

INCREASING WORKFORCE PRODUCTIVITY THROUGH WORKPLACE DESIGN: EVIDENCE FROM ORGANIZATIONS IN NORTH MACEDONIA

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Abstract

This research analyses how workplace design facilitates workforce productivity by considering various aspects, such as physical, ergonomic, psychological, and socio-demographic. Applying concepts from the Job Characteristics Model as well as the socio-technical systems approach, a theoretical model of workplace design as a predictor of employee productivity is developed and empirically tested through the use of five dimensions, such as the physical work environment, ergonomics, job autonomy, job rotation, and social interaction. In order to carry out the study, a mixed-method design was used by conducting a systematic literature review as well as collecting primary data based on a survey of 350 employees working in organizations in the Republic of North Macedonia. The empirical findings show that all workplace design dimensions have a positive and statistically significant relationship with productivity. The regression model proves to be statistically significant at the level of 0.01 significance with an explanatory power of 61% for workforce productivity ($R^2 = .61$; adj. $R^2 = .59$; $p < .001$), where the social interaction dimension has the largest standardized coefficient, followed by ergonomics and the physical work environment.

Keywords: workplace design; workforce productivity; ergonomics; autonomy; job rotation; social interaction; organizational performance

1. Introduction

Workplace design has increasingly become an important topic in Human Resource Management, Organizational Behavior, and Strategic Management. In current organizations, productivity is not only about the use of technology and task allocation; it is also a consequence of the quality of the workplace environment, employees' autonomy, role significance, and socio-political circumstances that allow cooperation and involvement.

Historically, job and workplace design have been rooted in classic economic theory and management theory. For instance, Smith (1776) discussed productivity in terms of the importance of specialization and division of labor, whereas Babbage (1832) argued the productivity implications of the concept of specialization through mechanization and cost-efficiency. Finally, Taylor's scientific management (1911) included standardized task performance and vertical division of labor. Even though these concepts were instrumental in boosting productivity, they were also associated with dangers such as monotony and employee alienation when used exclusively.

Theories that came after expanded the scope from making the task simpler to designing work around humans. Herzberg et al. (1959) discussed the importance of intrinsic work characteristics in terms of motivation, while Hackman and Oldham's (1976) Job Characteristics Model highlighted five critical factors – skill variety, task identity, task significance, autonomy, and feedback – that make a job meaningful and engaging. At the same time, the Socio-Technical Systems theory highlighted the interconnectedness between technical structure and social relations within organizations (Trist & Bamforth, 1951).

In today's organizations, workplace design decisions are not limited to how jobs are structured. Factors such as the work environment, ergonomics, employee autonomy, job rotation, flexibility, and social interaction are all relevant. Such variables affect fatigue, motivation, communication, learning, and performance at work. Hence, it is important to view workplace design as a multifaceted organizational process rather than an administrative issue.

The current research aims to explore the connection between workplace design and workforce productivity in organizations located in the Republic of North Macedonia. The proposed paper seeks to contribute to existing research by integrating work design theories with information on workplace design practices in organizations today and their impact on worker productivity.

Objectives of Research and Hypotheses

The main objective of this study is to study the influence of workplace design on productivity of the workforce. Specifically, this research aims to explore what dimensions of workplace design have the greatest correlation with productivity and find out if the findings of empirical analysis confirm the existence of a multidimensional workplace design model.

The objectives of this study include:

- Exploring the theoretical basis for job and workplace design in terms of their effects on productivity.
- Evaluating employees' views of different aspects of workplace design.
- Empirically testing the correlation between workplace design and workforce productivity.
- Formulating recommendations aimed at enhancing organizational productivity by means of human-centered workplace design.

The general hypothesis of this research study is:

H1: Workplace design has a significant positive effect on productivity of the workforce.

The sub-hypotheses that are explored include:

- H1a: Physical work environment has a positive effect on workforce productivity.
- H1b: Ergonomic working conditions have a positive effect on workforce productivity.
- H1c: Employee autonomy at work has a positive effect on workforce productivity.
- H1d: Job rotation has a positive effect on workforce productivity.
- H1e: Positive social interactions have a positive effect on workforce productivity.

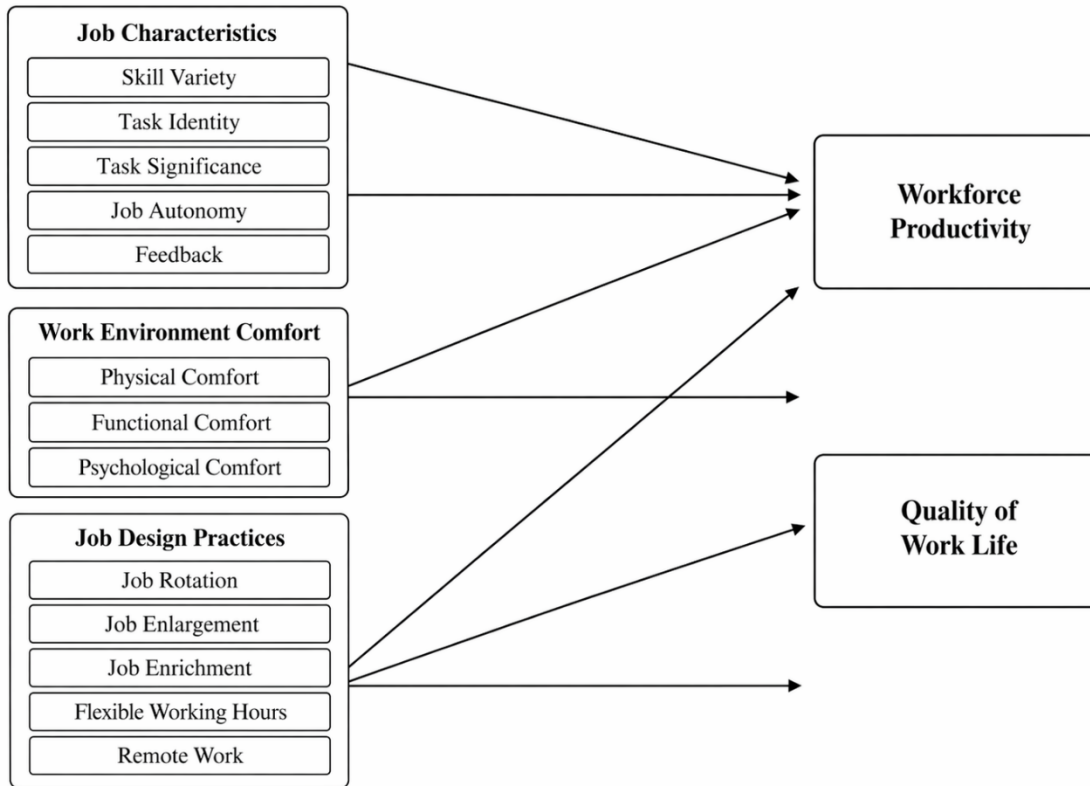


Figure 1. *Conceptual framework of workplace design and workforce productivity*

Conceptual Framework

This theoretical model involves both the structural aspects and human aspects of work design. According to the Job Characteristics Model, an analysis can be done in relation to how task characteristics affect performance and motivation. The Socio-Technical Systems theory stresses that there must be a match between the technical system and social interaction. The workplace design model in this research is based on five components.

Workplace design inputs	Theoretical basis	Expected outcome
Physical environment and ergonomics	Biological and perceptual-motor job design; ergonomics	Reduced fatigue, better comfort, and improved performance
Autonomy and job rotation	Job Characteristics Model; motivational job design	Higher motivation, learning, responsibility, and adaptability
Social interaction	Socio-Technical Systems approach	Stronger cooperation, communication, and collective productivity

Figure 1. Conceptual framework linking workplace design dimensions with productivity outcomes.

2. Literature Review

Work entails not only economic transactions where labor and payment are exchanged but also social, psychological, and organizational processes wherein people help achieve common objectives, acquire skills, and construct their occupational selves. Work is defined in management studies as a process involving activities done to accomplish organizational ends (Schermerhorn, 1993).

Job design is defined as the arrangement of task content, methods, responsibilities, and relationships to meet the requirements of technology, organizations, society, and individuals (Davis, 1966). It encompasses the design of both the technical and social elements of the work activity (Umstot, 1976). Workplace design is more inclusive than job design since it covers both job content and other factors related to the physical environment in which work occurs.

Effective workplace design requires balancing the objectives of organizations, including productivity, efficiency, and quality, with those of employees, which include autonomy, competence, safety, and meaningfulness of work. According to Armstrong & Taylor (2014), there should be consistency between roles, organizational structure, and employees' abilities. Likewise, Mathis et al. (2017) suggest that job design could be modified to improve production results and job satisfaction.

Autonomy denotes the level of control employees exercise over how and when to carry out their duties. Autonomy is important in the Job Characteristics Model since it enhances employees' accountability for Workplace autonomy can be divided into method autonomy, scheduling autonomy, and criteria autonomy. Method autonomy permits an individual employee to have freedom concerning the choice of methods used to complete tasks, while scheduling autonomy gives him the opportunity to participate in decision-making regarding the scheduling of his work. Criteria autonomy refers to the possibility for employees to be engaged in defining criteria for evaluating their work.

Nevertheless, the autonomy must be coupled with proper communication from managers, appropriate training and performance management systems. Otherwise, lack of clear objectives and necessary feedback can turn out to be a disadvantage. In other words, autonomy should become a part of organizational processes as such.

Job rotation is understood as reassignment of an individual from one task, job or department to another. Job rotation can help eliminate boredom, promote skill diversity, add flexibility and increase employees' awareness of related tasks. It is especially effective in case companies aim to develop versatile and less specialized employees.

There are multiple reasons behind the significance of job rotation as cited in the literature: employees will have greater access to information, the employer will have a clearer understanding of the skills of his staff, and motivation levels will improve due to the lack of monotony (Eriksson & Ortega, 2006). Furthermore, job rotation can promote organizational commitment by enhancing the comprehension of employees regarding how their tasks fit into the bigger picture of organizational functioning.

Nonetheless, job rotation does not apply to all jobs evenly. In case of a very specialized job position, constant rotations will lead to higher training costs and decreased efficiency when staff members need much time to learn and master the required skills (Hsieh & Chao, 2004). Hence, job rotation needs to be approached in an organized and competence-based manner. The physical work

environment entails factors such as lighting, noise, temperature, spatial layout, accessibility, and general comfort in the workplace setting. These factors impact the employees' concentration abilities, communication opportunities, and performance throughout the workday.

Ergonomics is concerned with designing workplaces, tools, and processes according to human abilities and limitations. Through ergonomics, one eliminates superfluous effort and ensures that workers do their jobs in a safer and more comfortable environment. When applied in office and knowledge-related environments, ergonomics concerns itself with such matters as seating, desk arrangements, positioning of monitors, movement, lighting, and minimizing repetitive strain injury.

Another important aspect in design is social interaction. Places of work which encourage teamwork, communication, and trust can enhance the process of coordinating information exchange among workers. This brings us to the point about socio-technical systems theory, which is quite appropriate for the topic of discussion.

3. Methodology and Model Specification

3.1 Research Design: In this research, a mixed-method approach will be used. Qualitative research will involve an extensive literature review based on theories about job design, workplace design, ergonomics, autonomy, job rotation, and organizational behavior. Quantitative research will utilize data gathered from a survey administered to employees of various organizations in the Republic of North Macedonia.

This design is both descriptive and explanatory in nature. The descriptive aspect entails a review of the current perspectives regarding workplace design, whereas the explanatory part entails testing the influence of these variables on workforce productivity.

3.2 Sample and Data Collection: Primary data was collected using structured questionnaires distributed among a sample of 350 respondents comprising operational personnel, middle-level management, and top-level management. These respondents came from diverse organizational backgrounds. The questionnaire comprised close-ended Likert scale statements that measured the work environment features and productivity perceptions, as well as some open-ended questions to gauge other perceptions.

Secondary data was collected from books and journal articles concerning human resources management, job design, ergonomics, and organizational behavior.

3.3 Variables and Regression Model: The dependent variable is workforce productivity (WP). The independent variables are physical environment (PE), ergonomics (ER), autonomy (AU), job rotation (JR), and social interaction (SI). Control variables included age, gender, educational attainment, and occupation.

$$WP = \beta_0 + \beta_1 PE + \beta_2 ER + \beta_3 AU + \beta_4 JR + \beta_5 SI + \varepsilon$$

In this model, β_0 represents the constant term, β_1 through β_5 represent the regression coefficients of the independent variables, and ε represents the error term. The hypotheses were tested at a 95% confidence level using regression coefficients and significance values.

4. Results

4.1 Descriptive Statistics: From the descriptive analysis, it is evident that the dimensions of workplace design receive fairly high scores. The dimension with the highest average score is social interaction ($M = 4.01$), while ergonomics and employee productivity have the second and third-highest average scores respectively ($M = 3.94$ and $M = 3.89$). The lowest average score was observed for job rotation ($M = 3.42$). *Table 1. Descriptive statistics for study variables.*

Variable	Mean score
Physical environment	3.87
Ergonomics	3.94
Autonomy	3.76
Job rotation	3.42
Social interaction	4.01
Workforce productivity	3.89

4.2 Correlation Analysis: A correlation analysis was performed to determine the extent to which each of the workplace designs correlates positively or negatively with workforce productivity. It is clear that all correlations are positive and statistically significant. The highest correlation coefficient belongs to social interactions, where $r = .64$, ergonomics, where $r = .62$, and the physical environment, where $r = .58$. The lowest correlation coefficient is $r = .41$, which belongs to job rotation.

Table 2. Correlations between workplace design factors and workforce productivity.

Relationship	Correlation (r)	Interpretation
Physical environment and productivity	.58	Positive, significant
Ergonomics and productivity	.62	Positive, significant
Autonomy and productivity	.55	Positive, significant
Job rotation and productivity	.41	Positive, significant
Social interaction and productivity	.64	Positive, significant

4.3 Regression Analysis: The multiple regression approach was adopted to establish the extent of influence of each factor on the productivity of the labor force. The entire model was found to be statistically significant ($p < .001$), with an R^2 of .61 and adjusted R^2 of .59, indicating that 61 percent of the variability in workforce productivity is accounted for by the predictors.

Table 3. Standardized regression coefficients predicting workforce productivity.

Predictor	Standardized β	Significance	Interpretation
Physical environment	.21	$p < .01$	Supported
Ergonomics	.24	$p < .01$	Supported
Autonomy	.19	$p < .05$	Supported
Job rotation	.12	$p < .05$	Supported
Social interaction	.27	$p < .01$	Supported

4.4 Hypothesis Testing

Table 4. Summary of hypothesis-testing results.

Hypothesis	Description	Result
H1	Workplace design has a significant positive impact on workforce productivity.	Supported
H1a	The physical work environment positively affects workforce productivity.	Supported
H1b	Ergonomic conditions positively affect workforce productivity.	Supported
H1c	Autonomy at work positively affects workforce productivity.	Supported
H1d	Job rotation positively affects workforce productivity.	Supported
H1e	Social interaction positively affects workforce productivity.	Supported

Source: Author calculation.

5. Discussion

This confirms the assumption from theory that workplace design is a multifaceted factor influencing productivity. The existence of positive and significant correlations between all variables indicates that productivity is affected not only by individual efforts, but also by factors such as workspaces, work itself, autonomy, and social relations at the workplace.

In terms of statistical significance, social interaction ($\beta = .27$, $p < .01$) stands out as the highest predictor among the analyzed factors. The fact that workspaces where communication and cooperation prevail increase coordination, facilitate information exchange, and improve team performance highlights the importance of socio-technical system approaches in the workplace, since technical elements need to be reinforced by social structures.

Another important factor is ergonomics ($\beta = .24$, $p < .01$), followed by physical environment ($\beta = .21$, $p < .01$). From these statistics, one can conclude that factors associated with ergonomics and physical conditions should not be underestimated. Comfortable workspaces, proper lighting, reduction of noise levels, adequate workspace layout, and ergonomic furniture help maintain performance at an optimal level.

Autonomy positively impacts productivity ($\beta = .19$, $p < .05$). It is clear that the higher the degree of autonomy among workers, the better their performance due to their ability to decide on how tasks should be done. Additionally, job rotation also has a significant impact on productivity ($\beta = .12$, $p < .05$), but since the impact is weak, it should not be implemented everywhere without restrictions.

6. Conclusion and Recommendations

It can be concluded from this research that workplace design plays a very important role in ensuring productivity among employees. From the results of this research, it becomes clear that physical environment, ergonomics, autonomy, job rotation, and social interaction all play a vital role in determining worker performance. Out of all these, social interaction, ergonomics, and physical environment have proven themselves to be the most powerful predictors.

According to this research, work is no mere economic activity. Work is rather an organized and social process designed according to task design, worker autonomy, physical environment, and interpersonal relationships.

From these findings, organizations should take into account the following recommendations:

- Ensure that the workplace allows for concentration as well as interactions among employees.
- Purchase ergonomically designed furniture along with suitable lighting and noise reduction equipment and space allocation to ensure comfort and reduce tiredness.
- Confer more control to employees regarding discretion on performing tasks.
- Use job rotation effectively, especially in jobs where skill improvement is useful.
- Employees' managers should be trained on how to provide support for autonomy and communication among employees.
- Use valid measures of performance and productivity while evaluating initiatives in designing the workplace.

7. Limitations and Future Research

While this study offers some empirical evidence, there are a number of limitations that should be considered. Firstly, this study relies on self-reporting data collected from surveys, which might be influenced by the perception of the participants instead of their actual productivity levels. Secondly, this study is limited to the organizations operating in the Republic of North Macedonia, which might affect its generalizability to other organizations in different environments. Thirdly, this study employs cross-sectional data, and thus no causality can be established.

In the future, the scope of this study could be broadened to include samples of organizations from various industries and countries, include objective measures of productivity, and apply longitudinal designs to investigate if changes in the design of workplaces have a long-lasting effect on employee productivity.

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