

Role of Supervisor in the Performance of Postgraduate Research Students

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Using social learning theory as support, this study aims to empirically quantify the role of the supervisor in determining the performance of postgraduate research students. To accomplish this, the underlying structure of items were identified and validated via exploratory factor analysis and confirmatory factor analysis. Furthermore, the hypothesised relationships were tested via CB-SEM (AMOS). Employing 127 valid responses, it was estimated that supervisor factor explains 33% of the variance in the performance of postgraduate research students. The regression weight for supervisor factor in the prediction of the performance of postgraduate research students is also significantly different from 0 at the 0.05 level (two-tailed). Interestingly, it was also found that the structural model fits the social learning perspective well. Thus, the present study concludes that the better the quality of research supervision the more capable and confident the postgraduate research students are in learning and conducting research independently.

Key Words: *Postgraduate research students' performance; supervisor factor; CB-SEM (AMOS).*

Introduction and Background

The quality of research supervision is a crucial factor in determining the success of postgraduate studies. Supervisors' provide advice and guidance to assist students to plan their research and to develop appropriate research practices. They provide feedback on the progress of the students, develop their research skills, keep them on track to enhance and develop their knowledge in a specific area of research, and equip them with skills needed to become an independent researcher. However, no empirical studies have been conducted previously to investigate how much of the variance in the performance of postgraduate research students is explained by the quality of supervision, and hence the present study finds its rationale.

Research Objectives

1. To identify the underlying structure of items that makes supervisor factor and postgraduate research students' performance scale and the number of involved factors.

2. To examine the role of supervisor factor in the performance of postgraduate research students.

Research Questions

3. What is the underlying structure of items that makes supervisor factor and postgraduate research students' performance scale? How many factors are involved?
4. What is the role of supervisor factor in the performance of postgraduate research students?

Review of Literature

A wide range of studies by researchers (e.g., Usman and Dangars, 2015; Ankoma-Sey and Maina, 2016; Ayandoja, Aina, and Idowu, 2017) has found a positive relationship between supervision and academic performance of school students. The findings predominantly indicate that success of research projects mainly depends on the interaction of students and supervisors Moskviceva, Bordovskaia, and Darinskaya (2015). Abdullah and Evans (2012) found that "fast track supervisors"

were rated more favourably by postgraduate students than “normal” supervisors implying that the “fast track supervisor” was more successful in the context of postgraduate studies. Investigating the factors affecting the completion of postgraduate degrees, De Zoysa (2008) found that one of the many reasons why some students dropped out of their respective programs was a lack of supervisory support. An exploratory factor analysis by, Ismail (1997) identified the economic and demographic background of students and their personal issues as a crucial factor behind the dropouts. Similarly, the research findings by Parker (1995) indicated the locus of control and financial assistance as key predictors of dropouts at postgraduate level distance education. Most importantly, Meerah (2010) elaborated that the nature of supervision proves to be one of the major factors that influences the student’s performance. Arabaci and Ersozlu (2010) found that faculty’s mentoring skills greatly affect students’ performance. The effect becomes more prominent in supervisors’ style of advising and guidance, sharing experiences and being a role model for students. About mentoring skills, Ketter (2009) cites the quote of John Crosby, “*mentoring is a push in the right direction*”. Cowan (2006) concluded that in the field of management, mentoring is a very common topic. Kay and Hinds (2002) underwrites this view and declares mentoring as a relationship between two independent sides in management structure in which a mentor guides a mentee towards a common goal. Allen and Eby (2007) define a mentor as a supervisor, a guide, a teacher or a skilled developer who helps individuals to realise their dreams of an ideal life. Arabaci and Ersozlu (2010) reassert this by pronouncing supervisors’ mentoring skills as an important influencing factor in postgraduate students’ education. They concluded that postgraduate students’ perceptions about

their supervisor’s mentoring skills are above average and also found that mentoring skills of female supervisors were higher than the male. Another descriptive study by Mutula (2009) revealed that poor supervision significantly influences the performance of students along with the quality of supervision may also be affected by the research experience of supervisor.

Development of Hypothesis

Thus, based on the above arguments, the following hypothesis is proposed;

H1: *There is a relationship between supervisor factor and the performance of postgraduate research students.*

Methodological Assumptions

Students pursuing MBA by research program and PhD in management studies in different universities in Klang Valley, Malaysia, were selected as the target sample for this study. The data was collected from 156 respondents out of which 127 valid responses were analysed after screening. To ensure that the respondents had the necessary knowledge about research, only the data from students enrolled in the second and third semester were considered. The survey questionnaires for supervisory factor were adopted from the operationalised definition of previous descriptive and exploratory studies (e.g., Kay and Hinds, 2002; Allen and Eby, 2007; Mutula, 2009; Arabaci and Ersozlu, 2010), whereas the survey questionnaire for the performance of students was developed for this research. To ensure construct validity and reliability, exploratory factor analysis (EFA) together with confirmatory factor analysis (CFA) was conducted. Since we developed some research instruments to achieve the main objective of this study; therefore, exploratory factor analysis was conducted to isolate the latent factors from these items. Further, to validate the EFA results, and statistically establish that the constructs

under study load into a certain number of underlying sub-constructs, confirmatory factor analysis was conducted. The hypothesised relationship was examined via structural equation modelling with the application of CB-SEM.

Analysis and Results

Uni-dimensionality tests The fourteen items of a supervisory factor and seven items of the performance of students were subjected to principal component analysis (PCA). Prior to performing PCA, the suitability of

data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients with values of 0.4 and above. The Kaiser Meyer-Olkin value for supervisory factor was 0.837 and for the performance of postgraduate students was 0.775 which exceed the recommended value of 0.5 (Kaiser,1974). Together with Bartlett’s Test of Sphericity, which is statistically significant, the results are in support of the factorability of the correlation matrix.

Table 1: *KMO and Bartlett’s Test*

<i>Kaiser-Meyer-Olkin Measure of Sampling Adequacy</i>		SF	SP
		0.837	0.775
<i>Bartlett’s Test of Sphericity</i>	Approx. Chi-Square	450.188	
	df	55	301.761
	Sig.		21
		0.000	0.000
Eigenvalues		4 & 1.8	3.5
Total variance explained		40+16%	51%

The two-component solutions for supervisory factor explained a total of 56% of the variance with component one contributing 40%, and component two contributing 16%, whereas, the seven items of the performance of postgraduate students explained a total of 51% of the variance. Next, to strengthen the argument for retaining the correct number of variables of a supervisory factor, and as suggested by Hubbard and Allen (1987), and Zwick and Velicer (1986), the eigenvalues generated based on PCA were used. It is clear from Table 1 that the eigenvalues generated are larger than the criterion value and hence, two factors are retained. The results showed that the factor analysis or data reduction analysis is reduced to 10 items of a supervisory factor, which are the mentoring It is worth mentioning here that to aid the interpretation of the two components; oblimin rotation was performed. As is evident from Table 2, the pattern matrix

skills of supervisors and their research experience.

Table 2: *Pattern and Structure Matrix of Factors*

Items	Pattem coefficients		Structure coefficients	
	Components		Components	
	Mentoring skills	Experience	Mentoring skills	Experience
SF8	.926		.876	
SF9	.813		.806	
SF7	.786		.753	
SF3	.729		.734	
SF5	.629		.683	
SF2	.627		.666	
SF10	.456 ²	.333	.554	.467
SF14		.767		.760
SF11		.734		.751
SF12		.697		.718
SF13		.697		.705

revealed the presence of simple structure with two components, showing a number of strong loadings. Further, two specific forms of construct validity, namely, convergent

validity and discriminant validity were used in this study. The two components are found to have acceptable convergent and discriminant validities. Table 2 shows a pattern of correlation and all six items of mentoring skills, and four items of supervisor experience are related to the same construct (i.e., supervisor factor). It can be noted that the results displayed in Table 2 also show a discriminant validity because the relationships between measures of different constructs are very weak. Thus, the correlation provides evidence that the measures that should not be related are in reality not related. Only item 10 were found to be cross-load on another factor. However, such items were dropped for further investigation Hadi, Abdullah, and Sentosa (2016a).

Confirmatory factor Analysis Confirmatory factor analysis was conducted to validate the EFA results, and statistically establish that the constructs under study load into a certain

number of underlying sub-constructs. It is evident from Figure 1 that all indicator loadings are above the threshold of 0.5, ranging from 0.52-0.88, the two sub-latent constructs (mentoring skills and supervisory experience) of the supervisory factor are also moderately to highly correlated (.71*.55 = 0.39). Therefore, the hypothesised high order factor is a good explanation of the correlations that exist among the sub-constructs (Cunningham 2008). Furthermore, the hypothesised higher order model reveals a comparatively good fit as can be seen from Figure 1, indicating that the model fit the data well as all the indices such as χ^2 , $\chi^2/df = 1.391$, probability value = 0.064, GFI = 0.927, CFI = 0.964, TLI = 0.952, RMR = 0.041, and RMSEA = 0.059 fulfils the recommended threshold. All these values indicate an adequate model fit. Therefore, re-specification of hypothesised measurement model is not required.

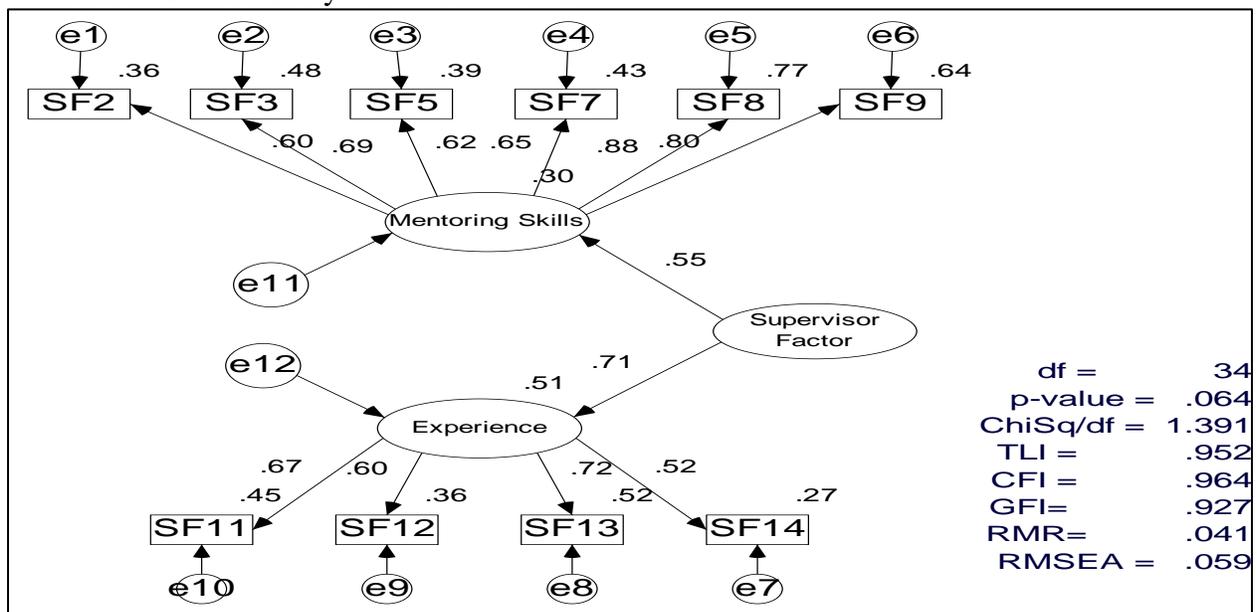


Figure 1: Hypothesised measurement model of supervisor factor

Structural model To confirm the suitability of measurement model, the next step is to test the hypothesised relationship, presented by the structural portion of the model as

shown in Figure 2. It is clear from the figure that the structural model needs to be re-specified as the goodness of fit indices did not fulfil the recommend criterion.

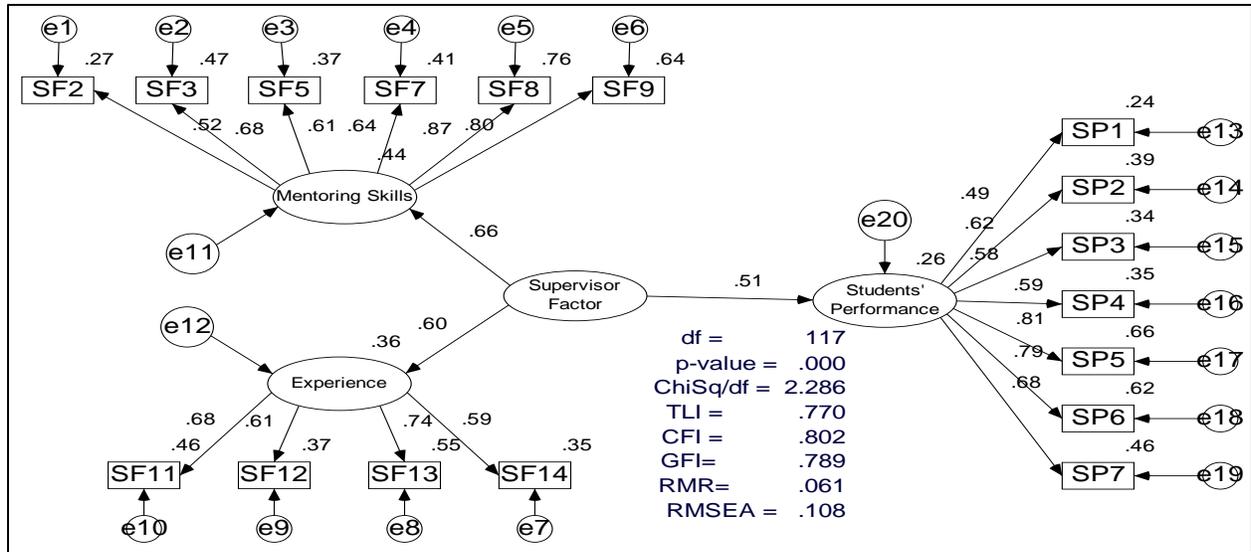


Figure 2: Hypothesised structural model

The hypothesised model was modified, and the issues were addressed through the deletion of inappropriate items such as SP1, SP2, SP5, SF3, and SF14. The re-specified structural model is presented in Figure 3.

Table 3: Hypothesized and Re-specified Structural Model

Evaluation Indices	Hypothesised structural Model	Re-specified structural Model
CMIN or X^2	236.9	57.62
Df	117	42
P- Value	0.000	0.055
CMIN/df or X^2/df	2.286	1.372
RMR	0.061	0.048
GFI	0.789	0.919
TLI	0.770	0.948
CFI	0.802	0.960
RMSEA	0.108	0.058

Subsequently, the model fit the data well, as confirmed by the following values: p-value=0.055, CMIN/df = 1.372, GFI=0.919, TLI=0.948, CFI=0.960, RMR=0.048 and RMSEA=0.58. This study found a positive

and significant relationship between supervisor factor and the performance of postgraduate research students. The amount of variance explained by supervisor factor is also considered to be medium (33%).

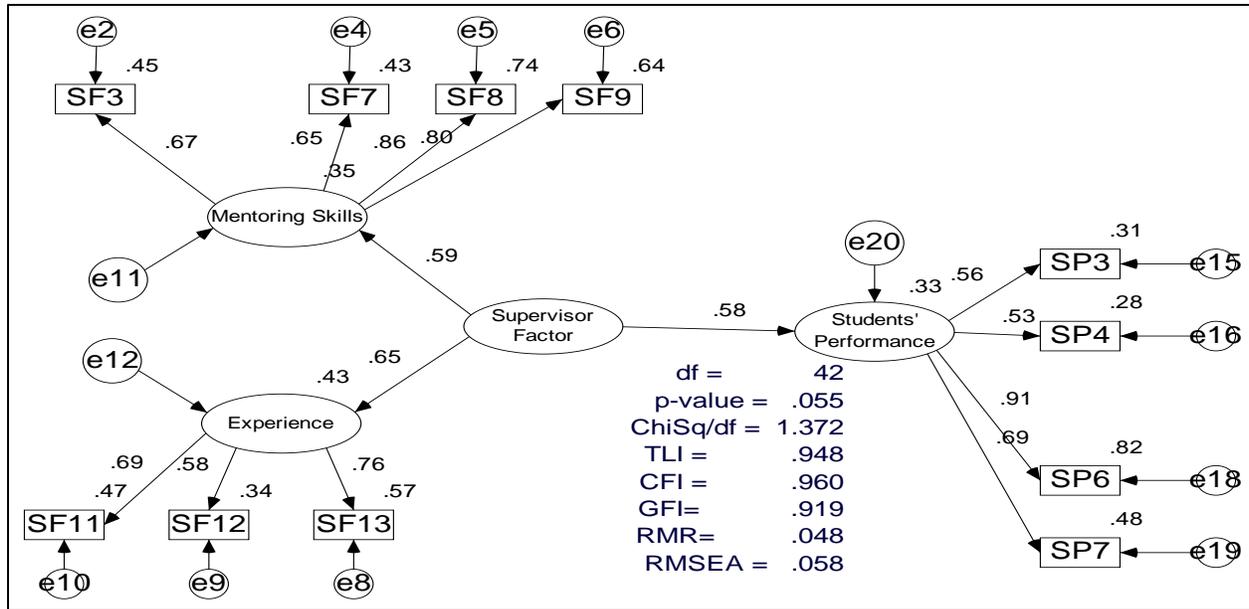


Figure 3: Re-specified structural model

A comparative analysis of hypothesised and re-specified structural model as shown in Table 3 reveals that the removal of inappropriate indicators made a significant improvement to the re-specified model (Figure, 3 and Table 3). In particular, the overall chi-square value decreased from 236.9 to 57.62. Similarly, an increase in the probability value associated with X^2 from 0.000 to 0.055 is also an indication of a good fit. Improvement in other fit indices was also found, for instance, RMSEA decreased from 0.108 to 0.058, TLI increased from 0.770 to 0.948, CFI from 0.802 to 0.960, GFI from 0.789 to 0.919.

Findings and Discussion

In this study, exploratory factor analysis was used to identify the structure underlying each construct. The underlying structure of factors was further validated via confirmatory factor analysis. When statistically examined, the construct under study loaded into a number of underlying sub-constructs. Results revealed that mentoring skills and supervisor experience confirmed as dimensions of supervisor factor. Furthermore, the instruments used in the study are considered reliable and valid as indicated by composite reliability CR and

AVE whose values are above the threshold (0.7 and 0.5 respectively¹).

Composite reliability for students' performance

$$\begin{aligned} \text{Composite reliability} &= \text{SSI}/(\text{SSI}+\text{SEV}) \\ \text{SSI} &= (.56 + .53 + .91 + .69)^2 = 7.23 \\ \text{SEV} &= .31 + .28 + .82 + .476 \\ \text{SEV} &= .69+.72+.18 +.52 = 2.11 \\ \text{CR} &= 7.23/(7.23 + 2.11) \\ \text{CR} &= 7.23/ 9.34 = .77 \end{aligned}$$

Composite reliability for supervisor experience

$$\begin{aligned} \text{SSI} &= (.69 + .58 + .76)^2 = 4.12 \\ \text{SEV} &= .476+.336+.577 \\ \text{SEV} &= .524 + .664 + .423 = 1.61 \\ \text{CR} &= 4.12/(4.12 + 1.61) \\ \text{CR} &= 4.12/ 5.73 = .72 \end{aligned}$$

CR for mentoring skills

$$\begin{aligned} \text{SSI} &= (.67 + .65 + .86+ .80)^2 = 8.88 \\ \text{SEV} &= .448 + .422 + .739 + .64 \\ \text{SEV} &= .552 + .578 + .261 + .36 = 1.751 \end{aligned}$$

¹ AVE for mentoring skills
 $\text{AVE} = (.67^2 + .65^2 + .86^2 + .8^2)/4$
 $\text{AVE} = .448 + .422 + .739 + .64 = 2.249/4 = .56$
 AVE for supervisor factor = $.47 + .56 = 1.02 / 2 = 0.51$

$$CR = 8.88 / (8.88 + 1.751)$$

$$CR = 8.88 / 10.631 = .835$$

The β of the path coefficient emanating from the supervisor factor to postgraduate research students' performance has a positive influence on the performance of students, indicating that the relationship between the two is statistically significant at 5% level with $\beta = 0.57$, C.R = 2.85, and a p-value of 0.004 which further means that the probability of getting a critical ratio as large as 2.85 in absolute value is 0.004. Thus, it can be interpreted that if supervisor factor goes up by 1 standard deviation, student's performance goes up by 0.57 standard deviations. In other words, a 100-point change in supervisor factor will bring about 57 points of change in performance of the students. Therefore, hypothesis H1 stands validated.

This finding is in line with the predictions of the social learning theory by Albert Bandura, which posits that "*learning is a cognitive process that takes place in a social context and can occur purely through observation or direct instruction*". The findings of this study are also consistent with previous descriptive studies by Mutula (2009), Arabaci and Ersozlu (2010), Abdullah and Evans (2012) and Peach, Ruinar, and Webb (2014) among others.

Conclusions

The study is an effort to quantify the supervisor's role in the student's performance in postgraduate level studies context. Firstly, the underlying structure of items was identified which later was validated. The result of CFA elaborated the fact that the mentoring skills and supervisor experience are confirmed dimensions of the supervisory factor. On the whole, the supervisory factor explains 33% of the variance in postgraduate research students' performance. The hypothesis testing revealed the results of the hypothesised relationship. It was found that supervisor

factor does affect the performance of postgraduate research students. To conclude, the structural model fits the social learning perspective well and it is found that the higher quality of supervision leads to more competent and confident the postgraduate research students. So the supervisor's role directly impacts the postgraduate students' learning and enable them to be more competent at conducting effective research independently.

Implications

The research findings of the current study can have significant levels of implications for academic institutions, supervisors, students, and overall research and higher education policymaking institutions. Considering the findings of the study, academic institutions can ensure success by ensuring their focus on acquisition, training and retention of quality supervisors. Further, mentoring skills and supervisor experience are keys to predicting the performance of a researcher. Therefore, a supervisor should view training as an integral part of their improvement as learning-oriented training programs improve skills.

The results also suggest that students should follow a supervisor who is relevant to their key area of research and interest. They should create and maintain a friendly and healthy relationship with their supervisor. Student-Supervisor meetings must be arranged frequently on regular basis. This will allow the student to get the supervisor's feedback regarding their progress. Lastly but most importantly, the policymakers must organise learning oriented training opportunities for faculty of higher education institutions to help improve and enhance the quality of supervision.

Limitations and Future Research Direction

Limitations of the current study include the cross-sectional data that was collected from Malaysia. This restricts the findings to be

generalized and implemented in other regions. Future research on the topic should be conducted in other parts of the globe aligned with the local context. The findings of the study might be affected due to differences in cultural psychology. The current study is also the first to quantify the role of supervisors. Therefore, recommended future research needs to be done to see the role of supervisor factor together with other relevant variables such as institutional factor, student personal factor, etc, further, associated factors can also be studied for assessment of their moderating or mediating role in the relationship. The present study relies on the perceptual data of postgraduate management students which somewhat limits its scope. Future research direction should include and consider students from other disciplines.

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