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"YOU'LL BE HAPPY": CAREER SATISFACTION MODEL FOR FEMALE ENGINEERS USING PLS-SEM APPROACH

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Abstract

Gender has influenced career satisfaction where women's nature and physical attributes are said to have significant influence to their satisfaction level as compared to the counterpart gender. This study was designed to construct Career Satisfaction Measurement Model for female engineers with families. Three rounds of the Modified Delphi technique were conducted prior to the development of the model. After the experts reached the final consensus on the constructs, the questionnaire items were constructed to further develop the measurement model. A total of 254 questionnaires were gathered and analysed using the inferential statistics via SmartPLS (PLS-SEM) to construct the model structure. The results showed significant relationship of Ho2, Ho3, and Ho4 in influencing career satisfaction through the factors of co-worker relationship ($\beta = 0.216$, $p = 0.000 < 0.05$), gender equality ($\beta = 0.154$, $p = 0.01 < 0.05$), and mentor ($\beta = 0.196$, $p = 0.045 < 0.05$). Nevertheless, no significant relationship was found between salary (0.185, $p = 0.090 > 0.05$) and career satisfaction. Such findings confirm the model's efficacy to measure the factors of career satisfaction among female engineers with co- worker relationship and gender equality as the dominant factors. This can be utilised to determine the optimum career satisfaction for prospective female engineers in the public or private sector as part of the parallel necessity to satisfy the career pattern in the current century.

Index Terms: Management, Career Satisfaction, Female Engineers, Measurement Model, PLS-SEM.

INTRODUCTION

Women's involvement in the workforce requires not only social support but also the effort from employers. This is because employers play a significant role as the magnet that provides the side factors that can motivate women's sustainability and retention to work [1]. Furthermore, the human resource departments have the capability to alter the policy to suit the economic change and employees' issues within the organisations [2].

Hence, it is important for organisations to investigate the satisfaction level of their employees in order to promote their continuous contribution to the workforce. Career satisfaction is the general term that promotes employees' positive attitude and can subsequently affect their

The Seybold Report
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career. Employees' career satisfaction can be determined from their perception, evaluation, and positive emotion in carrying assigned tasks [3]. Such satisfaction can be influenced by various factors such as the organisation's background, work environment, and personal factors. Therefore, employees are considered to be satisfied with their career when their expectations, desires, and needs are met and satisfied.

A number of studies have investigated the influence of employees' demographic variables such as gender, age, level of education, and marital status to their level of career satisfaction at their respective organisations. Several studies have shown that gender has influenced career satisfaction where women's nature and physical attributes are said to have significant influence to their satisfaction level as compared to the counterpart gender [4].

However, such difference is often overlooked by organisations where their emphasis towards the influential factors of career satisfaction is often equally distributed between both genders without considering the differential needs between men and women [5].

In addition, career satisfaction is also dependent on one's emotion and environment. Career satisfaction as the positive emotional state that originates from one's evaluation towards his or her job [4]. Career satisfaction also depends on the nature, and attitude of a person that vary according to their gender [6].

This further highlights on the potential difference in the career satisfaction between men and women together with the influence from their working environment. This study aims to construct the Career Satisfaction Measurement model among women civil engineers with families. Following the findings reported by existing studies as well as the Modified Delphi technique, the factors of career satisfaction investigated in this study are mentors, co-worker relatonships, gender equality, and salary.

LITERATURE REVIEW

Positive supervisory relationship is believed to have the potential of increasing the level of satisfaction among female employees as well as promoting friendship, trust, respect, and career satisfaction. Female civil engineers are more likely to have better benefits and satisfaction than female mentors [3]. Mentors of similar gender often act as prominent role models to female civil engineers at the subordinate level while creating effective psychosocial relationships and understanding amongst them [7].

Furthermore, same-gender relationship allows for better supervision of tasks that can help female civil engineers to improve their work quality and surpass male civil engineers [8]. Majority of female civil engineers agree that supervisory relationship provides a clearer picture about their career, improves their understanding to the job scope, and increases their work performance [9]. Thus, having a female mentor is a great satisfaction for female civil engineers to continue expanding their career as the same-gender interaction facilitates the career sharing between them.

The Seybold Report
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Good co-worker relationship also affects the career satisfaction among female engineers with families. Professional civil engineers emphasise on the need to develop a flexible employee communication system to improve employees' satisfaction level towards their positive relationship with colleagues and employers [10]. Meanwhile, career satisfaction among female civil engineers is also related to the comfortable co-worker relationship [11]. The characteristics of a co-worker relationship can be seen from the aspects of (i) cooperation that helps or connects employees with one another in a task force, (ii) teamwork that changes from time to time and helps to foster teams' performance, (iii) support that exists within a social network and is dependable particularly when help is needed, (iv) trust as the interpersonal reliance that is important in an organisation, (v) exchange of information that involves the delivery of good explanation from senior employees to new employees, and (vi) atmosphere among colleagues that forms the collective context and socio-emotional environment of the workplace [12]. These characteristics are crucial in the effort to expand the spirit of wrking as a team with excellent commitment. Hence, women engineers believe in the importance of co-worker relationship for them to efficiently complete their daily tasks and produce positive emotion in their career.

The career satisfaction of female engineers is also influenced by employers who practise gender equality. Women generally acquire negative experience in organisations where their presence is unwelcomed, receive less support and respect, and often neglected [13]. This is due to the existence of several supervisors in the organisations who are bias towards men especially when it comes to managing projects. There are also employers who only assign female civil engineers with passive tasks as they believe that female civil engineers are less aggressive and tend to be emotional when assigned with existential workloads as opposed to male civil engineers [14]. As a result, women are often positioned in the managerial departments despite their effort to penetrate the male-dominated industries [15]. This proves that comparisons on the ability between men and women highly affects women's opportunity to strive in an organisation and subsequently leads to the glass ceiling that limits their career development.

Employees' perspective towards female engineers has the potential to significantly influence their salary. Female engineers are likely receive lower salary than male engineers due to the difference in the amount of workloads [11]. This creates a salary gap between the two genders where the income difference is based on their level of experience, competency, job scope, and leadership skills [16].

Furthermore, a woman's marital status is also likely to affect her salary due to the stigma that their dual-role between career and family will influence their responsibilities at the workplace [17]. In this regard, equal salary between male and female civil engineers may increase the career satisfaction level of the latter as female civil engineers will be satisfied if they receive equal [18] or more salary than male civil engineers despite having to perform more workloads [19]- [20]. Thus, employers should invest more trust on women's capability of performing important tasks that will increase their level of salary as received by male engineers.

The Seybold Report
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METHODOLOGY

The data collection process of this study was conducted via a questionnaire. It was developed after three rounds of the Modified Delphi Technique and received a high level of agreement from the selected experts. The consensus level was calculated based on the Quartile Range Analysis (QRA). Delphi process shall end once an agreement has been achieved by the experts [21]. The Boards of Engineers Malaysia reports a total of 745 female civil engineers who are registered with the organisation [22]. From that figure, 248 female civil engineers have been selected as the minimum research sample of the study. A total of 300 questionnaires were distributed via random layered sampling to female civil engineers with families and 262 questionnaires were retrieved. However, only 254 questionnaires were properly completed and suitable for data analysis. There empirical data was analysed using inferential statistics via SMART PLS (PLS-SEM) in order to construct the structural model.

DATA ANALYSIS

The career satisfaction measurement model was constructed through the process of evaluation model measurement and structural model testing. The evaluation model measurement was conducted to evaluate the Confirmatory Factor Analysis (CFA) by determining whether the research items measure what they are supposed to measure, its accuracy in representing a construct, and subsequently satisfies the standards of validity and reliability. It comprises convergent validity dan discriminant validity where the aspects of convergent validity can be seen on the values of (i) outer loading, (ii) composite reliability, and (iii) average variance extracted (AVE). Meanwhile, the discriminant validity is visible through (i) Fornell–Larcker, (ii) cross loading, and (iii) Heterotrait-Monotrait Ratio (HTMT) [23]. On the other hand, the structural model testing involves the value testing of (i) Inner VIF (Multicolinearrity - Inner VIF), (ii) β Coefficient and T Statistics, (iii) R square, (R2), (iv) size effect (f2), and (v) Predictive Relavance (Q2) [24].

I. Evaluation Model Measurement: Measuring Convergent Validity

- **Outer loading:** Outer loading is the standard load that connects the factors to the indicator variables. The load value should be > 0.70 (Henseler, Ringle, & Sarstedt, 2015). Nevertheless, the load value that ranges between 0.50 to 0.70 can be considered if AVE > 0.50 [25].
- **Composite reliability:** Composite reliability serves as an alternative to Cronbach's Alpha and acts as the convergence validity test in a reflective model. The value should be >0.60 [26] or > 0.70 for validation-based models [27].
- **Average variance extracted (AVE):** AVE tests the convergence validity and differentiation. In a reflective model, the AVE should be > 0.50 [25] and greater than the cross load, which posits that the factor should be half of the respective indicator variation. Credibility of pointer can be defined as the squared measurement of 0.708 = 0.50 [27], hence leading to the AVE reliability value of > 0.50. The findings for the three analyses are shown in Table 1.

The Seybold Report
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Table 1: Outer Loading Value, Composite Reliability, and AVE

Construct	Item	Outer loading >0.50	Composite Reliability >0.70	AVE >0.50
Mentors	KM1	0.667	0.904	0.511
	KM2	0.771		
	KM3	0.671		
	KM4	0.699		
	KM5	0.772		
	KM6	0.686		
	KM7	0.739		
	KM8	0.730		
	KM9	0.693		
Co-worker Relationship	KR10	0.735	0.925	0.531
	KR11	0.577		
	KR12	0.789		
	KR13	0.676		
	KR14	0.727		
	KR15	0.777		
	KR16	0.778		
	KR17	0.776		
	KR18	0.667		
	KR19	0.756		
	KR20	0.731		
Gender Equality	KJ21	0.749	0.912	0.514
	KJ22	0.882		
	KJ23	0.673		
	KJ24	0.780		
	KJ25	0.583		
	KJ26	0.672		
	KJ27	0.860		
	KJ28	0.755		
	KJ29	0.598		
	KJ30	0.531		
Salary	KG31	0.741	0.900	0.502
	KG32	0.611		
	KG33	0.678		
	KG34	0.635		
	KG35	0.666		
	KG36	0.820		
	KG37	0.776		
	KG38	0.759		
	KG39	0.659		

The Seybold Report
ISSN 1533-9211
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II. Evaluation Model Measurement: Measuring Discriminant Validity

Fornell–larcker: According to the Fornell-Larcker criteria, the AVE value can also be used to prove the discriminant validity. The Fornell-Larcker posits that the main AVE value for each variable must be greater than the correlations with other variables. In the context of absolute values, discriminant validity happens if the upper number (the main AVE value) in any of the factors is greater than the number (correlation) below [25]. The findings in Table 2 showed that the Fornell Lacker criteria has been satisfied.

Table 2: Analysis of Fornell Lacker Value (AVE > R)

Construct	Salary	Co-worker Relationship	Gender Equality	Mentors
Salary	**0.709**			
Co-worker Relationship	0.323	**0.728**		
Gender Equality	0.135	0.055	**0.668**	
Mentors	0.256	0.214	0.144	**0.715**

- **Cross loading:** Cross loading is an excellent loading indicator to measure the intended and unintended factors. The establishment for factor loading is > 0.70 [23] and between 0.50 to 0.70 [28]. Meanwhile, the establishment for cross loading is less than factor loading value [23] – [25]. Table 3 illustrated that the cross loading values have satisfied the conditions of establishment as suggested by previous researchers.

Table 3: Cross Loading

Items	Salary	Co-worker Relationship	Gender Equality	Mentors
KG31	**0.667**	0.223	0.146	0.246
KG32	**0.771**	0.249	0.111	0.478
KG33	**0.671**	0.391	0.425	0.197
KG34	**0.699**	0.334	0.409	0.209
KG35	**0.772**	0.474	0.107	0.128
KG36	**0.686**	0.340	0.494	0.199
KG37	**0.739**	0.170	0.117	0.189
KG38	**0.730**	0.259	0.433	0.164
KG39	**0.693**	0.341	0.201	0.198
KR10	0.291	**0.735**	0.402	0.267
KR11	0.286	**0.577**	0.463	0.239
KR12	0.113	**0.789**	0.429	0.208
KR13	0.350	**0.676**	0.094	0.160
KR14	0.335	**0.727**	0.402	0.136
KR15	0.258	**0.777**	0.120	0.150
KR16	0.149	**0.778**	0.490	0.488
KR17	0.476	**0.776**	0.083	0.112
KR18	0.401	**0.667**	0.441	0.437
KR19	0.105	**0.756**	0.474	0.127
KR20	0.156	**0.731**	0.457	0.126
KJ21	0.111	0.148	**0.749**	0.488
KJ22	0.126	0.408	**0.882**	0.469
KJ23	0.475	0.178	**0.673**	0.470
KJ24	0.120	0.421	**0.780**	0.109

The Seybold Report
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KJ25	0.409	0.479	**0.583**	0.432
KJ26	0.446	0.409	**0.672**	0.118
KJ27	0.488	0.408	**0.860**	0.108
KJ28	0.499	0.408	**0.755**	0.421
KJ29	0.440	0.134	**0.598**	0.466
KJ30	0.422	0.410	**0.531**	0.416
KM1	0.185	0.164	0.268	**0.667**

*Cross loading values less than factor loading value.

- **Heterotrait-Monotrait (HTMT) ratio:** HTMT Ratio is the geometric min value of the Heterotrait-Monotrait correlation (correlating indicator across different phenomena) divided by the average of Heterotrait- Monotrait correlation (correlating indicator of the same construct) [27]. HTMT value of less than 0.90 indicates the existance of discrimination validity between the reflective model construct [25]. Heterotrait-Monotrait (HTMT) ratio value should be < 0.90 [24]. This indicates that the Heterotrait-Monotrait (HTMT) ratio of the study has been satisfied with all values are <0.90 as shown in Table 4.

Table 4: Analysis of Heterotrait-Monotrait (HTMT) Ratio < 1.00

Construct	Salary	Co-worker Relationship	Gender Equality	Mentors
Salary				
Co-worker Relationship	0.355			
Gender Equality	0.136	0.123		
Mentors	0.271	0.215	0.138	

III. Structural Model Evaluation

The next process in constructing the model was to evaluate the structural model based on several analyses that subsequently test the hypotheses of the study. The structural model evaluation involved the analysis of (i) Multicolinearrity (Inner VIF), (ii) β Coefficient and T Statistics, (iii) R square, R2, (iv) size effect, f2, and (v) Predictive Relavance, Q2 [24].

- **Multicolinearrity (Inner VIF):** According to the Fornell-Larcker criteria, the AVE value can also be used to prove the discriminant validity. The Fornell-Larcker posits that the main AVE value for each variable must be greater than the correlations with other variables. In the context of absolute values, discriminant validity happens if the upper number (the main AVE value) in any of the factors is greater than the number (correlation) below [25]. The findings in Table 2 showed that the Fornell Lacker criteria has been satisfied.

Table 5: Inner VIF Values for the Career Satisfaction Constructs < 5.00

Construct	Career Satisfaction
Salary	1.221
Co-worker Relationship	1.023
Gender Equality	1.119

- **Beta coefficient and T statistics:** Cross The path coefficients in PLS is similar to the standard coefficientdan β in the regression analysis where the β value, marked as sample mean (M) in PLS, enables the researcher to test the hypotheses. In this regard, β marks the expected variation in the dependent variables with the variation unit in the independent

The Seybold Report
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variables [25]. The β value of each path in the hypothesis model is calculated where greater β values indicate more significant impact towards the laten endogenous construct. Nevertheless, the β value must be validated via the T-statistics test where the T value must be >1.645 for one tailed research.

The initial predictions of the study are as follows: (i) Ho1, the salary factor has a significant influential relationship towards career satisfaction, (ii) Ho2, Ho1, the co-worker relationship factor has a significant influential relationship towards career satisfaction, (iii) Ho3, the gender equality factor has a significant influential relationship towards career satisfaction, and (iv) Ho4, the mentors factor has a significant influential relationship towards career satisfaction. As predicted, the findings in Table 6 showed that Ho2, Ho3, and Ho4 indicate that the respective factors do possess significant relationship to influence career satisfaction, namely co-worker relationship ($\beta = 0.216$, $T = 1.669$, $p = 0.000 < 0.05$), gender equality ($\beta = 0.154$, $T = 1.836$, $p = 0.001 < 0.05$), and mentors ($\beta = 0.196$, $T = 1.683$, $p = 0.045 < 0.05$). Therefore, Ho2, Ho3, are Ho4 highly supported.

Table 6: Path Coefficient Values

Hyp.	Relationship	Sample Mean (M/β)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	p – values Sig < 0.05
Ho1	Salary > Career Satisfaction	0.106	0.185	1.229	0.090
Ho2	Co-worker relationship > Career Satisfaction	0.216	0.161	1.669	0.000
Ho3	Gender Equality > Career Satisfaction	0.154	0.041	1.836	0.001
Ho4	Mentors > Career Satisfaction	0.196	0.179	1.683	0.045

- **R square (R^2):** The structural model contains directed points that relate the constructs with one another and portray the hypotesised relationships with Beta (β) values in order to test the R square (R2) values. The R square (R2) values allow the researcher to determine the contribution values for all variables. According to Chin (1998), the value of R2 = 0.67 is strong, 0.33 is intermediate, and 0.19 is weak. Table 7 depicted the Predictive Power establishment [29 between the constructs.

Table 7: Level of Predictive Power

R^2 Value	Level
> 0.67	Strong
> 0.33	Intermediate
> 0.19	Weak

The analysis shows that the research model has a strong predictive power value with R2 = 0.952. The highest value is recorded by the co-worker relationship construct as shown in Table 8. This explains that the R2 value suggest a variance of 95.2% that is explained by the independent constructs toward the dependent constructs of the study. This is followed by mentors (93.1%), gender equality (88.9%), and salary (80.4%).

The Seybold Report
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Table 8: R Square (R^2) Value

Construct	R Square (R^2)
Salary	0.804
Co-Worker Relationship	0.952
Gender Equality	0.889

- **Effect size (f^2):** The effect size (f2) investigates the dependency impact of a variable towards another variable. F^2 is the level of impact of each latent exogenous construct towards the latent endogenous construct [23]. This is determined by the R Square (R^2) value. In this regard, the omittance of an independent variable from the path model shall alter the coefficient value (R^2) which will determine whether the latent exogenous construct has significant influence towards the latent endogenous construct.

The effect size of a variable can be calculated using the following formula:

$$f^2 = \frac{R\ included - R\ excluded}{1 - R\ included}$$

The effect size is evaluated as weak, intermediate, and strong as shown in Table 9.

Table 9: Effect Size (F^2)

Effect size value (f^2)	Effect size (f^2)
$\leq f^2 < 0.15$	Weak
$0.15 \leq f^2 < 0.35$	Intermediate
$f^2 \geq 0.35$	Strong

The analysis in Table 10 indicates that the co-worker variable has a prominent effect towards career satisfaction with $f^2 = 0.107$.

Table 10: Effect Size Construct (f^2)

Construct	Endogenous	R^2 included	R^2 excluded	Effect Size (f^2)
Salary	Career Satisfaction	0.804	0.783	0.107
Co-worker Relationship	Career Satisfaction	0.952	0.923	0.604

- **Predictive Relevance Value (Q2):** The measured Q^2 value must be greater than zero for the specified latent endogenous construct. This is because the Q^2 value in the structural model evaluation that is greater than zero shows that the model path prediction for all constructs are relevant [23]. Thus, the value that must be satisfied by the Q^2 criteria is $Q^2 > 0$ [24]. Table 11 illustrated that the constructed model possesses the predictive relevance as shown in Table 11.

Table 11: Effect Size (F2)

Dependent Variables	SSO	SSE	$Q^2 = (1-SSE/SSO)$
Salary	2,010	1,211	0.398
Co-Worker Relationship	2,211	985	0.555
Gender Equality	804	409	0.491
Mentors	1,809	989	0.453

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The overall analysis leads to the construction of a measurement model that determines the career satisfaction of female civil engineers as shown in Figure 1.

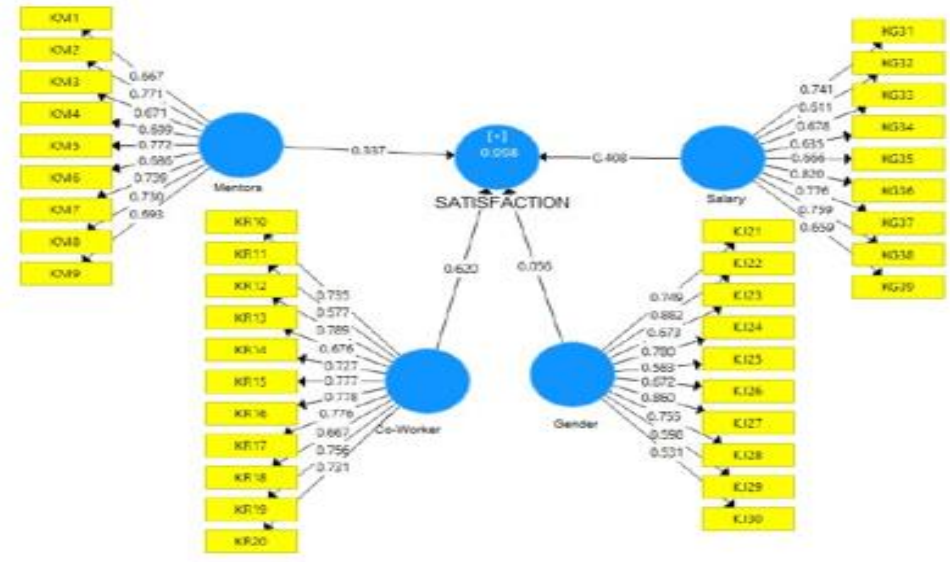

Figure 1: Career Satisfaction Model

DISCUSSION AND CONCLUSION

In conclusion, four main sub-constructs have been identified to have significant influence toward the career satisfaction level of female civil engineers with families. The career satisfaction research is based on Herzberg Two Factor Theory which suggests that employees' satisfaction is dependent on the extrinsic factor of hygiene as well as the intrinsic factor of motivation. The motivator-hygiene factor is capable of promoting the sense of satisfaction and motivation in an organization [30]. Furthermore, it is also worth to mention that motivation may lead toward satisfaction, which subsequently will result towards an increase in performance. However, experts believe that in the context of married women with families, the factor that has the potential to promote career satisfaction is the existence of hygiene that caters the situation of female employees. The findings reported in this study add to the theories and pool of knowledge pertaining to the topic of career satisfaction among female civil engineers with families. It has the potential of expanding the existing theories and models to further explain about the influential factors of career satisfaction among female civil engineers in Malaysia, which may serve as a point of reference for future studies. From the practical perspective, this study may also serve as a guideline for human resource managers to improve human resource management and development programs in their organizations. It will also allow policy makers to further improve the employees' policy for it to be more professional and effectively assist employees regardless of their gender. To expand this model, further research is proposed to explore new factors that contribute to the satisfaction among women in various fields so that a perfect life-balance model can be developed specifically for women.

The Seybold Report
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Conflict of Interest Statement

The authors declare that have no conflicts of interest related to this research. This study was conducted without any financial or personal relationships that could potentially bias the interpretation or reporting of the results.

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