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Impact of Women's Empowerment, Mobile Technology Usage, and Managerial Support on Work-Life Balance among Female Engineers: Content Validation

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Abstract: The empowerment of women is an important agenda in upholding women's rights. Empowering women in the energy sector can help them gain more control over balancing work and family matters. Studies have shown that mobile technology has the potential to have both positive and negative impacts on the work-life balance of individuals. Support from organizations, particularly from managers, plays a crucial role in empowering employees. The utilization of mobile technology can also have a positive impact on the work-life balance of employees. Therefore, managerial support is viewed as a key factor in enhancing empowerment initiatives and maximizing the benefits of mobile technology for employees' work-life balance. Hence, this study aimed to investigate the influence of female empowerment, mobile technology usage, and managerial support on work-life balance. The authors delved into content validation of the instruments used in this study using the content validation index (CVI) method. The originality lies in the thorough investigation of the ways in which a variety of variables, including work-life balance, managerial support, mobile technology usage, and women's empowerment, intersect and impact the lives of female engineers. The research was made more rigorous using the CVI technique, which guarantees that the results are solid and trustworthy. This research offers valuable insights into strategies for narrowing the gender gap in the engineering field and empowering and supporting women in the workplace. This paper delves into the research methodology, instrument development, and content validation results.

Keywords: women empowerment, research methodology, instrument development, content validity.

女性赋权、移动技术使用和管理支持对女性工程师工作与生活平衡的影响：内容验证

摘要：赋予妇女权力是维护妇女权利的重要议程。赋予能源部门的妇女权力可以帮助她们更好地平衡工作和家庭事务。研究表明，移动技术有可能对个人的工作与生活平衡产生积极和消极的影响。组织的支持，特别是来自管理人员的支持，在赋予员工权力方面起着至关重要的作用。移动技术的使用也可以对员工的工作与生活平衡产生积极影响。因此，管理支持被视为加强赋权举措和最大限度地发挥移动技术对员工工作与生活平衡的好处的关键因素。因此，本研究旨在调查女性赋权、移动技术的使用和管理支持对工作与生活平衡的影响。作者使用内容验证指数(血管内皮生长因子)方法深入研究了本研究中使用的工具的内容验证

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。其独创性在于彻底调查了各种变量（包括工作与生活的平衡、管理支持、移动技术的使用和女性赋权）如何交叉并影响女性工程师的生活。使用血管内皮生长因子技术使研究更加严格，从而保证了结果的可靠性和可信度。这项研究为缩小工程领域性别差距以及在职场中赋予和支持女性的策略提供了宝贵的见解。本文深入探讨了研究方法、工具开发和内容验证结果。

关键词：妇女赋权、研究方法、工具开发、内容效度。

1. Introduction

The empowerment of women has emerged as a worldwide movement aimed at safeguarding and promoting women's rights in areas such as education, employment, and well-being. Moreover, female empowerment promotes gender equality, which allows women to take an equal place in economic and developmental processes. Statistics show that the participation of women in the Malaysian workforce continues to increase annually [1]. However, the trend is rather different in the engineering field. Although the advancement of technology and the democratization of education, especially in STEM (science, technology, engineering, and mathematics), have contributed to the better participation of women in male-dominated industries, such as engineering, women are still underrepresented in engineering and related fields [1]. While the statistic for female empowerment has shown a slight increase from 0.726 in 2018 to 0.727 in 2019, women continue to be underrepresented in technical and professional fields compared to men [2]. Statistics from the Board of Engineers Malaysia (BEM) stated that out of 26% of engineering female graduates, only 6% became professional engineers. Several reasons have contributed to many female engineers' decision to leave the profession. One of the reasons is the difficulty in balancing work and life matters. Long working hours, for example, force workers to sacrifice time for their private lives [3].

Women engineers are perceived to have a lack of control over their jobs and are not allowed to perform challenging physical tasks due to the notion that they possess limited capabilities and skills. This happens when employers and colleagues tend to doubt their abilities and decisions. Thus, the working culture in engineering does not appear to treat women equally compared to their male counterparts. In this regard, organizations and supervisors play an important role in empowering women in the workplace by ensuring gender equality and harmonious diversity. In the Malaysian private sector, the level of support during the testing phase greatly relies on employers' initiatives and positive actions to support women in the workplace. It is observed that women need more

support and understanding from their employers to cope with their double and triple roles. Supportive employers help female employees balance work and family obligations. It is, therefore, vital for organizations to take serious steps and actions to develop and establish formal policies that emphasize work-life balance, which may include flexible working arrangements and childcare facilities to support women at the workplace [4]. In the engineering field, the support provided by supervisors through their attitudes and behaviors toward employees' needs is essential for determining and enhancing employees' well-being, particularly in terms of work-life balance. However, there are limited studies on and less prominent understanding of the impacts of managerial support on employee wellbeing [5].

In addition, mobile technology usage (MTU), which encompasses the use of portable communications and computing devices with Internet access, such as smartphones, tablets, and laptops, may impact the work-life balance of individuals, particularly working adults. In recent years, Malaysia has emerged as one of the most digitally connected societies globally, boasting an internet penetration rate of approximately 80%. This connectivity is largely facilitated through the widespread use of smartphones among Malaysians [6]. Wang et al. [7] stated that technology plays an important role in an individual work-life balance. In some aspects, it might help in mitigating work-life conflict but also, from a different perspective, could create conflict due to the extension of working hours, resulting in the invasion of work affairs into home life. A study found that the use of mobile technology in the West is a source of strain and burnout among employees [8]. Thus, the use of mobile technology can both benefit and harm users' work-life balance. After conducting a thorough literature search, it was discovered that there is a scarcity of studies examining the effects of MTU on the work-life balance of female engineers in the Malaysian energy sector.

Considering this matter, the overall aim of this study was to examine the impact of female empowerment and MTU on the work-life balance of female engineers in the energy sector. In addition, managerial support

was introduced as a moderating variable in the study. This study investigated the impact of managerial support on the relationship between female empowerment, MTU, and work-life balance among female engineers in the Malaysian energy sector.

This paper provides a comprehensive analysis of content validity and the feedback received from expert reviewers during the pre-testing phase. Pre-testing before actual data collection is crucial. By gathering responses and feedback during this stage, potential issues can be identified and addressed. Additionally, pre-testing helps to verify the relevance and clarity of the constructs. In this study, the authors sought feedback from both academics and industry professionals. The comments received were then analyzed using the content validity index (CVI) to assess the level of agreement among the panelists. Based on the comments, some modifications were made, and the instrument was ready for the next step. Therefore, this paper is organized as follows: introduction, research methodology, research instrument, survey instrument development, and conclusion.

2. Research Methodology

This study employed a quantitative method and cross-sectional survey design to acquire data to address the research questions. The cross-sectional survey design offers researchers a concise snapshot of outcomes. This method typically utilizes a survey technique that is cost-effective and efficient in gathering data within a short timeframe. Furthermore, it is a formal method used to measure relationships, analyze cause and effect, and understand the interactions between variables [9].

The study utilized stratified sampling techniques, which are a type of probability sampling method. According to Hayes [11], stratified random sampling allows researchers to obtain the best sample representing the entirety of the studied population. In addition, the snowball sampling method was also used in this study. In particular, the primary unit of analysis for this study involved female engineers working in various energy companies in Malaysia, such as those in the oil and gas, nuclear power, and utility sectors. The target respondents for this research were female engineers employed in Malaysian public listed companies within the energy industry. The scope of the study was restricted to female engineers within this sector, irrespective of their rank, position, or marital status.

According to the Board of Engineers (BOE), the total number of graduate engineers in Malaysia is 177,334, with female engineers making up 29.08% of this total, which is equivalent to 51,568 female engineers. However, the total population in the energy sector remains unknown. Thus, the G*Power software was used to calculate the sample size, and the minimum number of samples required for the study was 98.

The collected data were analyzed using Statistical Package for the Social Sciences (SPSS) Version 26.0 and SmartPLS for structural equation modeling (SEM). To conduct basic analysis, such as descriptive statistics and reliability tests for the pilot study, SPSS was utilized. Additionally, SmartPLS for SEM was employed to test the measurement model, analyze the structural model, and measure the moderating variables for this study.

3. Research Instruments

The survey comprised 72 items utilizing a Likert scale ranging from 1 to 5, with 1 indicating strongly disagree, 2 for disagree, 3 for neutral, 4 for agree, and 5 for strongly agree. The questionnaire was structured into two sections. The first section focused on demographics, including age, ethnicity, marital status, highest level of education, job position (field engineer/non-field engineer), company orientation (oil & gas, power & utilities, service & equipment), and years of service. The second section delved into inquiries regarding female empowerment, MTU, managerial support, and work-life balance.

4. Survey Instrument Development

Although there are many variations in the development of the research instruments, for this study, a five-phase model for the development of the questionnaire was followed, as shown in Fig. 1.
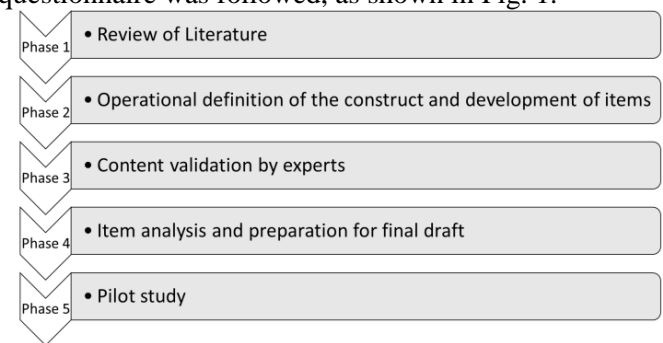

Fig. 1 5-phase development of the research instrument [14]

4.1. Phase 1

During Phase 1, literature review was conducted to explore the evolution of research skills development. This involved critically analyzing various scholarly works to identify constructs essential for effective research conduct. In the realm of women's empowerment, various frameworks have been identified for measuring progress and impact, such as Moser's framework, the Harvard analytical framework, Longwe's women empowerment framework, and the survey-based women's empowerment index (SWPER). However, many of them have been developed to measure women's empowerment in community

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contexts. After comparing and analyzing the identified constructs, five constructs from Longwe's empowerment framework (WEF) were selected for this study and revised to align with the organizational context. These constructs were utilized in the study and are operationally defined in Table 1.

Table 1 Operational definitions (Developed by the authors)

Variables	Dimensions and Operational Definitions
Women empowerment	*Welfare* encompasses the fundamental needs of women and pertains to their material well-being in comparison to men. In the realm of employed women, welfare denotes the support provided by employers in the workplace, such as childcare services, maternity leave, protection from sexual harassment, and flexible work schedules.
	Access It is imperative that women have equal access to resources and benefits in the workplace. This includes access to training and career development opportunities, information and communications technology (ICT), fair treatment in job promotions, and opportunities for furthering their education.
	Conscientization entails recognizing the disparities between genders and advocating equitable gender relations, free from bias. It also involves women being acutely aware of any discrimination or unequal treatment they may face in the workplace. Consequently, it necessitates immediate measures to bridge the gender gap and diminish gender inequalities.
	Participation Women's opportunity to engage in discussions and decision-making within organizations, free from barriers such as cultural inequality. Women voice their opinions during meetings, contribute to decision-making, participate in program and policy planning, and collaborate with men on challenging tasks.
	Control gives women the freedom to decide on their lives, careers, and families while playing an active role in the development of the nation. In an organization, control allows women to express their opinions, control their workload, and have the freedom to conduct work with minimal constraints.
MTU	*MTU* refers to the use of portable communications and computing devices with Internet access, such as smartphones, tablets, and laptops. Also refers to the use of mobile devices connected by wireless technology, which enables users to share voice, data, and mobile applications (apps).
Managerial support	Managerial support is a shared responsibility between employers and employees, aimed at assisting employees in overcoming challenges both within and outside of the workplace. This support extends beyond formal work-related matters to encompass informal emotional, motivational, and personal support.
Work-life balance	Achieving *work-life balance* entails the capacity to maintain a fulfilling personal, social, and family life while also dedicating oneself to full-time work commitments.

MTU refers to the utilization of portable devices with wireless connectivity that accompany the user wherever they go. Literature review found that MTU has various impacts, especially on working adults. Some studies found that MTU helps mitigate work- and non-work conflict, whereas other studies found that MTU leads to burnout and blurred boundaries between work and non-work, thus causing conflict in work-life balance. Thus, MTU is operationalized as described in Table 1.

In reviewing several studies on managerial support, it has been determined that such support encompasses formal (such as programs, policies, and organizational assistance) and informal (including mental, emotional, and motivational support) actions taken by employers toward their employees [15]. Hence, managerial support is a crucial aspect of the employer-employee relationship, encompassing a mutual commitment to promoting the well-being of employees.

Several studies have explored the concept of work-life balance, often equating it with work-family balance. However, based on the literature review, work-life balance is distinct from work-family balance. Work-family balance primarily focuses on the interplay between work and non-work responsibilities, while work-life balance encompasses a broader spectrum of non-work demands and activities, such as family, health, sports, travel, and more.

A crucial aspect of work-life balance is an individual's subjective perception of balance [16]. It is not simply a matter of balancing work and personal life, but rather the ability to enjoy personal, social, and family life while maintaining a full-time job. In this study, we operationalize work-life balance as the capacity to achieve this harmony and fulfillment in all aspects of life while pursuing a career.

4.2. Phase 2

Phase 2 of the study involved the development of instruments and the establishment of operational definitions for the constructs. The questionnaire utilized scales adapted from various sources, with the exception of the women empowerment scale. The Longwe empowerment framework, as adapted by Syahirah et al. [15], was employed for the women empowerment scale, with modifications made to the items. This is because the original version from Longwe was more focused on the empowerment of women in social development rather than in organizational settings. Various documents, including the National Women Policy 2009, Women Development Action Plan (WDAP) 2009, TalentCorp reports, and relevant studies on women empowerment in organizational settings, were reviewed and incorporated to enhance the empowerment scale. The

original scale consists of 31 items, whereas the proposed scale comprises 37 items. However, some items may be dropped or merged during validation.

For MTU, the original scale by Duxbury and Smart [8] was adapted for this study. The scale consists of 8 items related to the advantages of MTU. The scale for managerial support was originally adopted from Anchour et al. [15], which comprises 13 items. For work-life balance, the original scale of 4 items from Brought et al. [16] was adopted. Table 1 presents the operational definitions and item development.

Table 2 Items (Developed by the authors)

Items	Sources
Women empowerment	
Welfare	
1. I can choose a flexible working time schedule.	[17, 18]
2. All meetings are usually held during work hours.	
3. Outstation work is usually carried out after working hours.	
4. I am satisfied with the current maternity leave duration.	
5. Sexual harassment has never occurred in my workplace (verbally or physically).	
6. My organization provides incentives for childcare, such as childcare centers.	
7. My organization provides family care leave.	
8. My organization has special parking for pregnant women.	
9. A nursing room is available at my workplace.	
Access	
1. I have always been able to use technology facilities while doing tasks.	[17, 19]
2. The opportunity to pursue higher education is offered to me.	
3. I often get the opportunity to undergo training for my career development.	
4. I always receive clear instructions and information for performing my tasks.	
5. I have consistently been afforded equal opportunities for promotions regardless of gender.	
6. I have access to being promoted to a leadership position.	
7. I believe that my male colleague has greater opportunities for career development.	
8. I have the opportunity to work on-site and tackle challenging tasks.	
9. I have been given the opportunity to lead a project in my organization.	
Conscientisation	
1. I believe that women should have equal opportunities to hold high-ranking positions alongside men.	[17, 20, 21]
2. I believe that it is important for men to be involved in balancing career and family responsibilities alongside women.	
3. I believe that men should participate in family affairs, rather than solely concentrating on their careers.	
4. I believe that women have the same ability to make rational decisions as men.	
5. I believe women can compete competitively with men.	
6. I think that today, being a full-time housewife is no longer the best option for women.	
7. I believe that men are better at making decisions.	
8. I am aware that my superiors and colleagues always doubt my skills and ability to perform heavy tasks.	
1. I have never felt excluded during meetings.	[17, 21, 22]
2. I often reach decisions through cooperation with colleagues and superiors.	
3. I can always collaborate with colleagues and superiors.	
4. There is a channel through which I can express my opinion to higher authorities to improve procedures and policies in the workplace.	
5. I always receive guidance and advice on career development from my superiors.	
1. All opinions shared by female engineers are valued and respected.	[17, 22, 23]
2. I am free to perform tasks in my field of work without any hindrance.	
3. I can control my workload and working hours.	
4. There is rarely a domination and subordination relationship between men and women within the scope of my work.	
5. I can make decisions regarding my field of work without any obstacles.	
6. My superiors trust me to lead projects without any doubt.	
With MTU for work and non-work:	[8]
1. I am more efficient and productive at work.	
2. I can manage my time more effectively.	
3. I have more flexibility and freedom with respect to when and where I work.	
4. I can reach people, and people can reach me when I am in transit/traveling/offsite.	
5. It is easier to get work done outside "normal" working hours.	
6. My family can get in touch with me during my working hours.	
7. I can work from home.	
8. I can work from home in an emergency (i.e., sick kids).	
9. It helps me with my work-life balance.	
1. My supervisor is supportive when family problems arise.	[16]
2. My supervisor allows for flexibility in my work arrangements to enable me to handle my family responsibilities.	
3. My supervisor provides advice on how to handle my work and family responsibilities.	
4. In the event of a conflict, managers understand when employees must put their family first.	
5. In this organization, employees can easily balance their work and family lives.	
6. My supervisor understands that I must meet family responsibilities and those related to my job.	
7. In this organization, it is generally acceptable to talk about one's family at work.	
8. Managers in this organization are sympathetic to the childcare responsibilities of their employees.	
9. This organization supports employees who want to relocate to less demanding jobs for family reasons.	

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10. In this organization, employees are encouraged to strike a balance between work and family life.

11. The management generally encourages department heads to be sensitive to employees' family and personal concerns.

12. Overall, managers within this organization are highly accommodating when it comes to addressing family-related needs.

13. This organization encourages employees to set limits on where work stops and home life begins.

1. I currently maintain a healthy balance between my work commitments and personal activities. [15]

2. I have difficulty balancing my work and non-work activities.

3. I feel that the balance between my work demands and non-work activities is currently about right.

4. Overall, I believe that my work and non-work life are balanced.

4.3. Phase 3

During Phase 3, the items go through a content validity phase, which is also known as a pre-test. Ensuring content validity is crucial for validating the construct in terms of its wording, format, clarity, and relevance. The questionnaire draft was then sent to seven experts for content validation; all reviewers were academicians and industrial experts. The reviewers were selected based on their expertise and qualifications in the field. They were asked to rate the relevance of the instrument and its potential to represent each construct. They must also ensure that all items are clear to the respondents. The content validity of the instrument was assessed by analyzing the CVI values, which measured the level of agreement among the panelists [13]. For the CVI, the panel of experts was asked to rate each scale item's relevance to the underlying construct. A 4-point scale was used to avoid a neutral point. The four points used for item rating were 1 - not relevant, 2 - somewhat relevant, 3 - quite relevant, and 4 - highly relevant. For each item, the CVI was computed as the number of experts giving a rating of 3 or 4, divided by the total number of experts. The expert panel rating by seven or more members resulted in a CVI exceeding 78% (0.78), indicating a high level of agreement and value [12]. This meant that if a significant majority of the panel's opinions agreed, items were considered relevant to the concepts investigated. Meanwhile, a CVI score below 78% indicates that the items on the instrument do not sufficiently cover the thematic domains explored. This raises concerns regarding objectivity and appropriateness [12]. In this study, the CVI of each reviewer's rating was calculated. The results ranged from 1.00 to 0.86, indicating that the majority of the items were deemed relevant and appropriate for measuring the construct. The CVIs calculated for each item are shown in Table 3.

Table 3 CVIs (Developed by the authors)

No. of items	No. of agreements	CVI
Welfare		
Item 1	6	0.86
Item 2	6	0.86
Item 3	6	0.86
Item 4	6	0.86
Item 5	6	0.86
Item 6	6	0.86
Item 7	6	0.86
Item 8	6	0.86
Item 9	6	0.86
Access		
Item 1	7	1.00
Item 2	7	1.00
Item 3	7	1.00
Item 4	7	1.00
Item 5	6	0.86
Item 6	7	1.00
Item 7	6	0.86
Item 8	7	1.00
Item 9	7	1.00
Conscientisation		
Item 1	6	0.86
Item 2	6	0.86
Item 3	6	0.86
Item 4	6	0.86
Item 5	6	0.86
Item 6	6	0.86
Item 7	6	0.86
Item 8	7	1.00
Participation		
Item 1	7	1.00
Item 2	6	0.86
Item 3	6	0.86
Item 4	7	1.00
Item 5	6	0.86
Control		
Item 1	6	0.86
Item 2	7	1.00
Item 3	6	0.86
Item 4	5	0.86
Item 5	7	1.00
Item 6	6	0.86
MTU		
Item 1	6	0.86
Item 2	6	0.86
Item 3	6	0.86
Item 4	6	0.86
Item 5	6	0.86
Item 6	6	0.86
Item 7	6	0.86
Item 8	6	0.86
Item 9	6	0.86
Managerial Support		
Item 1	6	0.86
Item 2	6	0.86
Item 3	6	0.86
Item 4	6	0.86
Item 5	6	0.86
Item 6	6	0.86
Item 7	6	0.86
Item 8	6	0.86
Item 9	6	0.86
Item 10	6	0.86
Item 11	6	0.86
Item 12	6	0.86
Item 13	6	0.86

Continuation of Table 3		
Work-Life Balance		
Item 1	6	0.86
Item 2	6	0.86
Item 3	6	0.86
Item 4	6	0.86

Table 4 summarizes the comments for each variable. Table 5 presents the general comments received from the reviewers.

Table 4 Items (Developed by the authors)

Variables	Summary of the Comments	Action
Women empowerment	- The majority of the items are relevant. - Some are double-barrel items.	- For double-barrel items, for example, Item 2 under participation "I often reach decisions through cooperation with colleagues and superiors." The word *colleagues* will be omitted.
Managerial support	- All items are relevant; however, there are too many items.	- The items cannot be reduced because they are relevant to the study and to answering research questions.
MTU	- Clarify what MTU means	- We will put the description at the construct.
Work-life balance	- The majority of items are clear and relevant. - Can add more items to this section - Some items combine negative and positive wording.	- Increasing the number of items on the questionnaire will result in a longer survey, leading to decreased respondent engagement and participation. - The sentence will be restructured into positive sentences.

Table 5 General comments on the questionnaire (Developed by the authors)

Reviewers	Comments
Reviewer A	Some constructs or variables are not well balanced in terms of the number of items to measure. Having too many items in your survey can discourage respondents from participating. Insufficient items may lead to reliability and validity concerns in the future, particularly when certain items must be eliminated due to low loading factors.
Reviewer B	A good attempt to develop the instrument. Items are clear and relevant. A pilot study will allow you to gain more insights.
Reviewer C	Overall the questionnaire is well equipped with more relevant items. I recommend minor corrections in sections A and B if they are relevant. Further, I suggest using variable items from reputable journals such as Emerald and Elsevier.
Reviewer D	It is recommended to provide a clear explanation of MTU and each variable to ensure that
	respondents have a thorough understanding of the expectations for the items. Attempt to identify which item is more relevant to answering your RQs. Hair et al. [10] suggested that even a single item can effectively represent a construct; however, a construct consisting of three items may offer a more reliable representation.
Reviewer E	The items, length, and relevancy are acceptable. Consider adding a few more questions to the work-life balance section.
Reviewer F	All the items are relevant to the industry. It is recommended to make amendments to the demographic section by updating the rank/position, years of service, job mode, and other relevant information commented on.
Reviewer G	The items are pertinent to the industry and are straightforward.

4.4. Phase 4

At this phase, the reviewers' comments were reviewed and analyzed. Amendments and adjustments were made according to the comments. For the construct under women empowerment, which is conscientization for Item 6, the sentence structure was modified to be less offensive, as noted by the reviewer. The sentence "I think that today, being a full-time housewife is no longer the best option for women" was changed to "I think that nowadays, women should have their own income." Next, Participation Items 2, 3, and 8 were restructured due to the double-barrel sentence. The word "superior" and "colleagues" were omitted, depending on the suitability of the sentences. In addition, for MTU, the description already put in the question to represent the meaning of MTU. Finally, for work-life balance, the sentences for Item 2 were revised to convey a positive message. The sentence "I have difficulty balancing my work and non-work activities" was changed to "I have no problem in balancing my work and non-work activities." Therefore, the total number of items was 72, including demographic items. The revised items are presented in Table 6.

Table 6 Revised items (Developed by the authors)

Variables	Items
Women Empowerment	*Welfare* 1. Childcare centers are available at my workplace. 2. I can choose a flexible working time schedule. 3. All meetings are usually held during work hours. 4. Outstation work is usually carried out after working hours. 5. I am satisfied with the current maternity leave duration. 6. Sexual harassment has never occurred in my workplace (verbally or physically). 7. My organization provides incentives for childcare, such as childcare centers. 8. My organization provides family care leave. 9. My organization has special parking for pregnant women.

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10. A nursing room is available at my workplace.

Access

1. I have always been able to use technology facilities while doing tasks.
2. The opportunity to pursue higher education is offered to me.
3. I often get the opportunity to undergo training for my career development.
4. I always receive clear instructions and information for performing my tasks.
5. I have consistently been afforded equal opportunities for promotions, regardless of gender.
6. I have access to being promoted to a leadership position.
7. I believe that my male colleague has greater opportunities for career development.
8. I get opportunities to work on-site and conduct challenging tasks.
9. I have been given the opportunity to lead a project in my organization.

Conscientisation

1. I believe that women should have equal opportunities to hold high-ranking positions alongside men.
2. I believe that it is important for men to be involved in balancing career and family responsibilities alongside women.
3. I believe that men should participate in family matters, rather than solely concentrating on their careers.
4. I believe that women have the same ability to make rational decisions as men.
5. I believe women can compete competitively with men.
6. I think that nowadays, women should have their own income.
7. I believe that men are better at making decisions.
8. I am aware that my superiors always doubt my skills and ability to perform heavy tasks.

Participation

1. I have never felt excluded during meetings.
2. I often reach decisions through cooperation with superiors.
3. I can always collaborate with my colleagues.
4. There is a channel through which I can express my opinion to higher authorities to improve procedures and policies in the workplace.
5. I always receive guidance and advice on career development from my superiors.

Control

1. Opinions shared by female engineers are highly valued and respected.
2. I am free to perform tasks in my field of work without any hindrance.
3. I can control my workload and working hours.
4. There is rarely a domination and subordination relationship between men and women within the scope of my work.
5. I can make decisions regarding my field of work without any obstacles.
6. My superiors trust me to lead projects without any doubt.

Mobile | With MTU (a smartphone, laptop, and tablet

Technology Usage | with internet connection) for work and non-work:

1. I am more efficient and productive at work.
2. I can manage my work time more effectively.
3. I have more flexibility and freedom with respect to when and where I work.
4. I can reach people, and people can reach me when I am in transit/traveling/offsite.
5. It is easier to get work done outside "normal" working hours.
6. My family (husband, parents, siblings, and children) can get in touch with me during my working hours.
7. I can work from home.
8. I can work from home in an emergency (i.e., sick kids).
9. It helps me with my work-life balance.

Managerial Support |
1. My supervisor is supportive when family problems arise.
2. My supervisor allows for flexibility in my work arrangements to enable me to handle my family responsibilities.
3. My supervisor provides advice on how to handle my work and family responsibilities.
4. In the event of a conflict, managers understand when employees must put their family first.
5. In this organization, employees can easily balance work and family lives.
6. My supervisor understands that I must meet family responsibilities and those related to my job.
7. In this organization, it is generally acceptable to talk about one's family at work.
8. Managers in this organization are sympathetic to the childcare responsibilities of their employees.
9. This organization supports employees who want to relocate to less demanding jobs for family reasons.
10. In this organization, employees are encouraged to strike a balance between work and family life.
11. The management generally encourages department heads to be sensitive to employees' family and personal concerns.
12. Overall, managers within this organization are highly accommodating when it comes to addressing family-related needs.
13. This organization encourages employees to set limits on where work stops and home life begins.

Work-Life Balance |
1. I currently maintain a healthy balance between my work commitments and personal activities.
2. I have no problem balancing my work and non-work activities.
3. I feel that the balance between my work demands and non-work activities is currently about right.
4. Overall, I believe that my work and non-work life are balanced.

4.5. Phase 5

A pilot study was conducted to examine the reliability of the instrument produced during the final stages of testing. For the pilot study, 30 respondents

were selected from the total target population. During this phase, the data collected from the pilot test were analyzed using SPSS to assess its reliability by calculating Cronbach's alpha. This information was crucial in enhancing the instrument before it is distributed to a larger sample. It was imperative that the new or modified instrument undergoes re-evaluation based on the findings of the pilot study.

5. Conclusion

In conclusion, this study is currently in the midst of pre-testing, and the method of expert review is utilized to validate the content of the research instrument. To ensure the questionnaire is suitable for the specific industry studied, it is imperative that feedback be sought from academic and industry experts. Their input will help tailor the questionnaire to the context and industrial setting. To ensure the effectiveness of the adopt and adapt method, it is imperative that the questionnaire undergo validation by an expert prior to distribution to respondents. This study is a good fit for the CVI approach because it ensures that the construct is relevant and clear. Fruitful comments are gathered from academics and professionals in the industry. By guaranteeing the validity and reliability of the research findings, the use of the CVI in analyzing the content validation of female empowerment, MTU, managerial support, and work-life balance among female engineers makes a significant contribution to the academic field. By methodically assessing the content's relevance, clarity, and comprehensiveness within these crucial domains, this methodological approach strengthens the study's credibility and makes it easier for related fields to make evidence-based decisions.

According to the study, the authors suggest that researchers prioritize the thorough validation of their content through the systematic application of CVI before conducting a pilot study. This recommendation stems from the recognition of CVI's pivotal role in ensuring the reliability and validity of research instruments and materials. By rigorously employing CVI, researchers can discover the relevance, clarity, and appropriateness of content elements, thereby laying a strong foundation for subsequent phases of the study. Additionally, integrating CVI into the pre-pilot phase enables researchers to identify and rectify potential content-related issues early in the research process, thereby minimizing the risk of biased or erroneous findings during data collection and analysis. Embracing CVI as a preliminary step before conducting pilot studies enables researchers to carry out methodologically rigorous investigations that produce credible and actionable insights. This contributes to the advancement of knowledge within their respective fields as it provides validation from academic experts and industry professionals.

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