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Ph.D. students' expectations from their supervisors: A sequential exploratory mixed methods study in Pasteur Institute of Iran

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Abstract

Introduction: Satisfaction from the supervisor is considered one of the important factors in the choice and successful advancement of students' theses. In addition to the supervisor's academic skills, the ability to communicate with the student and guide him/her in the direction of the thesis project is also important. This article aimed to evaluate the criteria for supervisor selection by doctoral students of the Pasteur Institute of Iran.

Methods: This study was an instrument-development variant of sequential exploratory mixed method design, and also was a cross-sectional descriptive study that was accomplished in two qualitative and quantitative parts. The collection instrument of the qualitative part was a purpose-based interview until the time of information saturation, and the instrument of the quantitative part was the multicast questionnaire in terms of the Likert standard, which was completed by the community members. After analysis, the findings of the two steps were combined to answer the research questions.

Results: Among 181 students of the Pasteur Institute of Iran that participated in the research, 104 people had 22-52 years old. Friendly attitude, honesty, ability to provide financial support, friendly environment, observation of the research ethics principles and avoidance of academic theft, and finally the support of the supervisor in the defense session have got the most priority among this study participants, especially among female students. Accordingly, the supervisor's academic rank, his/her experience, and ability in patent and invention registration, along with the opinion of the past student and others have the least importance.

Conclusion: According to this research, the possibility of creating a good job position after graduation, the possibility of continuing their studies at higher levels, or creating suitable conditions for immigrating to advanced countries in addition to gaining the best situation at the final the thesis are the reasons for the high sensitivity of students in choosing a supervisor for their thesis.

Keywords: Academic Dissertation, Surveys and Questionnaires, Education, Graduate, assessment, students' expectations

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1. Introduction

Scientific counseling is an ongoing evolutionary process, which plays a significant role in the student's academic education, career, and personal goals [1]. Students have various reasons to pursue a doctorate, although their views generally change after the end of their doctorate, even those who have entered the degree due to their intrinsic satisfaction and its own sake [2].

Smith et al. (2005) reported a significant difference in the type of students' expectations before and after entering post-graduate studies in a US university [2].

Generally, there is a need to choose a supervisor for the thesis for postgraduate education. The supervisor should assist the student in collecting, managing, analyzing, and disseminating information. If a student has a correct estimation of faculty members' abilities, he/she

can make a better decision on selecting a thesis and also a supervisor. The supervisor is one of the most important elements of education. Faculty member behavior and academic degree along with the teaching method were also evaluated as they have been reported as criteria for supervisor selection [3]. Although the matching of the supervisor's specialty to the thesis subject is very important, the student's abilities in association with the supervisor and other students, and the laboratory staff are important as well as the methods of the dissertation [3]. In a review that Szymanska (2011) conducted on the faculty members' evaluation, especially supervisors, some questions were more emphasized like teacher availability, faculty ability to motivate students, allocating enough time for the student by teachers, and teachers' preparedness for the students' questions at the meeting [4].

It is important for students that the supervisor takes his/her responsibility as seriously as possible, and spends considerable time and energy on the thesis topic. Also in a research project in Australia and the United Kingdom, it has been important for students that the supervisor pays attention to the work and supports the students [3]. In Iran, Galehdar et al. (2007-2008) studied 680 students' satisfaction with the academic counseling of supervisors at Lorestan University. This study's results showed that about 40% of students were not satisfied with their instructors, and there was a significant association between student turnover and student satisfaction with the supervisor [5].

In a study by Zhao in Canada (2011) accomplished on 13000 students of Toronto University in various disciplines, 4815 students participated and the response rate to the questions was 36.5 percent. Sixty percent of the participants were female and the rest of them were male. Generally, 73% of students were satisfied with their supervisors[6].

Cambridge University, UK, has posted students' expectations from their supervisors on its website. These expectations included: the supervisor's ability in encouraging and motivating the student in research and study, the supervisor's ability in guiding the student the right way, guide the student in how to use the university facilities, acquainting the student with other students or researchers who are working in the same field, student guidance by the supervisor in the systematic research process and electronic backup of studies, full supervision of student's research process, encouraging the student to attend seminars, advising students to observe research ethics e.g. plagiarism evidence, advise to write the thesis as fast as possible, guiding student on thesis presentation and help them find jobs after graduation [7].

One of the most important factors in successful thesis progress is the student's satisfaction with the supervisor and meeting reasonable requirements [8]. If students have good estimations of their supervisor's abilities, they can make better decisions on selecting a thesis and also a supervisor. On the other hand, young faculty members are required to be aware of their main duties in the research area and obtain the necessary experience before recruiting students. Several studies were performed to measure students' expectations from their supervisor for selecting the thesis topic and acting like that [9,10].

In this study, students' expectation from their thesis supervisor was investigated, which plays a crucial role in the appointment of the supervisor before this stage. This study was accomplished in two parts: a qualitative and quantitative study concerning the Likert standard interview and a multicast questionnaire completed by students of the Pasteur Institute of Iran.

2. Materials and Methods

2.1. Methods of Study

This study was a sequential exploratory mixed methods design of instrument-development variants. In the first step, a qualitative study was followed to explore the domains of the subject. Interviews were conducted using an interview guide, and sampling was continued until information saturation. In the second step, a multicast Likert-scale questionnaire was developed using the data collected in the first step [11,12]. To design and validate the quantitative questionnaire, the following steps were followed:

2.1.1. Phase I

a. Qualitative

This step involved creating unique items and points for questions in the instrument. The texts (including similar research and instruments) were examined using a deductive approach. Interviews and group discussions were analyzed by the use of the inductive approach. A set of related items were developed targeting students' expectations from their supervisor.

In qualitative research, samples are included with specific experience or knowledge of the phenomenon under study[13]. In the qualitative part of this study, doctoral students studying at the Pasteur Institute of Iran formed the research community.

b. Research Community

In qualitative research, samples are used who have special experience or knowledge about the phenomenon under study [14]. In the qualitative part of the present study, the Ph.D. students of the Pasteur Institute of Iran formed the research community. Criteria for inclusion in qualitative research included students studying, being in the process

of choosing a supervisor, defending a proposal, or completing a dissertation. The criteria for inclusion in the review section of the study texts, including English and Farsi, were related to the selection criteria of the general supervisors.

In qualitative research, it is not possible to determine the sample size in advance, but it is determined during the study, that is, the researcher continues sampling until data saturation is reached. Data saturation is when no new data are found to complement and enrich the classes developed during the research. In this study, after interviewing 8 students and conducting a focused discussion session with PhD students from the Pasteur Institute of Iran, the researchers reached data saturation as codes were repeated during the analysis, so the sample was terminated.

c. Data Collection

The first step was a review of the texts. In the area of supervisor selection criteria, a comprehensive review of existing external texts, resources, and tools was conducted. In the next step, in-depth semi-structured qualitative interviews were conducted to complete the items. After selecting the sample using the purposive method and obtaining consent and permission to record the interviews, participants were invited to participate in an in-depth face-to-face and individual semi-structured interview. In this study, the widest possible variety of different dimensions, such as the stage of completion of the dissertation, gender, and students from different disciplines, were used to select participants. The interviews lasted on average between 15 and 45 minutes. With the consent of the participants, the interviews were recorded and then transcribed verbatim. First, some preliminary interviews were conducted to familiarize the researcher with possible and unforeseen problems and to determine the composition of the questions. In semi-structured interviews, a set of general questions is designed, but the focus of the interviews is on the participants' responses [15]. The initial interview questions, based on the shortcomings of reanalyzing the data in the research conducted in Iran, included the following:

- How did you choose your supervisor?
- What factors did you consider when choosing your supervisor?
- Describe the process of selecting your supervisor.
- If you disagree with the supervisor, state your reasons.

2.1.2. Phase II: Quantitative

This phase of the research involves the steps of scale development or tool design and Scale evaluation or instrument validation (validation and reliability of the primary tool).

2.1.2.1. Instrument Design

A scale is a group of related items that are expected to measure a particular phenomenon. At this point, the items are combined to form a new instrument, and after that, the responses are changed to a numerical form and are statistically analyzed [11, 16]. In the instrument design phase, we must determine which scale or format to use in developing a new measurement system. Accordingly, the most frequent scale is the Likert format and Cronbach's alpha reliability is also increasing with the use of the 5-point Likert scale, but along with the options increasing, the reliability decreases. Generally, a 5-to-7 Likert scale is appropriate for most instruments [17,18]. In this study, the 5-point Likert scale (from very low to very high) was used for each one of the items and 24 questions were designed.

2.1.2.2. Scale Validation

This step involves investigating the validity or scale evaluation of the new instrument during the time that the item analysis is performed. Item analysis refers to the specific methods used to evaluate instrument items, both qualitatively and quantitatively, to evaluate the quality of each item. It is notable to mention that the main components of scale evaluation are validity and reliability. Unless by having evidence of the validity and reliability of an instrument, it cannot reliably be suggested to others for measurement.

2.1.2.2.1. Narrative

Validation of the questionnaire consists of three steps:

A. The first step in determining formal validity:

To determine the validity, both qualitative and quantitative methods were used:

Formal validity qualitative determination

Five participants were interviewed face-to-face to validate the qualitative approach, and irrelevance and ambiguity were rated as difficult. After revising items based on participant perspectives, the next step was to reduce and delete erroneous items and determine the relevance of each item to the application of the item impact approach. The impact score was calculated by the following formula: (Impact Score=Frequency (%) × Importance)[19]. For formal validation, 10 graduate students and supervisors were asked to rate the relevance, difficulty, irrelevance, ambiguity, and complexity of each item. Quantitative validity was also assessed. The item impact index was determined and the impact score was also calculated according to the Likert scale. Also, those items

that were found to be suitable for subsequent analysis were retained [19].

B. The second step is to determine the Content Validity

For the quantitative content validity investigation, the measurement of content validity ratio (CVR) and content validity index (CVI) was used. In the CVR index, the necessity of an item is evaluated from the expert's point of view while the relevance of each item is considered in the CVI index [19]. In the model presented by Lawshe, to determine content validity, the questionnaire is provided to a panel of experts who comment on the questionnaire items' necessity. The response of experts is coded as followings: E: Essential; U: Useful but not essential and N: Not Essential. After that, the panel members' votes are quantified by CVR. The following formula is used for calculating CVR:

$$CVR = \frac{nE - \frac{N}{2}}{\frac{N}{2}}$$

Where nE is the number of experts who identify the essential scale item and N is the total number of panel members. The CVR equation assigns values between -1 to +1 [19]. CVR of less than zero means that less than half of the experts believed that one scale item is necessary. Where CVR is zero means that only 50% of the panel experts members believed that one scale item is necessary, and CVR more than zero means that 50% of experts believed that one item is necessary, and consequently it is valid.

The minimum value for six specialists is 0.99. We also considered the least acceptable CVI as 0.79. In this study, Cronbach's alpha coefficient was calculated in a 30-person sample before doing structural validity, to determine internal consistency.

C. The third step is to the construct validity

In this study, structural validity was determined by exploratory factor analysis that has the purpose of discovering patterns within the analyzed data (data not shown) [20].

2.1.2.2.2. Reliability

This stage includes questionnaire reliability. Reliability refers to the repeatability or robustness of scores from one assessment to another. Reliability is an essential but insufficient condition of research validity. An instrument whose scores are not reliable will not be able to provide valid interpretations. Researchers should ensure that items in a subscale are matched, and also should measure similar properties. The dimensional constitutive sub-scales must also have this property. In this study, to achieve this goal, Cronbach's alpha (Coefficient alpha) was used. Cronbach's alpha represents the irrelevancy of a group of items that measure a structure. The values of Cronbach's alpha ranged from zero (no stability) to one (complete stability) [21]. Higher values indicate greater reliability. A minimum of 0.7 is recommended for alpha[22], which is 0.7 in this study.

3. Results

3.1. Demographic Information

Of the 181 Ph.D. students of the Pasteur Institute of Iran, 104 (57%) were enrolled in the study. Among the respondents, 57 (55%) students were female, 36 (34%) were male, and 11 (10%) did not mention their gender. Of 91 (87.5%) participants who stated their age, 29% were 29-30 years old. The oldest person was 52 years old, and the youngest was 22 years old.

Eighty-four (81%) respondents were Ph.D. students, 10 (10%) were master's students and 10 students did not report their degree. Most respondents were in their first and second semesters, and the majority of participants (n= 57, 55%) were studying medical biotechnology and microbiology.

Moreover, in this study, interviews with eight students and a focus group discussion with Ph.D. students of the Pasteur Institute of Iran led to data saturation because of the duplication of codes, and sampling was also terminated. The analysis process of this study was accomplished regarding the qualitative content analysis and the conventional approach.

3.2. Validity and reliability of the questionnaire

Evaluations have resulted in the production of a five-point Likert scale questionnaire and 28 items. The questions were categorized into five distinct domains using the factor analysis of questionnaire items. The domains designated for the supervisor selection criteria included the professional ethics of the supervisor, his / her professional communication ability, the experience, and expertise of the supervisor, his / her ethical characteristics, the proposed thesis topic, and also the characteristics of the work environment. Table 1 indicates the questions for each domain and other results related to the factor analysis. Moreover, the impact score method was used, to assess the quantitative validity of quantitative item impact [19]. Accordingly, items with a score equal to or greater than 1.5 were retained and other items were deleted [19]. Cronbach's alpha coefficient for the instrument was 0.89, and this indicated high questions internal consistency of the questionnaire.

Table 1: The questionnaire of supervisor selection criteria according to the students' opinion of the Pasteur Institute of Iran

1	**How effective do you consider the role of each of the following factors in choosing a supervisor?**	**Very much**	**Much**	**Medium**	**Little**	**Not important**
1-1	Friendly behavior of the supervisor					
1-2	Honesty of supervisor					
1-3	Supporting students to enter the future study and research positions abroad					
1-4	Communication with other professors and research institutes inside the country					
1-5	Creating communication between the student and other professors to advance the thesis work					
1-6	The ability to provide financial support (resources inside or outside the institute)					
1-7	Powerful resume of supervisor					
1-8	The supervisor's relationship with the industry and the possibility of creating future job opportunities for the student					
1-9	Dedicating enough time to answer the student's questions and doubts					
1-10	The applicability of the proposed thesis topic					
1-11	Improving the student's self-confidence the supervisor					
1-12	Helping the student during the stages of the thesis (teaching research methods, searching for sources, writing articles)					
1-13	The transfer of knowledge and laboratory techniques by the supervisor					
1-14	Supporting the student in the thesis defense session					
1-15	Time management to advance the student's thesis					
1-16	Academic rank of supervisor (assistant professor, associate professor, or professor)					
1-17	Friendly environment and working in a spirit of cooperation in the thesis department					
1-18	Providing administrative and research facilities (desktop, computer, laboratory equipment, and appropriate laboratory space)					
1-19	The experience and ability of the supervisor in patent registration					
1-20	Encouraging students to research activities, publish articles, and participate in congresses					
1-21	Compliance with the principles of research ethics and avoiding plagiarism in academic research by the supervisor					
1-22	Transparency in the financial issues of the thesis					
1-23	The position and organizational influence of the supervisor in the place of study or higher levels of the organization					
2	**Specify the degree of importance of the following information sources in choosing a supervisor, from number one to five:**	**Very much=1**	**Much=2**	**Medium=3**	**Little=4**	**Not important=5**
2-1	The opinion of students who have a thesis with the supervisor					
2-2	The opinion of other students					
2-3	Student evaluation of teacher teaching					
2-4	The opinion of experts in the department, education, and other parts of the institution					
2-5	The opinion of other faculty members					

3.3. Research Questions section

In this study, 57 (55%) participants believed that the question "the friendly attitude of the supervisor" is of high importance and only one person (0.9%) did not consider it important. Also, the supervisor's integrity is of great importance to all research participants. Support for students entering overseas academic and research positions is of great importance for more than half of this study participants. Communicating with other faculty members and other research institutes in the country was considered an important point for more than half of the participants (Fig. 1.1 to Fig. 1.3).

Making contact between students and other faculty members the supervisor is of great importance to more than half of the research participants to advance the thesis work. The ability of the supervisor in providing financial support (from sources inside or outside the institute) has attracted the attention of more than 67% of this study's participants. The strong resume of the supervisor and his experience have been of great importance for more than half of the participants in the research. The communication ability of the supervisor with industry, and the possibility to create future career opportunities for the student are also of great importance to half of the students. Regarding, half of the students thought it was important to devote adequate time to answer their questions and ambiguities (Fig. 1.4 to Fig. 1.8).

The applicability of the Ph.D. thesis proposed topic was of great importance to the students and half of the students rated it as five. The supervisor’s ability in creating confidence in the student to do a thesis was considered very important by 54% of the students. In addition, 48% of the students considered it very important for the supervisor to accompany the student during the dissertation process. The supervisor’s ability in transferring knowledge and laboratory techniques was considered very important by 50% of the students. The support of students by the supervisor at the thesis defense was very important for 57% of the participants. Half of this study's participants think that the supervisor’s ability in timing the thesis process is very important. The academic rank of the supervisor (assistant professor, associate professor, or professor) has not been of great importance to most of the students (Fig. 1.9 to Fig. 1.15).

Having a friendly environment at the site of the dissertation was assumed as a very important point for students. Moreover, providing office and research facilities for the students was important for 45% of the students. The supervisor's experience and ability in patent registration were very important for 36% of the participants. Encouraging students to do research activities, publish articles, and attend congresses by the supervisor is of great importance for 44% of students. Adherence to the research ethics and avoidance of academic theft by the supervisor was very important for 71% of students (Fig. 1.16 to Fig. 1.20).

Transparency in thesis financial matters was very important for half of the students. Also, the supervisor position and influence at the education place or higher levels of the organization were very important for 42% of this study's participants. Students (having a thesis) point of view about the supervisor is very important for 46% of students (Fig. 1.21).

The student's opinion about the supervisor was very important for only 11% of this study's participants. The student's own opinion did not matter much to the choice of the supervisor during the study. The opinion of experts in the department and other parts of the institute has been of little importance for students about the supervisor. Also accordingly, the opinion of other faculty members was of little importance to the student (Fig. 1.22).

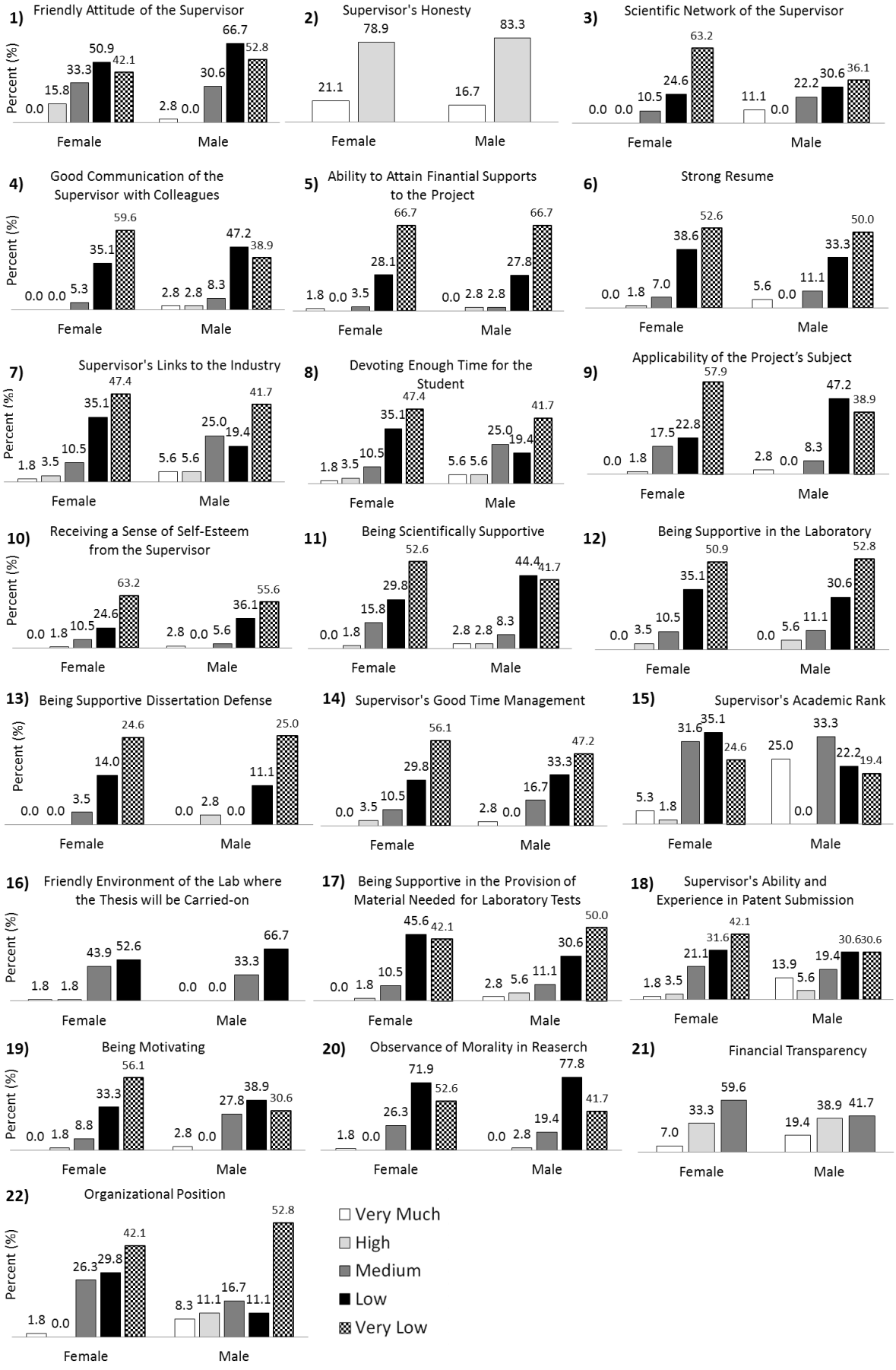

Figure 1. Determinants of choosing a faculty for the supervision of a master or Ph.D. thesis based on the responses of male and female students

4. Discussion

This study is based on the need of this research center to evaluate the criteria for supervisor selection by doctoral students of the institute and agrees with similar research in some countries like the USA and UK. In this study, the participation rate in answering the questions of the research design questionnaire was 57% (104 out of 181 people). The absence of some students during the questioning period may have been the reason for the reduction in the number of responses, the reason that some of the students in the higher education semesters were busy writing their dissertations, and were not attending the institute because of the end of the laboratory operations. Regarding gender, the largest number of respondents were women (55%), which is concerning a large number of female students. The maximum age of respondents was 29-30 years old, which comprises 29% of the total respondents and indicates that individuals of this age group are more interested in the research. Most of the students participating in the research were studying in the first and second semesters, and they were enrolled due to the concern and sensitivity of the students towards the thesis and supervisor selection because the students still did not select their thesis and supervisor in the first and second semesters. Based on the qualitative and quantitative analysis, the friendly attitude of the supervisor was of great relative importance to the students, which could be attributed to the students' sensitivity to their thesis with minimal tension with the supervisor, which was supported by a study conducted by Ives in 2005 [23]. Almost all students have considered the supervisor's integrity as a very important point. Following the qualitative study and interview, some supervisors' dishonesty about students' financial problems during the article writing process resulted in students' uncertainty and concern.

According to the present study, the interest of second-semester students was higher in the questionnaire questions in comparison with other students and it gradually reduced by passing the semesters. This can be attributed to the fatigue of higher-term students and their interest in the dissertation project completing, as soon as possible. Additionally, there is a marked difference between students' expectations during entering the doctoral program and at the end of the course, which is in agreement with former studies and research that were accomplished in other countries[24-26]. More than half of the respondents to the questionnaire indicated a high-level interest in supporting the student supervisor in entering overseas educational and research positions, indicating a strong interest amongst students to pursue their education or work in advanced countries. In addition, more than 87% of respondents to the questionnaire were interested in communicating with other educational and research centers in the country. This may be caused by job positions found in such centers. More than 94% of students consider that the issue of financial support from a supervisor is very important, which appears reasonable, concerning that many students are young and not still employed. The strong resume of the supervisor and his experiences were very important for 89% of this study's participants. The reason for this is the requirement for having an experienced supervisor to guide the students' thesis. A large number of students (73%) stated that the supervisor's association with the industry and the opportunity to create future job opportunities are important. This appears reasonable due to the student's job search. Many students find it important to allow enough time for the supervisor to answer the student's questions and ambiguities. This is gradually diminishing by progress of the students because students conduct more parts of the research by themselves in the higher semesters. The thesis topic applicability proposed by the supervisor was very important for students. This is important because of the possibility of finding a job or educational position inside the country or abroad. For most of the students, the academic degree of the supervisor was not very important. Therefore, irrespective of the supervisor’s academic rank, his professional attitude and ability to guide the student in the thesis project completing are very important and agree with the studies accomplished by Szymanska. In addition, the appropriate work environment and friendly communications were very important (96%) at the site of the student's thesis project[4]. Because the number of female students is more than male students, more questions were answered by female students in general. However, the results of the qualitative and quantitative analysis indicated that the female students were more sensitive to the questions of the questionnaire and some of these questions were more important for female students. For example, the supervisor's professional interaction and intimate communication were more important to female students.

The perception of the students about the supervisor's behavior includes the supervisor's ability in encouraging and motivating students in the research, the ability of the supervisor to properly guide the student in research, the student's guidance by the supervisor in utilizing university facilities, acquainting the student with other students or researchers who are working in a single context, guiding the student by the supervisor in a systematic research process and also providing electronic backups of completed studies, fully overseeing the student research

process, encouraging the student to attend seminars, advising the student on the research ethics principles e.g. avoiding plagiarism, advising the student to start writing the thesis as soon as possible, student guidance on paper submission and student guidance in finding post-graduate job opportunities are in agreement with studies that were accomplished at the University of Cambridge, UK[7].

Research Highlights

What Is Already Known?
Satisfaction from the supervisor is considered one of the important factors in the choice and successful advancement of students' theses.

What Does This Study Add?
The students' expectations from the supervisors are not only related to solving their problems in the field of thesis, but also solving future problems such as creating a good job position after graduation are another their expectations from their supervisors.

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