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Flow among Scientists: A Job Demands Resources Perspective

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ABSTRACT

The study was conducted to investigate the relationship of flow at work of scientists with their job demands, job resources and personal resources. 64 scientists comprised the sample. Personal data sheet, work-related flow inventory, general self-efficacy scale and Copenhagen psychosocial questionnaire (second version) were the instruments used in the study. Descriptive statistics, t-test, ANOVA, correlation analysis and hierarchical regression were the statistical techniques used. The results of the study suggested that scientists of various age-groups and length of service did not differ from each other on job demands, job resources, personal resources and flow at work. It was also found that flow at work was significantly positively related to job resources and personal resources but not significantly related to job demands. Job resources and personal resources were found to be significant positive predictors of flow at work whereas job demands were not found to have a significant impact on flow at work.

Keywords : Flow at work; Job demands; Job resources; Personal resources

ABBREVIATIONS

FaW	Flow at work
JD	Job demands
JR	Job resources
PR	Personal resources
Abs	Absorption
Enj	Enjoyment
IM	Intrinsic motivation
QD	Quantitative demand
CD	Cognitive demand
PD	Pace demand
ED	Emotional demand
IaT	Influence at work
VaW	Variation at work
MW	Meaningfulness of work
RC	Role clarity
PfD	Possibilities for development
SuS	Supervisor support
SoSo	Social support

1. INTRODUCTION

Flow is a concept of positive psychology and has been considered a predictor of happiness and satisfaction in humans[1]. It is a state in which people are deeply involved in an activity, enjoy it thoroughly and feel motivated while doing it. Cziksentmihalyi had claimed that people feel flow more during work than in free time. Experiencing flow at work makes employees happy and motivated in task which results in job engagement, high performance and job satisfaction[2]. The applicability of flow concept is very useful for the growth and enhancement of organisation in general and employees in particular as it has positive influence on organisational citizenship behaviour of employees[3]. Present study investigated the FaW in scientists and its relation with their job characteristics by considering Job Demand-Resources theory as its theoretical base. Flow at work has been defined as "a short time peak experience that is characterised by absorption, enjoyment and intrinsic motivation"[4]. Absorption is defined as the state of total concentration during which a person immersed in work forgets everything around him[5]. Enjoyment is defined as a state where a person enjoys the activity or work at hand and makes positive judgement regarding his work life[6]. Intrinsic motivation refers to performing a certain work-related activity for experiencing the inherent pleasure and satisfaction in the activity[6,7]. Positive environment fosters intrinsic motivation. The employees having positive work conditions and resources are intrinsically motivated to perform their work happily and want to continue in it.

Job demand resource theory proposes that "all working environments or job characteristics can be modelled using two different categories, namely job demands and job resources. Job demands are related with exhaustion and job resources are associated with job engagement"[8]. Job demands are defined as "the physical, psychological, social, or organisational aspects of the job that needs a physical and/or psychological effort and are related with certain physiological and/or psychological costs"[9] and Job Resources are defined as "the physical, psychological, social, or organisational aspects of the job that are functional in achieving work goals, to reduce job demands and its associated physiological and psychological costs or stimulate personal growth, learning, and development"[10]. In extension to the JDR model, personal resources also play a significant role in

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FaW. Personal resources are the aspects of self that are related with resilience and belief of person in his ability to control the environment[11]. Personal resources includes self efficacy, resilience, optimism and competency[12]. Personal resources like self efficacy and optimism are assumed to influence job resources and work engagement and in return job resources influence the personal resources[12]. Personal resources like self efficacy and job competency have positive effects on work engagement, well being and positive emotions of employee[13]. In the present study, self-efficacy has been regarded as one of the personal resources.

Many studies on flow at work have found the positive relation of job resources with all the three components of flow. Job resources like autonomy, feedback and social support were found to be positively related with flow experience among music teachers[14]. Another Study on FaW report the negative relationship between hindrance demands and flow experience which leads to burnout or exhaustion in employees. The job resources and FaW have spiral relationship as they have positive effect on flow experience and flow experience also has positive influence on availability of resources[15]. Studies related to health care workers suggests that job resources are the main antecedents of the flow experience. Resources positively influence the dimensions of FaW, particularly work enjoyment whereas Job demands positively influence absorption and negatively influence the enjoyment and intrinsic motivation[16]. In educational institute, Job resources for teachers like autonomy and variety of work has positive effect on FaW and Job demands like workload doesn't show any significant relation with FaW[17]. Job resources and personal resources like self efficacy and competency are positively related and leads to positive emotions in nurses in emotionally challenging environment[13].

Based on the job demand resource theory as theoretical background and empirical findings related to study variables, present study hypothesised that job demands will be negatively related to FaW whereas job resources and personal resources will be positively related to flow at workplace. The study considered following four job demands and seven resources which were operationally defined as under:

Quantitative Demands: These demands are related to the amount of work to be done by the employee. People meet these demands by working for longer duration.

Pace Demands: These demands require working at high speed.

Cognitive Demands: These demands deal with the mental pressure and decision-making aspects of jobs.

Emotional Demands: These include dealing with emotional clients or colleagues.

Social Support: The support and relationship with superior and colleagues determine the social support of employee at workplace.

Role Clarity: The degree to which employees experience that they know their roles and responsibilities

Possibility for Development: refers to the opportunities provided by organisation for the career growth and development of employees.

Influence: It is the extent to which employees had influence on the amount of work and his/her collegues.

Meaningfulness of Work: The work is meaningful for the employee if it has significance and importance for the organisation and related to employees area of interest.

Variation: refers to the variety in the job tasks and activities at workplace.

Self Efficacy: It refers to one's belief in one's ability to succeed in general or accomplish a task. [12]

1.2 RATIONALE OF THE STUDY

The applicability of concept of flow is very useful for the growth and enhancement of organisation in general and employees in particular. Experiencing flow at work makes employees happy and motivated in task which results in job engagement and high performance at the workplace and reduction in burnout. Present study focuses on three dimensions of flow and its relation with job demands and resources available at organisational as well as personal level. It is assumed that knowing the interplay of job demands and resources on flow at work will provide the relevant and useful base to redesign jobs. This in turn will ensure that positive and relevant resources will be available to buffer the effects of job demands and foster the flow experience among employees during work.

2. METHODOLOGY

2.1 Objectives of Study

(i) To examine job demands, job resources, personal resources and flow experience at workplace among scientists of different age groups and lengths of service.
(ii) To investigate the relationship between job demands, job resources, personal resources and flow experience at workplace.
(iii) To find out the predictors of flow experience at workplace of scientists.

2.2 Hypotheses

H1: There will be significant differences in job demand, job resources, personal resources and flow at work experience among scientists of different age groups and lengths of service.

H2: There will be significant relationship between study variables: job demands, job resources, personal resources and flow at work.

H3: Job demands, job resources and personal resources will significantly predict flow experience at workplace of scientists.

2.3 Sample

The sample comprised 64 scientists of a reputed organisation based in Delhi (Males=59, Female=5) ranging in age from 26 years to 55 years. 53% of participants were B. Tech whereas 42. 2% of participants were M. Tech. Only 4. 7% of the sample had done PhD.

2.4 Instruments

Personal Information Sheet: This instrument measured six demographic variables namely, age, gender, educational qualification, department and length of service.

Work Related Flow(WOLF) Scale Bakker[6] : This questionnaire measures flow at work retrospectively. It consists of 13-items followed by 7 point Likert scale (1 = never and 7 = always). The scale comprises three dimensions: absorption (4 items, Cronbach alpha is 0. 80), enjoyment (4 items, value of cronbach alpha is 0. 80) and intrinsic motivation (5 items, Cronbach alpha 0. 75).

Generalised Self-Efficacy Scale: Schwarzer & Jerusalem[18] : measures self-efficacy which is the personal resource in the present study. It contains 10 items with Cronbach alpha between 0. 76 and 0. 9.

Copenhagen Psychosocial Questionnaire Second Version (COPSOQ II): Pejtersen, & Kristensen[19] : Job demands and Job resources were assessed using scales selected from COPSOQ II. The scale measures quantitative demand (4 items, Cronbach alpha 0. 82), Pace (3 items, Cronbach alpha 0. 84), Emotional Demand (4 items, cronbach alpha 0. 87), cognitive demand(4 items, Cronbach alpha 0. 74), influence at work (4 items, Cronbach alpha 0. 73), Variation at work (2 items, Cronbach alpha 0. 50), role clarity (3 items, Cronbach alpha 0. 78), social support (items 3, Cronbach alpha 0. 70), supervisor support (3 items, Cronbach alpha 0. 79), possibilities for development (4 items, Cronbach alpha 0. 77), meaning of work(3 items, Cronbach alpha 0. 74).

2.5 Procedure

Web based questionnaire were prepared and mailed to 100 scientists. Two weeks time was given to the participants for the submission of filled in form. Participants were asked to inform through mail in case of any query. Brief introduction regarding research and ethical guidelines were provided to the participants. Consent and privacy of the participants were ensured. The response rate was 64%. Responses were checked for any missing data and then data analysis was done.

3. DATA ANALYSIS AND RESULTS

The data for this research were analysed using Statistical Package for Social Sciences (SPSS 22. 0).

3.1 t- test

t- test was computed to examine the difference of study variables i. e. job demands, job resources, personal resources, flow at work and its three dimensions (absorption, enjoyment and intrinsic motivation) among scientists of different lengths of service. Group1 (scientists with 6 to 15 years of service) and Group 2 (scientists with 16 to 20 years of services) were compared and the t-values (Table 1) for all the variables were not significant which suggest that there is no significant difference between group 1 and group 2 on job demands, job resources, personal resources, flow and its three dimensions. The results suggest that the resources like influence on work, variety of work, social support and clarity about their role were almost similar for both the group of scientists. The perception of scientists towards possibilities for development and whether their work is meaningful does not differ significantly with respect to their years of service. Results also show that personal resources does not differ significantly with the years of experience of scientists. The job demands and experience of absorption, enjoyment and intrinsic motivation does not differ with the length of service of scientists.

Table 1. Mean, SD and t-ratio of FaW, JD, JR, PR between scientists of different lengths of service

Variable	Dimension	Length of service	Mean	SD	t-ratio	P-value
FaW	AbS	6-15 years	20. 12	4. 51	0. 38^{ns}	0. 70
		16-20 years	19. 70	4. 11		
	EnJ	6-15 years	22. 00	4. 80	-1. 18^{ns}	0. 24
		16-20 years	23. 29	3. 90		
	IM	6-15 years	23. 48	5. 17	0. 26^{ns}	0. 97
		16-20 years	23. 45	5. 07		
JD	QD	6-15 years	10. 93	2. 49	-0. 99^{ns}	0. 32
		16-20 years	11. 54	2. 41		
	CD	6-15 years	12. 84	4. 47	0. 074^{ns}	0. 94
		16- 20 years	12. 77	3. 49		
	ED	6-15 years	11. 09	3. 66	0. 33^{ns}	0. 74
		16-20 years	10. 83	2. 28		
	PD	6-15 years	9. 39	2. 68	0. 27^{ns}	0. 78
		16- 20 years	9. 22	2. 27		
	IaT	6-15 years	11. 87	3. 15	0. 18^{ns}	0. 85
		16-20 years	11. 74	2. 74		
	VaW	6-15 years	5. 42	1. 37	-0. 60^{ns}	0. 54
		16-20 years	5. 61	1. 11		
JR	SuS	6-15 years	9. 18	3. 29	-0. 88^{ns}	0. 37
		16-20 years	9. 87	2. 91		
	SoSo	6-15 years	9. 51	2. 65	-0. 46^{ns}	0. 64
		16-20 years	9. 83	2. 93		
	RC	6-15 years	11. 21	3. 27	0. 63^{ns}	0. 52
		16-20 years	10. 67	3. 44		
	PfD	6-15 years	15. 12	4. 01	1. 04^{ns}	0. 30
		16-20 years	13. 90	5. 01		
	MW	6-15 years	10. 96	3. 57	-0. 03^{ns}	0. 97
		16-20 years	11. 00	3. 94		
PR		6-15 years	31. 50	5. 48	-0. 11^{ns}	0. 91
		16- 20 years	31. 60	3. 98		

3.2 ANOVA

ANOVA was computed for examining the difference of study variables based on age. Three groups of age categories (26-35 years, 36- 45 and 46-55 years) were analysed and the f-values (Table 2) were not found to be significant. The results for job demands (f=0. 51, p > 0. 05), job resources (f= 0. 12, p > 0. 05) , FaW (f=0. 14, p > 0. 05), absorption (F= 0. 21, p

Table 2. ANOVA Summary of FaW, JD, JR, AND PR among the scientists in reference to Demographic profile; age category: group1 (26-35 years), group 2 (36-45years) and group 3 (46-55 years)

		Sum of squares	df	Mean square	F	Sig
Absorption	Between Groups	8. 214	2	4. 107	0. 217^{ns}	0. 80
				18. 957		
	Within Groups	1156. 40	61			
	Total	1164. 61	63			
Enjoyment	Between Groups	14. 040	2	7. 020	0. 355^{ns}	0. 70
				19. 786		
	Within Groups	1206. 96	61			
	Total	1221. 00	63			
Intrinsic	Between Groups	15. 942	2	7. 971	0. 301^{ns}	0. 74
	Groups	26. 459				
	Within Groups	1614. 00	61			
	Total	1629. 94	63			
Flow Work	Between Groups	38. 024	2	19. 012	0. 149^{ns}	0. 86
				127. 229		
	Within Groups	7760. 96	61			
	Total	7798. 98	63			
Job-Demand	Between Groups	54. 914	2	27. 457	0. 517^{ns}	0. 59
				53. 134		
	Within Groups	3241. 20	61			
	Total	3296. 11	63			
Job Resources	Between Groups	61. 914	2	30. 729	0. 125^{ns}	0. 88
				246. 402		
	Within Groups	15030. 5	61			
	Total	15092. 0	63			
Personal Resources	Between Groups	35. 589	2	17. 794	0. 773^{ns}	0. 46
				23. 011		
	Within Groups	1403. 65	61			
	Total	1439. 23	63			

> 0. 05), enjoyment (f=0. 35, p > 0. 05), intrinsic motivation (f= 0. 30, p > 0. 05) and personal resources (f=0. 77, p > 0. 05) suggest that there is no significant difference in job demands, job resources, personal resources, flow at work and its three dimensions among scientists of different age category.

Thus, the first hypothesis (H1) got rejected which assumed that there is significant difference of all variables among scientists of different age groups and length of service.

3.3 Pearson Coefficient of Correlation

It was computed to predict the correlation between the study variables i. e. job demands, job resources, personal resources, flow at work and its three dimensions. The result (Table 3) suggests that there is a significant positive correlation between flow at work and its three dimensions i. e. absorption (0. 79), enjoyment (0. 85), and intrinsic motivation (0. 77) at 0. 01 level of significance.

Job resources were significantly positively correlated with job demands (0. 48), FaW(0. 36), enjoyment(0. 37)at 0. 01 level of significance and absorption(0. 25), and intrinsic motivation(0. 26) at 0. 05 level of significance. No correlation was found between personal resources and job resources.

Job demands had no significant correlation with flow, absorption, enjoyment, intrinsic motivation and personal resources. Personal resources were positively correlated with flow (0. 48), absorption(0. 28), enjoyment(0. 48) and intrinsic motivation(0. 39). Thus, the second hypothesis was partly accepted.

3.4 REGRESSION

To examine the third hypothesis, hierarchal regression was computed assuming FaW as dependent variable and job demands, job resources and personal resources as independent variables. Age and experience were the controlled variables. The regression was computed for three dimensions of FaW. The results suggest that job resources and personal resources were significant positive predictors of FaW, absorption, intrinsic motivation and enjoyment. Job resources explained 15% variance whereas personal resources explained 20% variance towards criterion factor, i. e. flow at work. For absorption (Table 4), job resources explained 6% variance and personal resources explained 7% variance. Job resources explained 14% and personal resources explained 18% variance towards criterion factor enjoyment (Table 5). Job resources explained 11% and personal resources explained 14% variance towards criterion factor intrinsic motivation (Table 6). The predictors job demands, job resources and personal resources independently explained regression coefficient towards flow at work. The regression coefficient 'β' explained how strong each predictor influences towards the criterion factor flow at work. Through regression model (Table 7) its clearly observed that JD (β = -0. 10, t= -0. 90, p= 0. 36) are not significantly predicted in flow at work. Job Resources (β = 0. 43, t= 3. 67, p = 0. 00) and Personal Resources (β = 0. 46, t= 4. 37, p = 0. 00) were found to positively predict flow at work.

4. DISCUSSION

The results of the present study indicates that demographic factors like age and length of service do not have any significant

Table 3. Correlation Matrix between the study dimensions variables; FaW, JD, JR, PR, Absorption, Enjoyment and Intrinsic Motivation

	JD	JR	PR	AbS	EnJ	IM	FaW
JD	1						
JR	0. 48**	1					
PR	-0. 10ns	-0. 11ns	1				
AbS	0. 08ns	0. 25*	0. 28*	1			
EnJ	0. 10ns	0. 37**	0. 48**	0. 63**	1		
IM	-0. 05ns	0. 26*	0. 39**	0. 38**	0. 47**	1	
FaW	0. 04ns	0. 36**	0. 48**	0. 79**	0. 85**	0. 77**	1

Table 4. Regression model summary for outcome factor absorption

Model	R^2	Adjusted R^2	ΔR^2 Change	F Change	P-Value
Age, Experience	0. 01	-0. 02	0. 01	0. 35	0. 70
JD	0. 01	-0. 03	0. 00	0. 48	0. 75
JR	0. 08	0. 01	0. 06	3. 97	0. 02
PR	0. 15	0. 08	0. 07	5. 03	0. 05

Table 5. Regression model summary for outcome factor enjoyment

Model	R	R^2	Adjusted R^2	ΔR^2	F Change	P-Value
Age, Experience	0. 26	0. 07	0. 04	0. 07	2. 35	0. 10
JD	0. 30	0. 09	0. 04	0. 02	1. 30	0. 12
JR	0. 48	0. 23	0. 18	0. 14	10. 91	0. 00
PR	0. 64	0. 41	0. 36	0. 18	18. 45	0. 00

Table 6. Regression model summary for outcome factor intrinsic motivation

Model	R	R^2	Adjusted R^2	ΔR^2	F Change	P-Value
Age, Experience	0. 09	0. 00	-0. 02	0. 00	0. 25	0. 77
JD	0. 10	0. 01	-0. 03	0. 00	0. 17	0. 88
JR	0. 35	0. 12	0. 06	0. 11	7. 49	0. 05
PR	0. 51	0. 26	0. 20	0. 14	11. 22	0. 00

effect on the study variables. The workload (quantitative and pace demand) and demands related to mental pressure remained almost similar for scientists irrespective of their length of service. The job resources like role clarity, influence on work, meaningfulness of work, social support, variation in work and possibilities for development were also found

Table 7. Regression coefficient model for outcome factor FaW from the predictors

Model	Unstandardised Coefficients		Standardised Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	10. 60	14. 78		0. 71	0. 47
Age	0. 07	0. 37	0. 03	0. 18	0. 85
Experience	0. 26	0. 47	0. 09	0. 55	0. 58
JD	-0. 16	0. 18	-0. 10	-0. 90	0. 36
JR	0. 30	0. 08	0. 43	3. 67	0. 00
PR	1. 07	0. 24	0. 46	4. 37	0. 00

almost similar for the scientists of all age groups and length of service. This may be due to similar job requirements and job resources available at workplace as the scientists worked in a team to execute the project where everyone have their assigned roles.

Present study found the significant positive correlation of job resources and personal resources with FaW, absorption, enjoyment and intrinsic motivation. The results also suggest that job resources and personal resources are positive predictors of FaW. These are in line with job demand and resource theory which suggest positive correlation of job resources and personal resources with FaW and job resources as predictors of FaW. It is also supported with empirical findings as Salanova[15] suggested that personal resources and job resources like social support and clear work goals facilitate FaW. Bakker[14] also claimed the significant positive relationship of job resources and personal resources with three dimensions of FaW. The results of correlation suggests that scientists having more amount of job resources like influence at work, role clarity, variety in work are likely to enjoy their work more and feel internally motivated towards their work. Employees having variety in work which requires different skills to execute, role clarity i. e. knowledge about their responsibility and work and have influence on work will enjoys their work and feel motivated towards doing it.

The positive correlation between personal resources and FaW suggests that the person's belief about his/her capabilities to accomplish a task is positively related with the experience of flow at work. The person who believes that he is capable to complete the task will feel motivated to participate, get absorbed in the task and enjoy it.

Job demands do not have significant correlation with FaW and its three dimensions. In the literature, studies report mixed findings about the relationship of job demands and flow at work. Habe & Tement[17], examined the effect of job demands and job resources on three dimension flow at work in a sample of higher educators and found that Job demands like workload doesn't show any significant relation with outcome. Whereas Bakker[14] found positive correlation between workload and absorption, negative correlation between work load and enjoyment and no relation with intrinsic motivation. Nelson[20] found no correlation between cognitive demands and flow at work.

The findings of the study suggest that availability of high amount of job resources leads to experience of flow at workplace. The person having role clarity and influence on their work conditions will be motivated towards his work and will enjoy it. This is in line with Cziksentmihalyi's[21] claim that a person having clear goals, clarity of work and full control over the situation will feel flow. Also, the variety of work could be considered as the opportunities to utilise the skills of a person which may lead to motivation and enjoyment. The outcome of the study suggests that to foster FaW among employees of organisation, one should focus on availability of Job Resources and should aim at enhancing Personal Resources.

5. CONCLUSIONS

The present study investigates the flow at work and its relation with JD, JR and PR among scientists. The findings of the study suggest that demographic factors like length of service and age of sample have no effect on the study variable. It was also observed that job resources and personal resources are positively correlated with FaW, absorption, enjoyment and intrinsic motivation. They are found to be the positive predictors towards FaW. The increase in the availability of job resources and high self-efficacy will lead to more absorption in work, more work enjoyment and high intrinsic motivation, thus enhancing the experience of flow at work. The limitation of the study is its small sample size having less representation of females and scientists with lesser years of service.

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In the current study, she was involved in planning method of the study.