Employee Performance Evaluation Using Analytic Hierarchy Process (AHP): A Case Study

Rafikul Islam and Nagendran Periaiah

Department of Business Administration

International Islamic University Malaysia

Jalan Gombak, 53100 Kuala Lumpur, Malaysia

1

Presentation Outline

- Introduction
- Objective
- Literature Review
- Research Method
- Findings
- Conclusion

Introduction

- An employee performance appraisal is a process - often combining both written and oral elements - whereby management evaluates and provides feedback on employee job performance, including steps to improve or redirect activities as needed.

- Performance document provides a basis for pay increase or promotion.

- The whole evaluation process must be fair and objective

- Current performance appraisals - use financial target such as total sales, expenses, payment collection and profit
- Equal increment or bonus to all staff in the same department.
- No differentiation between high and low performing employees

Objectives

- Establish relevant set of criteria and sub-criteria for performance appraisal at Chemvi Laboratory Sdn. Bhd.

- Determine the priority of criteria and sub-criteria by interviewing key senior managers

- Evaluate employee performance using the Analytic Hierarchy Process (AHP) and ranking of employees in the organisation

Background Company: Chemvi Laboratory Sdn. Bhd.

- Formed in early 2000

- The lab is in Shah Alam, Malaysia

- The core business is chemical laboratory testing

- Drinking water, wastewater, marine/ river water quality, smoke/ air emission and food analysis.

- Around 50 employees - laboratory manager, human resource/admin manager, business development manager, accountant, senior chemist, chemist, industrial hygienist, laboratory technician, field technician, and clerks.

Literature Review

- Conteh and Yuan (2022) investigated the relationship between High Performance Work System (HPWS) and Employee Service Performance (ESP) through organizational support (OS). The results show that the above relationship is positive

- Ali *et al.* (2019) show that physical working environment of an organization has positive correlation with employees' performance

- Employee performance evaluation is an important tool that an organization uses. Hassanpour *et al.* (2022) developed and tested an employee performance evaluation model for Isfahan municipality corporation, Iran

Method

- Many tools are available to evaluate performance appraisals such as ranking, paired comparison, confidential report, essay evaluation, critical incident, and checklist.

- Detailed information on each tool was explained to the top management of Chemvi Laboratory.

- The managing director preferred ranking and paired comparison.

- The concept of AHP and its application in performance appraisal was presented to the top management and senior managers.

- A one-day workshop was conducted with relevant employees to explain the proposed performance appraisal system using the AHP method.

8
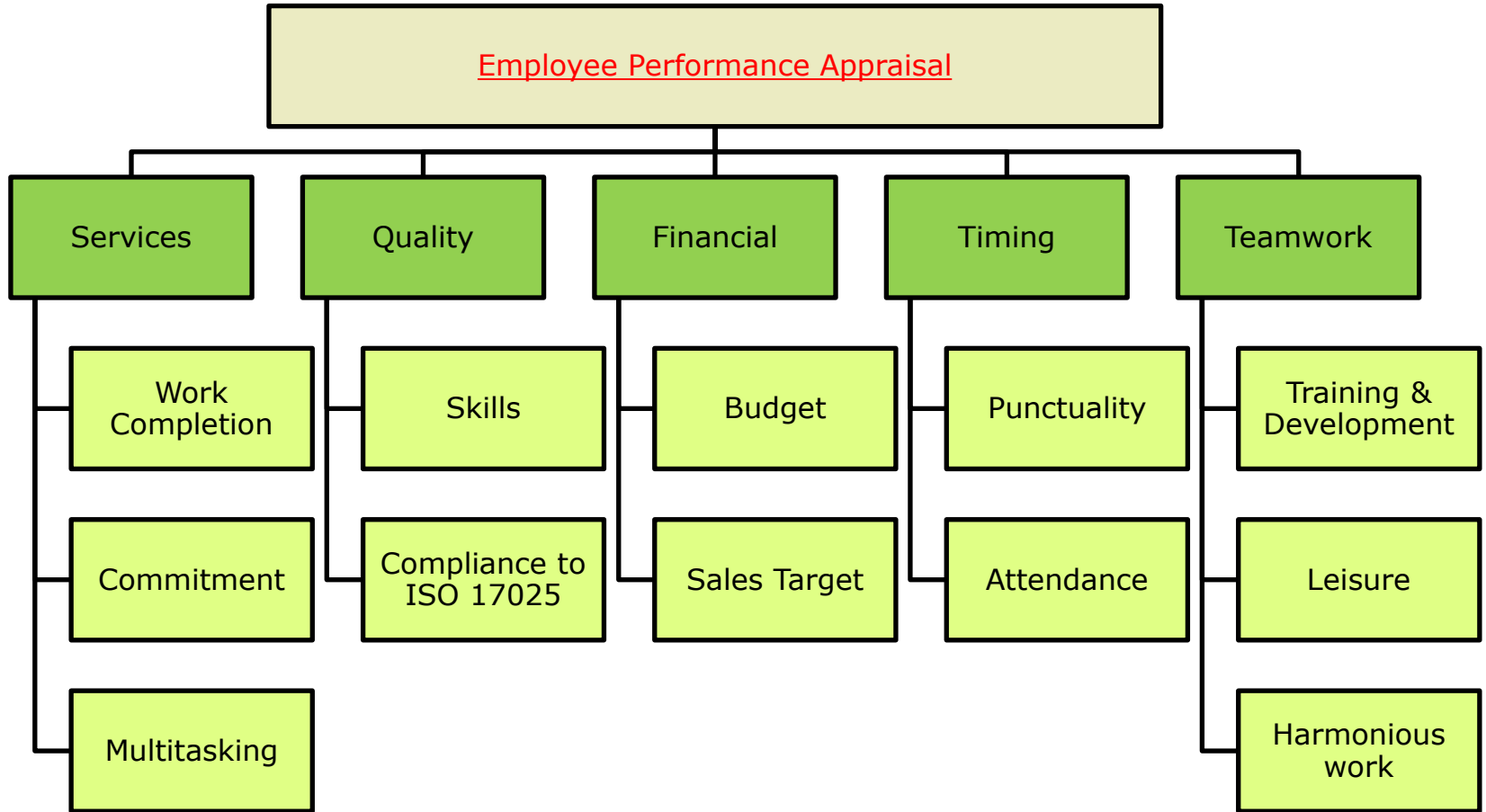
DETERMINATION OF PRIORITIES OF THE DECISION CRITERIA AND SUBCRITERIA

- ❑ An AHP questionnaire was developed to determine weights of the decision criteria.

- ❑ Questionnaires were distributed to the four senior managers and managing director of the company.

- ❑ There was a briefing on how to complete the questionnaire based on pair-wise comparisons.

- ❑ Questionnaires were collected and further analysed using the AHP analysis tool – AHP Calc version 24.12.13 developed by Klaus D. Goepel available online (http://bpmsg.com).

Results & Discussion

Matrix		Services 1	Quality 2	Financial 3	Timing 4	Teamwork 5	O 6	O 7	O 8	O 9	O 10	normalized principal Eigenvector
Services	1	-	1 1/4	1 2/7	1 3/7	5/6	-	-	-	-	-	22.09%
Quality	2	4/5	-	1 1/2	1 4/7	5/7	-	-	-	-	-	20.65%
Financial	3	7/9	2/3	-	3/4	1/2	-	-	-	-	-	13.95%
Timing	4	5/7	5/8	1 1/3	-	2/3	-	-	-	-	-	15.98%
Teamwork	5	1 1/5	1 2/5	2 1/9	1 5/9	-	-	-	-	-	-	27.33%
O	6	-	-	-	-	-	-	-	-	-	-	0.00%
O	7	-	-	-	-	-	-	-	-	-	-	0.00%
O	8	-	-	-	-	-	-	-	-	-	-	0.00%
O	9	-	-	-	-	-	-	-	-	-	-	0.00%
O	10	-	-	-	-	-	-	-	-	-	-	0.00%

Matrix

		Work Completion	Commitment	Multitasking	○	○	○	○	○	○	○	normalized principal Eigenvector
		1	2	3	4	5	6	7	8	9	10	
Work Completion	1	-	2/3	1 1/5	-	-	-	-	-	-	-	30.42%
Commitment	2	1 1/2	-	1 3/5	-	-	-	-	-	-	-	43.38%
Multitasking	3	5/6	5/8	-	-	-	-	-	-	-	-	26.20%
0	4	-	-	-	-	-	-	-	-	-	-	0.00%
0	5	-	-	-	-	-	-	-	-	-	-	0.00%
0	6	-	-	-	-	-	-	-	-	-	-	0.00%
0	7	-	-	-	-	-	-	-	-	-	-	0.00%
0	8	-	-	-	-	-	-	-	-	-	-	0.00%
0	9	-	-	-	-	-	-	-	-	-	-	0.00%
0	10	-	-	-	-	-	-	-	-	-	-	0.00%

12

Matrix

normalized principal Eigenvector

		Training & Development 1	Leisure 2	Harmonious Work 3	○ 4	○ 5	○ 6	○ 7	○ 8	○ 9	○ 10
Training & Development	1	-	2 5/7	1/2	-	-	-	-	-	-	-
Leisure	2	3/8	-	2/7	-	-	-	-	-	-	-
Harmonious Work	3	2 1/6	3 4/9	-	-	-	-	-	-	-	-
0	4	-	-	-	-	-	-	-	-	-	-
0	5	-	-	-	-	-	-	-	-	-	-
0	6	-	-	-	-	-	-	-	-	-	-
0	7	-	-	-	-	-	-	-	-	-	-
0	8	-	-	-	-	-	-	-	-	-	-
0	9	-	-	-	-	-	-	-	-	-	-
0	10	-	-	-	-	-	-	-	-	-	-

normalized principal Eigenvector:
- 30.68%
- 13.55%
- 55.78%
- 0.00%
- 0.00%
- 0.00%
- 0.00%
- 0.00%
- 0.00%
- 0.00%

Criteria	Weight	Rank	Sub-criteria		Weight	Overall Weight	%	Rank
Services	0.221	2	Work Completion	C_{11}	0.304	0.067	6.72	8
			Commitment	C_{12}	0.434	0.096	9.59	4
			Multitasking	C_{13}	0.262	0.058	5.79	11
Quality	0.206	3	Skills	C_{21}	0.679	0.140	13.98	2
			Compliance to ISO 17025	C_{22}	0.321	0.066	6.62	9
Financial	0.140	5	Budget	C_{31}	0.498	0.070	6.97	7
			Sales Target	C_{32}	0.502	0.070	7.03	6
Timing	0.160	4	Punctuality	C_{41}	0.629	0.101	10.06	3
			Attendance	C_{42}	0.371	0.059	5.94	10
Teamwork/ Cooperation	0.273	1	Training & Development	C_{51}	0.307	0.084	8.38	5
			Leisure	C_{52}	0.135	0.037	3.69	12
			Harmonious work	C_{53}	0.558	0.152	15.23	1
Total	1.000				5.000	1.000	100	

Pairwise comparison matrix for the intensities

Employees were evaluated by measuring the intensities. The pairwise comparison matrix for the intensities: excellent (E), good (G), average (A), satisfactory (S), and poor (P)

	E	G	A	S	P	Weights
E	1	3	5	6	8	0.501
G		1	3	5	6	0.262
A			1	3	5	0.133
S				1	3	0.067
P					1	0.036
CR=0.06						

Rating for each employee

No	Name	C_1			C_2		C_3		C_4		C_5		
		C_{11}	C_{12}	C_{13}	C_{21}	C_{22}	C_{31}	C_{32}	C_{41}	C_{42}	C_{51}	C_{52}	C_{53}
1	NR	G	E	G	G	A	G	E	E	E	A	A	A
2	SY	A	G	G	E	S	S	A	E	E	A	E	G
3	DK	E	E	E	G	A	S	G	G	G	G	E	G
4	DY	G	G	G	A	S	E	G	E	E	A	G	G
5	WH	G	G	G	G	A	E	G	A	A	A	G	G
6	GW	G	G	G	A	A	E	G	E	E	A	E	G
7	KA	S	G	G	A	A	A	A	E	E	E	G	A
8	MD	A	A	A	A	A	P	A	G	E	G	G	G
9	PO	G	E	A	E	G	A	G	E	E	E	G	G
10	VI	E	A	A	G	G	A	A	E	E	E	E	E
11	AS	S	A	A	S	S	A	G	E	E	E	E	G
12	SU	A	A	A	S	S	A	G	G	G	E	G	G
13	NF	G	G	G	G	G	S	G	G	E	G	G	G
14	NA	A	A	E	E	G	P	G	P	S	E	E	G
15	SF	E	E	E	E	E	G	G	G	S	E	A	A
16	SG	G	E	G	E	G	S	G	E	E	E	G	G
17	UT	A	A	A	A	A	S	G	A	A	G	G	A
18	HZ	G	G	G	G	A	A	G	E	E	E	A	G
19	KH	A	A	G	A	A	S	G	G	G	G	G	A
20	MU	G	A	A	G	G	S	G	S	G	E	G	G

16

Overall score of each employee

No		C_1			C_2		C_3		C_4		C_5			Score
		C_{11}	C_{12}	C_{13}	C_{21}	C_{22}	C_{31}	C_{32}	C_{41}	C_{42}	C_{51}	C_{52}	C_{53}	
	Weight	**0.067**	**0.096**	**0.058**	**0.140**	**0.066**	**0.070**	**0.070**	**0.101**	**0.059**	**0.084**	**0.037**	**0.152**	
1	NR	0.262	0.501	0.262	0.262	0.133	0.262	0.501	0.501	0.501	0.133	0.133	0.133	0.2962
2	SY	0.133	0.262	0.262	0.501	0.067	0.067	0.133	0.501	0.501	0.133	0.501	0.262	0.2874
3	DK	0.501	0.501	0.501	0.262	0.133	0.067	0.262	0.262	0.262	0.262	0.501	0.262	0.3015
4	DY	0.262	0.262	0.262	0.133	0.067	0.501	0.262	0.501	0.501	0.133	0.262	0.262	0.2751
5	WH	0.262	0.262	0.262	0.262	0.133	0.501	0.262	0.133	0.133	0.133	0.262	0.262	0.2387
6	GW	0.262	0.262	0.262	0.133	0.133	0.501	0.262	0.501	0.501	0.133	0.501	0.262	0.2883
7	KA	0.067	0.262	0.262	0.133	0.133	0.133	0.133	0.501	0.501	0.501	0.262	0.133	0.2429
8	MD	0.133	0.133	0.133	0.133	0.133	0.036	0.133	0.262	0.501	0.262	0.262	0.262	0.1963
9	PO	0.262	0.501	0.133	0.501	0.262	0.133	0.262	0.501	0.501	0.501	0.262	0.262	0.3601
10	VI	0.501	0.133	0.133	0.262	0.262	0.133	0.133	0.501	0.501	0.501	0.501	0.501	0.3436
11	AS	0.067	0.133	0.133	0.067	0.067	0.133	0.262	0.501	0.501	0.501	0.501	0.262	0.2470
12	SU	0.133	0.133	0.133	0.067	0.067	0.133	0.262	0.262	0.262	0.501	0.262	0.262	0.2044
13	NF	0.262	0.262	0.262	0.262	0.262	0.067	0.262	0.262	0.501	0.262	0.262	0.262	0.2626
14	NA	0.133	0.133	0.501	0.501	0.262	0.036	0.262	0.036	0.067	0.501	0.501	0.262	0.2670
15	SF	0.501	0.501	0.501	0.501	0.501	0.262	0.262	0.262	0.067	0.501	0.133	0.133	0.3481
16	SG	0.262	0.501	0.262	0.501	0.262	0.067	0.262	0.501	0.501	0.501	0.262	0.262	0.3630
17	UT	0.133	0.133	0.133	0.133	0.133	0.067	0.262	0.133	0.133	0.262	0.262	0.133	0.1530
18	HZ	0.262	0.262	0.262	0.262	0.133	0.133	0.262	0.501	0.501	0.501	0.133	0.262	0.2980
19	KH	0.133	0.133	0.262	0.133	0.133	0.067	0.262	0.262	0.262	0.262	0.262	0.133	0.1811
20	MU	0.262	0.133	0.133	0.262	0.262	0.067	0.262	0.067	0.262	0.501	0.262	0.262	0.2290

Rank of each employee

Name	Overall Score	Ideal Score	Rank
SG	0.3630	1.0000	1
PO	0.3601	0.9920	2
SF	0.3481	0.9589	3
VI	0.3436	0.9465	4
DK	0.3015	0.8306	5
HZ	0.2980	0.8209	6
NR	0.2962	0.8159	7
GW	0.2883	0.7942	8
SY	0.2874	0.7917	9
DY	0.2751	0.7578	10
NA	0.2670	0.7355	11
NF	0.2626	0.7234	12
AS	0.2470	0.6804	13
KA	0.2429	0.6691	14
WH	0.2387	0.6575	15
MU	0.2290	0.6308	16
SU	0.2044	0.5630	17
MD	0.1963	0.5407	18
KH	0.1811	0.4988	19
UT	0.1530	0.4215	20

Conclusion

- The outcome of performance evaluation is often used for year-end bonus, rewards, salary increments, compensation, training need analysis, and promotion of employees.

- Therefore, a very transparent and systematic performance evaluation system is deemed necessary. The evaluation should be done in an un-biased and objective way.

- The meaning of criterion and sub-criterion being used, the weight of each criterion and the method need to be communicated to the employees at the beginning of the year/assessment calendar.

- The poor performing employees need to be identified and further coaching and training need to be given so that they can perform better

- Managers need to be also trained on how to carry out assessment objectively without personal bias to anyone

- The evaluation outcomes should be communicated to the employees. The high ranking employees should be rewarded adequately

- Overall, the management of the company expressed satisfaction on the new method based on AHP

ICEFM 2022, Wieliczka, Poland

23-25 Oct, 2022