ASSESSMENT OF QUALITY OF WORK LIFE USING RANDOMIZED BLOCK DESIGN TECHNIQUE: A CASE STUDY

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Abstract

Quality of work life is an extent to which employees can enhance their personal lives through their work, environment and experiences. Quality of work life is specifically related to the level of happiness a person derives for his career. Each person has different needs when it comes to their careers; the quality level of their work life is determined by whether those needs are being met. A person with a high quality of life tends to feel as though all of their important needs and wants are fulfilled. They are generally happy and overall feel as though their life is good. It is found that eighty six percent employees are satisfied with the working conditions of the organisation. More than 86% employees agreed that organizations provide adequate and fair compensation for their services/work. Eighty seven percent of employees also feel that the organization provide sufficient retirement, benefits; like pension, provident fund etc. Eighty six percent of employees feel that safety of worker is a higher priority for the organization.

Keywords: *Casting industries, Job Satisfaction, Performance, Quality of Working Life (QWL),*

1. INTRODUCTION

Quality of work life (QWL) refers to the level of happiness or dissatisfaction with one's career. Those who enjoy their careers are said to have a high quality of work life, while those who are unhappy or whose needs are otherwise unfilled are said to have a low quality of work life. The term refers to the favorableness or un-favorableness of a total job environment for people. QWL programs are another way in which organizations recognize their responsibility to develop jobs and working conditions that are excellent for people as well as for economic health of the organization. Quality of work life improvements are defined as an activity which takes place at every level of organization, which seeks greater organizational effectiveness through the enhancement of human dignity and growth. To achieve a high quality of work life, it is essential to choose a job that fulfils your needs. First, you must determine what those needs are. If you want a job that engages your mind and challenges you, it is important to understand that in advance so you can earn the qualifications that will allow you to obtain such a job.

The casting is one of the most important of the manufacturing processes. All metal starts life as the product of some form of melting and refining process and casting is designated a primary process and as such it is of considerable interest to all engineers. Cast parts range in size from a few millimetres and weighing several grams, such as jewellery parts, to very large castings and weighing many tons, such as the huge propellers and stern frames of ocean liners. In many cases cast parts are ready for use as they come from the casting process, but more often than not they require subsequent machining and finishing. The various types of castings which are: produced are ferrous, non ferrous, Aluminium Alloy, graded cast iron, ductile iron, Steel etc. for application in automobiles, railways, pumps compressors & valves, diesel engines, cement/electrical/textile machinery etc. The work done by the various researchers is summarized in this section.

Taylor (1979) identified the essential components of quality of working life as basic extrinsic job factors of wages, hours and working conditions, and the intrinsic job notions of the nature of the work itself. He suggested that a number of other aspects could be added. Hackman and Oldhams (1980) highlighted the constructs of QWL in relation to the interaction between work environment and personal needs. They emphasized that the personal needs are satisfied when rewards from the organization, such as compensation, promotion, recognition and development meet their expectations. Efraty and Sirgy (1990) conducted a study based on a

sample of 219 service deliverers to the elderly in a large mid-western city. Quality of work life (QWL) was conceptualized in terms of need satisfaction stemming from an interaction of workers' needs (survival, social, ego, and self-actualization needs) and those organizational resources relevant for meeting them. Rossmiller (1992) found that QWL positively influenced the respect accorded to teachers, teacher participation in decisions affecting their work, professional collaboration and interaction, use of skills and knowledge and the teaching learning environment. Research has indicated that the QWL affects organizational culture and effectiveness, staff's health, high stress and burnout levels, more complaints, higher direct medical expenses and patients' morbidity and mortality rates have been noted as the repercussions of low levels of QWL.

Danna & Griffin (1999) Concluded that the Quality of Working Life is not a unitary concept, but has been seen as incorporating a hierarchy of perspectives that not only include work-based factors such as job satisfaction, satisfaction with pay and relationships with work colleagues, but also factors that broadly reflect life satisfaction and general feelings of well-being. Winter et al. (2000) viewed QWL for attitudinal response among the employees which includes role stress, job characteristics, and supervisory, structural and social characteristics to directly and in directly shape academicians' experiences, attitudes and behaviours. Sirgy et al. (2001) defined quality of work life as satisfaction of these key needs through resources, activities, and outcomes stemming from participation in the workplace. Needs as defined by the psychologist, Abraham Maslow, were seen as relevant in underpinning this model, covering health & safety, economic and family, social, esteem, actualization, knowledge and aesthetics, although the relevance of non-work aspects is play down as attention is focused on quality of work life rather than the broader concept of quality of life.

Donald (2005) investigated QWL indicators in six Canadian Public Health Care Organizations (HCO's) by reviewing documentation relevant to QWL and conducting focus group or team interviews. Group interviews were taped and analyzed with qualitative data techniques. They found employee well being and working conditions are important indicators of QWL. Rose et al. (2006) stated that quality of work life is a philosophy or set of principals, which holds that people are trustworthy, responsible and capable of making a valuable contribution to the organization. It also involves respect and the elements that are relevant to an individual quality of work life include task, working environment, organizational culture,

administrative system and the relationship between on the job and off the job life. Serey (2006) defined quality of work life as it is certain and best meet the existing work environment along with meaningful and satisfying work. It also includes an opportunity to implement one's talents and abilities to face challenges that require independent initiative and self direction. Turner and Pack (2007) developed strategic plans due to importance of investing on preserving athletes. He carried out his research on 190 athletes who were selected randomly and concluded that women are more committed to the team and university. Bhanugopan & Fish (2008) suggested indicators like lack of job stress, lack of job burnout, lack of turnover intentions and job satisfaction. They included measures like job satisfaction, earning money, membership in successful teams, job security & job growth. Hosseini (2010) stated that career satisfaction, career achievement and career balance are not only the significant variables to achieve good quality of work life but quality of work life (QWL) or the quality of work system as one of the most interesting methods creating motivation and is a major way to have job enrichment which has its roots in staff and managers' attitude to motivation category that is more attention to fair pay, growth opportunities and continuing promotion improves staff's performance which in turn increases QWL of employees. Reddy & Reddy (2010) defined in general terms, QWL, refers to the favourableness of a job environment for people. It refers to the quality of relationship between employees and the total working environment.

Kashani (2012) stated that Quality of work life has been defined as a philosophy or a set of principles, which holds that people are trustworthy, responsible and capable of making a valuable contribution to their organization. It also involves treating people with respect. Zare et al. (2012) undertook a study on quality of work life to identify its dimensions Library method was used to gather information on theoretical basics, literature and to identify aspects and scales. Field study method was used to gather information through questionnaires distributed among 30 experts. The data so collected was analyzed using Analytical hierarchy process (AHP). Rathamani and Ramchandra (2013) described that Quality of work life is an environment that promotes and maintains employee satisfaction with an aim to improve working conditions for labours and organizational effectiveness for employers. Valarmathi & Karishnan (2013) stated that Quality of work life can be defined as the environment at the work place provided to the people on the job.

Battu and Chakravarthy (2014) concluded that the Quality of work life of Nurses and Paramedical staff in hospitals is good. The researcher highlights some of the small gaps in QWL towards the hospitals where it aims in promoting peaceful relation with the staff. There is no personal motive to blame the services of the Nurses and Para-medical staff. There are many Nurses and staff who spent their life to serve the public and safeguard the lives of the patients without expecting any benefit. But still there are a few lacunae in our medical facilities and infrastructure available in hospitals. There is a need to make better infrastructure and services in all hospitals which will help for the public. So, the management should take utmost care to improve the Quality of work life of the employees in Private and Public sector hospitals. Priyadarshni and Bhagat (2014) concluded that the proposition that the degree of satisfaction in Quality of Work Life is related to the degree to which the employees believes his or her success criteria have been met, especially if the individual places great importance on these criteria which include pay, respect, personal growth and family life balance. This supports the materialistic work ethic that place strong emphasis on corporate power, income and personal growth as parts of their careers.

2. Introduction of industries

The survey for the quality of work life is performed on the employees of two industries.

First industry was established in 1991, as one of the trusted business entities involved in manufacturing, supplying and exporting a comprehensive range of pump castings, Pump casting spares and pulleys. Meeting the demands of numerous industries, the products are appreciated for their durability and high performance this foundry group is one of the leading manufactures of cast iron graded & S.G iron casting since 1991. It is producing 1500 MT casting per month. The turnover of the industry is about 25 crores per annum with more than 100 employees.

The second industry was established in 1997, as one of the trusted business entities involved in manufacturing of electric motor, impellers, Industrial gearbox and Flywheel Castings etc. The turnover of the industry is about 15 crores per annum with more than 75 employees. Both the industries are located in the northern part of the India.

2.1 Data collection and analysis

A survey was conducted among the employees of the casting industries to explore the quality of work life of employees. The sample size of 150 was taken from both the industries. In the present study, data have been collected through questionnaire. The questionnaire has been

structured with both open & closed ended questions. Eleven categories of questions with four options and their responses are presented in this section.

After collecting the data from 150 employees, the responses have been analyzed by using: percentage calculations and pie charts.

2.2 Analysis of Responses by Pie chart

Pie charts are used to analyze the response of questionnaire by the employees of both the industries.

Question 1: How long have you been working for the organization?

Table 1 shows the responses of 150 employees for Question 1 and it is shown by pie chart in Fig. 1.

Table 1: Responses of Question 1.

Response	Rank	No. of Employees	Percentage
Five years and	A	51	34.00
Two-five years	B	37	24.66
One-two years	C	39	26.00
Less than one year	D	23	15.34

Table 1 shows that 15.3% of the employees are working for less than one year in the industry, 26% of employees are working for the period between 1-2 years, similarly 24.66% of the employees have the working experience of 2 to 5 years, whereas 34% of employees having more than 5 years of experience in the organization. Table 2 shows the response of the Question 2 and Table 3 shows the response of the Question 3 respectively.

Question 2: Are you satisfied with the working conditions of the organization?

Table 2 Responses of Question 2

Response	Rank	No. of	Percentage
Strongly agree	A	58	38.66
Agree	B	72	48.00

Disagree	C	20	13.34
Strongly	D	0	0.00

Question 3: Is the work environment motivating for the employees?

Table 3: Responses of Question 3

Response	Rank	No. of Employees	Percentage
Strongly agree	A	52	34.66
Agree	B	79	52.66
Disagree	C	19	12.68
Strongly disagree	D	0	0.00

Table 4 shows the response of the Question 4 while Table 5 shows the response of the Question 5 respectively.

Question 4: Do different departments in the organization co-operate with each other.

Table 4 Responses of Question 4

Response	Rank	No. of Employees	Percentage
Strongly agree	A	52	34.66
Agree	B	67	44.00
Disagree	C	17	21.34
Strongly disagree	D	0	0.00

Question 5: Do you feel that relationship with colleagues increases productivity and job satisfaction?

Table 5 Responses of Question 5

Response	Rank	No. of Employees	Percentage
Strongly agree	A	61	40.66

Agree	B	71	47.34
Disagree	C	0	0.00
Strongly disagree	D	18	12

Table 6 shows the response of the Question 6 while Table 7 shows the response of the Question 7 respectively.

Question 6: Do you think that organized training programs really help to increase the productivity and job satisfaction?

Table 6 Responses of Question 6

Response	Rank	No. of Employees	Percentage
Strongly agree	A	46	30.66
Agree	B	86	57.34
Disagree	C	18	12.00
Strongly disagree	D	0	0.00

Question 7: Does your organization provide adequate and fair compensation for your services/work?

Table 7 Responses of Question 7

Response	Rank	No. of Employees	Percentage
Strongly agree	A	81	54.00
Agree	B	49	32.66
Disagree	C	20	13.34
Strongly disagree	D	0	0.00

Table 8 shows the response of the Question 8 while Table 9 shows the response of the Question 9 respectively.

Question 8: Does the organization provide benefits like retirement, pension scheme?

Table 8 Responses of Question 8

Response	Rank	No. of Employees	Percentage
Strongly agree	A	39	26.00
Agree	B	92	61.34
Disagree	C	19	12.66
Strongly disagree	D	0	0.00

Question 9: Are you satisfied with your job?

Table 9 Responses of Question 9

Response	Rank	No. of Employees	Percentage
Strongly agree	A	49	32.66
Agree	B	81	54
Disagree	C	20	13.33
Strongly disagree	D	0.0	0.00

Question 10: Do you feel that safety of worker is a higher priority for your organization?

Table 10 Responses of Question 10

Response	**Rank**	**No. of Employees**	**Percentage**
Strongly agree	A	41	27.34
Agree	B	88	58.66
Disagree	C	21	14
Strongly disagree	D	0	0.00

Question 11: Do you receive regular and helpful feedback on your performance?

Table 11 Responses of Question 11

Response	Rank	No. of Employees	Percentage
Strongly agree	A	24	16.00
Agree	B	86	57.33
Disagree	C	36	24.00
Strongly disagree	D	4	2.67

3. Randomized Block Design (RBD)

Randomized Block Design (RBD) test is used to find the significant difference among the factors / parameters considered in the study. The survey was conducted for two organisations and pie charts show the result of the survey in section 2.2. This section deals the qualitative analysis of data to find the significant difference between the parameters.

3.1 Analysis of survey through RBD test

The responses of eleven questions are represented by R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, and R_{11} for which questions are as follows:

Q_1 = How long have you been working for the organization?

Q_2 = Are you satisfied with the working conditions of the organization?

Q_3 = Is the work environment motivating for the employees?

Q_4 = Do different departments in the organization co-operate with each other?

Q_5 = Do you feel that relationship with colleagues increases productivity and job satisfaction?

Q_6 = Do you think that organized training programs really help to increase the productivity and job satisfaction?

Q_7 = Do your organization provide adequate and fair compensation for your services/work?

Q_8 = Does the organization provides benefits like retirement, pension scheme?

Q_9 = Do you feel satisfied with your job?

Q_{10} = Do you feel that safety of worker is a higher priority for your organization?

Q_{11} = Do you receive regular and helpful feedback on your performance?

Table 12 shows the combined response of all the questions.

Table 12 Combined responses of all the questions using randomized block design (RBD)

Responses	A	B	C	D	Total percentage
R_1	34.00	24.66	26.00	15.34	100
R_2	38.66	48.00	13.34	00	100
R_3	34.66	52.67	12.67	00	100
R_4	34.66	44.00	21.34	00	100
R_5	40.67	47.33	00	12.00	100
R_6	30.67	57.33	12.00	00	100
R_7	54.00	32.67	13.33	00	100
R_8	26.00	61.33	12.67	00	100
R_9	32.67	54.00	13.33	00	100
R_{10}	27.33	58.67	14.00	00	100
R_{11}	16.00	57.33	24.00	2.67	100
Total	**369.32**	**537.99**	**162.68**	**30.01**	**1100**

The model of the Randomize block design (RBD) is used:

$$Y_{ij} = \mu + B_i + T_i + e_{ij} \quad \text{---------} \quad \text{(Eq. 1)}$$

Where,

μ = Overall mean

Y_{ij} = Observation with respect to the j_{th} treatment of factor (option) and i_{th} block (question)

B_i = Effect of the i_{th} block (question)

T_j = Effect of j_{th} treatment of factor (option)

e_{ij} = Random error associated with its block (question) and the j_{th} treatment of the factor (option).

Hypothesis with respect to treatment (option):

Null Hypothesis (H_0) = $T_1 = T_2 = T_3 = T_4$

Alternate Hypothesis H_1 = Treatment means are not equal for at least one pair of treatment means.

Hypothesis With respect to block (question)

Null Hypothesis $H_0 = B_1 = B_2 = B_3 = B_4 = B_5 = B_6 = B_7 = B_8 = B_9 = B_{10} = B_{11}$

Alternate Hypothesis $H_{1=}$ Block means are not equal for at least one pair of block means

The relationship between different sum of squares of the total is shown as follows:

Total sum of squares ($S.S_{total}$) = Sum of squares of block ($S.S_{blocks}$)

+ Sum of squares of treatments ($S.S_{treatments}$) + Sum of squares of errors ($S.S_{error}$)

or

$$S.S_{total} = S.S_{blocks} + S.S_{treatments} + S.S_{error}$$

$$Y = \sum_{i=1}^{4} \sum_{j=1}^{11} Y_{ij} = 1100$$

$Y_1 = 369.32$ $Y_2 = 537.99$

$Y_3 = 162.68$ $Y_4 = 30.01$

$Y_1 = 100,$ $Y_2 = 100,$ $Y_3 = 100,$ $Y_4 = 100,$ $Y_5 = 100,$ $Y_6 = 100$

$Y_7 = 100,$ $Y_8 = 100,$ $Y_9 = 100,$ $Y_{10} = 100,$ $Y_{11} = 100$

$$S.S_{total} = \sum_{i=1}^{b} \sum_{j=1}^{a} Y_{ij}^2 - \frac{Y_{..}^2}{N}$$

$$S.S_{total} = \sum_{i=1}^{4} \sum_{j=1}^{11} Y_{ij}^2 - \frac{Y_{..}^2}{44}$$

$(34)^2+(24.66)^2+(26)^2+(15.34)^2+(38.66)^2+(48)^2+(13.34)^2+(34.66)^2+(52.67)^2+(12.67)^2+$

$(34.66)^2+(44)^2+(21.34)^2+(40.67)^2+(47.33)^2+(12)^2+(30.67)^2+(57.33)^2+(12)^2+(54)^2$

$+(32.67)^2+(13.33)^2+(26)^2+(61.33)^2+(12.67)^2+(32.67)^2+(54)^2+(13.33)^2+(27.33)^2$

$+ (58.67)^2 +(14)^2+(16)^2+(57.33)^2+(24)^2+(2.67)^2 - \frac{1100^2}{44}$

$S.S_{total} = 16{,}720.87$

$$S.S_{blocks} = \sum_{i=1}^{b} \frac{Y_{i.}^2}{a} - \frac{Y_{..}^2}{N}$$

$$S.S_{blocks} = \sum_{j=1}^{11} \frac{Y_{.j}^2}{11} - \frac{Y_{..}^2}{44}$$

$$= \frac{(369.32)^2+(537.99)^2+(162.68)^2+(30.01)^2}{11} - \frac{(1100)^2}{44}$$

$S.S_{blocks}$ =13699.62

$$S.S_{treatments} = \sum_{j=1}^{a} \frac{Y_{.j}^2}{b} - \frac{Y_{..}^2}{N}$$

$$S.S_{treatments} = \sum_{i=1}^{4} \frac{Y_{i.}^2}{4} - \frac{Y_{..}^2}{44}$$

$$= \frac{(100)^2+(100)^2+(100)^2+(100)^2+(100)^2+(100)^2+(100)^2+(100)^2+(100)^2+(100)^2+(100)^2}{4} - \frac{(1100)^2}{44}$$

$S.S_{treatments}$ = 0.00

$S.S_{error}$ = S,S $_{total}$ - $S.S_{blocks}$ - $S.S_{treatments}$

= 16,720.87 - 13699.62 – 0.00

= 3020.38

The generalized results and results applied to the problem of RBD are summarized in Tables 13 and 14 respectively.

Table 13 Generalized results through RBD

Source of variation	Degrees of freedom	Sum of squares	Mean sum of squares(MMS)	F ratio
Between treatments	a-1	S.S $_{treatments}$	S.S $_{treatments}$/(a-1)	MMS $_{treatments}$/MMS $_{error}$
Between blocks	b-1	S.S $_{blocks}$	S.S $_{blocks}$ /b-1	MMS $_{blocks}$/MMS $_{error}$
Error	N-a-b+1	S.S $_{error}$	S.S $_{error}$ /N-a-b+1	
Total	N-1	S,S $_{total}$		

Table 14 Specific results of survey using RBD

Source of variation	Degrees of freedom	Sum of squares	Mean sum of squares(MMS)	F ratio
Between treatments	3	0.00	0/3= 0.00	0/100.68 = 0.00
Between blocks	10	13699.62	13699.62/10=1369.96	1369.96/100.68=13.60
Error	30	3020.68	3020.68/30=100.68	
Total	43	16,720.87		

In Table 14, the value of the calculated F ratio for the treatment is zero, whereas its standard tabulated value of 2.92 at the significance level of 0.05 and degrees of freedom (3, 30). The calculated F ratio for the blocks is 13.60, whereas its standard tabulated value is 2.16 at the significance level of 0.05 and degrees of freedom of (10, 30).

Component- treatment (option)

$F_{calculated}(0) < F_{\alpha=0.05 \text{ and } df=(3,30)}$ i.e. 2.92

Hence, the null hypothesis (H_0) should be accepted.

This means that there is no significant difference in terms.

Component- block (question)

$F_{calculated}(13.60) > F_{\alpha=0.05 \text{ and } df=(10,30)}$ i.e. 2.16

Hence, the null hypothesis (H_0) should be rejected.

This means that there is a significant difference in terms.

4. DISCUSSIONS

Some important results obtained by using pie chart technique are summarized below:

(i) As far as working experience is concerned, approximately 59% of the employees are having experience of more than two years.

(ii) More than eighty six percent employees feel that the working conditions of the organisation are satisfactory.

(iii) Approximately 78% of employees feel that different departments in the organization have good cooperation with each other.

(iv) Eighty eight percent of employees feel that relationship with colleagues increases productivity and satisfaction.

(v) More than 86% employees agreed that organizations provide adequate and fair compensation for their services/work.

(vi) Eighty seven percent of employees feel that the organization provide sufficient retirement, benefits; like pension, provident fund etc.

(vii) More than 86% employees feel that safety of worker is a higher priority for the organization.

(viii) About 77% of the employees of these industries feel satisfaction with their jobs.

(ix) Seventy three percent of employees receive regular and helpful feedback on their performance.

5. CONCLUSIONS

Quality of life is the degree of well-being felt by an individual or group of people. Unlike standard of living, quality of life is not a tangible concept, and therefore cannot be measured directly. Furthermore, quality of life consists of two components. The first is a physical aspect which includes such things as health, diet, as well as protection against pain and disease. The second component is psychological in nature. This aspect includes such things as stress, worry, pleasure and other positive or negative emotional states. Although the employees who said that they are not satisfied with the working conditions of the organization are less but organization cannot ignore them. The organization should try to satisfy those employees who are not satisfied with their job. Organization should look after issues raised by employees who are not satisfied with the fringe benefits provided by organization. Organization should look after the issues raised by 12-15% of employees who disagree that training programs oriented by the organization are really helpful in increasing productivity and job satisfaction. Some of the employees are not satisfied with their jobs and organization should try to find out the reasons for dissatisfaction and

efforts should be made to resolve the reasons of their dissatisfaction. The limitation of the study may be that some respondent may not reveal true information in the survey.

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