

A Study on Effect of Job Design and Ergonomics on Employee Performance in Indian Automotive Sector

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ABSTRACT

Growing competition and increasing need of adaptability often requires organizations to switch and convert themselves according to the demand of circumstances. In this process of reformation, employee performance gets affected by many aspects. The aim of this paper is to analyze and test the effect of Job Design and Ergonomics on Employee Performance. This paper also tests the relatedness of Job Design and Ergonomics. The research was conducted in 32 organizations, having managers and supervisors at about 64 kinds of designations handling teams of workers in the manufacturing units, of the automotive sector of India, covering all major fields of operation of OEM (Original Equipment Manufacturers) companies. The purpose of choosing this sample was to highlight the importance of ergonomics in these organizations and to show how employee performance gets affected by their physical work environment and the understanding of their job to be performed. This is a quantitative study based data was analysis using CFA, correlation and multivariate regression analysis. The results manifested that CFA model and regression analysis described a significant impact of Job Design and Ergonomics on Employee Performance. The correlation outcomes revealed that Job Design and Ergonomics were well connected having p value of 0.00, $P < 0.005$. The findings suggested, while focusing on improving the employee upshot, it becomes necessary for organisations to include Ergonomics in Job Design as a Design for Safety.

Keywords: Job Design, Ergonomics, Employee Performance, Automotive Sector

Introduction

Job Design is a combination of the content and method of work which is adopted in the execution of a task or job (Belias D, 2013). Employee's job

involvement and outcome will increase if the work style is aligned with the worker psychological needs and perceptions towards the organisation (Mujataba T et.al, 2013). An effective job style will increase involvement, satisfaction and pleasure from activities and tasks performed in all respects like psychological features, emotional and physical energies to realize goals (Ababneh O.M, 2015). Generally inputs areas are received within the sort of matter, energy and knowledge. Human demand area unit system demand will be a case for instrumentality that is usable and safe, tasks that area unit is compatible with and where the people's expectations associated with jobs to be performed are fulfilled (Atnafu D, 2018). Employees are a prime element of the organisation (Gabčanová I, 2011). Employees project a major zone of quality of production that depends on the potential employees hold individually. The orientation of an organisation on the human element turns out to be one of the major tasks of strategic management. Human elements, be in any form like: toil, intellect, capital, human facet, talent or any higher term, the importance remains the same in strategic accomplishment and competitive advantage. Due to this growing importance given to employees, it is proven that employee mould the organisation's score behaviour and human development factors affect the organisational performance as a whole (Masa'deh R et.al, 2019). The basic relation between job design and ergonomics is based on types of plans a job design should include. These are designs for mental capacity, efficiency, motivation and safety. Under the design for safety, there comes ergonomics which specifies the workplace feasibility to produce best for the organization. Employee's performance, being the core is often affected by many aspects, of which, understanding of job and availability of physical facilities are covered in this paper.

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Literature Review

Employee Performance

Organisational performance is a sign that the company is efficiently achieving individual goals. One of the essential elements of an organisation, assessable in nature, is employee performance which is measured through outcome or productivity. This evaluation may show results of deviation from set standards due to many reasons that can be job related, employee related or organisation related (Muda I, 2014). Firms now have realised that they depend majorly on their employees which are human assets of the organisation. Hence, focus on exploitation of human capital particularly for strategic success has become prominent in the present time of competitive pressures (Anastasios D, 2018). The organisations very well know why employees are important and hence it is the managerial concern and responsibility to work towards their development. This can be done through defining the reasons of deviation of employee performance and working towards elimination of such causes (Ioana R, 2012).

Job Design

Job Design is integrated with duty characteristics, effective management of tasks to be performed, clear relations and range of tasks, power and responsibility balance and many other dimensions (Cullinane S et.al, 2017). Job Design is a function of arrangement of tasks, responsibilities and duties present in an organisational framework. Job Design is a way of organizing content, purpose, pattern and all relations with the job to be performed. Job Design can be conceptualised through many perspectives. Clarity helps seeking direction towards thorough execution of performance demanded by the organisation (Fathima A et.al, 2014). The relationship between task selection and counterproductive work behaviour (CWB) and the relation between modification in task selection and alter CWB is well established and important for organisations to gain expertise in variety of operations and tasks in the long run (Staafflebach B, 2017). Identification with proper assignment of tasks results in a structural psychology within the mind of employees which makes them feel

being identified in the organisation. This results in a well patterned behaviour which is the main requirement of organisations (Darja K et.al, 2015). Ambiguous descriptions, wide set of unmanageable tasks and unclear objectives often result in dissatisfactory performance and chaos among employees required to fulfil their duties (Raju K, 2017). Winning during this competitive era of business lies within the ability of a producing firm to grasp what, how, when and where with the way abundant to provide success (Ugwuegbu C et.al, 2018). Supervision is path towards effective leadership which always contribute towards worker well-being, satisfaction in job and commitment towards the organisation (Matheiu C et al., 2015). Job style has to comprise of certain techniques of expansion like Job Rotation, Job Enlargement and Job Enrichment (Belias D, 2013). Overall employee improvement is a step towards development of the organisation and opening doors of further success and stability in the competitive environment. Continuous improvement helps in creation of enhancement methods to deliver innovations in particular manner (Hanaysha J, 2016). Increased employee productivity and well-being with high level of organisational success and profitability are the most common benefits experienced through flexibility tactics used to reduce workload and make employee work freely in the organisation (Yazdanifard R et.al, 2014).

Ergonomics

The idea of ergonomics is to provide efficient and safe working environment in order to maximise well-being and thus increase productivity. The conceptualization of ergonomics is based on application to the extent of a machine adaptation with the operator, providing him with effective handling to avoid his effort going waste for the completion of job (Vieira L et.al, 2015). Ergonomics has some branches like micro-ergonomics, macro-ergonomics and psychological feature, environmental and cultural engineering science (Naeini S et.al, 2018). Most firms, particularly the big corporation area units, are concerned in applied science designing and implementation to scale back worker rate of attrition and conjointly to boost performance by

making changes in the ergonomics conditions of the organisation (Yoshifumi H et.al, 2017). Industrial space engineering, these days, play a crucial role in communications among the geographic point, team work, table policies, layout, lighting, noise management and lots of alternative aspects of machinery and operators atmosphere (TrigosF et.al, 2015). Organizing the conditions of labour execution is additionally a task that constitutes a vital facet for a firm's productivity, therefore, touching their viability, productivity and results. The explanations of such impact area unit factors like heating, lighting and ventilation (Lopez-Garcia J.R et.al, 2019). An article in Central Institute for Labour Protection (CIOP) on engineering science aspects of non-public protecting instrumentality (PPE) style and use researched on aspects associated with, among alternative things, a comparison of body strain and time period limitation for users carrying air-tight and drill suits (Lezak K et.al, 2015). Researchers evaluated the effectiveness of a no-cost-to-workers, highly-rated slip-resistant shoe program in preventing staff compensation injury claims caused by slippery on wet or greasy floors among food services workers. All kinds of preventive facilities ought to be obtainable at the work place to avoid accidents and unwanted occurrences so as to extend productivity workmen (NIOSH, 2019). Automation guarantees bigger potency, lower work and fewer human errors with clear advantages of better productivity (Seppelt B.D et.al, 2012). Researches highlight the importance of employee well-being in the organisational environment by taking measures to maintain a safe and sound domain of working. Such measures result in positive impacts of integration that reduce injuries and avoid unwanted circumstances (Yazdani A et.al et.al, 2018). Store management comprises of many aspects which include supply chain management, distribution management and warehouse management. For the purpose of accomplishing such tasks, the environment has to be employee-friendly for attaining effective and efficient results (Fernando J, 2016). Size of the produce and its management should be efficient for the objective of maintain quality and smoothness of operations. This is possible with convenience of machinery in use and the machine-operator adaptability (Daria Battini

et.al, 2013). Fatigue is taken as the final result of integration of various factors like working time, facilities available, and load of work. The full understanding of present potential, resources, and environment is required for effective and efficient management of workplace fatigue (Yazdi Z et.al, 2015).

Research Methodolgy

Research Objectives

- 1) To identify the degree of impact of Job Design on Employee Performance
- 2) To test the effect of Ergonomics on Employee Performance
- 3) To draw out conclusion on connectedness of Ergonomics and Job Design

Research Hypothesis

- H1:** There is no significant impact of Job Design on Employee Performance
- H2:** There is no significant impact of Ergonomics on Employee Performance
- H3:** There is no significant relation between Job Design and Ergonomics

Sampling

A list of 32 companies was selected for the purpose of data collection. These companies were of tier 2 category with high production targets and low profitability supplying manufactured spare parts to other automotive companies. Managers and supervisors of 64 categories of designations responded to a 5 point Likert scale questionnaire used for sampling. As this study is based on present description of job design and ergonomics and its impact on employee performance, it has a descriptive research design. The sample of a total of 200 responses was shortlisted after data cleaning process was executed. Demographic details of responses collected are shown below:

Table 1: Demographic details

Gender	Male	95%
	Female	5%
Experience	Less than 1 year	4.50%
	1 to 3 years	25.50%
	3 to 5 years	33.50%
	More than 5 years	36.50%
Age	Less than 30 years	21.00%
	30 to 40 years	48.50%
	40 to 50 years	27.50%
	Above 50 years	3.00%

Results and Analysis

Factor Suitability Test

Based on critical and comprehensive review a total of

9 factors were selected under each aspect, Job Design and Ergonomics, respectively. The KMO and Barlett's test is used to identify the level of significance of questions used for the study. The test results are as follows:

Table 2: KMO and Barlett's test for job design

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.893
Bartlett's Test of Sphericity	Approx. Chi-Square	818.288
	df	21
	Sig.	.000

Table 3: KMO and Barlett's test for ergonomics

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.91
Bartlett's Test of Sphericity	Approx. Chi-Square	1039.126
	df	28
	Sig.	0

It was observed that KMO measure is 0.893 and 0.910 for job design and ergonomics, respectively. Also, chi-square tests were also found to be significant in all three variables (chi-sq: 818.288, p=0.000 and chi-sq=1039.126, p=0.000). This ensures that the adequacy of questions used and factors selected is acceptable.

Confirmatory Factor Analysis

Based on all factors selected for study, AMOS software was used to create a CFA model resulted in factor loading as shown below:

Table 4: Factor loadings of CFA model

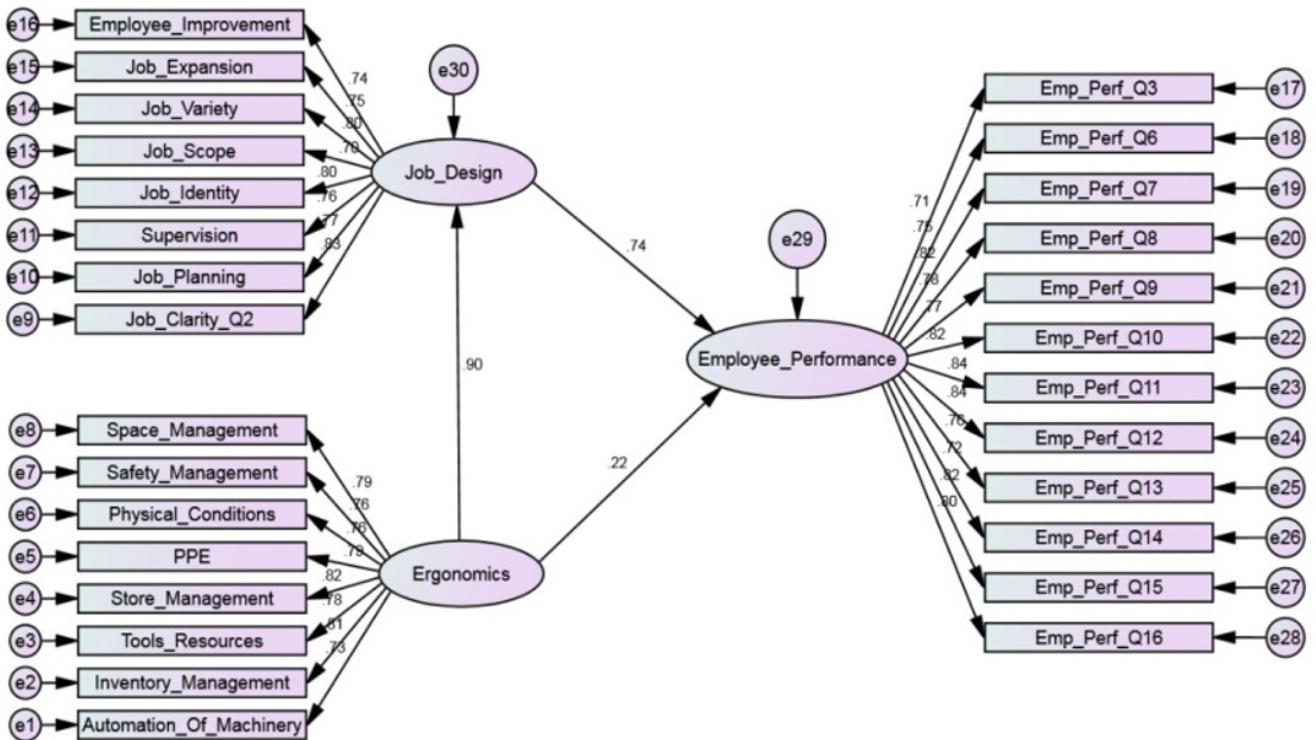
	Job clarity Q1	0.65
	Job clarity Q2	0.83
Job design	Job variety	0.8
	Job identity	0.8
	Job scope	0.79
	Job planning	0.77

	Supervision	0.76
	Job expansion	0.75
	Employee improvement	0.74
	Job flexibility Q1	0.62
	Job flexibility Q2	0.59
Ergonomics	Space management	0.79
	Physical conditions	0.76
	PPE	0.79
	Tools and resources	0.78
	Automation of machinery	0.73
	Safety management	0.76
	Store management	0.82
	Fatigue level management	0.45
	Inventory management	0.81

It was observed that certain factors like Job flexibility Q1, Job flexibility Q2, Job clarity Q1 and Fatigue management were a bit problematic which

may result in facing difficulty in interpretation. Hence, these factors were eliminated from the study and a new model was created, as shown below:

Figure1: CFA model



The model fit was interpreted on the criteria of goodness of fit and construct validity as shown below:

Table 5: Goodness of fit

Metric	Value	Base Value	Acceptance
CFI (Comparative Fit Index)	0.90	≥ 0.9	Acceptable
RMSEA (Root Mean Square of Approximation)	0.05	≤ 0.05	Acceptable
PNFI (Parsimonious Normal Fit Index)	0.75	Around 0.855 (PRATIO)	Acceptable
PCFI (Parsimonious Comparative Fit Index)	0.76	Around 0.855 (PRATIO)	Acceptable
NFI (Normal Fit Index)	0.83	0 to 1	Acceptable

Table 6: Construct validit

Metric	Value	Base Value	Acceptance
Factor loading	Above 0.75	Above 0.75	Acceptable
Average Variance Extracted	0.59 (Job design)	≥ 0.5	Acceptable
	0.60 (Ergonomics)		
	0.61 (Employee performance)		

The measures of model fit and construct validity show that the default CFA model fulfils all criteria of goodness and hence can be taken as an acceptable model for the research study conducted. It can be concluded that Job Design and Ergonomics have a direct and consequential impact Employee Performance.

Correlation Analysis

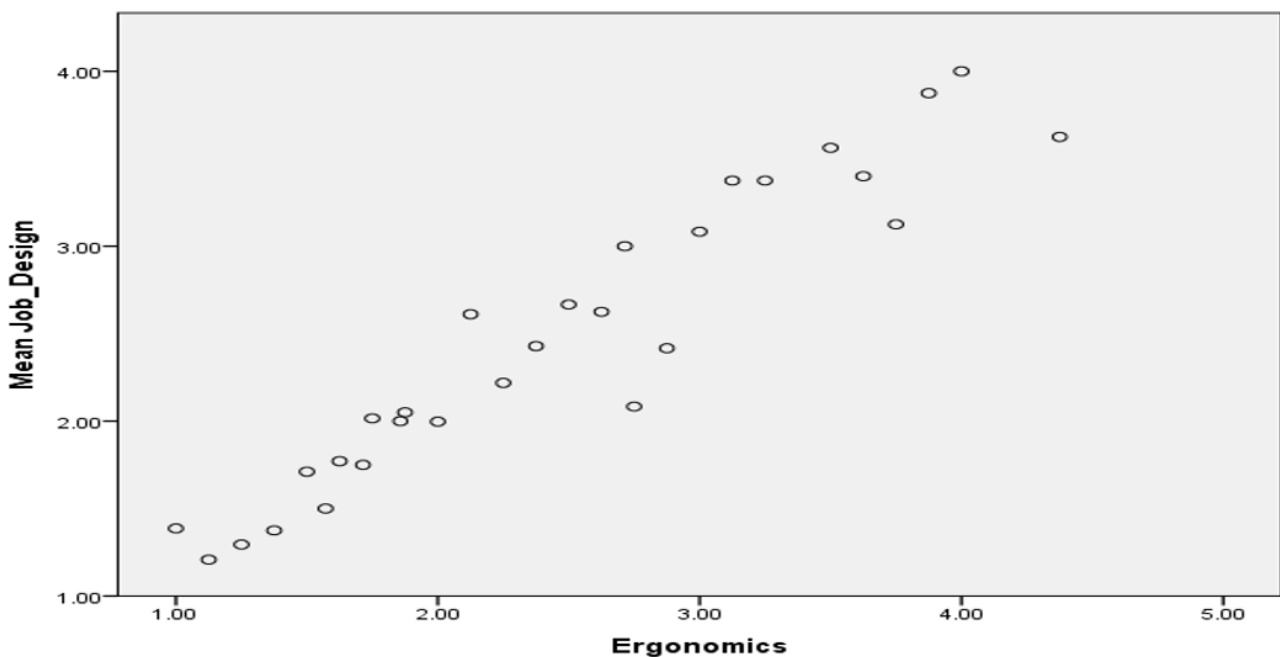
Correlation analysis can be considered as a statistical approach used to identify and assess the strength of relationship that exists between two quantitative variables. (Franzese, 2019).

Table 7: Correlation

		Job Design	Ergonomics
Job Design	Pearson Correlation	1	.831**
	Sig. (2-tailed)		0
	N	200	200
Ergonomics	Pearson Correlation	.831**	1
	Sig. (2-tailed)	0	
	N	200	200

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

Figure 2: Correlation chart



In Table 7, it was observed that correlation estimates where $p < 0.005$, i.e. 0.000. This indicates that there is a significant positive correlation between Job Design

and Ergonomics. Hence, there is enough evidence to reject the null hypothesis stating there is no relation between Job Design and Ergonomics. Hence, it can

be said that Ergonomics and Job Design go hand-in-hand. This was also verified through the correlation chart showing clear relation between closely related points of Job Design and Ergonomics as shown in Figure 2.

Regression Analysis

Regression can be used to examine the strength of such relationship that exists between variables considered (Kaya, 2013).

Table 8: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.902 ^a	.814	.812	.31162

a. Predictors: (Constant), Ergonomics, Job Design

Table 8: ANOVA

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	83.874	2	41.937	431.864	.000 ^b
	Residual	19.130	197	.097		
	Total	103.004	199			

a. Dependent Variable: Employee Performance

b. Predictors: (Constant), Ergonomics, Job Design

It was studied that the value of R is greater than 0.7 (as shown in Table 8), indicating a strong relationship between variable considered. R square is a statistical estimate for identifying how closely the data is fitted on the regression line. In this case, the value of R square is 0.814. This means that 81.4% of the variance in the dependent variable i.e. Employee Performance can be predicted from the independent variables i.e. Job Design and Ergonomics. Also, in Table 9, ANOVA output for the regression model results as $p < 0.005$ i.e. 0.000. This shows that the data is statistically significant and the independent variable(s) have a significant impact on the dependent variable. The p value being less than the significance value concludes that there is enough evidence to reject the null hypothesis that there is no impact of Job Design and Ergonomics on Employee Performance.

Conclusion and Implications

Job design has a direct and interactive relationship with overall employee outcomes. Job design can be used for problem solving and providing motivational opportunities to employees for performing better

(Cullinane S et.al, 2017). Job Design is a powerful tool that can drive the organisation towards better employee outcome thereby helping the organisation to produce and move further in the present competitive era. The strong interactive relationship of Job Design and Employee Performance, shown in this study, explains that an employee performs better when he/she understands his/her job better. Ergonomics, on the other hand, helps the employee easing out his job and perform better for the organisation. It is essential to improvise workstations and create a favourable work environment for employee to execute lean manufacturing and help organisation become steady and permanent (Vieira L et.al, 2015). It is Ergonomics that help maintaining a safe and sound environment for operational excellence to be attained by the employee and increase fruition of job. As seen in the CFA model, both Job Design and Ergonomics significantly impact Employee Performance, describes how an organisation can experience beneficial repercussions by considering Job Design and Ergonomics as influencing factors. The regression and correlation analysis state that both the independent factors are well related to each other having a significant impact

on employee performance. The Ergonomic conditions when considered with Job Design can be pinpointed and considered as a pinnacle that affects employee performance the most (Jara O et.al, 2019). The presented research can help managers to understand the importance of collation of Ergonomics with Job Design and why it should be taken as a Design for Safety. This research study can be used by managers to understand why inclusion of Ergonomics in Job Design as a Design for Safety can help eliminating affliction of employee upshot. Through the CFA model conferred, it can be explained that design for safety is an important aspect which should be included in design of the overall job that is to be performed. This can be useful for each employee, increasing productivity and leading to creation of opportunities of new developments.

Suggestions

With provision of this model, it can be studied that there is an extant and significant relation existing between Job design and Ergonomics. This relation explains that the organisation should be susceptible towards connecting the existing knowledge base of employees with proper education of physical facilities provided to perform the same. It is important for organisations to include Ergonomics as a sizable element of Job Design which will further ensure increase in productivity scope with more committed employees. Hence, the recommendations through this study can be to define the present existence of this relation between Job design and Ergonomics in a more skilful and focused manner. Organisations should use this relation for more stability and sustainability in the present and potential market of operations. This will help enhancing not only the employee performance but also the organisational performance with long term sustenance. Better the understanding and use of this relation, better would be the success rate of the organisation in the long run. Also, this project explains that there is a significant impact of Job design on Employee Performance. Hence, it can be used as a medium to increase Employee Performance in the long term and make the employees more committed towards the organisation. Using the

specified relations it can be said that the organisations can use these to help increasing profitability, which is taken as a stumbling block of the sector of sample selected. By focusing on Ergonomics of the organisation, employees can feel secured while working for the organisation. Automation of machinery can be used to increase productivity and hence the profitability of the organisation. Organisations should target more on providing proper knowledge of physical facilities with the provision of basic learning of the job. Not only provision of facilities is important but also explaining and specifying the positive impacts of that facility is also important.

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