International Journal of Doctoral Studies

An Official Publication of the Informing Science Institute
InformingScience.org

IJDS.org

Volume 15, 2020

PSYCHOMETRIC ANALYSIS OF A PROPOSED MODEL TO DETERMINE FACTORS INFLUENCING SELECTION OF A RESEARCH SUPERVISOR

Ali Shafiq	Taylor's University, Selangor Darul Ehsan, Malaysia	ali.shafiq@taylors.edu.my
Saeed Pahlevan Sharif	Taylor's University, Selangor Darul Ehsan, Malaysia	saeed.sharif@taylors.edu.my
Anbareen Jan*	Taylor's University, Selangor Darul Ehsan, Malaysia	jananbareen@sd.taylors.edu.my

* Corresponding author

ABSTRACT

Aim/Purpose	This paper found some factors which influence research supervisees' selection of their research supervisors.
Background	Research on supervisor-supervisee relationship is mostly conducted when research students have already initiated their studies. Research on *how* a supervisor is selected *before* the research begins is researched less. How do supervisees select their supervisors? Which factors do they consider important? These questions were not clearly answered in the literature so far.
Methodology	A scale was developed to measure factors which influence the selection of research supervisors. Using an online survey, data was collected from 315 research students in Malaysia between August and October 2018. Psychometric properties of the scale were assessed using exploratory factor analysis followed by confirmatory factor analysis. Construct reliability, convergent validity, and discriminant validity of the scale were assessed using composite reliability, maximal reliability, average variance extracted, and maximum shared variance.
Contribution	How research supervisees select their supervisors is an understudied area. Most of the research on supervisor selection is done *after* the research journey has begun. This research focuses on the thought processes *before* supervisor selection.

Accepting Editor Peter John Sandiford | Received: February 15, 2020 | Revised: May 5, May 29, 2020 | Accepted: June 1, 2020.
Cite as: Shafiq, A., Pahlevan Sharif, S., & Jan, A. (2020). Psychometric analysis of a proposed model to determine factors influencing selection of a research supervisor. *International Journal of Doctoral Studies, 15,* 285-304. https://doi.org/10.28945/4567

Findings	Demographics, expertise, and physical appearance emerge as important constructs that influence the thought process of a research supervisee. Each of these constructs is composed of several dimensions, each with its own weight and importance.
Recommendations for Practitioners	Research supervision is an integral part of contemporary teaching profession. To develop this important dimension of an academic's career, this research holds high significance. The emerging factors will help researcher supervisors enhance their profiles and become more visible. This has practical implications for higher education institutions as well.
Recommendation for Researchers	Further studies in this area can explore these factors across different cultures, distinction between undergraduate and postgraduate students, public and private higher education institutions, and scholarship or self-funded students.
Impact on Society	Attracting better and relevant research students will result in a better match between researcher's capability and supervisor's expertise leading to high impact research.
Future Research	This research was done on only 315 respondents. More respondents from diverse population might influence the outcome.
Keywords	research supervision, supervisee-supervisor relationship, postgraduate research, SEM, AMOS

INTRODUCTION

Education comes within the service sector of an economy. It is an intangible offering that lies within the 'Mental Stimulus Processing' quadrant (Lovelock, 1983). The service providers, just like the manufacturers of a product, send favourable information about their services to attract interested people. Recipients process this information in their 'black box' and decide whether to avail the service or not. This process is captured in the Three-Stage Model of Service Consumption. These three steps are identified as *pre-purchase stage, service encounter stage,* and *post-encounter stage* (Lovelock & Wirtz, 2011).

Conducting research is of central importance in successful completion of many undergraduate and graduate programmes (Onen, 2016). For undergraduate programmes, research typically comprises of a research project (also called final year project) which usually spans 1-2 semesters, whereas for postgraduate programmes, research is generally longer in duration. Despite this difference, students of both programmes conduct their research under supervision of a research supervisor. A typical job description of a research supervisor is to use his/her experience and knowledge in guiding supervisees in carrying out a research project, or an entire thesis in case of postgraduates. Successful completion of any academic research depends significantly upon the supervisor-supervisee relationship, which we refer here as research supervision.

Research supervision is described as "a two-way interactional process that requires both the student and the supervisor to consciously engage each other within the spirit of professionalism, respect, collegiality, and open-mindedness. Supervision is a complex social encounter which involves two parties with both converging and diverging interests" (Ismail et al., 2011, p. 79). It can be argued, though, that there are more than two parties involved with diverse interests. A supervisor and his/her supervisee both need to understand all important characteristics of each other to make this relationship effectives. Hence it is also termed as 'ethical work' (Grant, 1999), as it tries to understand the way people are and what they want to be.

For those programmes where conducting research is compulsory for degree completion, effectiveness of research supervision becomes crucial. Effectiveness of this relationship, which although is between two personalities, is also influenced by many non-personal factors. As can be seen in the

sections below they include gender, age, nationality, and religion as one's personal factors; while experience, fame/repute, possession of research grant, administrative/leadership position as some of the non-personal factors. It is a combination of these personal and non-personal factors that influences research supervision.

Existing literature on selection of an academic supervisor has taken into account perspectives of doctoral students as well as their supervisors (Ives & Rowley, 2005; Murphy et al., 2007; Onen, 2016; Lee, 2008) and has broadly focused on role of supervisor and supervisor-supervisee relationship (Cheon et al., 2009; Mainhard et al., 2009). Reviewing the existing literature reveals that it is conducted within the period when research supervisee had already initiated their research studies, meaning that they had selected their supervisor, and their relationship had been established. On the contrary, little research is done to reflect that period when the supervisee is selecting a supervisor. When looked at from the perspective of the Three-Stage Model of Service Consumption, most of the existing research fits in the second (*service encounter*) stage. This stage means that supervisees have received information from the service provider (research supervisor) and have made their decision of selecting a supervisor (*pre-purchase stage*). Within this scenario, a question arises: What about the period *before* the relationship began? How did supervisees select their supervisors? Which factors did they consider, and how did they weigh those against others? These questions will help in understanding the thought process of a supervisee when making this important decision. However, these questions were not clearly answered by the literature. Research on *how* a supervisee makes decision *before* the supervisory relationship begins is researched less.

A critical review of literature reveals two streams of research done within the domain of supervisor-supervisee relationship: Those who studied this relationship after the relationship began. Common names included in this stream are: (Al-Naggar et al., 2012; Burnett, 1999; Fulton & Turner, 2008; Ismail et al., 2011; Lessing & Schulze, 2002; Malfroy, 2005; Nordentoft et al., 2013; Svinhufvud & Vehviläinen, 2013; Vilkinas, 2008). Research within the other stream studied this relationship before it was formed. It includes Onen (2016) and Shafiq and Jan (2017). This research is also part of the second stream, so it is pertinent to discuss the earlier work done. Research by Onen (2016) found the factors that influence PhD students' selection of supervisors at a university in Africa. The author's motivation to conduct this research was 'reactionary'. Many PhD students from this university had complained against their supervisors which motivated Onen (2016) to conduct his research. Hence, this research was limited to a specific university. It used a mixed-methods approach for data collection and analysis. Finally, its author used 'Rational Choice Theory' as an underlying basis for supervisees' decision. One of the assumptions of this theory is that people make rational choices by making rational calculations. While these assumptions strongly hold true in economics, they might not be entirely true when making general decisions. This criticism can be supported by Shafiq and Jan (2017) who found that supervisees even considered 'physical attractiveness' and 'profile picture' when selecting a supervisor. Apparently these factors do not seem 'rational'. The other paper in this stream is by Shafiq and Jan (2017) which also forms the basis of this research. Shafiq and Jan (2017) explored the important factors which determined students' selection of their research supervisors. The authors also ranked the explored factors in order of importance. In their conclusion they proposed a conceptual model on how these factors could be categorised (see Figure 1). But what they lacked, which they also acknowledged, was generalisability of their proposed model since they did not collect data from a large sample. This research takes the work of Shafiq and Jan (2017) further. It considered the shortcoming of Shafiq and Jan (2017) and so developed a questionnaire for large sample size. This questionnaire was based on the same dimensions as explored by Shafiq and Jan (2017). Using large sample size would help validate the proposed model by Shafiq and Jan (2017) and generalise it. Hence the objectives of this study are:

1. To analyse the psychometric properties of a research instrument developed to find the factors research students find important in selecting a supervisor.

2. To validate the model given by Shafiq and Jan (2017) by using the survey instrument developed in objective 1.

These objectives helped fill a two-pronged gap in the available literature. Within the context of selecting a research supervisor this research (1) developed an instrument to get their responses, and (2) developed a model that includes all important factors related to selection of a research supervisor. To meet these objectives an online questionnaire was circulated to undergraduate and postgraduate research students studying in Malaysia. Malaysia is fast becoming an educational destination for higher education. Many of its public and private universities are being ranked in Asian and International rankings reflecting its focus on education quality. Its PhD numbers are increasing and according to Malaysia Education Blueprint 2015-2025 efforts are being made to increase them even further by 2025. In addition to postgraduate students, undergraduate students were also included in this study. These students were undertaking a bachelors with honours during which they had to take a research project spanning 1-2 semesters. This research project culminates in a report which is equitable to a shorter version of a postgraduate thesis. The assessment criteria for these students is different from postgraduates in that it does not generally have a viva-voce, but other rubrics are similar, although being less stringent than postgraduates. Generally, undergraduates have a broader option to select their supervisors because they do not necessarily require one with PhD qualification. This is not the case for postgraduates, especially PhD students, whose supervisor must have obtained a doctorate degree. However, even in such case, larger number of undergraduates limits the chances that they will get their preferred supervisor. Another important aspect of undergraduate supervision is that generally there is one-to-one supervision. For postgraduates, especially for PhD students, there is a supervisory team typically comprising of 2-3 supervisors. It can be noticed from these salient points that supervision for undergraduates and postgraduates is different mainly at the level and not necessarily by nature. This background warranted undergraduates to be considered in this research along with postgraduates.

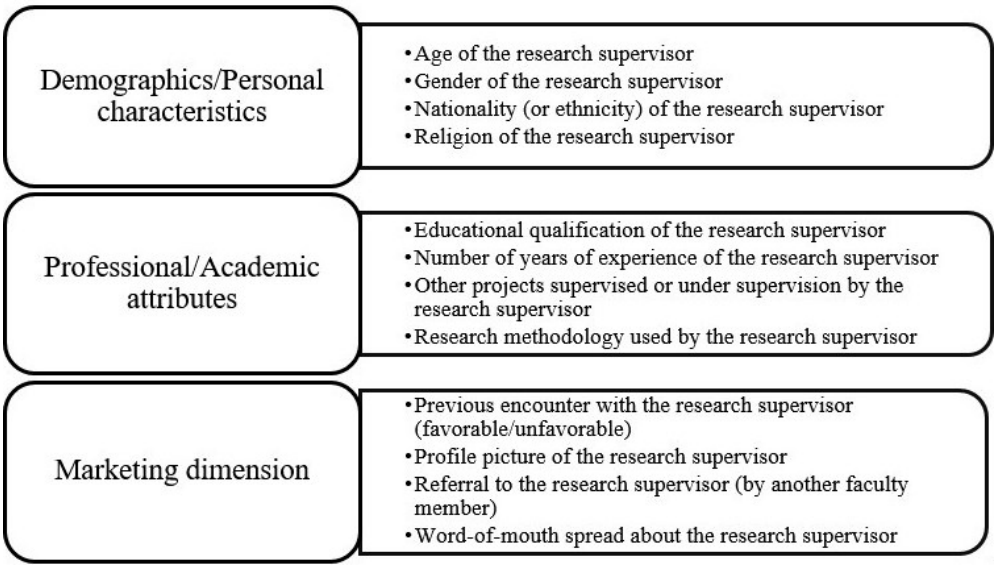

Figure 1: Categorization of dimensions as given by Shafiq and Jan (2017)

The following sections detail how this paper unfolds: After briefly introducing the topic and its background, the relevant literature is discussed. It discusses what has been done and where it falls short. This is followed by methodology which explains quantitative nature of this research, usage of questionnaire, selecting sample size, and use of AMOS. The data analysis section elaborates how the model was developed and its key assumptions, whereas the findings section highlights its key threshold values. The conclusion and discussion section explains the findings of the model, while the rec-

ommendations section highlights how this research is beneficial for faculty and educational institutions. While this research is important in its own domain, it must be recognised that it had its own limitations. All the respondents were studying in Malaysia. The data would have been broader had it come from different countries. Second, there was an imbalanced representation of undergraduate and postgraduate students; ideally both groups should be similar in size.

LITERATURE REVIEW

Selecting research supervisor holds critical importance in the entire research journey that students embark on (Ives & Rowley, 2005). The process of selecting supervisors differs across institutions; ideally a student's choice should be given prime importance, but quite often it is not (Onen, 2016). Some studies have also discovered that students are unaware that they have a choice of selecting their own research supervisors (Ives & Rowley, 2005; Onen, 2016). According to Halcomb (2016) in selecting a supervisor, students should collect basic information such as supervisor's area of expertise, number of supervisees under their supervision, and their publication record prior to initiating their research studies. However, these are not the only attributes that students should look at. Literature reveals the following important characteristics in/about research supervisors that are important to research supervision. As mentioned above there are two streams of literature pertaining to research *before* and *after* the relationship started. Hence, the literature is also discussed considering both streams.

Age, gender, and nationality

Research supervision is influenced by demographics of supervisor and supervisee. The most common demographics that affect this relationship are age, gender, and nationality. Gender is considered a very important influencing demographic factor (Cheon et al., 2009; Datta et al., 2009; Goodyear et al., 1992; Grant, 1999; Ismail et al., 2011). Age is another demographic which is commonly cited (Cheon et al., 2009; Datta et al., 2009; Grant, 1999; Ismail et al., 2011; Zhao et al., 2007). Nationality is another commonly cited demographic that affects research supervision (Grant, 1999; Ives & Rowley, 2005; Ismail et al., 2011). Supervisors are human beings, and their gender and age perform a significant role in their personalities (Cheon et al., 2009; Datta et al., 2009). With regards to these factors, a study conducted at a Malaysian public university found age and gender as important factors which influence students' PhD completion (Al-Naggar et al., 2012). Alternatively, there are other research which found gender of supervisor to be the least important factor in selection (Ives & Rowley, 2005; Jamieson & Gray, 2006).

Alternate viewpoint on gender

Gender also influences the research supervision in a non-academic way. Goodyear et al. (1992) in their research found opposite genders developing broader non-academic, physical, and/or romantic relationships. Their research was limited to opposite genders only. Broadly it may include relationships between same genders. In any case the authors assert that such relationships are risky as they might jeopardize the academic relationship, especially if such romantic relationship turn sour. Hence Ives and Rowley (2005) advised to prioritise intellectual rather than personal needs when selecting a supervisor

In addition, there are other demographics such as supervisor's religious preferences, ethnicity, and race (Cheon et al., 2009; Datta et al., 2009) but their influence is lesser than gender, age, or nationality. Similarly, supervisor's tribe is another influencing variable, but with lesser effect (Onen, 2016). Finally, supervisor's marital status is also found in literature, but its affect is considered very insignificant (Zhao et al., 2007).

Supervisor's religion

Supervisor's religion may also affect the relationship (Cheon et al., 2009; Datta et al., 2009). Supervisees see their supervisors through their religious lens. This might lead to favourable or unfavourable bias, such as that reported by Goodyear et al. (1992) when a faculty member refused to chair the dissertation of a student because of difference in religion.

Supervisor's experience and capabilities

A supervisor is an "experienced and successful researcher, an established authority in some area of his/her discipline" (Grant, 1999, p. 7). Capabilities of supervisors are regarded as a vital factor in the success of a candidate (Ismail et al., 2011; Lessing & Schulze, 2002; Vilkinas, 2008). A successful dissertation is not only the outcome of a research student's capabilities but is also affected by the contribution from supervisor. Competence in field is regarded as one of the two most important elements when selecting a supervisor (the other element is supervisor's availability) (Ives & Rowley, 2005). Some salient findings on supervisor's competence are listed below:

- Students base their selection primarily on supervisor's academic experience (Datta et al., 2009; Ives & Rowley, 2005; Onen, 2016). Lack of experience on part of a supervisor can lead to failure of students (Ismail et al., 2011) which is why their area of expertise has been ranked high in relation to their capabilities (Ives & Rowley, 2005; Onen, 2016). Even though expertise of a supervisor in a given research area is considered the main factor, some authors believe that a balance between critique and creativity comes next in the list of contributions that a supervisor can make in the success of a supervisee (Lessing & Schulze, 2002; Momeni et al., 2011).
- Similarly, knowledge is ranked as one of the two most important factors in selecting a supervisor (Momeni et al., 2011, Onen, 2016). This gets support by others who believe students often give more emphasis to highest academic qualification (Buttery et al., 2005). Yet, it should not be taken as the final word because students' opinions regarding supervisor's knowledge, skills, and personality are also found to be overlapping (Ali et al., 2016).
- Communication skill is another attribute that students have frequently cited important in the supervision process (Datta et al., 2009; Momeni et al., 2011). It is also ranked in the two most important attributes when selecting a supervisor (after his/her knowledge) (Momeni et al., 2011).

Other projects supervised by supervisor

One of the criteria of supervisor's selection is research publications (Ali et al., 2016; Datta et al., 2009; Onen, 2016). Research supervisors should be chosen based on their established research record (Ives & Rowley, 2005). This sounds logical too because if a supervisor is not an active researcher then the burden of meeting research targets falls on supervisees alone (Lessing & Schulze, 2002). Vilkinas (2008) asserts that to be actively engaged in research, a supervisor must possess relevant research knowledge in that field. This links research track record back with research expertise and knowledge, as discussed above.

Previous encounter/interaction with supervisor

Choosing supervisor is also challenging because supervisees don't know about them until they start working with them (Onen, 2016). It can be helped if supervisees have had an interaction with their supervisor previously such as taking a course with them, or having met them in past, etc. Interaction of supervisors with supervisees is also identified as an important criterion (Datta et al., 2009). It concurs with a previously proposed model of supervision which asserts that previous episodes of interaction between a supervisee and supervisor holds high importance in successful completion of dissertation (Grant, 1999).

Referral to supervisor by others

Students seek referral to experienced teachers for their research (Lessing & Schulze, 2002). While in most cases a supervisor is assigned by their institution, in some instances parents (or guardians) also suggest a particular supervisor because of personal/family relation (Onen, 2016). It was opined by Shafiq and Jan (2017) that referral also includes those given by a faculty member/colleague. In this regard, discussion among staff about their supervisory practices might be beneficial for research students (Al-Naggar et al., 2012) as it can help in sharing knowledge about one's supervisory practices.

Word-of-mouth about research supervisor

Reputation among students and colleagues is often very helpful in selecting a supervisor (Datta et al., 2009; Onen, 2016). This argument is supported by the following narration, "no one advised me on whom to choose. I just made my choice depending on what I had seen and heard about my supervisors" (Onen, 2016, p. 36). This was explained by (Grant, 1999, p. 4) as, "the students' experience of the supervisor's actions, and the stories told by other students of that supervisor's actions, produce a series of over-determined and affect-laden image texts of the supervisor". These excerpts show the importance of word-of-mouth about a potential supervisor. It is often the information in the air that lets a student decide more than any other tangible piece of information. Instances have been quoted where students were aware of their supervisor's reputation which helped them in making the selection (Ives & Rowley, 2005).

Relationship between a supervisee and supervisor

Research has shown that quality and strength of relationship between a supervisor and student can determine the success or failure of research (Ismail et al. 2011; Mainhard et al., 2009; Moxham et al., 2013; Nakabugo & Masembe, 2004; Pyhältö et al., 2012). Following the same line of thought, advice and supervisor's personal touch are counted as some factors which affect students' satisfaction (Cheon et al., 2009; McCallin & Nayar, 2012). A supervisor's role is that of a guide, who not only ensures quality research but gives emotional support too (Lessing & Schulze, 2002; McCallin & Nayar, 2012). Hence it is emphasised that "tenacity, support by the supervisor, personal and collegial support, and previous experience" all lead to successful completion of research work by a student (Ismail et al., 2011, p. 80). It is also important to note here that supervisors' own experience as a supervisee also has a great impact on their role as a supervisor (Lee, 2008) which ultimately affects how the relationship develops.

Availability of supervisor

A supervisor's availability (in terms of time, discussion, review, monitoring, etc.) is one of the two most important factors which students look for before selecting a supervisor (Ives & Rowley, 2005). This is seconded by Onen (2016) as well as by a focus group study by Jamieson and Gray (2006). It was conducted on undergraduate research students and found that students expect their supervisors to give them enough time and show interest in their work.

In possession of research funding

Research funding can clearly determine the choice of postgraduate research students. It is certainly one of those factors which determine PhD students' study completion (Al-Naggar et al., 2012). Postgraduates are generally mature adults who are often self-funding their tuition and living expenses. Research funding in such cases acts as a lifeline for their research (McCallin & Nayar, 2012).

Administrative position held by supervisor

This appears as a non-academic and rather 'cunning' criterion to select a supervisor, but it has been suggested that students should consider a research supervisor's administrative position before selection (Datta et al., 2009). There can be many reasons for this: administrative positions take up most of

the time leaving very little for research related activities; it can make a supervisor 'unavailable', etc. On the contrary, having a senior administrative position might be a correct 'political' decision.

RESEARCH METHODOLOGY

This study is quantitative in nature. A cross-sectional survey was carried out between August and October 2018 using self-completion questionnaires. More specifically, in order to meet its objective, an online questionnaire (See Appendix) was sent to undergraduate and postgraduate research students in Malaysia. Online surveys are relatively inexpensive, can be used to collect data quickly with overall less survey error, and can eliminate missing data (Ritter & Sue, 2007). However, online surveys are practical if the target population has access to computer and Internet which was not a concern in this study as the target respondents were university students in Malaysia. Their participation was purely voluntary. It was circulated via targeted emails and posts/messages via social media (Facebook and WhatsApp) groups. Regular reminders were sent till appropriate number of responses was reached. All the questions were marked 'compulsory' hence there were none with missing values and all the questionnaires returned were usable. The questionnaire was designed with the help of linguistic experts to ensure its appropriateness, clarity, and ease of understanding. This affirmed that only the intended meaning was conveyed.

RESPONDENTS' PROFILE

The 315 respondents included 194 females and 121 males. The median age of the respondents was 28 with a mean of 29.7. There were 93 bachelors' students, 51 masters, and 171 doctoral students. This is of particular importance because the results will be influenced by the postgraduates who formed majority. There were 275 full-time students, 160 were on some form of scholarship, and 191 were studying in a private sector higher education institution. Finally, only 83 were assigned a research supervisor by their respective institutions whereas 219 chose themselves; 13 did not have a supervisor yet. The details can be seen in Table 1.

Table 1: Demographic and educational profile of the respondents

Characteristic	*n* (%)	Characteristic	*n* (%)
Gender		University's classification	
Male	121 (38.4)	Public sector	124 (39.4)
Female	194 (61.6)	Private sector	191 (60.6)
Marital Status		Mode of education	
Married	118 (37.5)	Full Time	275 (87.3)
Single	197 (62.5)	Part Time	40 (12.7)
Level of Study		Funding for education	
Bachelor	93 (29.5)	on (any form of) scholarship	160 (50.8)
Master	51 (16.2)	Self-funded	155 (49.2)
Doctorate	171 (54.3)	Who chose your research supervisor?	
		Assigned to me	83 (26.3)
		I chose	219 (69.5)
		Don't have one yet	13 (4.1)

DATA ANALYSIS

To assess the psychometric properties of the supervisor selection scale, this study conducted a maximum likelihood exploratory factor analysis (EFA) with Promax rotation followed by a maximum likelihood confirmatory factor analysis (CFA). While EFA is used to identify the underlying patterns of correlations between the questions used to measure respective constructs, CFA confirms the obtained structure from EFA using goodness of fit indexes. The dataset was split into two subsets consisting of 157 and 158 participants which were used for EFA and CFA respectively. EFA was performed using SPSS version 20 (SPSS Inc., Chicago, IL, USA). The Kaiser–Meyer–Olkin (KMO) test and the Bartlett's test of sphericity were used to evaluate adequacy of the sample and appropriateness of the EFA. Eigenvalue greater than one criterion and scree plot were used to determine the number of extracted factors. Items with communality and absolute loading values of .3 or greater were regarded as appropriate (Pahlevan Sharif & Sharif Nia, 2018). Cronbach's alpha greater than .7 was used as the criteria for good internal consistency of the items. Using AMOS version 24, CFA was conducted to validate the results of EFA. Several model fit indices were used to assess the model fit of the measurement model. The model was revised following modification indices. Construct reliability (measuring internal consistency among the scale items), convergent validity (assessing the degree to which the items of a construct should theoretically be related, are in fact related) and discriminant validity (assessing the degree to which the items of a construct that theoretically should not be related to another construct, are in fact not highly related) were assessed using composite reliability, maximal reliability, average variance extracted, and maximum shared variance. Composite reliability and maximal reliability greater than .7 indicate good construct reliability. To establish convergent validity, composite reliability should be greater than .7 and average variance extracted should be greater than .5. Finally, for each construct, average variance extracted should be greater than maximum shared variance to fulfil the requirement for discriminant validity.

RESULTS

Table 2 reports the results of psychometric evaluation of the supervisor selection scale using the first dataset consisting of 157 participants. Initially, an exploratory factor analysis was conducted on all items of the scale. The KMO was .78, and the Bartlett's test of sphericity was significant ($p < .001$, 1088.75, $df = 91$) indicating sampling adequacy. Using a scree plot, EFA revealed three factors together accounting for 54.10% of the variance comprising 14 of 19 items (Factor 1: 5 items, factor 2: 6 items, and factor 3: 3 items). Five items were removed due to low communality and high cross-loading. Cronbach's alpha of all the factors was greater than .7 indicating good internal consistency among the items of the factors. The first factor was related to supervisors' demographic characteristics. The second factor pertained to supervisors' expertise and the third one was about supervisors' physical appearance.

Subsequently, a maximum likelihood confirmatory factor analysis was conducted to confirm and validate the factor structure obtained from exploratory factor analysis using the second dataset with a sample of 158 participants (Table 3). The measurement model consisting of three constructs (i.e. demographic characteristics, expertise, and physical appearance) was developed accordingly. The results indicated that the initial measurement model did not fit the data well ($\chi^2(74, N = 158) = 213.89$, $p < .001$, $\chi^2/df = 2.89$, goodness of fit index (GFI) = .85, comparative fit index (CFI) = .85, Tucker-Lewis index (TLI) = .82, incremental fit index (IFI) = .86, standardized root mean square residual (SRMR) = .10, and root mean square error of approximation (RMSEA) = .11 (90% confidence interval = .09–.13)). The model was revised by deleting the second item of supervisor's expertise which loaded weakly on its respective construct and allowing two pairs of the measurement errors of the first construct to freely covary.

Table 2: The results of conducting EFA on the supervisor selection scale

Factor/item	Exploratory factor analysis (N = 157)				
	Communalities (extraction)	Factor loading	Eigenvalue	Variance	Cronbach's alpha
Demographic characteristics			3.50	29.97	.86
Age	.33	.44			
Sex	.44	.62			
Nationality	.73	.85			
Race	.78	.92			
Religion	.69	.86			
Expertise			2.92	14.75	.80
Educational qualification	.27	.53			
Professional experience	.27	.53			
Designation and position	.31	.50			
Research grant	.30	.48			
Number of publications	.79	.89			
Quality of publications	.66	.83			
Visual attractiveness			2.81	9.37	.84
Profile picture visibility	.55	.71			
Profile picture attractiveness	.83	.93			
Attractiveness	.62	.77			

Table 3: The results of conducting CFA on the supervisor selection scale

Factor/item	Confirmatory factor analysis (N = 158)				
	Factor loading	Composite reliability	Maximal reliability	Average variance extracted	Maximum shared variance
Demographic characteristics		.89	.92	.61	.25
Age	.75				
Sex	.61				
Nationality	.75				
Race	.86				
Religion	.91				
Expertise		.76	.95	.41	.12
Educational qualification	.40				
Professional experience	--				
Designation and position	.40				
Research grant	.54				
Number of publications	.91				

Factor/item	Confirmatory factor analysis (N = 158)				
	Factor loading	Composite reliability	Maximal reliability	Average variance extracted	Maximum shared variance
Quality of publications	.79				
Visual attractiveness		.84	.96	.64	.25
Profile picture visibility	.67				
Profile picture attractiveness	.92				
Attractiveness	.79				

The final model, shown in Figure 2, had a good fit ($\chi^2(60, N = 158) = 115.70$, $p < .001$, $\chi^2/df = 1.93$, GFI = .90, CFI = .94, TLI = .92, IFI = .94, SRMR = .08, and RMSEA = .08 (90% confidence interval = .06–.10)). The results showed that the final model had a significantly better model fit than the initial model ($\Delta\chi^2(\Delta df = 14) = 98.19$, $p < .001$). Composite reliability and maximum reliability of the constructs were greater than .7 indicating good construct reliability. Average variance extracted of demographic characteristics and physical appearance was greater than .5. However, supervisor's expertise showed an average variance extracted of .41. This could be due to the conservativeness of average variance extracted. The high composite reliability of the constructs fulfilled the convergent validity requirement (Sharif et al., 2018). Moreover, average variance extracted of each construct was greater than its respective maximum shared variance that established discriminant validity of the constructs.

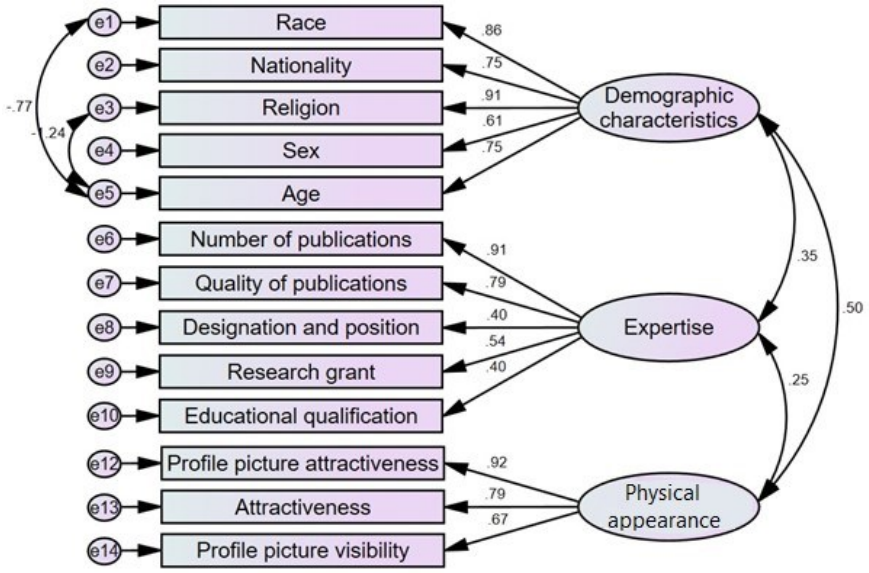

Figure 2: The measurement model (N = 158)

CONCLUSION AND DISCUSSION

This research revised and validated the model proposed by Shafiq and Jan (2017). The validated model represents the important attributes (constructs) and their corresponding dimensions which a research student considers while selecting a research supervisor. In particular, this model shows three main constructs related to supervisors: their demographic characteristics, their expertise, and their physical appearance. Each construct of this model comprises of several corresponding dimensions. Existing literature has commonly cited the first two constructs, while the third was rather missing

and was only hypothesised by Shafiq and Jan (2017). Onen (2016) had mentioned several of these dimensions as well, such as educational qualification, experience, publications, tribe (or race), age, gender, etc. However, there were several others mentioned by Onen (2016), such as word-of-mouth, referral, etc. which could not be validated through this model.

This research established the model, as shown in Figure 2. This model was based on the original model (Figure 1). When both of them are compared, the following observations are made: The original proposed model and the model validated in this research, both have three main constructs that represent the factors which affect supervisees' choice of supervisors. The names of the constructs were different in both in order to better reflect their dimensions. This change in name was due to several changes in their respective dimensions formed in this research as opposed to that originally proposed. Firstly, the construct 'demographics' in the original model comprised of 4 dimensions (age, gender, nationality, and religion). The model formed in this research has 5 dimensions. 'Race' emerged as another underlying dimension in addition to the 4 originally proposed. In the original model 'race' was subsumed under 'nationality'. Hence the model formed here is more comprehensive than that originally proposed. Second, the construct originally proposed as 'professional/academic attributes' was renamed 'expertise' in the new model. This change was necessary in order to better reflect the underlying dimensions which were very different than those originally proposed. The original model had 4 underlying dimensions (educational qualification, number of years of experience, other projects supervised, and research methodology). The new model was named 'expertise' due to the nature of its underlying new constructs. It is formed by 5 constructs, namely: designation and position, educational qualification, number of publications, quality of publications, and research grant. As seen, only 'educational qualification' was a common dimension in both the models. With the inclusion of new dimensions, this construct is more comprehensive than that originally proposed. Third and final, the construct 'marketing dimension' was renamed 'physical appearance' in the new model to better reflect the new underlying dimensions. 'Profile picture visibility' was the only dimension common in both the models. In contrast, 'attractiveness' and 'profile picture attractiveness' were new dimensions added under this construct replacing 'previous encounter', 'referral', and 'word-of-mouth'. This reduced the number of dimensions in the new model to 3, from 4 as proposed in the original model.

Moreover, this study compared the three extracted dimensions of the scale (i.e. demographic characteristics, visual attractiveness, and expertise) across different groups of the participants in terms of their gender (i.e. male and female), level of study (i.e. bachelor, master, and PhD), and university's classification (i.e. private and public sector). The results are reported in Table 4.

Some immediate conclusions can be drawn from Table 4: There is no significant difference between males and females in how important they consider the demographics and physical appearance of a supervisor. In terms of evaluating the expertise, these two groups had significant differences though. When analysed using the level of studies the group differences became clearer: The PhD students were found to differ significantly from masters and bachelors students, in evaluating demographics and physical appearance of supervisors. However, in terms of expertise, the bachelors' students differed from both the masters and PhD students. This difference can be ascribed to postgraduates being more focused on important aspects of a supervisor which really help in the academic progress of a student. After all, the expertise of a supervisor makes a difference. The difference between public and private university students was significant across all three constructs.

Table 4: The three dimensions of the scale across different socio-demographic characteristics of the participants

Respondents' attributes	n (%)	Demographic characteristics		Physical Appearance		Expertise	
		M	SD	M	SD	M	SD
Gender							
[1] Male	121 (38.4)	-0.04	0.95	-0.04	0.97	0.15	0.92
[2] Female	194 (61.6)	0.02	0.95	0.02	0.94	-0.10	0.94
		[1]-[2] (p = .56)		[1]-[2] (p = .60)		**[1]-[2] (p < .05)**	
Level of Study							
[1] Bachelor	93 (29.5)	-0.42	0.76	-0.14	0.95	-0.54	0.98
[2] Master	51 (16.2)	-0.31	0.76	-0.25	0.96	0.08	0.86
[3] PhD	171 (54.3)	0.32	0.98	0.15	0.93	0.27	0.81
		[1]-[2] (p = 1.00), **[1]-[3] (p < .01), [2]-[3] (p < .01)**		[1]-[2] (p = 1.00), **[1]-[3] (p < .10)**, **[2]-[3] (p < .05)**		**[1]-[2] (p < .01), [1]-[3] (p < .01),** [2]-[3] (p = .57)	
University's classification							
[1] Public sector	124 (39.4)	0.49	1.01	0.23	0.88	0.28	0.80
[2] Private sector	191 (60.6)	-0.32	0.76	-0.15	0.97	-0.18	0.98
		[1]-[2] (p < .01)		**[1]-[2] (p < .01)**		**[1]-[2] (p < .01)**	

M: Mean. SD: Standard deviation. One-way ANOVA with Bonferroni correction for pair-wise comparisons was used to test the significance of group differences between subjects with different level of study. Independent sample t-test was used to test the significance difference between male and female subjects as well as between public and private sectors. All tests were two-tailed. *P-value* < 0.1 are shown in bold.

RECOMMENDATIONS AND IMPLICATIONS

Research supervision is an integral part of contemporary teaching profession. To develop this important dimension of an academic's career, this research holds high significance as the factors identified and the suggestions given will help researchers and supervisors enhance their profiles and become more visible. Considering these findings, following recommendations are given to research supervisors:

- It is important for academics to continually improve their educational qualification and professional experience. Both were given very high importance by research students. While experience generally accumulates with time, the research supervisors should improve their qualifications. Supervisors with highest degree (usually PhD) and more experience will be preferred. With increased importance of hiring only PhD faculty worldwide, perhaps the direction has been set and those without PhD have come to realise its importance too. Qualifications may also include professional development. Although this was not mentioned in the questionnaire yet it is understandable that one needs to continually improve his/her knowledge and skills in order to remain updated and learn more. Such updates are not limited to professional certifications only, but also include trainings, workshops, seminars, and conferences.
- Supervisors should focus on quality of publications more than their numbers as it is one of those dimensions considered very high on importance by supervisees. It is not to undermine the importance of number of publications, as it is a very significant criteria for job application and promotion in many countries, but what the supervisees give more importance is the quality. Quality of publications is also important for one's own career, repute, and ranking in

academic circles. It is especially important nowadays when platforms like Google Scholar and ResearchGate have made good quality publications more visible.

- Possession of research grants is also valued high when selecting a supervisor. While its importance can easily be understood from the point of view of postgraduate students, it was given equally high importance by the undergraduates. Postgraduates generally support their own tuition and living expenses and therefore seek supervisors in possession of research grant. From the supervisors' point of view research grants are also a source of great admiration for them in any higher educational institution. The local and global ranking of any institute includes research grant as an important factor. Hence, any supervisor in possession of research grant is considered valuable.

This has practical implications for higher education institutions as well. It serves as a yardstick to estimate which research supervisor has higher potential for being selected by supervisees and to identify those who have lower potential. This will help institutions play a part in supervisors' development and ultimately its own betterment.

Moreover, further studies in this area can explore the same factors across different cultures, distinction between under and postgraduate students, public and private higher education institutions, and scholarship or self-funded.

FUNDING STATEMENT/ACKNOWLEDGMENT

This research was funded by the Center for Research Management under Taylor's Internal Research Grant Scheme by Taylor's University Malaysia.

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APPENDIX

QUESTIONNAIRE

While deciding on your research supervisor…

1. How important is his/her age?

1 least important	2	3	4	5	6	7 most important

2. How important is the sex of the potential research supervisor?

1 least important	2	3	4	5	6	7 most important

3. How important is his/her nationality?

1 least important	2	3	4	5	6	7 most important

4. How important is his/her race?

1	2	3	4	5	6	7

least important						most important

5. How important is his/her religion?

1 least important	2	3	4	5	6	7 most important

6. How important is his/her educational qualification?

1 least important	2	3	4	5	6	7 most important

7. How important is his/her professional experience?

1 least important	2	3	4	5	6	7 most important

8. How important is his/her current designation/position in the university?

1 least important	2	3	4	5	6	7 most important

9. How important is it that he/she has research grants/research projects?

1 least important	2	3	4	5	6	7 most important

10. How important is it that he/she is from the same area/field of research as yours?

1 least important	2	3	4	5	6	7 most important

11. How important is his/her number of publications?

1 least important	2	3	4	5	6	7 most important

12. How important is his/her quality of publications?

1 least important	2	3	4	5	6	7 most important

13. How important is his/her preferred research methodology?

1 least important	2	3	4	5	6	7 most important

14. Suppose that you had met your potential supervisor earlier, before your decision to select him/her as your research supervisor. How important would this information be in influencing your decision?

1 least important	2	3	4	5	6	7 most important

15. How important is it that his/her profile picture is visible?

1 least important	2	3	4	5	6	7 most important

16. Will an attractive profile picture of the potential research supervisor influence your decision?

1 not at all	2	3	4	5	6	7 absolutely

17. How important is it that your potential supervisor is attractive to look at?

1 least important	2	3	4	5	6	7 most important

18. Suppose that someone that you already know (a faculty member, a relative, etc.) recommends a research supervisor to you. How important is this information in influencing your decision?

1 least important	2	3	4	5	6	7 most important

19. How important is it what people (your friends, your seniors, or other students (not faculty members) at the university) say about the potential research supervisor?

1 least important	2	3	4	5	6	7 most important

Personal Information

Gender: ☐ Male ☐ Female

Age (in years): _____

Nationality: _____

Ethnicity: _____

Religion: _____

Marital status: _____

You are currently studying at:

☐ Bachelors ☐ Masters ☐ PhD

Your area of specialization/study: _____

Your mode of education: ☐ full time ☐ part time

Your study is: ☐ Self-funded ☐ sponsored/under scholarship

Name of university: _____

The university that you study in is: ☐ Public sector university ☐ Private sector university

Do you have a research supervisor? ☐ Yes ☐ No

If yes, did you choose your research supervisor or was he/she assigned to you? ☐ I chose ☐ Assigned to me

If you are reading this it means that you have already liked my research title and that you are interested to fill out this questionnaire ☺ thank you so much for that and I look forward to your response.

BIOGRAPHIES

Dr. Ali Shafiq is a Senior Lecturer at Taylor's Business School, Taylor's University Malaysia. He writes in the area of consumer behaviour, services, marketing ethics, post-graduate development and teaching and learning. He has conducted many trainings on academic and research writing. His exceptional communication skills has earned him Taylor's President Award.

Dr. Saeed Pahlevan Sharif is an Associate Professor at Taylor's Business School, Taylor's University Malaysia. His current research interests include financial literacy, consumer's financial behaviour, health care financing, as well as teaching and learning. His research endeavours have resulted in several publications in prestigious journals. His remarkable publications and research achievements have earned him many awards.

Anbareen Jan is a PhD Scholar at School of Education, Taylor's University Malaysia. Her topics of interest are curriculum development, internationalisation of education, and pedagogical practices in teaching languages. Her previous work on undergraduates' choice of research supervisor made her explore further the factors which influence students' decision of their supervisors' selection.