

Career Persistence Model for Female Engineers in the Indonesian Context

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ABSTRACT

Extant studies about female engineers have suggested their career persistency in the engineering career is influenced by the workplace, which is characterized by male dominated culture making them feel marginalized. In Indonesia, similar studies for reference are limited. This paper is based on an exploratory quantitative study using a questionnaire developed based on the Career Persistence Model. This paper is based on an empirical exploratory quantitative study by adopting Buse's et al. Career Persistence Model (2013). The intention is to contribute to the literature in the context of Indonesia. It explores the Indonesian cultural dimensions and investigates their relationship to the roles of women in family, society and the workplace, and how women manage to navigate barriers to avoid taking alternative career paths. Contrary to extant studies, findings show women feel equally treated to men in the workplace, however some work demands may hinder. The strong acknowledgement of one's roles in this collective society outdoes the opinions that the Islamic jurisprudence (fiqh) has marginalized empowerment of women, resulting in gender-based injustices and discrimination. Future studies should look into social supports at the workplace in an attempt to retain and increase the share of women in the engineering career in Indonesia).

SARI PATI

Hasil penelitian terdahulu mengenai insinyur perempuan telah memberikan gambaran bahwa "career persistency" (ketahanan dalam berkarir) insinyur perempuan dipengaruhi oleh kondisi lingkungan kerja dengan ciri budaya patriaki - didominasi oleh laki-laki, yang mengakibatkan para insinyur perempuan merasa terpinggirkan. Di Indonesia, penelitian serupa untuk referensi masih sangat terbatas. Makalah ini dibuat berlandaskan pada studi kuantitatif eksploratif empiris dengan mengadopsi "Career Persistence Model" oleh Buse dan kawan-kawan (2013). Tujuan riset ini adalah memberikan kontribusi kajian literatur untuk konteks Indonesia. Riset dilakukan dengan cara mengeksplorasi dimensi budaya Indonesia dan pengaruhnya terhadap

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peran perempuan di dalam keluarga, masyarakat dan tempat kerja, serta mempelajari bagaimana insinyur perempuan yang telah berhasil menavigasi hambatan negatif dalam berkarir untuk tidak keluar dari jalur profesi insinyur. Bertentangan dengan hasil temuan riset sebelumnya, riset empiris ini menunjukkan bahwa insinyur perempuan merasa diperlakukan setara dengan rekan kerja laki-laki di tempat mereka bekerja, walaupun ada beberapa tuntutan pekerjaan yang dapat menjadi penghalang. Pengakuan kuat akan peran seseorang di dalam masyarakat kolektif melampaui pendapat yang menurut hukum Islam (fiqh) perempuan telah terpinggirkan, mengalami ketidakadilan dan diskriminasi. Studi serupa dimasa mendatang perlu mempelajari aspek dukungan sosial di tempat kerja guna mendapatkan solusi yang dapat mempertahankan dan meningkatkan andil perempuan dalam profesi insinyur di Indonesia

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INTRODUCTION

The competitive advantage of a nation is often associated with its dominance and development in science and technology, so that the engineering profession without doubt plays a vital role to support it. The need for engineers shows a constantly increasing figure to support infrastructure and industrial development (Cochrane, 2016. Nazmudin, 2016). This is also the case in Indonesia; the country requires additional 120,000 engineers to support economic development by 2020 according to the official reports released by the Indonesian Cabinet Secretary Office (2015).

However, Indonesia only has 750,000 engineers (in 2015), and can only produce 35,000 per year, which means there is a shortage of engineers (the Association of Indonesian Engineers (Sujatmiko, 2004). What is the problem? In terms of education, the number of female engineering students in Indonesia is almost equal to that of male students. This is reflected in the Gender Parity Index of 1.0347 (Human Development Report, UNDP 2015). However, in total, the country can only produce 35,000 new engineering graduates per year. Bigger problems occur after graduation. Only 45 percent graduates decide to work in the engineering career. Many decide to divert from engineering-

related occupations, due to lack of job openings in engineering and it is often faster to get a job in other fields (Gareta, 2015).

Besides, working conditions and the workplace are also blamed for causing the consistently low share of women in the engineering professions. In many cases, the work of an engineer involves risks especially if they are working in factories or laboratories dealing with chemicals and gases; in construction works for buildings, infrastructures as well as in oil and gas. In addition, some engineering works demand long hours and travelling to sites. Consequently, the number of female engineers entering the engineering profession is low.

For example, in the US, women make up 20% of engineering graduates, but it is estimated 40% quit or never enter the engineering profession (Silbey, S. 2016). In Indonesia women only represents 5% of engineers (Sakernas BPS, 2015), making the field is still dominated by male engineers; and place woman as minority*. Although various research have proven more diverse leadership leads to increased performance, but in reality, the so-called 'leaky pipeline' phenomenon for female engineers is also prevalent in Indonesia, especially as the further a woman advances in her career

stage, the lower the number of women peers (Meiksins, et al. 2016).

Studies on engineering-based firms have also shown that women can understand certain products and services better than men, so they can help with product improvements. For example, in communication technology, more women than men use social-networking apps on mobile phones. They also found to have different contextual ways in remembering people than men, and so might use different ways in searching for friends (Taylor, 2013). Women are also found to be more socially concern than man. Many are motivated to become engineers because they want to be responsible engineers and make a difference in people's lives (Silbey, 2016). Hence, industries and governments need more inclusive engineering workplace to achieve scientific and technological excellence (2014).

The situations have invited concerns among academics and practitioners in an attempt to enhance women representation in the engineering career. Although studies about female engineers around the world have been produced in significant quantities every year covering a broad range of topics, mostly discussing the causes of women's under-representation in the engineering fields (Meiksins, et,al, 2016); however, similar studies Indonesia are still in infancy, and hence there are limited references available for further research.

This paper is based on an empirical exploratory quantitative study by adopting Buse's et al. Career Persistence Model (2013). The intention is to contribute to the literature in the context of Indonesia. It explores the Indonesian cultural dimensions and investigates their relationship to the roles of women in family, society and the workplace, and how women manage to navigate barriers to avoid taking alternative career paths. Hopefully the construct may be used for future research to build dimensionality of career persistence in different contexts. Due to

limited academic papers as reference, this paper also utilizes reports published by professional consulting firms or institutions, as well as some expert commentaries in related associations, e.g. the Indonesian Engineering Association (PII).

*Note: the small number of female engineers working in the profession was reflected in how difficult it was for authors to find respondents for this research.

Literature review

The Society of Women Engineers conducts analysis on the literature of women in Engineering annually. Their reviews about the topic in 2015 suggests that gender bias in engineering and science is still reported existing involving sexist behavior by senior male scientists (Meiksins, et,al, 2016). In addition, even though studies about female engineers have been produced around the world in significant quantities every year covering a broad range of topics, however little is still known on why women are still under-represented in the engineering fields (Meiksins, et,al, 2016). More research is called for to check on how to attract more women to enter the engineering career, and persist in the career for longer time.

Some authors look at the causes of female engineers to persist in the engineering professions and compare them with those who leave the profession. However, there is still lack of comprehensive theoretical frameworks explaining the reasons why female engineers who persist in or depart from engineering career. They use the Career Change Model (Rhodes & Doering, 1983), and suggest that female engineers who continue differ from those who quit in their experience of workplace, which is the process of advancement opportunities and empathic support from their superiors for their work-life roles, suggesting the organizational factors are more important in predicting career persistency of female engineers. Fouad's et. al. (2016) findings give important practical implications to the literature

of career persistency of female engineers because organizational factors are under the control of managers and decision-makers, thus can be built-in company strategies.

In Indonesia, similar studies Indonesia are still in infancy, and hence there are limited references available for further research. Due to limited academic papers as reference, this paper also utilizes reports published by professional consulting firms or institutions, as well as some expert commentaries in related associations, e.g. the Indonesian Engineering Association (PII). This paper is based on an empirical exploratory quantitative study by adopting the Career Persistence Model (CPM) by Buse et al. (2013). The main objective of the study is to find explanation why some female engineers persist in engineering professions, while others quit after only a few years working as engineers, in the context of Indonesia. The following research question guided the study: What are the most important (unique) factors influencing female engineers in Indonesia to retain their engineering profession as compared to their counterparts who quit.

The Career Persistence Model (CPM)

The Career Persistence Model (CPM) by Buse et al. (2013) was founded on the Social Cognitive Career Theory, originally proposed by Lent et al (1994, 2002), utilizing Bandura’s (1986) Social Cognitive Theory. This framework explains the relationships between a person’s individual social cognitive

variables (e.g., self-efficacy, outcome expectation, and personal goals) and how these variables interact with other aspects of the person and his/her environments (i.e., family and the workplace) that shape the development of the person’s career path.

Grounded on Bandura’s (1986) SCT, Lent et al. (1994) hypothesized that person, environment, and behavior variables affect one another through complex, and reciprocal linkages. Thus, Lent (2005) updated the SCCT to address the changes in career development decisions, resulting from the reciprocal interactions and linkages between a person’s individual social cognitive variables, and the dynamic changing environments where the individual is embedded in. Thus, the SCCT can be used as a framework for understanding career choice factors, including interests, education and career choice, and persistency in pursuing career goals. Based on the updated SCCT framework, Buse, et al., (2013) posit that the framework can also be used to explain career persistence of women in engineering profession (in USA). As shown on Figure 1 below, the CPM indicates three factors that have strong reciprocal relationships to women’s persistence in engineering career. They are: 1) Individual factors, 2) Career choice factors which influence the individual factor variables, and 3) moderated by the Contextual factors that lead to persistence in the engineering as explained in Figure 1.

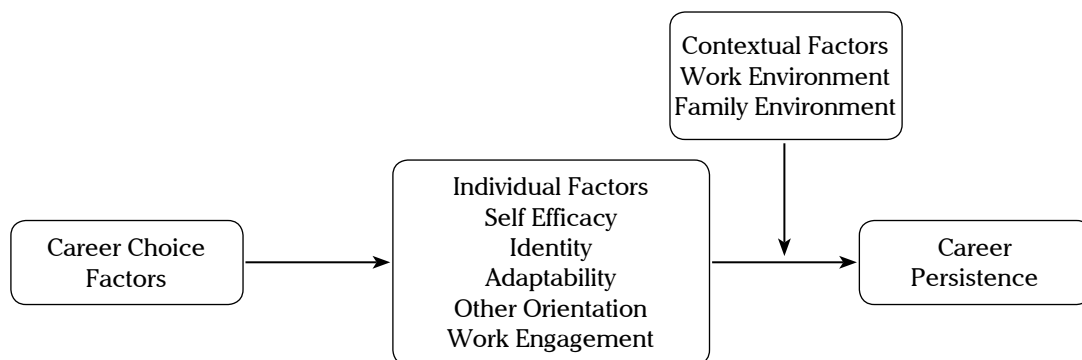


Figure 1. Career Persistence Model Buse et al., 2013

Individual factors consist of the following five aspects: self-efficacy, identity as an engineer, adaptability, other orientation, and work engagement as described in the following. Self-efficacy includes high degree of self-confidence, self-control in dealing with difficult work situations or undertaking tough technical problems, managing conflict with superiors and co-workers, as well as balancing work and life demands. Identity as an engineer is expressed as the degree of liking solving difficult, challenging, and complex problems, being analytical, assertive in voicing opinions. Adaptability refers to the ability to work in engineering field, which normally is characterized as a male-dominated culture creating difficult workplace where engineers experience discrimination and/or harassment. Other orientation refers to the ability to work in a team (including external stakeholders). Work engagement explains the motivating factors behind their persistency in engineering career, including challenges and opportunities to work on new technologies, project, or products inside or outside their organizations. These three groups of factors have impacts to career persistency in engineering professions.

Career choice in engineering is discussed in terms of engineers being good at math and science, and they naturally decide to pursue education in engineering studies.

Contextual factors include family environment and work environment. Family environment refers to marital status and children, role of husbands or partners in decisions regarding child-care, and the female engineer's decision whether to continue working (part-time or full-time) in the engineering profession or to quit.

Work environment discusses corporate culture of their male-dominant workplaces, including equal opportunity, 'glass-ceiling phenomenon's, discrimination and/or harassment, as well as relationships with superiors and colleagues.

Adoption of the CPM in Indonesia – Socio-cultural perspectives

This paper adopts the Career Persistence Model (CPM) by Buse et al. (2013) to find answers to the research questions stated above. As the model was used to check the career persistency for respondents in the USA, the variables in the contextual factors may not fully represent the situation in Indonesia. Consequently, when adopting this model in Indonesia one should consider adjusting the model for Indonesia's environment context.

This paper discusses variables in the influential factors informed by the norms in Indonesia, including the religious beliefs and socio-cultural values, which in turns have impact on all aspects discussed in the CPM (the Individual factors, career choice and the contextual factors), moderating the persistency of women in engineering career.

Religious beliefs

As the biggest Muslim country in the world in terms of population, the Islamic religious views have strong influence over the majority of the people in Indonesia, especially regarding the role of women in society and in the workplace. Within these Islamic religious beliefs there is a strong tendency of patriarchal Islamic jurisprudence (fiqh) which has marginalized empowerment of women, even though national laws recognize the equality of men and women. Consequently, gender-based injustices and discrimination in this Muslim community is prevalent (Hasyim 2015).

Javanese socio-cultural values

The Javanese society is the biggest ethnic group in Indonesia, comprising 40% of the country's total population (World Population Review 2017); and the majority of the people in Indonesia (60%) live in Java island. Naturally, Javanese socio-cultural values are reflected in many parts in Indonesia (Geertz, C. 1976). One of the most distinctive values in Javanese society is *rukun* (harmious unity), expressed a being respectful, polite, obedient,

cooperative, mutual acceptance, and harmonious existence (Mulder 1978). Thus, a person's individuality should be expressed through the group; and all overt expressions of conflict should be avoided (Murder 1978; Koentjaraningrat 1985). In Javanese society, a married woman is expected to remain in close contact with her family to be able to assist older parents. Thus, as a daughter, a woman is still responsible to take care of her parents even though she lives in a separate house (Geertz, 1961).

General cultural dimensions in Indonesia

According to Hofstede's (1984, 2005) cultural dimensions in Indonesia is regarded as a collectivist and feminine society, whereby there is a high preference for individuals to be accepted in a particular group or society besides their nuclear families. Thus, regardless of religion and ethnicity, the people in the society care and help each other, live in harmony with kin-based extended families, as well as tend to conform to the ideals of the society and families to which they belong to, including the Islamic religious views discussed above.

Geertz (1961) in her study about Javanese women, also found that women accept male domination, restrictive codes of female behavior, the linkage of family honor with female virtue, i.e. being conscious of social judgments and 'punishment,' to avoid being labeled as selfish (Geertz 1961). In the traditional Western society, a similar concept was discussed by Herbert Mead (1925, 1930). According to Mead, in order for the 'I' to develop, the 'Me' has to conform to the society, which Mead referred to as the 'social I'. In some cases, the 'I' is sacrificed for the 'Me' to grow. This is because the human mind makes sense of the world through communication - the use of vocal gestures and through the taking of roles. Socio-cultural values are accepted as conscious acts to conform to the social expectations, which are performed repeatedly, and finally become habits and culture.

In the case of educated women, Mead also argued that educated women, if they are married, they should be allowed work and be part of the intellectual world. Women must accept the judgments of others as long as she is capable of performing her roles as a wife and a mother at the same time. Thus, it is a conscious decision for married women to take on motherhood role and give up their career if they have to. In most Western (individualistic) countries, influential reference groups shift from family members to friends and government agencies. For example, when growing children reach the university age, they are expected to be independent, earn their own money and get government loans to support their studies. When they have children, working mothers can utilize day care facilities.

In Indonesia, it is normal for grown up children to live with their parents and get financial supports, including for education. In most cases, adult women are expected to take of her multiple roles, no matter how conflicting they may be. Married career women are still placed as the most responsible party for taking care of their children, and for doing domestics errands (Darmaji, et al, 2014). In a more traditional family, however, a woman, even though she is married, is still expected assist older parents. Reciprocally, younger parents normally take care of their younger grand- children. Family members are expected to help each other. For those who earn more, can hire domestic helpers to take care of children and to do domestic errands That is why day-care facilities is not a norm in Indonesia (even in bigger cities, like Jakarta).

The situation is worse for a married woman being a mother and a professional engineer at the same time. Professional female engineers are expected to perform in engineering jobs characterized by male domination, sometimes involving multiple projects at the same time, with complex problems, unpredictable, and risky situations requiring good teamwork, frequent travels and long-hour

work. Thus, they have to be able to focus, solve problems, make important decisions and be adaptive (Hewlett, et al, 2008). To conclude, even though Indonesia is the biggest Muslim country in the world in terms of population, the patriarchal Islamic jurisprudence (*fiqh*) which has marginalized empowerment of women, are hand in hand with the strong cultural values of *rukun* (harmony). Women tend to acknowledge their *kodrat* (nature) by taking on multi roles as a daughter, wife, mother and professional women, regardless how conflicting the roles may be. They accept male domination, restrictive codes of female behavior and are conscious of social expectations. Women navigate barriers to avoid taking alternative career paths. Thus, taking up an engineering profession is a deliberate conscious action.

Study Proposition

Adopting the Buse’s et. al, 2013 Career Persistence Model (CPM) in the context of Indonesia, especially in the engineering profession, this paper proposes Cultural dimensions as the fundamental variable influencing all the factors for women engineers’ decision in pursuing career in the engineering profession in Indonesia (Figure 2).

METHODS

This paper is based on an exploratory study because the topic discussed here, i.e., career of female engineers in engineering profession, is at its initial stage of study. Consequently, there is not much information available on previous

similar studies (Sekaran, 2006; Brown, R.B. (2006). Therefore, the study is not meant to offer final and conclusive evidence or solutions; but the result of it may offer a range of causes and alternative options for a solution of this specific problem in the future (Sandhusen, R.L. 2000). Hopefully, this study can be used as a reference for further research, that it may help improved research design (sampling methodology and data collection method), and can form as the basis of more conclusive research in the future.

Research design

The main survey instrument in this study is an administered questionnaire (Appendix-1), which is generated to accommodate questions relate to career persistence factors. Ordinal data using a five point Likert scale was used to categorize respondents’ opinion from strongly disagree (scale 1) to strongly agree (scale 5) to career persistence factors between two groups of female engineers who, during the data collection: a) were still working in the engineering profession; b) already quit working in the engineering profession.

The questionnaire captures information of respondents personal as well as professional lives, consists of six parts, as follows: I) Respondent’s demographic profile (age, marital status, number of children, age of the youngest child, length of working years, and highest education level) (no. 1-5); II) Information about current job (no. 1-10); III) Likeness of job (no. 1-10); IV) Workplace

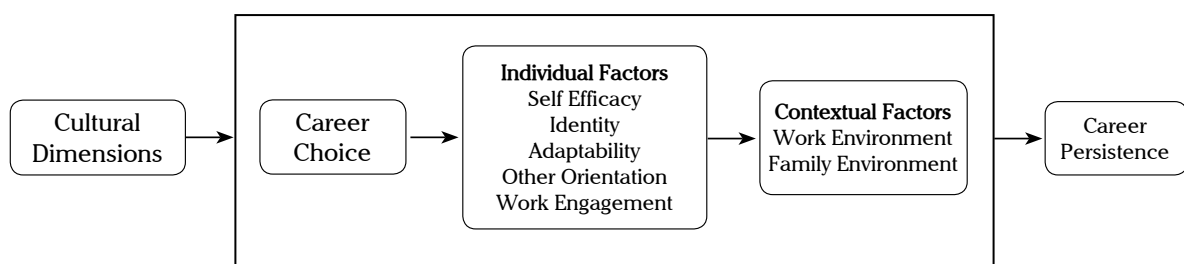


Figure 2. Proposed model: Impact of Cultural Dimensions to Career Persistence Model

contextual factors (no.1-10); V) Profession (no. 1-3); VI) Open-ended suggestions on how to be successful engineers; VII) Willingness to be interviewed for further study.

The survey instrument was employed as a strategy to collect 'snapshot' information to explore a situation of 'leaky pipeline' phenomenon of female engineers in the engineering profession, especially as the further a woman advances in her career stage (Kelley et al, 2003). Survey was also employed to find important factors and explanations why some female engineers retain their engineering profession, while others give them up, based on based on the order degree of agreement to the survey statements.

Due to the limited number of respondents in the study (female engineers who are working in the engineering profession), explained earlier, and the nature of this study as an exploratory study, ordinal data categorization was used in the questionnaire. Disadvantages of using ordinal data, include: a) because ordinal data are based on order not value, they are considered as non-parametric, not continuous data. Consequently, collected data cannot be analyzed using numerical tests. They cannot be used to measure mean values, standard deviation to summarize the distribution, and do not represent a set of population. Thus, can be used to represent: a) frequency of occurrences, using percentage (%) to show how many respondents have expressed opinions of "strongly disagree", "disagree," etc.; and 2) the median value of the scale, not median value of the data. For these reasons, the percentage list is employed to present the frequency level only (Park and Jung. 2009).

As discussed in the previous chapter, this study proposes Cultural dimensions as an important variables influencing a women engineer when making decisions to pursue career in engineering profession in Indonesia. In the Career Persistence model the variable of Cultural dimensions variable is added in the Contextual Factors. Thus, items

relevant to the cultural dimensions variable are taken into consideration when designing the survey; consequently will be analyzed to differentiate the persistent female engineers in the engineering professions in comparison to female engineers who quit after several years involve in the profession.

Data collection

Data was collected in the first quarter of 2015 through online survey using a questionnaire (Appendix-1) to seek feedback from respondents regarding their degree of agreement to the statements. Ordinal data using a five point Likert scale was used to categorize respondents' opinion from strongly disagree (scale 1) to strongly agree (scale 5) to career persistence factors. Online data collection method was utilized because: a) It is faster, simpler and cheaper; b) it gives flexibility to busy respondents to decide when and where to participate; c) files can be saved for later reference. The drawbacks include: a) it has unfavorable response rate and sample biases, thus, needs extra efforts to remind candidates to participate (Couper, 2000); b) it is not entirely unanimous as survey request is sent out through to candidates' email addresses; and c) there is no help available if assistance is required (Skarupova, Katerina. 2014).

Apparently, finding female engineers as respondents for this study was not easy as previously thought. Due to lack of accurate data from relevant institutions of women engineers in Indonesia (where they work and what they do), the authors attempted other approaches to find the target respondents (female engineers who still work or had previously worked in the engineering professions). In despair, one of the researchers/authors, also a female engineer, approached her Alma Mater - a prominent public-owned university with top engineering degree, to get the list and contact details of women engineering graduates. Online questionnaire was sent to all graduates, however no single response received.

Hoping to get responses, the researcher used her social networks (friends and acquaintances) to get respondents. This approach is commonly practiced as an efficient and effective way to get supports in Indonesia, especially when asking people to take part in any survey, due to the low interests in reading. For example, Indonesia ranks 60th out of 61 countries in terms of reading interest, a study by Central Connecticut State University in the US has revealed (The Jakarta Post, 2016 August 29,). Utilizing the researcher's social network, she contacted female engineers at her Alma Mater, only those she already knew (designated respondents). In addition, she performed intensive contacts by phones and visits to twelve (12) engineering-based companies with various sizes in Jakarta to find respondents. Surprisingly, there were only five (5) companies that have women engineers working there; and each company only has less than five female engineers. This gives strong evidence showing that female is underrepresented in the engineering profession. Of these two sources, a total of sixty-five (65) online questionnaires were sent through. At the beginning, responses were slow; only after followed by multiple reminding

emails and phone calls, finally a total of thirty-seven (37) filled-in responses (56.92%) were received. Out of these 37 respondents, 13 of them still work in the engineering profession; while the other 11 had diverted into non-engineering professions, and the other 11 never work in engineering profession.

Data analysis

The questionnaire captures information of respondents personal as well as professional lives, consists of six parts, as follows: I) Respondent's demographic profile (age, marital status, number of children, age of the youngest child, length of working years, and highest education level) (no. 1-5); II) Information about current job (no. 1-10); III) Likeness of job (no. 1-10); IV) Workplace contextual factors (no.1-10); V) Still in the engineering/already quit, length of years worked as an engineer); VI) Open-ended suggestions on how to be successful engineers; VII) Willingness to be interviewed for further study. Data collected in each part is described in the following.

Part I: Respondent's demographic profile

This part consists of respondents' personal information. Out of the 35 female engineers

Table 1. Respondents' demographic profile

		Group A	Group B
Age	21-30 years	46.15%	18.18%
	31-40 years	15.38%	18.18%
	41-50 years	30.77%	63.64%
	Over 50 years	7.69%	0
Marital status	Married	46.15%	18.18%
	Not Married	53.85%	81.82%
Number of children	0	69.23%	81.82%
	1	15.38%	18.18%
	2	15.38%	0
	3	0	0
My youngest child is at the age of	0 <1 year	41.67%	36.36%
	1-10 years	25.00%	9.09%
	11-20 years	0	9.09%
	Over 20 years	0	0
My highest Education	S1 (Undergrad)	30.77%	54.55%
	S2 (Master's)	53.85%	45.45%
	S3 (Doctoral)	15.38%	0

who participated in the survey, 13 (34.29%) were still working in the engineering career; 11 (31.43%) already quit from engineering career; and 13 (34.29%) never entered the engineering career. The study focuses on the respondents who have/had pursued the engineering career at some point in their career lives. Thus, only 24 respondents are discussed in this paper. Out of the 24 respondents, 13 of them (52.17%) were still working in engineering profession at the time of data collection; while the rest 11 of them (47.83%) had quit from the engineering career*. Only group A and B will be analyzed in this study.

The majority of respondents in Group A is younger (61.53% ≤ 40); while the majority of respondents in group B is older (63.64% ≥ 40) years old, with the majority of both groups are **not** married (A: 53.85%; B: 81.82%). The married respondents in group A have 1-2 young children (below 10 years old); while only 18.18% of group B have one child with older age.

Part II: Information about current job

This part discusses information related to current job/profession. The two groups of respondents share similar characteristics in terms of their

Table 2. Respondents' current job

		Group A	Group B	
1	I am currently working in	Private-profit	23.08%	63.64%
		BUMN (SOE)	7.69%	9.09%
		Gov Dept	23.08%	9.09%
		Other	46.15%	18.18%
2	I have been working for (# of years)	0-1 year	7.69%	18.18%
		1-10 years	61.54%	9.09%
		11-20 years	15.38%	63.64%
		over 20 yrs	15.38%	9.09%
3	On average I spend _____ hours at work/ week	10-20 hrs	53.85%	18.18%
		21-30 hrs	15.38%	0
		31-40 hours	7.69%	18.18%
		over 40 hrs	23.08%	63.64%
4	I _____ mostly	work in the city	30.77%	63.64%
		travel occasionally	46.15%	27.27%
		travel a lot	23.08%	9.09%
5	I mostly _____ to go to work	Driving	53.85%	9.09%
		Public transport	23.08%	45.45%
		Had a driver	23.08%	45.45%
6	I mostly work	alone	0	18.18%
		In a small team	61.54%	36.36%
		In a big team	38.46%	45.45%
7	I am mostly involved _____ at one period of time	one project	30.77%	9.09%
		various project	69.23%	90.91%
8	My superiors/bosses are mostly	Female	0	27.27%
		Male	100.00%	72.23%
9	The clients whom I work with are mostly	Female	0	18.18%
		Male	100.00%	81.82%
10	My colleagues are mostly	Female	0	45.45%
		Male	100.00%	54.55%

current jobs reflected in questions 6 and 7: both groups work in teams, and are mostly involved in various projects at one period of time. Strong differences are reflected in questions 2, and 8-10. The majority of respondents in group A works less than 20 hours/week; while the majority of respondents in group B works more than 20 hours/week. Also, while group A has all 100% male superiors, clients, and colleagues; group B has female counterparts, even though as minority.

Part III: Likeness of job

This part discusses information related to current job/profession.

Both groups share the same ideas in questions: 1 – 7 regarding their agreement on the statements. Differences in both groups include are question no. 8: Group A: 61.54% are undecided, while group B: 54.54% disagree with the statement; 9) Group

A: 76.92% agree, while group B 36.36% undecided and 45.45% agree with the statement; 11) Group A (61.54% agree + 38.46% strongly agree) with the statement; while Group B: only 54.54 % agree.

Part IV: Workplace contextual factors (family and work)

This part discusses the contextual factors. Both groups share similar ideas in the following questions: 2, 3, 6, 7, 9, and 10. However both groups have different opinions regarding the following questions: 1) Group A 100% agree, while group B: (90.90%), half undecided and the other half agree with the statements; 4) Majority of group A (92.30%) agree; while majority of group B (63.64%) are undecided on this statement; 5) Majority of group A (46.15%) strongly agree, 30.77% undecided; while majority of group B (100%): agree and strongly agree with the statement; and 8) Majority of group A 38.46% half disagree and the

Table 3. Information related to respondents' current job

		Group A	Group B	
1	I'm allowed to make decisions, without having to consult to my colleagues	Strongly Disagree	7.69%	9.09%
		Disagree	46.15%	9.09%
		Undecided		9.09%
		Agree	15.83%	63.64%
		Strongly Agree	15.38%	9.09%
2	My job gives me a sense of achievement and self-fulfillment	Strongly Disagree	0	0
		Disagree	7.69%	0
		Undecided	7.69%	18.18%
		Agree	38.46%	63.64%
		Strongly Agree	46.15%	18.18%
3	My work is challenging and competitive, give me a sense of accomplishment	Strongly Disagree	0	0
		Disagree	0	0
		Undecided	7.69%	9.09%
		Agree	53.85%	72.73%
		Strongly Agree	38.46%	18.18%
4	I like solving problems and take initiatives of difficult situations	Strongly Disagree	0	0
		Disagree	7.69%	0
		Undecided	0	9.09%
		Agree	38.46%	72.73%
		Strongly Agree	53.85%	18.18%
5	I enjoy working with different people in different projects	Strongly Disagree	0	0
		Disagree	0	0
		Undecided	0	18.18%
		Agree	53.85%	63.64%
		Strongly Agree	46.15%	18.18%

6	We all need to support each other and work in collaboration with all team members	Strongly Disagree	0	9.09%
		Disagree	0	0
		Undecided	7.69%	18.18%
		Agree	58.85%	27.27%
		Strongly Agree	38.46%	45.45%
7	My job provides me with opportunities for self-development and enhancement	Strongly Disagree	0	0
		Disagree	15.38%	9.09%
		Undecided	7.69%	18.18%
		Agree	23.08%	54.54%
		Strongly Agree	53.85%	18.18%
8	It changes all the time, very dynamic and unpredictable	Strongly Disagree	15.38%	0
		Disagree	0	18.18%
		Undecided	7.69%	54.54%
		Agree	61.54%	18.18%
		Strongly Agree	15.38%	9.09%
9	It is a well-defined job situations with clear expectations for performance	Strongly Disagree	7.69%	0
		Disagree	15.38%	9.09%
		Undecided	0	36.36%
		Agree	76.92%	45.45%
		Strongly Agree	0	9.09%
10	Engineering career was my own choice since before my university age	Strongly Disagree	0	0
		Disagree	7.69%	9.09%
		Undecided	30.77%	18.18%
		Agree	38.46%	72.73%
		Strongly Agree	23.08%	0
11	I could make positive and meaningful contributions to the society through my projects	Strongly Disagree	0	0
		Disagree	0	18.18%
		Undecided	0	18.18%
		Agree	61.54%	54.54%
		Strongly Agree	38.46%	9.09%

other half agree; while group B: 45.45% undecided and majority (54.55%) agree with the statement.

RESULTS AND DISCUSSIONS

Part I: It seems natural that respondents in group B has longer work-hours (≥ 20 hours/week). They are older than respondents in group A, and only 2 respondents are married (18.18%). They each have 1 child only, one with 0-10 years, the other 11-20 years of age. Thus, working mothers do not have to worry too much to leave work earlier. However the data does not say why group B opt out of engineering career.

Part II shows that the two groups of respondents share similar characteristics in their current jobs

where they both work in teams, and are mostly involved in various projects at one period of time. This means engineering jobs are based on team-work with multi-tasks. Adaptive behavior in a complex situation would be the key success factors for engineering jobs. Interestingly, all 100% respondents of group A (still working in engineering career) have male superiors, male clients, and male colleagues. Thus, these respondents are the only female engineers in the company where they work, their peers and even clients are all male - a truly male dominated workplace.

While in group B, the respondents have some female colleagues, even in all the female staff is a minority group. There is no strong evidence

Table 4. Information related to contextual factors

		Group A	Group B	
1	At the office, I have been treated equally with male colleagues in terms of promotions, pay, and treatment	Strongly Disagree	0	0
		Disagree	0	9.09%
		Undecided	0	45.45%
		Agree	61.54%	45.45%
		Strongly Agree	38.46%	0
2	Outside office, most people think of me as a full house-wife unless I tell them that I am a professional (work as an owner/entrepreneur or as a staff in an organization)	Strongly Disagree	0	45.45%
		Disagree	30.77%	18.18%
		Undecided	23.08%	27.27%
		Agree	46.15%	9.09%
		Strongly Agree	0	0
3	My husband and children are very supportive in what I do as a female professional	Strongly Disagree	0	18.18%
		Disagree	0	0
		Undecided	53.85%	45.45%
		Agree	23.08%	36.36%
		Strongly Agree	23.08%	0
4	I have no problem working in a male-dominated environment (A: 53.85% NM; B: 81.82%)	Strongly Disagree	0	18.18%
		Disagree	0	0
		Undecided	7.69%	63.64%
		Agree	46.15%	9.09%
		Strongly Agree	46.15%	9.09%
5	I prefer to work in a company that allows flexible working hours	Strongly Disagree	0	0
		Disagree	0	0
		Undecided	30.77%	9.09%
		Agree	23.08%	36.36%
		Strongly Agree	46.15%	54.55%
6	I have no problem leaving my children because they are grown up and independent	Strongly Disagree	7.69%	18.18%
		Disagree	15.38%	0
		Undecided	53.85%	63.64%
		Agree	15.38%	9.09%
		Strongly Agree	7.69%	9.09%
7	My company provides female staff with a day-care facility close to my office	Strongly Disagree	15.38%	0
		Disagree	23.08%	18.18%
		Undecided	46.15%	72.73%
		Agree	7.69%	9.09%
		Strongly Agree	0	0
8	Most of my staff are able to make decisions and solve problems independently	Strongly Disagree	0	0
		Disagree	38.46%	0
		Undecided	15.38%	45.45%
		Agree	38.46%	54.55%
		Strongly Agree	7.69%	0
9	I am happy because our house is located in a safe and friendly neighborhood	Strongly Disagree	0	0
		Disagree	7.69%	0
		Undecided	7.69%	18.18%
		Agree	69.23%	54.55%
		Strongly Agree	15.38%	27.27%
10	I have someone I know and trust to look after my children when I am away for work	Strongly Disagree	0	18.18%
		Disagree	0	0
		Undecided	76.92%	63.64%
		Agree	23.08%	9.09%
		Strongly Agree	0	9.09%

to show that these female engineers quit their engineering career because they prefer to work in a company where there are female colleagues.

Part III. While the respondents in both group A and B are in agreement in many aspects, however, they are in disagreement with question no. 8 and 9. There is an indication the reasons of group B quit the engineering professions due to the fact that the engineering works change all the time, very dynamic and unpredictable; while non-engineering jobs are not the case. Second, group A is 76.9 in agreement, while group B is only 45.45 in agreement with the statement no 10 regarding whether their work is with a well-defined job situations with clear expectations for performance. It gives an indication that the reasons respondents in group B leave engineering jobs to find a less rigid work situations.

Part IV. All respondents in group A agree with the statement "At the office, I have been treated equally with male colleagues in terms of promotions, pay, and treatment; while 45.45% respondents in group B undecided and only 45.45% agree with the statements. This shows female engineers in group B quit their engineering profession because they feel they are equally treated at the workplace.

Also, in conjunction with data analysis of Part II, where 100 % of superiors, colleagues and clients of group A are 100% Male; while that is not the case for group B, there is no strong evidence to show that these female engineers quit their engineering career because they prefer to work in a company where there are female colleagues. However data in question no. 4 show that the majority of group A almost all of them (92.30%) agree with the statement "I have no problem working in a male-dominated environment"; while the majority of group B (63.64%) are undecided (not sure) with the statement. This could give an indication that the majority of female engineers in group B may have decided to opt out the engineering profession because they prefer to have careers in

a less-male-dominated workplace. Further study should confirm this issue.

MANAGERIAL IMPLICATIONS

Limitations include: 1) number of respondents should be increased to represent a population; 2) data collection was constructed solely through personal reference; 3) the research can be considered as a sensitive one, should be confirmed further with interviews to get real information on the reasons why some female engineering quit engineering career.

Managerial Implications: Organizations should help find alternatives for their female engineers to be able to work professionally while fulfilling roles as mothers; for example, provide transportation to office, day-care facilities within office vicinity, more flexible time. Suggestions for government offices: set up related vocational education institutions to produced skillful and trustworthy baby sitters with imposition of health, safety and security regulations.

CONCLUSION

Our research findings exhibit some interesting facts. First, while the majority (if not all) of previous studies suggest that the male-domination is one of the most important factors explaining why not many female engineers are interested in pursuing career in engineering; our study suggest this issue is not a problem at all. Even though Indonesia is the biggest Muslim country in the world in terms of population, our findings show that women engineers do not experience any gender discrimination in the workplace. They feel that they are treated equally with their male colleagues in terms of promotions, and pay. This may be explained from the popular social norms in Indonesia where there is strong acknowledgement of one's kodrat (nature) and the roles attached to it, as well as expected behaviors which is fundamentally build on rukun (harmony). Thus, women are conscious of male domination and the restrictive codes of female behaviors and social

expectations. Second, there is also a strong indication that the main reason women engineers stay in engineering career is because of their own deliberate and conscious career decision; without having to consult to other family members.

However, the fact that the majority of respondents are unmarried gives an indication that respondents have more freedom to make career choice and decisions. ■

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