

THE EFFECTS OF MOTIVATION, WORK-LIFE BALANCE AND MENTORING ON GENDER EQUALITY: A CASE FROM THE MALAYSIAN ENGINEERS

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Abstract: This study examines the effects of motivation, work-life balance, and mentoring on gender equality among Malaysian engineers. Surveys were completed by 200 engineers, with data analysed using SPSS. Results showed high mean scores for motivation ($\mu = 4.416$), work-life balance ($\mu = 4.305$), mentoring ($\mu = 4.112$), and gender equality ($\mu = 3.541$). Pearson correlation analysis revealed strong correlations between gender equality and motivation ($r = .631, p = .000$), work-life balance ($r = .387, p = .000$), and mentoring ($r = .369, p = .000$). Regression analysis indicated significant effects of work-life balance ($\beta = 0.466, t = 5.470, p = 0.000$) and mentoring ($\beta = 0.189, t = -2.634, p = 0.009$) on gender equality, but not motivation ($\beta = 0.148, t = 1.850, p = 0.829$). Future research should include qualitative methods to explore the personal and professional motivations of women engineers and how organisational culture, leadership styles, and peer support influence motivation. This study highlights the importance of promoting work-life balance and mentoring to advance gender equality, aligning with Sustainable Development Goal (SDG) #5.

Keywords: Gender equality, Malaysian engineers, Sustainable Development Goal (SDG).

Introduction

Gender equality simply implies that men and women should have access to the same opportunities, resources, and protections. It does not advocate for men and women to be identical or treated the same way. Due to the disparities in opportunities, gender equality is especially crucial for women. Women should have equal opportunities with men in work, leadership, and decision-making at all levels, as well as equal access to high-quality education, financial resources, and political engagement. Gender equality is a matter of human rights and is considered a precondition for and an indicator of sustainable people-centred development (Saraih *et al.*, 2023a).

Women are less likely to work in formal employment and have fewer opportunities for business expansion or career progression. When women work more, they still earn less. There is a lack of documented studies on women's leadership, even though they significantly contribute to the success of their companies (Hamdan & Saraih, 2021). As reported in the Star (2023), there are insufficient gender-based statistics from government sources. In contrast, in the year 2020, at least 45 agencies collected data related to gender issues, but most of these data have not been published. Interestingly, 63% of women in Malaysia said they were afraid to speak out and advocate for gender equality.

The gender gap in Malaysia's labour force participation has been fairly consistent over the past five years, with about 80.9% of men working or looking for work compared to about 55.5% of women (Khazanah Research Institute, 2023) (Figure 1).

However, in terms of STEM education and employment, data from the Ministry of Higher Education (MoHE) Graduate Tracer Study (GTS) suggest that Malaysia bucks global trends when it comes to women in STEM education but not when it comes to employment (Figure 2).

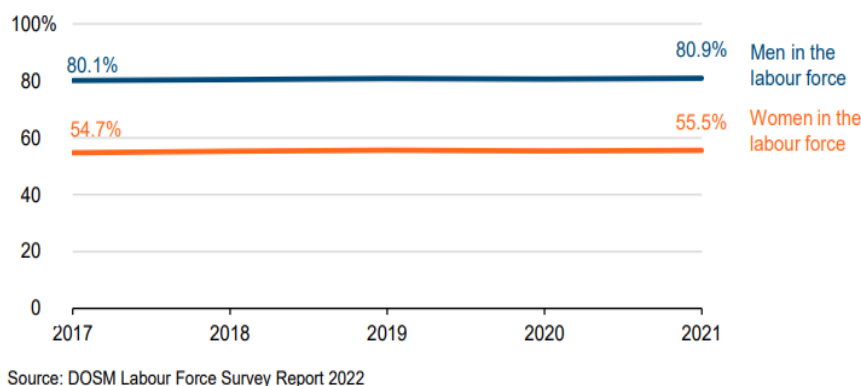


Figure 1: Labour force participants by gender (2017-2021)

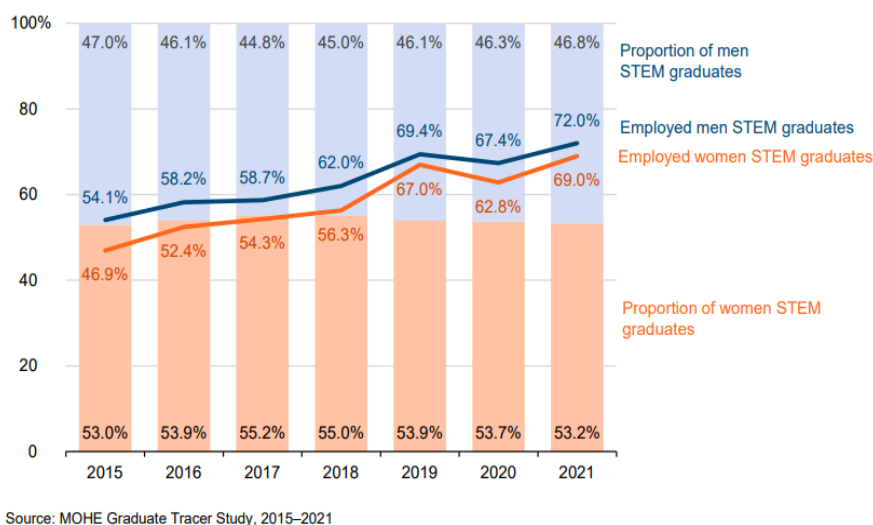


Figure 2: Proportion of STEM graduates and employment by gender (2015-2021)

Figure 2 shows the proportion of men and women STEM graduates (bachelor's degree and above) from 2015 to 2021 while the lines indicate the rates at which these graduates were employed at the time the GTS survey was administered. As presented, women consistently make up a greater proportion of STEM graduates than men (53.2% compared to 46.8%) but are hired at lower rates than men (69.0% compared to 72.0%).

Despite existing prejudices against women in Malaysia, there is a growing demand for skilled engineers and male engineers have stepped up to meet that demand. In Malaysia for example, female engineers are still under-represented as compared to male engineers. According to the statistics from the Board of Engineers Malaysia, out of 26% of female engineering graduates, only 6% became professional engineers (Nor Sham *et al.*, 2021). The importance of gender equality in all spheres, especially in economic participation has long been an area of considerable research, but it has witnessed limited action during implementation (Memon & Jena, 2017).

Even though there is a higher number of women employed in the manufacturing sector in Malaysia, the decreasing percentage of women creates an impact on the number of women who hold a high position of leaders in the manufacturing sector (Hamdan & Saraih, 2021). However, the declining percentage of women in leadership positions within the manufacturing sector in Malaysia not only hampers gender equality but also reflects broader challenges in the STEM fields (Hamdan & Saraih, 2021). Despite the highest number of women employed in the manufacturing sector, the decreasing proportion of women in leadership roles can be attributed, in part, to the under-representation of women in STEM-related fields.

This imbalance in STEM education and employment opportunities further exacerbates gender equality in leadership positions. STEM disciplines often serve as pipelines to technical and managerial roles in the manufacturing industry. By cultivating a supportive environment that encourages more women to pursue STEM education and enter leadership roles within the manufacturing sector, Malaysia can unlock the untapped potential of its female workforce and drive sustainable economic development.

Apart from that, the 2030 Agenda for Sustainable Development Goals (SDGs) was launched in 2015 to end poverty and set the world on a path of peace, prosperity, and opportunity for all on a healthy planet. The 17 SDGs demand nothing short of a transformation of the financial, economic, and political systems that govern our societies today to guarantee the human rights of all. In this new millennium, the notion of equality between men and women has evolved into the concept of gender equality, which is embodied in SDG #5, one of the SDGs (Saraih *et al.*, 2023b).

Given that the aim of SDG #5 is to achieve gender equality and empower all women and girls, this study aims to investigate the effects of several determinants such as motivation, work-life balance, and mentoring on gender equality among Malaysian engineers.

Motivation and Gender Equality

Gender plays a role in job motivation, which in turn influences organisational benefits. Women employees frequently struggle more than men with subjective motivational competence as well as with capacity, motivation, and task difficulty. Therefore, management needs to foster a climate where female employees can reach their full potential and improve the company's performance. A study of Štefko *et al.* (2017) presented the fact that the women's job satisfaction, in contrast to men, significantly affects the recognition of the superior. In the case of work motivation—the demotivation of women is significantly influenced by the fear of losing the workplace and also by the unfair behavior of the superior. Therefore, failure to meet these requirements might result in tension and frustration, ultimately diminishing job satisfaction. Despite having comparable qualifications, female employees are often considered to have fewer opportunities for promotion.

Job motivation is critical in encouraging employees to perform their jobs well. Besides improving job performance, motivation also promotes industrial harmony. Therefore, poor employee performance can often be attributed to a lack of motivation. Gender plays an important role in job motivation among employees in an organisation; however, little is known about the effect of motivation on gender equality. Women employees tend to develop positive attitudes at a slower rate than men. According to Štefko *et al.* (2017), women are very demotivated by an unstable job. If they are unsure, their motivation often diminishes. As added by Štefko *et al.* (2017), women are very demotivated if a result are conducted unfairly by the superior, since women are more emotional, they cannot take criticism, and their personality often does not take unjustness and humiliation.

Women also begin working on application issues with lower subjective motivational competence than men and they are more likely than men to attribute poor performance to a lack of capacity, motivation, or the complexity of the task (Ufuophu-Biri & Iwu, 2014). The European Institute for Gender Equality's 2024, Gender Equality Index highlights disparities in access to resources, status, and well-being between women and men. These disparities typically favour men and are often institutionalised through laws, justice systems, and social norms, leading to the demotivation of women in striving for gender equality. In addition, motivational factors are essential in driving women to pursue leadership roles and career growth. Addressing these disparities involves creating supportive environments that encourage equal participation and motivation across genders (McKinsey & Company, 2023).

Work-life Balance and Gender Equality

Limited evidence is found on the link between work-life balance and gender equality, particularly in the engineering context, although men and women experience work-life balance differently. Women are typically more responsible for household duties and childcare; they also devote more time to these tasks. In contrast to men and women without children, the study clearly demonstrates that working women who simultaneously care for the home and children are less likely to increase their unpaid extra hours. As presented by Mussida and Patimo (2021), the unequal share of care responsibilities between women and men further worsens the disadvantages of women in balancing public and private life, with an impact on their employment. This study confirmed that gender differences in the share of responsibilities roles in the public and private sphere influence the employability of women. This is because mothers have other obligations to their families; hence, would not have extra time to devote to their organisations. Greater work-life balance might benefit women; nevertheless, if they had more control over their work schedule (Chung & Van der Lippe, 2020).

As concluded by Burkhard (2022), more studies can be conducted to better understand the topics of equality, work-life balance measures, and reasons for the limited number of women in certain positions and fields. Thus, this study takes the initiative to provide empirical evidence on the effect of work-life balance on gender equality, particularly in the engineering field.

As reported by McKinsey and Company (2023) in "Women in the Workplace 2023", flexible work arrangements significantly impact work-life balance and gender equality. Women, who often shoulder a disproportionate share of childcare and household responsibilities, benefit greatly from remote and hybrid work models. These models not only help in managing work-life balance but also reduce the frequency of microaggressions, contributing to better mental health and increased gender

equality. Given that, organisations that prioritise flexible work environments and provide a better work-life balance see higher achievement among women and improved overall employee well-being and gender equality. However, limited evidence is found on the link between work-life balance and gender equality, particularly in local engineering studies.

Mentoring and Gender Equality

One strategy to address the challenges women experience in a male-dominated sector is implementing a formal mentorship program for women. Formal mentoring programs function by recreating the informal connections that have traditionally existed in the workplace, particularly for males and making these partnerships accessible to women who would not otherwise be included. These programs consider how mentors, mentees, and workplace culture are affected. Previous research has revealed potential impediments to effective mentoring as well as gender disparities in how male and female mentors may view mentoring (De Vries *et al.*, 2006). However, there is a lack of evidence on the direct link between mentoring and gender equality.

Mentoring is an integral part of gender organisations. While both men and women can benefit from mentoring, males advance more in their careers and receive more promotions than women. Mentoring plays a crucial role in helping women overcome various barriers to gender equality in job advancement. For any woman's career to progress, mentoring programs specifically created to support women may be crucial. Hence, by acknowledging under-achievement compared to male employees, mentorship programs might be vital in assisting women's professional advancement. As a result, organised programs for women's mentorship may both undermine and advance gender equality (Dashper, 2020).

Moreover, as highlighted by McKinsey and Company (2023), mentoring is recognised as a crucial tool for advancing gender equality in the workplace. Effective mentorship programs can address the "broken rung" phenomenon, where women are less likely to be promoted to managerial positions compared to men. By providing mentorship, companies can help women navigate career challenges, build professional networks, and develop the skills necessary for leadership roles. The importance of intersectional approaches in mentoring is also emphasised, ensuring that women from diverse backgrounds receive tailored support and opportunities for advancement. Thus, mentoring is expected to increase the level of gender equality.

Given the preceding literature, the researchers focused on investigating the effects of motivation, work-life balance, and mentoring on gender equality among engineers in Malaysia. Therefore, three hypotheses have been developed for this study. Hypothesis 1: There is a significant effect of motivation on gender equality among engineers; Hypothesis 2: There is a significant effect of work-life balance on gender equality among engineers; and Hypothesis 3: There is a significant effect of mentoring on gender equality among engineers.

Research Methodology

This study is classified as an explanatory study and is based on a quantitative study of Malaysian engineers. Deductive reasoning is then used to support the research's foundational steps, which include formulating hypotheses, gathering data, and analysing it before a hypothesis can be accepted or rejected, according to Borgers *et al.* (2020).

The sample size for this research project is about 200 respondents from 137,073 engineers in Malaysia (New Straits Times, 2020). In this study, convenience sampling was utilised due to the participation of a single company. Practical constraints, including limited access to a broader population and resource limitations, necessitated this approach. While convenience sampling restricts the generalisability of the findings, it provides valuable preliminary insights into gender equality issues within the participating engineering organisation.

The questionnaires have several sections, including data on demographics and all the tested variables. The 5-point scale of Likert scale is used to obtain the responses from respondents. The items for all of the tested variables were as the followings: Gender equality (12 items), motivation (13 items), work-life balance (15 items), and mentoring (15 items). The questionnaire measurements for variables are presented in Table 1.

Table 1: Questionnaire measurement for variables

Variables	Adapted From	No. of Items
Gender equality	UN Georgia (2018)	12
Motivation	Ryan (2011)	13
Work-life balance	Smeltzer <i>et al.</i> (2016)	15
Mentoring	Brodeur <i>et al.</i> (2015)	15

Data Analysis and Research Findings

Demographic Analysis of Respondents

200 engineers participated in this study as participants. Among the 200 respondents, 111 (55.5%) were men who worked as engineers. Regarding age analysis, the majority of respondents (78.5%) fell within the age range of 21 to 30 years old (157 in total). More than half of the respondents were newly graduated engineers in terms of the length of their employment. Next, the data on the various racial groups reveals that out of 200 respondents, 130 (65%) identified as Malay, 38 (19%) as Chinese, 28 (14%) as Indian, and 4 (2%) as others.

Out of 109 participants, those with an undergraduate degree made up the largest percentage (54.5%), as reported. The majority of them (71%) received monthly salaries in the range of RM2,000.00 to RM3,999.00, classifying them as junior engineers. This income level indicates that the majority of respondents had only recently begun their working lives, aligned with the study's findings, which revealed that 130 (65%) of the respondents had at least two years of work experience.

Mean Analysis of the Study Variables

The means of the tested variables were displayed in Table 2, with reported ranges from 3.541 to 4.305. Thus, the descriptive results for the means of all variables were considered when calculating the high indication. Based on the composite average score for each characteristic, the mean levels were classified as High (3.34 to 5.00), Medium (1.67 to 3.33), and Low (1.00 to 1.66). In conclusion, high mean scores of $\mu = 4.416$ and $\mu = 4.305$ were obtained for work-life balance and motivation at work, respectively. Additionally, mentoring and gender equality both received high mean scores, with respective values of $\mu = 4.112$ and $\mu = 3.541$ each.

Table 2: Mean analysis

Variables	Mean
Gender equality	3.541
Motivation	4.416
Work-life balance	4.305
Mentoring	4.112

Reliability Analysis

The reliability analysis utilises various scales and ratings to determine whether the data is reliable. Cronbach’s alpha is a widely used measure of internal consistency reliability in research. According to Nunnally and Bernstein (1994), which are commonly referenced in the literature, Cronbach’s alpha values can be interpreted as indicators of the reliability of a scale. A value of 0.90 and above indicates excellent reliability, suggesting that the items in the scale consistently measure the same underlying construct. Values between 0.80 and 0.89 are considered to reflect good reliability. It is important to assess the reliability of a scale to ensure that the measurements are consistent and accurate.

Referring to Table 3, the Cronbach’s alpha for the independent variables in this study is 0.852 for work-life balance, 0.954 for mentoring, and 0.968 for motivation. In contrast, Cronbach’s alpha for the dependent variable, gender equality is 0.971. As a result, it can be inferred that the reliability of the scale in this study is good to excellent because it exceeds the previously mentioned value.

Table 3: Reliability analysis

Variables	Cronbach’s Alpha
Gender equality	0.971
Motivation	0.968
Work-life balance	0.852
Mentoring	0.954

Pearson Correlation Analysis

Correlations analysis for the link between all of the examined variables were reported in Table 4. The correlation test was designed to demonstrate how strongly certain variables were related to one another or to demonstrate the degree of linkage between those two variables. The purpose of this research was to assess the relationship between factors that were both independent (motivation, work-life balance, and mentoring) and dependent (gender equality) variables.

Table 4: Pearson correlation analysis

Variables	Gender Equality	Motivation	Work-life Balance	Mentoring
Gender equality	-			
Motivation	0.631** 0.000	-		
Work-life balance	0.387** 0.000	0.498** 0.000	-	
Mentoring	0.369** 0.000	0.466** 0.000	0.100 0.157	-

This analysis has been categorised into five clusters, which indicated that ± 0.20 is a very weak correlation, ± 0.20 to ± 0.35 is a weak correlation, ± 0.35 to ± 0.50 is a moderate correlation, ± 0.50 to ± 0.70 is a strongly considerable high correlation, and ± 0.70 to ± 1.00 as a very strongly considerable correlation. In detail, there was a strongly considerable high correlation between motivation and gender equality with ($r = .631$, $p = 0.000$). Also, the other two variables presented a moderate correlation for work-life balance and gender equality with ($r = .387$, $p = 0.000$) as well as for mentoring and gender equality with ($r = .369$, $p = 0.000$). Given that, based on this research, the strongest correlation was found between motivation and gender equality.

Regression Analysis

The regression result for the study is shown in Table 5 and the R-square value is used to determine the strength of the independent variable that can explain the dependent variable. As seen in the table, the R-square value is 0.253, which is acceptable. The F ratio is used to determine the overall fitness of the regression model.

Table 5: Regression analysis

	R	R ²	R ² Change	F
Model 1	0.503	0.253	0.253	22.090
	β	t-ratio	Sig.	
(Constant)	-0.050	-0.069	0.945	
Motivation	0.148	1.850	0.066	
Work-life balance	0.466	5.470	0.000	
Mentoring	0.189	-2.634	0.009	

As indicated in Table 5, the F value is 22.090, with a significant p-value (0.000) less than 0.05. Furthermore, Table 5 presents that two variables have a significant effect on gender equality in this study, which are work-life balance ($\beta = 0.466$, $t = 5.470$, $p = 0.000$) and mentoring ($\beta = 0.189$, $t = -2.634$, $p = 0.009$). Thus, Hypothesis 2 and Hypothesis 3 are accepted in this study. Also, as presented in Table 5, motivation ($\beta = 0.148$, $t = 1.850$, $p = 0.066$) has no significant effect on gender equality based on the findings of this study. Thus, Hypothesis 1 is not accepted in this study.

Discussions

In this study, all of the independent variables (motivation, work-life balance, and mentoring) have a significant relationship with gender equality. However, when referring to the regression analysis, one of the independent variables, which is motivation is found not to significantly affect gender equality. On the other hand, the other two independent variables, which are work-life balance and mentoring are significantly affected by gender equality.

First, although motivation is essential for ensuring that employees do their duties appropriately and could increase job performance and promote industrial harmony; however, in the context of the engineering industry, motivation is not the key factor that might create an impact on gender equality. Gender has a significant impact on workplace job motivation, where women employees develop a good attitude at a slower rate than men. In contrast, men develop a positive attitude at a faster rate. While working on application difficulties (such as in the engineering industry), women exhibit lower subjective motivational competence than men and they are more prone than men to blame poor performance on a lack of aptitude, motivation, or task difficulty. This may provide the reason why motivation has an insignificant effect on gender equality. Moreover, grounded in evolutionary and sociological theories, the gender motivational theory argues that men are generally motivated by status enhancement, whereas women are motivated by risk reduction (Winstok & Weinberg, 2018). As reported by the Start (2023), 63% of women in Malaysia said they were afraid to speak out and advocate for gender equality. Thus, this might answer why motivation does not have a significant effect on gender equality.

Moreover, the organisational culture in many Malaysian engineering firms may not be conducive to foster gender equality. Studies indicate that women often face implicit bias and discrimination in male-dominated industries like engineering. These barriers can demotivate women regardless of their initial motivation levels, as they feel undervalued and unsupported in their careers. Moreover, stereotypes about women's capabilities in STEM fields persist, discouraging women from entering or persisting in engineering careers. These stereotypes can affect the hiring, promotion, and retention rates of women engineers, leading to an environment where individual motivation alone is insufficient to overcome structural inequalities.

Second, the researchers discuss about work-life balance. When it comes to work-life balance, men and women have different outcomes because women are often more responsible for housework and childcare, and spend more time on such tasks. At the same time, there is no comparison. Because of other family obligations, mothers do not have as much time to devote to their organisations. Women, on the other hand, would benefit from greater flexibility in their work schedules, resulting in a better work-life balance. The discursive and material difficulty of males taking time off from work puts more pressure on men to engage in child-raising, personal wellness, and work-life balance. Men, on the other hand, are under constant and increasing pressure to be more involved in their families and to take personal responsibility for their mental and physical well-being through work-life balance. Men also wanted to spend more time with their families and hobbies outside of work, but they felt responsible for their own career success. This was supported by Mofoluwawo (2021), who stated that work-life balance is no doubt a winning strategy for achieving gender equality in the workplace.

Third, a formal mentoring program for women is one technique for overcoming the difficulties that women faced in a male-dominated industry or workplace. The purpose of the formal mentorship program is to re-create the informal ties that have traditionally existed in the workplace, primarily among men and to expand these partnerships to women who would otherwise be excluded. A formal mentoring program aims to see how they affect the mentor, mentees, and organisational culture. While mentoring benefits both men and women, men benefit more in terms of career growth and promotions than women. It cannot be ignored that mentoring is essential for women to overcome gender gaps in professional progress such as in the engineering context. Thus, a formal mentoring program should be designed specifically to assist women in developing their career growth and promotion. Although mentoring is a complex intervention, it is frequently suggested as an intervention to address gender inequalities in the workplace (House *et al.*, 2021). Therefore, formal women's mentoring programs have the potential to strengthen gender equality, especially in the engineering context.

Conclusions

As a result, the researchers conclude that based on the study findings, only work-life balance and mentoring have a significant effect on gender equality among engineers in Malaysia. Thus, appropriate exposures and actions pertaining to increase work-life balance and mentoring need to be cultivated to reach the Malaysian aspiration towards gender equality (SDG #5) as a whole.

Referring to the regression analysis, the researchers discovered two substantial influences on gender equality, which are work-life balance ($\beta = 0.466$, $t = 5.470$, $p = 0.000$) and mentoring ($\beta = 0.189$, $t = -2.634$, $p = 0.009$). However, the motivation variable had no significant effect on gender equality ($\beta = 0.148$, $t = 1.850$, $p = 0.066$). Thus, only Hypothesis 2 and Hypothesis 3 are accepted in this study. Meanwhile, Hypothesis 1 is not accepted in this study.

Based on the findings, policymakers should implement targeted initiatives aimed at enhancing mentoring programs and promoting work-life balance to foster gender equality in engineering organisations. This can be achieved by establishing mentorship networks that pair women engineers with experienced professionals who can offer guidance and support throughout their careers. Additionally, offering flexible work arrangements such as remote work options or flexible hours can help alleviate the challenges faced by women balancing professional responsibilities with personal obligations. By prioritising mentorship and work-life balance initiatives, policymakers and engineering organisations can create a more inclusive and supportive environment, ultimately increasing gender equality within the field.

On the other side, the researchers encountered various constraints when conducting this study such as a lack of previous research on gender equality among engineers. Despite the fact that there have been many studies on gender equality, there have been very few studies on gender equality among engineers. There was a dearth of research that concentrated solely on male engineers, despite the fact that women had many that had a positive impact on the sector.

The researchers expect that more studies on gender equality will be undertaken in the future, encompassing a variety of independent variables (i.e., organisational culture, leadership styles, and peer support). Future research should also employ more representative sampling techniques across multiple companies to enhance the robustness and applicability of the results. A qualitative study designed also could help to gain insights into this study. Not only that, future researchers are advised

to transition this study to a longitudinal study design. By doing so, we not only address the limitations of the current research but also pave the way for future studies to explore gender equality in engineering more thoroughly. This longitudinal approach will enable us to examine how gender dynamics evolve over time within the engineering profession. Last but not least, the researchers hope this study can help future researchers with some references and guidance in the gender equality topic.

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Conflict of Interest Statement

The authors agree that this research was conducted in the absence of any self-benefits, commercial, or financial conflicts and declare the absence of conflicting interests with the funders.

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