad (2009).

Moreover, findings of the study also supported the indications of Ulker et al (2015) who indicate the requirement of further studies regarding office chairs in different office settings. Although difference of employee gender is also verifying the indications of Brand (2008) and moderation also makes Klein (1982) and Sarode and Shirsath (2012) fit with the findings of this study. The findings are more coherent with office chairs and their significance as most of the interaction of faculty is with office chairs and the increased impotence of chairs can also be examined from the Ulker et al (2015).

Relating the scenario with respect to higher education sector study indicated that chairs must be ergonomically sound in order to increase performance. Although table (desks) are creating effect with moderation of gender hence legitimate to declare the inclusion of moderator as right in this research.

4.1 Area for Further Studies

Researchers also like to induce importance of more studies in this regard especially those which can uncover the importance of office furniture e.g. shelves, filing systems and drawers. Moreover, the topic can also be checked in other industries which require focused work from employees or have requirement of long working e.g. Banks, Financial Institutions, HR & IT firms etc. Moreover studies which explore the effect of office furniture through anthropometric data e.g. Nnanna et al (2016) and Noshin (2018) would be much beneficial for exploring the importance of office furniture in Pakistan's work settings.

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