Journal of Engineering Issues and Solutions

Job Satisfaction of Civil Engineers Working in Local Level Government in Bagmati Province, Nepal

Arjun Upadhaya[1,*], Sujan Nepal[2], Sudip Pokhrel[3] , Bikram Rawat[4]

[1] *Student, Nepal Engineering College-Centre for Postgraduate Studies, Prayag Pokhari, Lagankhel, Lalitpur, Nepal, arjunpaudel1995@gmail.com*

[2]*Assistant Professor, Nepal Engineering College-Centre for Postgraduate Studies, Prayag Pokhari, Lagankhel, Lalitpur, Nepal, sujann@nec.edu.np*

[3]*Assistant Professor, Nepal Engineering College-Centre for Postgraduate Studies, Prayag Pokhari, Lagankhel, Lalitpur, Nepal, G.P.O. Box: 10210*

[4]*Former Engineer, National Reconstruction Authority*

rawatbikram71@gmail.com/bikram_ud@yahoo.com

**Corresponding Author: Arjun Upadhaya*

Received: May 5, 2025; Revised: July 5, 2025; Accepted: July 12, 2025

https://doi.org/10.3126/joeis.v4i1.81585

Abstract

This study explores the job satisfaction of Civil Engineers working in local governments across Bagmati Province, Nepal. These professionals play a vital role in infrastructure development, yet face challenges such as project delays, cost overruns, and demotivating staff adjustment policies. A total of 169 Civil Engineers were surveyed using structured questionnaires to assess their satisfaction levels across various job-related factors by single Global Rating Method and Summation of Job Factor Method. The findings reveal overall dissatisfaction, particularly with pay, which had the lowest mean score of 2.734. In contrast, supervision received the highest satisfaction score of 3.877. Statistical analysis indicates significant positive relationships between job satisfaction and key workplace factors. A multiple linear regression model shows that these factors collectively explain 71.2% of the variation in job satisfaction. While gender and work location had no significant influence, job designation and appointment type were found to impact satisfaction levels. The study highlights the need for improvements in working conditions, particularly in compensation, career progression, and administrative policies. Enhancing these areas can contribute to better motivation, retention, and performance of Civil Engineers, ultimately supporting more efficient infrastructure development at the local level.

Keywords: *Adjustment, Designations, Discouragement, Exhibit, Job Satisfaction in Nepal*

1 Introduction

Job satisfaction in general is the degree to which individuals enjoy their job. Job satisfaction can be defined as an individual's total feeling about their job and attitudes they have towards various aspects of their job as

well as an attitude and perception that could consequently influences the degree of fit between the individual and the organization. In civil service, job satisfaction is directly linked to the quality of public service delivery, particularly in infrastructure sectors where civil engineers operate as key technical actors.

Within the realm of professions, civil engineers are recognized as the fundamental force behind infrastructural progress. In organizational hierarchies, engineers hold diverse positions, some aligned with their qualifications at high tiers, while others find themselves at lower echelons. Typically, within the sphere of the government employment, one encounters an array of levels for civil engineers. Despite all being classified as civil engineers, their levels vary significantly. In a parallel manner, civil engineers can be found operating at federal, provincial and local tiers. Those civil engineers operating at the local level contend with a multitude of challenges, encompassing insufficient staffing, inadequate training, as well as shortcomings in legislation and policies. For government officials, satisfactions with their job have strong implication for upgrading the quality of government services and have direct impact on the quality of services given to the citizen [1].

The constitution of Nepal 2015 defines Nepal as a federal democratic republic organized around three levels of government-Federal, state and local [2].Henceforth, state is divided into seven provinces and local is divided into 77 districts and 753 local levels. The constitution of Nepal 2015 gives 22 powers to these local levels. In federal structure, the power of the Local government including financial resources has increased significantly especially in Bagmati province [3].

Different major projects and minor projects are being constructed and operated under the local government level in Bagmati Province. There are total 119 local administrative units in Bagmati province, which includes 3 metropolitan cities, 1 sub metropolitan cities, 41 urban and 74 rural municipalities in Bagmati. Among Seven provinces, Bagmati province is more developed than other provinces in terms of economic and infrastructure development. It has a capital city of Nepal. Bagmati province has announced a budget of NPR 70.93 billion for the fiscal year 2022/23, which is Rs13 billion more, compared to the province's budget for the current fiscal year. Bagmati province, where Nepal's federal capital and financial hub Kathmandu is located has allocated more budget in infrastructure in local level than other provinces will requires more civil engineers for infrastructure development at local level[4].

The Employee Adjustment Act of 2017 in Nepal aimed to restructure civil services across three tiers of government, aligning with a new system to benefit the geographically diverse population. Government employees were given voluntary choices to select from central, provincial, or local government levels. By July 2019, the adjustment placed more civil servants under the central government, with 84,409, 22,297, and 66,908 posts created for the central, provincial, and local levels, respectively. However, the actual adjustments resulted in 40,409, 14,659, and 31,043 employees in the central, provincial, and local levels, respectively. The data suggests a preference for federal government roles among senior staff. The absence of a Federal Civil Service Act for local-level employees has contributed to job dissatisfaction [5].

Prior studies like Wasaf, 2021[19], Jour ,2021[20], Kosec, 2022[21], Imam Hidayat Universitas ,2022[22] had studied the correlation between Performance and Job Satisfaction in abroad countries. Several engineering related research studies in Nepal have explored the job satisfaction of civil engineers in various sectors. These include studies on job satisfaction among civil engineers in the building sector [6], DRILP-AF project [7], engineering and architectural consulting firms [8], hydro-power consulting firms [9], and irrigation sectors under the government [10], Gandaki Provincial Government [11], federal structure–Bhojpur[12] and private organizations in Kathmandu valley [13]. Previous findings indicate overall job satisfaction among employees, with dissatisfaction mainly centered around pay systems and working environments. There is a

noticeable gap in research concerning local-level civil engineers—particularly in Bagmati Province—whose roles have expanded significantly but whose work conditions remain under-investigated.

This study addresses the limited research on job satisfaction among civil engineers in local governments, focusing on Bagmati Province, Nepal, and examining factors such as political interference, workload, and career development. Existing literature rarely captures the unique challenges faced by technical professionals at the local level. The findings will support policymakers in improving staff motivation, retention, and institutional performance in infrastructure delivery. Moreover, the study's approach can be replicated to assess job satisfaction among other technocrats across Nepal, offering broader insights for public sector reform.

1.2 Literature Review

1.2.1 Theoretical Framework

Hoppock initially coined the term job satisfaction, defining it as a blend of psychological, physiological, and environmental factors indicating contentment with one's job [14]. It encompasses positive employee attitudes towards their job, influenced by various aspects like social status and job experiences. Job satisfaction has notable implications, including reduced absenteeism and intent to quit (judge et al.,2001). In this research, Nine Facets of Job Satisfaction is used to quantify the job satisfaction of creative employees This study assumes a positive correlation between job satisfaction and job-related variables such as payment, promotion opportunities, supervision, fringe benefits, contingent rewards, operating conditions, co-workers, nature of work, and communication. Nine facets of job satisfaction, as outlined by (Spector, 2001), serve as indicators for enhancement. (Hussin, 2011) Found positive relationship between co-workers, promotion, work itself and supervision (Marjan, 2011) Found positive relationship between fringe benefits and job satisfaction. (Rast, 2012) Findings suggest that co-workers' relations, supervision, pay and nature of work are factors that have impact on organizational commitment. (Rad, 2009) Found that communication, pay, promotion and benefits are significantly associated with job satisfaction.

Previous research highlights the significance of factors like relative pay, promotions, co-worker relations, and organizational communication in influencing job satisfaction. The nine facets of the Job Satisfaction Survey (JSS) — pay, promotion, supervision, fringe benefits, contingent rewards, operating procedures, co-workers, nature of work, and communication — were chosen based on their broad applicability in public sector employment and their proven relevance in international job satisfaction research. These facets comprehensively cover both intrinsic and extrinsic factors influencing employee satisfaction.

In the context of local governments in Bagmati Province, these dimensions are particularly relevant. For example, pay and promotion reflect common concerns among civil engineers regarding equitable compensation and clear career progression in a bureaucratic system. Supervision and communication are vital in assessing the quality of leadership and transparency within resource-constrained local bodies. Fringe benefits and contingent rewards align with the limited but evolving benefits structures under Nepal's federal system. Operating procedures help evaluate perceptions of bureaucratic efficiency or inefficiency in daily administrative functions. Meanwhile, co-worker relationships and the nature of work address social support and the professional meaningfulness of engineering roles in local infrastructure development.

Thus, these nine facets offer a culturally and administratively relevant framework to assess job satisfaction among municipal civil engineers in Nepal's decentralized governance context.

The purpose of this study is to assess how these independent job-related variables affect the job satisfaction

of civil engineers working in Local level in Bagmati Province, Nepal.

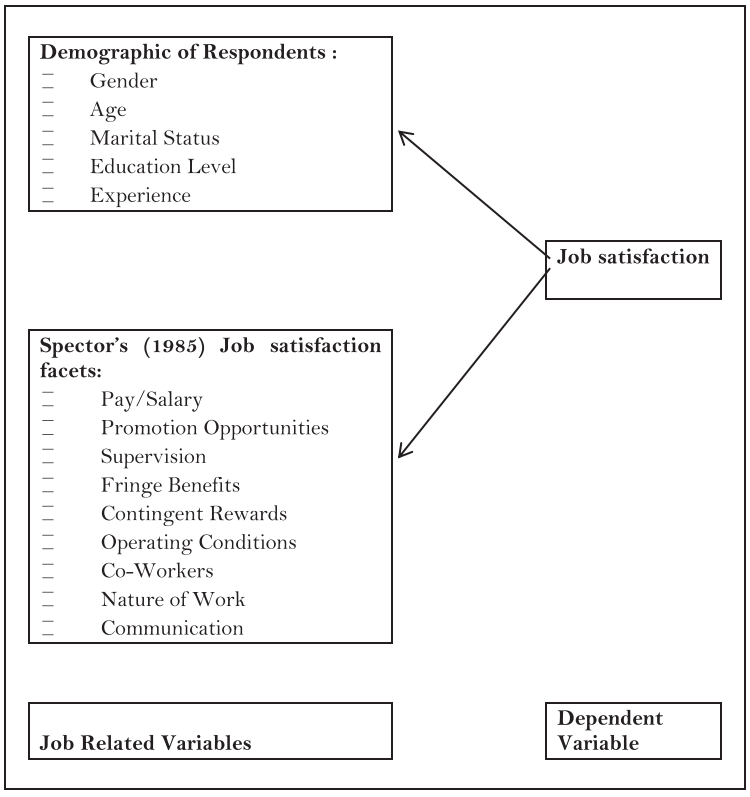

Figure 1: Theoretical Framework of Job Satisfaction

1.2.2 Spectors own way of analyzing scale

The JSS makes use of a Likert-type scale with six response alternatives for each item, ranging from "Disagree very much" (weighted 1) to "Agree very much" (weighted 6). A six-point scale, by lacking a true neutral option, forces respondents to lean one way or the other, potentially revealing more about their actual stance. For each of the nine 4-item sub-scales (PS, PRS, SUS, BES, RES, OPS, CRS, NWS and COS), and for the 36-items total satisfaction (JS), the respondents scores would be summed up and evaluated on the following basis [16].

Table 1: Mean Range for JSS

Scales	Dis-satisfactory	Ambivalence	Satisfactory
For every 4-item sub-scale	4-12 score	12-16 score	16-24 score
For 36-item JS scale	36-108 scale	108-144 score	144-216 score

Source:Developed on the basis of materials available on: Spectors Job Satisfaction Survey,JSS:retrieved from https://paulspector.com/assessment-files/jss/jss-interpretation.docx

3. Methodology

3.1 Study area

The proposed study was conducted on civil engineers working only in local level in Bagmati province, Nepal.

3.2 Respondent Details and Sampling

Table 2: List of Respondents

List of Districts in Bagmati Province	Total Number of Local level in district in Bagmati Province	Civil Engineers		
		6th level officer	7th level officer	8th level officer
Bhaktapur	4	23	0	7
Chitwan	7	12	18	7
Dhading	13	11	9	
Dolakha	9	3	10	
Kathmandu	11	27	41	10
Kavrepalanchok	13	12	11	
Lalitpur	6	10	6	6
Makwanpur	10	9	2	1
Nuwakot	12	14		
Ramechhap	8	6	2	
Rasuwa	5	2	3	
Sindhuli	9	10	3	
Sindhupalchok	12	13	3	
Total	**119**	**152**	**108**	**31**

Civil engineers at local level in Bagmati Province were 291.

Using the Cochran (1979) finite formula for sample size, the representative sample for the population is given calculated as per eqn (1)

$$n = \frac{Z^2 \cdot N \cdot P \cdot Q}{e^2 \cdot (N-1) + Z^2 \cdot P \cdot Q} \quad \text{.....(1)}$$

Where

Z = 1.96 (Value in 95 % Confidence Level)

N = 291 (no. of employees in local level in Bagmati province

P=Q=0.5(50% probability each)

Q=1-P

e = Standard Error (5% assumed)

$$n = \frac{(1.96)^2 \cdot 291 \cdot 0.5 \cdot 0.5}{(0.05)^2 \cdot (291-1) + (1.96)^2 \cdot 0.5 \cdot 0.5} \approx 166 \text{ .....(2)}$$

n=166

Convenience sampling technique was applied.

3.3 Data Collection

Questionnaire survey was the major instrument for the collection of data. The questionnaires were developed by (Spector, 1984) and used for the assessment of job satisfaction of engineers, doctors and health workers in public sectors [18] and for health workers for Nepal [19]. Same questionnaires were used in this research. This set of questionnaires, being already tested and used for assessment of job satisfaction, signifies the validity of the questionnaires.

Table 3: Cronbach's alpha values and internal consistency

S.No	Job Related Variables	Cronbach`s Alpha	No. Of Items	Internal Consistency
1	pay	0.762	4	Acceptable
2	Promotion	0.840	4	Good
3	Supervision	0.854	4	Good
4	Fringe benefits	0.833	4	Good
5	Contingent rewards	0.747	4	Good
6	Operating conditions	0.865	4	Good
7	Co-Workers	0.904	4	Excellent
8	Nature of work	0.870	4	Good
9	Communication	0.755	4	Acceptable

The reliability of the questionnaire for the research was assessed using SPSS V20 Software, with results presented in Table 3.2. All nine job related variables demonstrated reliability, as indicated by Cronbach's alpha values ranging from 0.7 to 0.9. Co-workers reliability exceeded 0.9, signifying excellent internal consistency. These findings affirm the survey instruments validity, ensuring reliable data for analysis and interpretation.

A pre-test was conducted with 30 local civil engineers in Bagmati Province to validate the questionnaire, which was then revised based on feedback. The finalized questionnaire was distributed to officers at the 6th, 7th, and 8th levels working locally in Bagmati Province. It comprises four sections: (1) General profile, (2) Job satisfaction using the Single Global Rating Method, (3) Job satisfaction for different job factors with nine factors and sub-divided questions, and (4) a space for respondents to provide comments. The questionnaire includes both open and closed-ended questions.

3.4 Data Analysis Tools

The questionnaire, distributed via Google forms to 200 local-level engineers in Bagmati Province, garnered an 84.5 % response rate (169 respondents). Two main factors influencing job satisfaction- Personal/ Demographic factors and nine job-related factors were considered. Hypothesis were formulated as null and alternative hypothesis and tested, with sub-null hypothesis examined for each demographic factor.

(H1): There are statistically significant differences in job satisfaction levels based other considered demographic factors

Accordingly, the null hypothesis is as follows:

(H0): There are no statistically significant differences in job satisfaction levels based on the considered demographic factors

Correlation and multiple linear regression analysis identified predictors of job satisfaction, while checks for multiple collinearities included tolerance and variation inflation factors. Residuals normal distribution and a linear relationship with predicted dependent variable scores were assessed using a histogram and a normal probability plot and Pearson Correlation Coefficient, ANOVA, T-test and Multiple Linear Regression.

4 Results and Discussions:

Table 4: Frequency Distribution of civil engineers Based on Demographic Factors

Demographic Factors	Frequency	Percent
Gender		
Male	143	84.6
Female	26	15.4
Age		
25 yrs. or less	9	5.3
26 to 35	110	65.1
36 to 45	31	18.3
46 to 55	15	8.9
over 55	4	2.4
Qualification		
BE	129	76.3
Master's degree	38	22.5
Ph.D. degree	2	1.2
Current Experience		
0 to 1 yrs.	7	4.1
1 to 3 yrs.	17	10.1
3 to 5 yrs.	90	53.3
5 to 10 yrs.	55	32.5
Marital Status		
Married	116	68.6
Unmarried	53	31.4

Table 4 presents the distribution of civil engineers by gender, age, education level, years of experience, and marital status .

Table 5 Frequency Distribution of civil Engineers Based on Demographic Factor engineers Based on SGRM and SJFM methods

Job Satisfaction	SGRM	SJFM
Highly Dissatisfied	3.6% (6/169)	0.6% (1/169)
Dissatisfied	35.5% (60/169)	4.7% (8/169)
Slightly Dissatisfied	34.9% (59/169)	66.9% (113/169)
Slightly Satisfied	20.1% (34/169)	26% (44/169)
Satisfied	5.9% (10/169)	1.8% (3/169)
Strongly Satisfied	0%	0%

From Table 5, the study shows the reveal mixed levels of satisfaction among civil engineers working at local level. It was found that Most respondents of Slightly dissatisfied was observed in both SGRM and SJFM. So, majority of civil engineers in local level in Bagmati Province are slightly dissatisfied with their job.

Table 6: Mean of JS on SGRM AND SJFM

JS	N	Mean	Std. Deviation	Variance
JS By SGRM	169	2.894	.964	0.929
JS By SJFM	169	3.241	.430	0.186

Table 6 shows the Measure of level of Job Satisfaction and its variables. Job satisfaction was also measured indirectly as summation job factor method which result mean of 3.241 out of 6, which means civil engineers, were slightly dissatisfied than moderate level of job satisfaction. The variation of results in summation job factor method was 18.6% only. This indicates a relatively lower spread of job satisfaction ratings among the civil engineers compared to the previous variable.

Table 7: Frequency distribution of Job-related Variables

Job Related Variables	Highly Dissatisfied	Dissatisfied	Slightly Dissatisfied	Slightly Satisfied	Satisfied	Highly Satisfied
Pay/salary	3(1.8)	42(24.9)	107(63.3)	13(7.7)	4(2.4)	0
Promotion Opportunities	5(3.0)	22(13.0)	43(25.4)	72(42.6)	27(16.0)	0
Supervision	1(0.6)	9(5.3)	23(13.6)	92(54.4)	40(23.7)	4(2.4)
Fringe Benefits	2(1.2)	15(8.9)	29(17.2)	92(54.4)	27(16.0)	4(2.4)
Contingent Rewards	5(3.0)	31(18.3)	81(47.9)	46(27.2)	4(2.4)	2(1.2)
Operating Conditions	8(4.7)	62(36.7)	66(39.1)	22(13.0)	10(5.9)	1(0.6)
Co-Workers	0	4(2.4)	21(12.4)	81(47.9)	53(31.4)	10(5.9)
Nature of Work	9(5.3)	44(26.0)	29(17.2)	65(38.5)	21(12.4)	1(0.6)
Communication	4(2.4)	43(25.4)	83(49.1)	30(17.8)	7(4.1)	2(1.2)

Note : Figure in the parenthesis is the percentage

In summary, the study shows mixed levels of satisfaction among civil engineers working at a local level. While civil engineers generally expressed satisfaction with their promotion, co-workers, fringe benefits, nature of work and the role of supervisors, concerns were raised regarding payment/salary, contingent rewards, operating conditions and communication. Operating conditions and Communication are scored poorly because of unclear and inadequate rules and procedures along with poor communication and unclear work assignments. These findings highlight the need for organizations to address these areas of concern to

enhance job satisfaction and create a supportive work environment for civil engineer.

Analyzing Spector's Job Satisfaction facets using Spector's own analytic Methodology

Table 8: Descriptive Statistics for Job Related Variables using Spector's methodology

Descriptive Statistics						
Job related Variables	**N**	**Min**	**Max**	**Mean**	**Std. Deviation**	**Position as per Spector's scale**
Sum of Pay/salary satisfaction	169	4	20	10.94	2.50	**Dissatisfactory**
Sum of Promotion satisfaction	169	5	21	13.92	3.80	**Neutral**
Sum of Supervision satisfaction	169	4	24	15.51	3.38	**Neutral**
Sum of Benefits satisfaction	169	4	23	14.67	3.57	**Neutral**
Sum of Rewards satisfaction	169	4	24	12.20	3.37	**Neutral**
Sum of Operation satisfaction	169	4	23	10.95	3.76	**Dissatisfactory**
Sum of Co-Workers satisfaction	169	5	24	14.01	4.61	**Neutral**
Sum of Work satisfaction	169	4	24	12.73	4.54	**Neutral**
Sum of Communication satisfaction	169	4	23	11.77	3.53	**Dissatisfactory**
sum of 36 Total item satisfaction	**169**	**82**	**164**	**116.68**	**15.48**	**Neutral**

As far as the nine facets of JSS are concerned, the score of pay satisfaction (PS), operation satisfaction (OS) and communication satisfaction (COS) is estimated to be 10.93, 10.95 and 11.77 respectively, which meet the Spector's condition for dissatisfactory results. Similarly, the score of promotion satisfaction (PRS), supervision satisfaction (SUS), benefits satisfaction (BES), reward satisfaction (RES), co-worker's satisfaction (CRS) and Nature of work satisfaction (NRS) were estimated at 13.92, 15.51, 14.67, 14.01 and 12.73 respectively which fall within the scores meant for neutral position.

As far as JSS's 36-items total satisfaction is concerned, it scores 116 and fulfills the Spector's condition for neutral results.

Evaluating statistical significance of respondents' responses, using One-sample T –Test

Table 9: One-Sample T -Test

One-Sample T -Test						
	Test Value = 3.5					
	t	**df**	**Sig. (2-tailed)**	**Mean Difference**	**95% Confidence Interval of the Difference**	
					Lower	**Upper**
Pay	-15.952	168	.000	-0.766	-.861	-.671
Promotion Opportunities	-.287	168	.774	-0.021	-.165	.123
Supervision	5.811	168	.000	0.377	.249	.505
Fringe Benefits	-6.968	168	.000	-0.451	-.579	-.323
Contingent Rewards	2.455	168	.015	0.167	.033	.304
Operating Conditions	-10.536	168	.000	-0.765	-.908	-.621
Co-Workers	.2170	168	.829	0.019	-.156	.194
Nature of Work	-8.263	168	.000	-0.559	-.693	-.426
Communication	-3.625	168	.000	-0.317	-.489	-.144
36 items total satisfaction	-7.768	168	.000	-.0257	-.323	-.192

Table 9 displays the mean differences and corresponding t-statistics for job satisfaction facets, including total satisfaction. Results reveal statistically significant mean differences ($P<0.05$) from the neutral mid-point of 3.5[18], indicating dissatisfaction in most variables. Exceptions include satisfaction with supervision, rewards, and co-workers, where respondents showed satisfaction.

Table 10: Correlation Coefficients between jobs related variable and job satisfaction of civil engineers at a local level

Correlations											
		JS	**Pay**	**Promotion Opportunities**	**Supervision**	**Fringe Benefits**	**Contingent Rewards**	**Operating Conditions**	**Co-Workers**	**Nature of Work**	**Communication**
JS	Pearson Correlation	1	.427**	.424**	.395**	.521**	.545**	.485**	.563**	.495**	.513**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	169	169	169	169	169	169	169	169	169	169

**. Correlation is significant at the 0.01 level (2-tailed).

Table 10 reveals a strong positive correlation ($P<0.01$) between Job Satisfaction (JS) and job-related variables at the local level. Correlation coefficients, ranging from 0.395 to 0.563, indicate significant positive relationships, suggesting higher satisfaction with these factors contributes to overall job satisfaction.

Multiple Linear Regression (MLR) technique to Explain Job Satisfactions of civil engineers

Table 11: Regression Model summary

Model Summary[b]					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Durbin-Watson**
1	.844[a]	.712	.695	0.313	2.03

a. Predictors: (Constant), pay, promotion, supervision, fringe benefits, contingent rewards, operating conditions, co-workers, nature of work, communication

b. Dependent Variable: JS By SJFM

As per Table 11, it indicates that the regression model has a strong fit with an R-value of 0.844. This suggests a healthy linear relationship between the predictor variables (pay, promotion, role of supervision, fringe benefits, contingent rewards, operating conditions, role of co-workers, nature of work, communication) and the dependent job variable, Summation of Job Factor

Method. The high R-squared value of 0.712 indicates that about 71.2% of the variability in the dependent variable can be explained by these predictor variables, demonstrating a substantial explanation of the observed variance and remaining 28.8% was explained by other factors, which are not included in this method. The Durbin-Watson statistical value is found to be 2.03, it suggests no autocorrelation in the residuals.

Table 12: Values of the level of collinearity among the independent variables.

Model	**Collinearity Statistics**	
	Tolerance	**VIF**
Pay	.898	1.114
Promotion Opportunities	.713	1.403
Supervision	.816	1.225
Fringe Benefits	.756	1.322
Contingent Rewards	.644	1.552
Operating Conditions	.645	1.551
Co-Workers	.836	1.196
Nature of Work	.915	1.093
Communication	.793	1.261

All the tolerance values are above 0.1 and all the VIF values are below 10, which suggests that there is no severe multicollinearity issue among the independent variables.

A graphical tool for assessing normality is the normal probability plot. A percentile - percentile plot (P-P Plot) or the cumulative probability plots of residuals (P-P plot) of the standardized data against the standard normal distribution. In the case of normally distributed data, the points on the P-P plot should generally follow a straight line indicating a strong positive correlation.

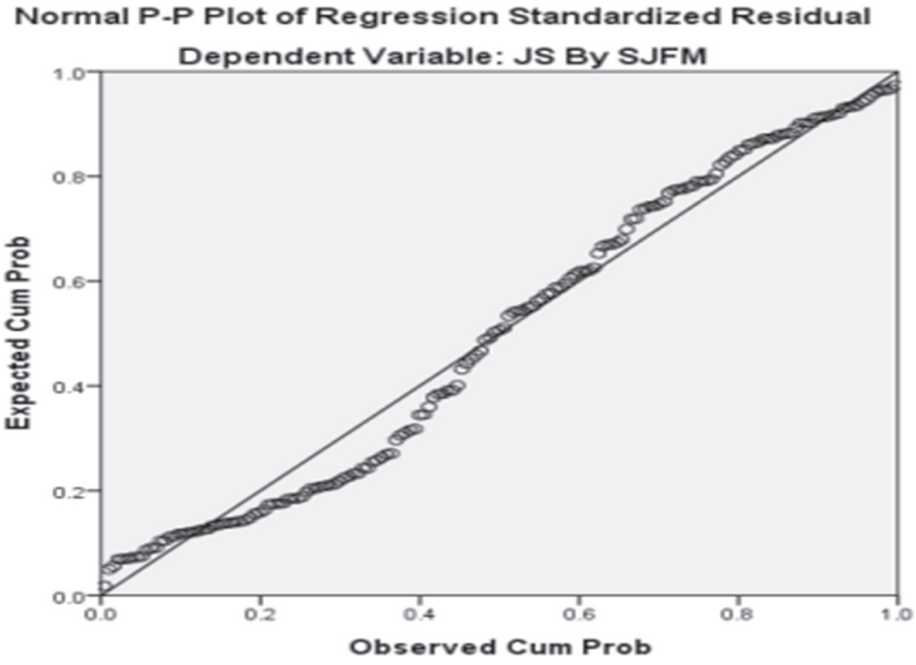

Figure 2: Normal P-P Plot for JS by SJFM

From figure 2, it is evident that the residuals fall near the normal distribution line without significant deviations. This indicates a normal distribution of residuals. Additionally, the data set shows that the residuals go through the origin further supporting the approximation of normal distribution concluding that the observed data is likely normally distributed.

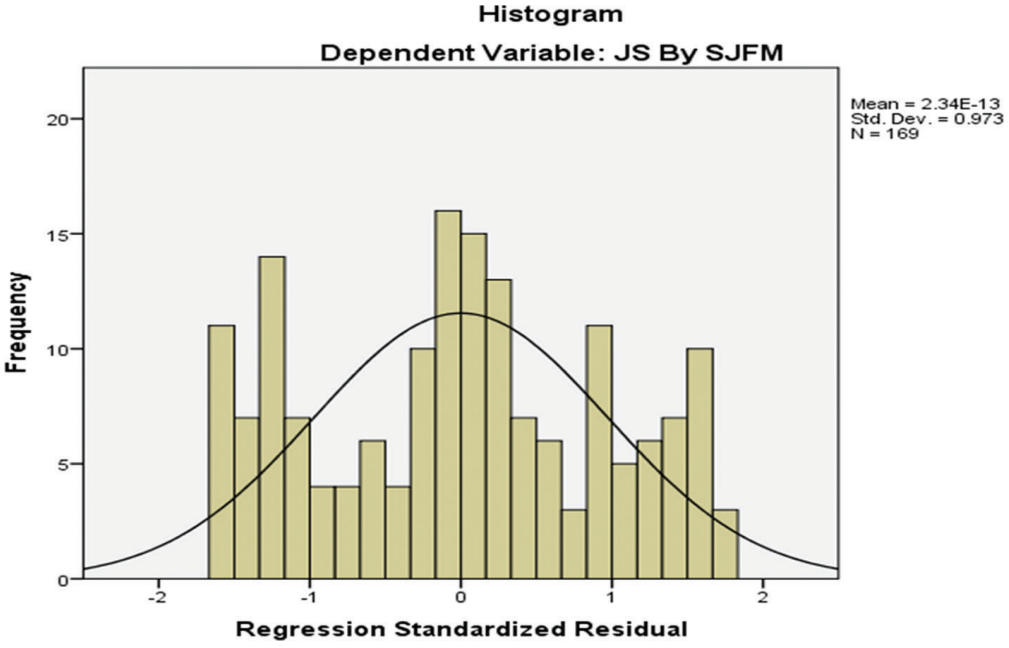

Figure 3: Histogram of JS

Normality was also assessed through a histogram (Figure 3) which revealed a bell-shaped curve for the job satisfaction variable, further confirming its normal distribution in the population.

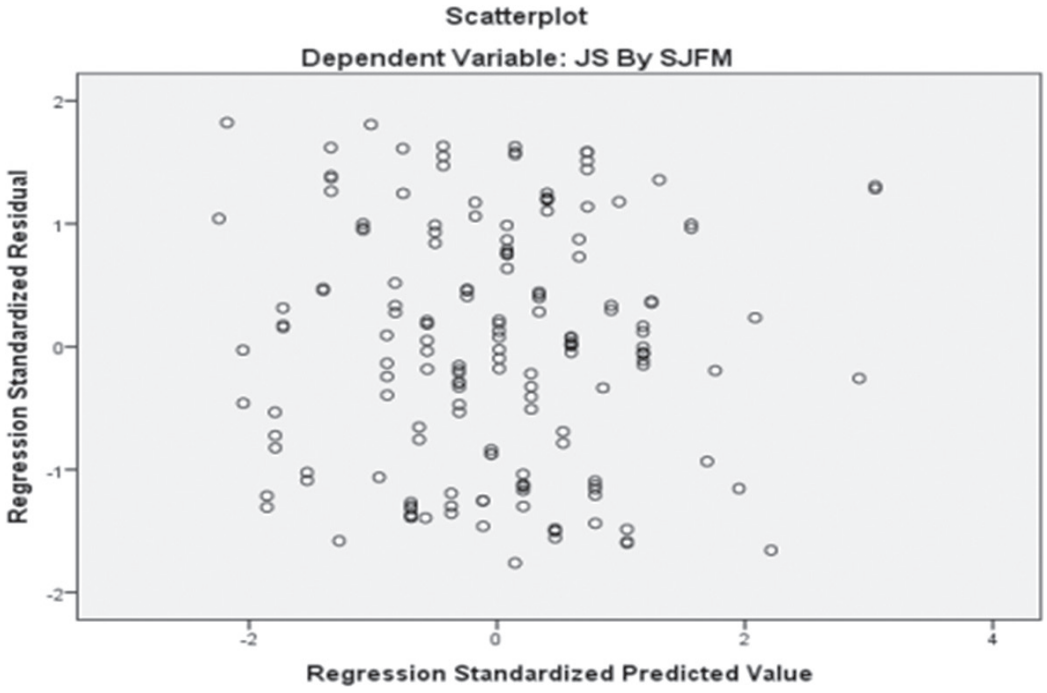

Figure 4: Scatter plot of JS

By plotting the standardized residuals against the predicted values as shown in Fig-4, the scatter plot of residual versus predicted value shows that the errors were uniformly distributed over the entire range of the predicted value and found that there was no clear relationship between the residuals and the predicted values. Therefore, the results suggest that the assumption of homoscedasticity should be met in the study.

Regressing Spector's 'Total satisfaction' over nine 'Job satisfaction facets'

Spector advocates to take all his 36 (9 x 4) items for total satisfaction (JS (Spector)).In order to evaluate whether this Total satisfaction is significantly determined by the nine Job satisfaction facets, the former variable is regressed over the later ones and following equations are formulated:

$$JS\ (Spector) = \beta_0 + \beta_1 PS + \beta_2 \beta 2 PRS + \beta_3 SUS + \beta_4 BES + \beta_5 RES + \beta_6 OPS + \beta_7 CRS + \beta_8 NWS + \beta_9 COS \quad \ldots\ldots\ldots\ldots\ldots (2)$$

Model 4.1 would estimate whether the Spector's "Nine job satisfaction facets" econometrically determine Spector's "Total satisfaction".

Table 13: Regression Model

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	-0.353	.201		-1.754	.081	-.750	.044
	Pay	0.130	.041	.143	3.187	.002	.049	.211
	Promotion Opportunities	0.124	.030	.208	4.126	.000	.065	.183
	Supervision	0.113	.032	.168	3.560	.000	.050	.175
	Fringe Benefits	0.095	.031	.149	3.045	.003	.033	.156
	Contingent Rewards	0.164	.036	.244	4.592	.000	.094	.235
	Operating Conditions	0.124	.032	.206	3.888	.000	.061	.187
	Co-Workers	0.123	.023	.250	5.366	.000	.078	.168
	Nature of Work	0.107	.022	.215	4.830	.000	.063	.151
	Communication	0.136	.031	.210	4.397	.000	.075	.196

Comparison of Job Satisfaction based on Gender

Table 14: T-test table for Gender

Gender	N	Mean	SD	Levene's Test for Equality of Variances		t-test for Equality of Means						
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
											Lower	Upper
Male	143	3.255	.444	1.190	.277	.783	167	0.435	.072	.092	-.110	.253
Female	26	3.182	.348									

For reporting effect size in T-test, Cohen's d formula as given equation 3 was used.

$$d = \frac{M_1 - M_2}{SD_{pooled}} \quad \text{.....(3)}$$

Where:

- $SD_{pooled} = \sqrt{\frac{(SD_1^2 + SD_2^2)}{2}}$

Where ,

M_1, M_2 are means of Male and Female groups and SD_1 and SD_2 are standard deviations of the Male and Female o groups.

$$SD_{pooled} = \sqrt{\frac{(n_1 - 1) \cdot SD_1^2 + (n_2 - 1) \cdot SD_2^2}{n_1 + n_2 - 2}}$$

$$= \sqrt{\frac{(142)(0.444^2) + (25)(0.348^2)}{143 + 26 - 2}} = \sqrt{\frac{(27.973) + (3.027)}{167}} = \sqrt{\frac{31.00}{167}} \approx \sqrt{0.1856} \approx 0.431$$

Now using Equation 2,

$$d = \frac{M_1 - M_2}{SD_{pooled}} = \frac{3.255 - 3.182}{0.431} = \frac{0.073}{0.431} \approx 0.169$$

From table 14, there were no significant differences (t (167) = 0.783, P = 0.435) in the score for male group (N=143, SD= 0.444) and female group (N=26, SD= 0.348). The effect size was small (Cohen's d = 0.17), suggesting minimal gender-based differences in job satisfaction. The magnitude of the differences in the mean (mean difference= 0.072, 95% CI=-0.110 to 0.253) was very small. Hence, H1 was not supported. Thus, there is no significant difference in means of job satisfaction level between male and female groups indicating that gender does not significantly affect job satisfaction.

Comparison of job satisfaction based on Designations

Table 15: ANOVA test table based on Designation

Current Designation Level	N	Mean	Std. Deviation	Test of Homogeneity of Variances		ANOVA	
				Levene Statistic	Sig.	F	Sig.
6th level Officer	80	3.228	.422				
7th level Officer	69	3.193	.429	.541	.583	3.454	.034
8th level Officer	20	3.473	.417				

The hypothesis tests if job satisfaction level differs among various current designations. Participants were divided into three designation (Group 1: 6th level Officer, Group 2: 7th level Officer, Group 3: 8th level Officer).

For any one-way or factorial ANOVA, eta squared (η^2) or partial eta squared formula as equation 3 was used to calculate effect size.

$$\eta^2 = \frac{F \cdot df_{between}}{F \cdot df_{between} + df_{within}} \text{ .....(4)}$$

Where, F means variance ratio

using equation 4, we get

$$\eta^2 = \frac{3.454 \cdot 2}{(3.454 \cdot 2) + 166} \approx \frac{6.908}{172.908} \approx 0.04$$

The ANOVA Results suggests that job satisfaction level between various current designation differ significantly (F (2,166) = 3.454, $p<0.05$) and $\eta^2 = 0.047$), indicating a small to moderate effect.

To check for the individual difference between the groups, post-hoc comparisons were done using Tukey HSD.

Table 16: TUKEY HSD Table based on Designation

Multiple Comparisons							
current Designation Level			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	6th level Officer	7th level	.036	.070	.867	-.129	.200
		8th level	-.244	.106	.058	-.495	.007
	7th level Officer	6th level	-.036	.070	.867	-.200	.129
		8th level	-.280*	.108	.028	-.534	-.025
	8th level Officer	6th level	.244	.106	.058	-.007	.495
		7th level	.280*	.108	.028	.025	.534

*. The mean difference is significant at the 0.05 level.

From table 16, The test indicates that the mean score for 7th level officer(M=3.193, SD=0.429) was significantly different from 8th level officer (M=3.473, SD=0.417)at 0.05 level .However , no significant differences were detected between 6th level Officer and 7th level Officer , also no significant differences were detected between 6th level Officer and 8th level Officer.

7th level officer were more dissatisfied than 6th and 8th level officers with a minimum mean score of 3.193. It is because of too little chances of promotion opportunities, payment received not satisfactory, inadequate adequate rules and regulations and no proper communication within organizations for 7th level officer.

Comparison of job satisfaction based on Appointments

Table 17: ANOVA test table based on Appointment via.

Appointment via and working in local level	N	Mean	Std. Deviation	Test of Homogeneity of Variances		ANOVA	
				Levene Statistic	Sig.	F	Sig.
Federal Government	43	3.380	.432				
Province Government	11	3.019	.362	.184	.832	4.093	.018
Local Government	115	3.213	.424				

The assumptions of homogeneity of variances were tested and found tenable using (F (2,166) = 0.184, p=0.832>0.05).so, homogeneity assumption of variance is met.

The hypothesis tests if job satisfaction level differs among various current Appointments. Participants were divided into three groups (Group 1: federal government, Group 2: Province government, Group 3: local government).

The ANOVA Results suggest that job satisfaction level between various Appointments differ significantly (F (2,166) = 4.093, p<0.05).

To check for the individual difference between the groups, post-hoc comparisons were done using Tukey HSD.

Table 18: TUKEY HSD Table based on Appointment via

Multiple Comparisons							
Appointment via and working in local level			**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
						Lower Bound	**Upper Bound**
Tukey HSD	Federal Government	Local Government	.167	.076	.072	-.012	.346
		Province Government	.361*	.143	.033	.023	.699
	Local Government	Federal Government	-.167	.077	.072	-.346	.012
		Province Government	.194	.133	.317	-.122	.509
	Province Government	Federal Government	-.361*	.143	.033	-.699	-.023
		Local Government	-.194	.133	.317	-.509	.122

*. The mean difference is significant at the 0.05 level.

From the above table 18 and test indicates that the mean score for federal government (M=3.380, SD=0.432) was significantly different from Province Government (M=3.019, SD=0.362). The mean differences were significant at 0.05 level. However, no significant differences were detected between the federal government and local government, and between the local government and province government.

The province government was more dissatisfied than the federal government and local government officers with a minimum mean score of 3.01. Appointment from Province government officers were more dissatisfied in terms of operating conditions, relation with supervision and co-workers.

5 Conclusion:

The job satisfaction among civil engineers was less than average. Furthermore, the research considered nine job-related factors using Spector's variables. Among these, the role of supervision received the highest satisfaction rating, averaging 3.88 out of 6, while payment and salary received the lowest satisfaction rating, averaging 2.73 out of 6. Demographic variables such as gender, job title, and years of experience showed limited influence on overall satisfaction, suggesting that organizational and systemic factors play a more critical role than personal attributes. Key influencing factors include organizational support, career development opportunities, and adequacy of resources. Male engineers reported slightly higher job satisfaction levels than their female counterparts, although the difference was not statistically significant. Additionally, engineers with longer service duration expressed greater satisfaction, indicating a possible link between tenure and adaptation to work environments. The findings underscore the need for targeted interventions by local and provincial government authorities to improve the work environment for civil engineers. Policymakers should consider:

- Enhancing career development and training opportunities.
- Addressing gender-specific challenges in the workplace to support female engineers.
- Ensuring adequate staffing and resources to reduce work-related stress.
- Implementing regular feedback and appraisal systems to improve motivation and retention.

These strategies can contribute to higher job satisfaction, which is directly linked to improved service delivery and project implementation in the water supply, sanitation, and infrastructure sectors.

6 Limitations and Future Research Directions

This study, while contributing valuable insights into the job satisfaction levels of civil engineers in local governments of Bagmati Province, is subject to several limitations. First, the sample was limited to engineers currently employed in local government units within a Bagmati province. Therefore, the findings may not be generalizable to engineers in other provinces or those working in federal or private sectors.

Second, the study relied on self-reported data collected through structured questionnaires, which may be affected by response bias or social desirability.

Third, the study primarily focused on quantifiable factors such as compensation, working environment, and professional growth. However, qualitative aspects like organizational culture, political interference, or psychological well-being were not deeply explored and could provide additional context.

Future research can address these limitations by:

- Expanding the geographic scope to include multiple provinces or nationwide samples.
- Employing longitudinal designs to assess changes in job satisfaction over time.
- Incorporating qualitative methods such as interviews or focus groups to gain deeper insights into engineers lived experiences.
- Exploring related themes such as burnout, retention, and the impact of decentralization reforms on engineering roles in local government.

By addressing these areas, future studies can build a more comprehensive understanding of the professional environment of civil engineers in Nepal and inform policy interventions for improved job satisfaction and workforce stability.

References

Subedi K.P, Chaudhari A.K. (2014). A study of Job Satisfaction status on civil service employees of Nepal. International Journal of Research and Scientific Innovation, Vol.I(No. V).

Government of Nepal. (2015, Constitution of Nepal). Retrieved from Ministry of Law, Justice and: http://www.moljpa.gov.np/.

Government of Nepal (2019). Capacity Needs Assessment for the Transition to Federalism. the International Center for Public Policy in the Andrew Young School of Policy Studies at Georgia State University.

Republica. (2022). Bagmati's Budget: Physical infrastructure, health and education major priorities. Retrieved from https://myrepublica.nagariknetwork.com/news/author/880.

Government of Nepal (2017). Retrieved from Employee Readjustment Act. Kathmandu: Ministry of Federal.

Bhattarai, A. K., Shrestha, S. K., & Mishra, A. K. (2018). Job Satisfaction Among Civil Engineers Working in Building Sector in Construction Firms of Nepal. Journal of Advanced Research in Civil and Environmental Engineering, Volume 5, Issue 3 - 2018, Pg. No. 9-17.

Basnet, A. (2015). Job Satisfaction and Motivational level of Civil engineers working in DRILP-AF Project. Kathmandu, Nepal: ACME Engineering College.

Sharma Poudel BP. (2002). Employee Job Satisfaction in particular reference to engineering and architectural consulting firms of Nepal. Lalitpur: Nepal Engineering College.

Thapa, P., & Shrestha, S. K. (2018). A Study of Job Satisfaction among civil engineers working in Hydropower Sector in Consulting Firms of Nepal. Lalitpur, Nepal: Pulchowk Campus.

Paudel, A., Shrestha, S. K., & Koirala, M. P. (2019). Job Satisfaction among Civil Engineers Working in Irrigation Sector under Government of Nepal. International Journal of Engineering Research & Technology (IJERT, Vol. 8 Issue 06.

Paudel., Nirmal Prasad Baral, Tulasi Ram Bhattarai, Keshav Basnet. (2020). Study on Job Satisfaction of Civil Engineers in

Gandaki Provincial Government, Nepal. http://saudijournals.com/sjce/: Saudi Journal of Civil Engineering.

Dahal A.K et.al, (2021). Job Satisfaction in Federal Structure - a Case of Bhojpur, Nepal. International Journal of Applied Engineering and Management Letters (IJAEML), DOI: https://doi.org/10.5281/zenodo.5496456, 5(2), 38-56.

Mainali. (2023). Assessment of job satisfaction level of civil engineers working in private organization in Kathmandu valley, Pokhara university.

Hoppock, R. (1935). Job Satisfaction. Harpere and Brothers, p.47.

Judge, T. A., Thoresen, C. J., Bono, J. E., & Patton, G. K. (2001). The job satisfaction–job performance relationship: A qualitative and quantitative review. Psychological Bulletin, https://doi.org/10.1037/0033-2909.127.3.376. 127 (3), 376–407.

Spector. (2001), October 8). Retrieved from http://paulspector.com/scales/our-assessments/job-satisfaction-survey-jss/

Tuzun, L. (2013). Organizational level analysis of communication satisfaction and identification in relation to job satisfaction. Journal of Economics Business & Management, 01.

Saqib Yaqoob Malik, Anwar Fazil Chishti, Saqib Shahzad. (2016). Measuring Employees' Job Satisfaction as Moderated by Cultural Dimension Power Distance in Public and Private Sectors' Pakistani Organizations. International Journal of Management Sciences and Business Research, ISSN (2226-8235) Vol-5, Issue 12.

Neha Batura, Jolene Skordis-Worrall, Rita Thapa, Regina Basnyat and Joanna Morrison. (2016). Is the Job Satisfaction Survey a good tool to measure job satisfaction amongst health workers in Nepal? Results of a validation analysis. 10.1186/s12913-016-1558-4

Wasaf Inayat, Muhammad Jahanzeb Khan (2021). A Study of Job Satisfaction and Its Effect on the Performance of Employees Working in Private Sector Organizations, Peshawar. https://doi.org/10.1155/2021/1751495

Jour, Katabi, A.HajiZadeh, Mohammad Bordbar, Ali Salehi, Amir (2021). The Relationship Between "Job Satisfaction" and "Job Performance": A Meta-analysis. Global Journal of Flexible Systems Management.

Zinka Kosec, Stella Sekulic, Stella Sekulic. (2022). Correlation between Employee Performance, Well-Being, Job Satisfaction, and Life Satisfaction in Sedentary Jobs in Slovenian Enterprises. Int. J. Environ. Res. Public Health.

Imam Hidayat Universitas Trisaksi, Jakarta, Indonesia (2022). Employee Motivation, Job Satisfaction, and Employee Performance: A Literature Review. Vol 3 No 6 , Dinasti International Journal of Digital Business Management