



Human Resources Strategies: From Job Satisfaction to Innovation in the Age of Technostress

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Abstract

Employee innovation is a crucial aspect of organizations in the current era. Therefore, studying the factors influencing individual innovation is vital and unavoidable. Undoubtedly, job satisfaction is a significant variable in management sciences. Nowadays, all organizations are interconnected with technology. This research explores the relationship between job satisfaction and individual innovation, including its components and the moderating role of technostress. This study, in terms of purpose, is applied, and in terms of data collection method, it is a descriptive survey. Data collection tools included the Technostress Inventory by Tarafdar and colleagues (2007), Janssen's Individual Innovation Questionnaire (2000), and the Job Satisfaction Survey (JSS) by Spector (1994). The validity and reliability of these questionnaires were confirmed. The sample size for this study was 215, and data analysis was performed using SPSS and SMART-PLS software. Job satisfaction has a significant and positive relationship with individual innovation, idea generation, idea promotion, and idea implementation. Technostress moderates the relationship between job satisfaction and individual innovation, idea generation, and idea promotion. However, technostress does not play a moderating role in the relationship between job satisfaction and idea implementation. *Conclusion:* Based on the results, organizations should take necessary measures to increase job satisfaction and reduce employee technostress.

Keywords: Technostress, Job Satisfaction, Human Resources, Mental Health, Individual Innovation

Introduction

In recent years, it has become common among researchers and scholars that innovation is crucial for organizations (Drach-Zahavy et al., 2004). Countries worldwide, relying on innovation, aim to increase productivity and improve their economic conditions. One of the major reasons for this focus is the increasing competition among societies (Mirfakhredini et al., 2010). Moreover, the rise in complexities and environmental uncertainties necessitates attention to innovation. Organizations that excel are highly adaptable and able to enhance their service quality (Robbins, 2007). Today, there is a consensus on the significance of innovation in an organizational context and the need for markets to be more dynamic. Organizations must innovate to meet their customers' changing demands and lifestyles and exploit opportunities created by technology and market changes (Rowley et al., 2011).

According to Chen et al. (2004), innovation refers to introducing a new combination of essential elements in the production system. Innovation capital includes organizational competency, research and development execution, and the creation of new technology and products to meet customer demands. The Organization for Economic Cooperation and Development (OECD) refers to any commercial exploitation of new knowledge as innovation. In other words, innovation entails implementing new processes or procedures that fundamentally differ from existing ones (Du Plessis, 2007).

In this environment, organizations must ensure their strategies are innovative and new to maintain their competitive advantage. Successful innovative activities within an organization require employees' participation at all levels (Lloréns Montes et al., 2004). Employees are considered crucial for fostering innovation. While innovation in literature is often rooted in creativity, such innovations are relatively rare, whereas gradual innovations based on employees' efforts are more common. Undoubtedly, a significant aspect of any organization is the discussion of individual innovation among its employees. The key to any organization's success and survival today lies in the innovativeness of its employees and encouraging them to innovate (Osayawe et al., 2004). Individual innovations are central to many principles in modern management, including Total Quality Management (Osayawe et al., 2004), Continuous Improvement initiatives (Fuller et al., 2006), corporate audacity (Elfring, 2003), creative problem-solving (Basadur, 2004), and organizational learning (Senge, 1990).

Individual innovation is recognized as a vital element for effective organizational performance and long-term sustainability (Janssen, 2000). Innovation behavior refers to individuals' deliberate efforts to generate, introduce, and utilize new ideas. Researchers generally agree that individual innovation starts with problem recognition and idea generation but also includes advocating for ideas and trying to build coalitions of supporters for idea implementation (Janssen, 2000; Kanter, 2009; Scott & Bruce, 1994).

Previous studies indicate that organizations can indeed benefit from individual innovation (Campbell et al., 1996). Empirically, a positive relationship between specific innovation behaviors and organizational performance has been demonstrated (Miron et al., 2004). It has also been shown that individual innovation does not diminish the quality and efficiency of normal work. Employees can maintain a balance between the presence of

innovation and the organizational features necessary for innovation promotion; quality and efficiency complement each other rather than compete. In this regard, Getz & Robinson (2003) proposed an interesting rule of thumb: Companies that improved through idea resources found that 80% of these ideas were improvements suggested by their employees, and only 20% were planned innovation activities. This validates the organization's capacity to harness new products and other aspects of performance through the knowledge of its human resources (Foss, 2007). Therefore, the most unique and non-replicable resources available to companies are individuals with knowledge who can effectively utilize other organizational resources (Argote & Ingram, 2000).

Therefore, paying attention to employees' conditions is vital for any organization. Job satisfaction is one of the influential factors in employees' conditions and, consequently, in the organization. According to Bai et al. (2024), the salience of job satisfaction stems from its dual role in propelling organizational advancements and enhancing the well-being of the workforce. The concept of job satisfaction among employees is so critical in the literature on human relations and organizational behavior that researchers have examined various predictors of this key element in organizational achievement (Kifle et al., 2012). Not having job satisfaction among employees is one of the major problems for organizations, leading to employee turnover, absenteeism, organizational disengagement, low motivation, and, ultimately, employees leaving the organization (Nasrollahi et al., 2022). This issue comes with high costs for the organization, including decreased productivity, training costs, empowerment, recruitment, and loss of organizational knowledge (Ansari et al., 2010).

On the other hand, job satisfaction is one of the influential variables in organizational efficiency, leading to increased organizational dynamism and productivity (Hessari & Nategh, 2022a; Kwai et al., 2010). Job satisfaction is a positive emotional state or feeling from job evaluation or individual experience (Sepahvand et al., 2023). This positive emotional state significantly contributes to individuals' physical and mental well-being. From an organizational perspective, a high level of job satisfaction reflects a highly desirable organizational atmosphere and leads to the attraction and retention of employees (Mohaghar et al., 2022).

Many researchers have attempted to define job satisfaction. For instance, Hopkins defined job satisfaction as "meeting specific needs related to personal work" and its spectrum as "liking the job." Also, job satisfaction has been defined as a positive orientation of an individual toward the job role they currently perform (Griffin et al., 2010) and a pleasurable mental state because of evaluating one's job as facilitating or meeting one's self-values. Job satisfaction is emblematic of employees' attitudes towards their work. It encompasses various dimensions, reflecting either a holistic attitude towards the job or pertaining to specific facets of the job (Bai et al., 2024).

In general, satisfaction and dissatisfaction are evaluated as a function of the observed relationship between what an individual wants from their job and what they get; hence, job satisfaction is an attitude indicating an individual's satisfaction, contentment, or persuasion in their work or job (Sharma & et al., 2010). Studies indicate that since 1976, over 3000 studies related to job satisfaction have been conducted. Researchers have examined the impact of various factors and variables on job satisfaction. Influential factors on job satisfaction include

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social health, mental health, leadership style, salary, promotion process, working conditions, and the job itself (Hakkak et al., 2022; Griffin et al., 2010). In summary, job satisfaction holds significance in three dimensions:

- *Individual Dimension:* This aspect determines its influence on employees' behavior in performing their tasks efficiently.
- *Organizational Dimension:* This refers to the impact of job satisfaction on organizational variables. Managers should prioritize their employees' job satisfaction for three reasons: Dissatisfied individuals are likelier to be absent, resign, or leave the work environment. Satisfied employees experience better physical and mental health and tend to live longer. Increased job satisfaction leads to a higher commitment to work (organizational commitment).
- *Social Dimension:* This signifies the impact of job satisfaction on "overall life satisfaction".

Additionally, it is undeniable that technology has become an inseparable part of today's society to the extent that organizations or individuals not engaging with technology are rarely found. Technology directly impacts organizational survival; hence, analyzing the effects of technology on organizations is crucial and necessary (Hessari et al., 2023). Successful organizations have always endeavored to utilize technology appropriately to advance their goals and ensure organizational sustainability. Positive effects of the technological revolution in organizations include improving productivity and reducing workplace fatigue (Vieitez et al., 2001). However, alongside these positive effects, technology also negatively impacts organizations. In today's rapidly changing technological world, technology introduces destructive stress, known as "technostress," into organizations (Rouhani & Mohammadi, 2022). This has led many employees to suffer from technostress. Previous literature indicates that the technological revolution contributes to increased job-related stress in the workplace (Rosen & Weil, 2000; Gallie, 2005).

Brod, a consultant, and psychologist specializing in adapting to new technology, introduced technostress in his book titled "Technostress: The Human Cost of the Computer Revolution" as a modern disease arising from humans' inability to adapt to new computer technologies in a healthy manner (Brod, 1984). Although Brod viewed technostress as an illness, other researchers consider it as an inability to adapt to changes imposed by technology. This reduced productivity and effectiveness in individuals' tasks. This decrease in productivity lowers the organization's success rate. Technology, especially information technology, is rapidly evolving, and consequently, organizations that do not update themselves lose their competitive edge against other organizations (Hessari & Nategh, 2022b). Implementing new technologies can create stress among organizational employees and negatively impact productivity. While IT might be costly for an organization, it is essential for accessing timely and relevant information to make appropriate decisions (Tarafdar et al., 2007; Weil & Rosen, 1997). Tarafdar and colleagues developed a measurement scale for technostress based on the data from the United States. They identified five elements of techno-stress, which are recognized as techno-stress builders (see Table 1).

Table 1: Techno-Stress Components (Tarafdar et al., 2007).

Technostress Components	Description
Technology Overload	A situation where an individual is compelled to work faster and longer due to technology.
Invasion of Technology	A situation in which employees feel technology can keep them constantly connected to work, due to the blurred boundary between work and personal matters.
Techno-Complexity	A situation where employees feel their skills are insufficient to handle the complexities related to information and communication technologies. Consequently, they are forced to invest time and effort in learning and understanding various aspects of technology.
Techno-Insecurity	A situation where employees feel threatened that they might lose their jobs to new information and communication technologies, or they might be replaced by others who are better at using these technologies.
Technology Uncertainty	This is a situation where employees feel uncertain and restless due to the rapidly changing nature of information and communication technologies, requiring constant updating.

The healthcare industry has also witnessed an increase in technostress. With the proliferation of online journals and research articles, medical facilities are inundated with vast information. While this information can be useful, it also leads to the emergence of technostress. Researchers have learned that by using technology, they can filter and consolidate necessary information in a targeted manner to reduce information overload. However, even with this filtration, a considerable amount of information remains, leaving users anxious as they cannot compare all of it (Hall & Walton, 2004).

Various research results clearly indicate that technology can tire and dishearten employees (Moore, 2000; Murray & Rostis, 2007; Sethi & Barrier, 1999). Techno-fatigue causes employees to lose their efficiency. Managing technostress can be challenging for an organization. Weil and Rosen found that scientific evidence shows that technostress also leads to excessive work perception, excessive information, loss of motivation, and job dissatisfaction (Weil & Rosen, 1997).

Brenda Mack and colleagues (2010), in their article titled "Technostress and Organizational Loyalty in IS&T Employees," investigated this matter. Their results indicate that understanding job stress reduces job satisfaction, while a better technology management strategy creates job satisfaction and organizational commitment (Mack et al., 2010). In line with this, Rajesh Kamur and colleagues (2013), in their article titled "The Relationship of Technostress on Job Satisfaction and Organizational Commitment among Professional (IT) Employees," explored this topic. Their study, conducted with 80 IT professionals from a technology park, showed that technostress negatively correlates with organizational commitment and job satisfaction (Kumar et al., 2013).

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Gaiter and colleagues (2008) used structural equation modeling to examine the relationship between organizational environment, work-family conflict, job stress, individual characteristics, job satisfaction, and organizational commitment in pharmacists in the United States. The results showed that organizational factors such as excessive workload, conflicts, and easy efficiency were among the most important variables impacting job stress. Moreover, their model revealed a significant relationship between individual characteristics, job satisfaction, and organizational commitment (Gaiter et al., 2008). Building upon the preceding statement, we formulate the following hypotheses:

H1: Job satisfaction has a significant and positive impact on individual innovation.

H2: Technostress moderates the relationship between job satisfaction and individual innovation.

H3: Job satisfaction significantly and positively impacts the idea generation component.

H4: Job satisfaction significantly and positively impacts the idea promotion component.

H5: Job satisfaction significantly and positively impacts the idea implementation component.

H6: Technostress moderates the relationship between job satisfaction and the idea generation component.

H7: Technostress moderates the relationship between job satisfaction and the idea promotion component.

H8: Technostress moderates the relationship between job satisfaction and the idea implementation component.

Research Methodology

This research is categorized as applied research in terms of its objectives and is a descriptive-survey study using correlational analysis through structural equation modeling in data collection. Data for this study were obtained through standardized questionnaires distributed in person. This research was conducted at several Organizations in Mashhad, Iran.

The researchers distributed 260 questionnaires randomly, following Krejcie & Morgan's table (1970). Out of these, 215 questionnaires were valid and usable. The data were collected in the first half of the year 2021. The Job Satisfaction Survey (JSS) questionnaire (1994), consisting of 4 questions on satisfaction with pay, four questions on job promotion, four questions on supervision, four questions on fringe benefits, four questions on potential rewards, four questions on job execution processes, four questions on co-workers, four questions on the nature of the job, and four questions on communication, was used. Additionally, the Techno-Stress questionnaire by Tarafdar et al. (2007), consisting of 6 questions on technology overload, three on technology invasion, five on technology complexity, five on technology insecurity, and four on technology uncertainty, was used. The Individual Innovation questionnaire by Jansen (2000), consisting of 3 questions on idea generation, three on idea promotion, and three on idea implementation, was used. The Likert scale was used for

measurement, ranging from "completely disagree" as the starting point to "completely agree" as the endpoint. The scores for the questions were calculated from 1 to 5.

After data collection, the data obtained from the questionnaires was transferred to the raw data pages of SPSS and SMART-PLS software for analysis. Descriptive statistics, including frequency and percentage, and inferential statistics, including structural equation modeling, were employed for analysis. The structural equation modeling (path analysis) was conducted using SMART-PLS software.

Feedback from university professors and experts was gathered to assess the validity of the measurement tools used in this study. Additionally, since the items included in these questionnaires were designed based on standard questionnaires, the mentioned questionnaires have good validity. To assess reliability, an initial sample of 30 questionnaires was pre-tested, and then, using the data obtained from these questionnaires and with the help of SPSS statistical software, the coefficient of confidence was calculated using the Cronbach's alpha method. The Cronbach's alpha coefficient was calculated as 0.962 for the Technostress questionnaire, 0.982 for the Job Satisfaction questionnaire, and 0.962 for the Individual Innovation questionnaire. Moreover, Cronbach's alpha coefficients for the components of Individual Innovation (idea generation 0.940, idea promotion 0.957, idea implementation 0.936) were calculated. Therefore, it can be said that the questionnaires used in this study have high internal consistency, reliability, and validity.

Data Analysis and Findings

This study used structural equation modeling to analyze and evaluate the model. Structural equation modeling is a statistical technique to examine linear relationships between observed (measured) and latent (unobserved) variables. In other words, structural equation modeling is a powerful statistical technique that combines measurement modeling (confirmatory factor analysis) and structural modeling (regression or path analysis) with a simultaneous statistical test. For this analysis, SMART-PLS software was used. This software analyzes structural equation models containing several variables and encompasses direct, indirect, and interaction effects. Furthermore, the outputs from this analysis are presented and discussed below.

The frequency and percentage of the research sample group based on gender, education level, and work experience are presented in Table 2. Considering the outputs, the model's factor loadings on the model (Figure 1), and the statistical significance (T statistics) of the model's relationships (Figure 2), the findings of the research indicate that job satisfaction has a strong, positive, and significant impact on individual innovation. On the other hand, technostress moderates the relationship between job satisfaction and individual innovation. The study further examines the impact on the components of individual innovation.

The findings demonstrate that job satisfaction significantly and positively influences idea generation, promotion, and implementation. Additionally, technostress moderates the relationship between job satisfaction and idea generation and promotion components. However, technostress does not have a moderating role in the relationship between job

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satisfaction and the component of idea implementation. The exact path coefficients and T statistics are presented in Table 3.

Table 2 - Frequency and Percentage of the Research Sample Group.

Variable	Subgroups	Frequency
Gender	Male	125
	Female	90
Age	22 to 30	69
	31 to 39	76
	40 to 48	48
	49 to 57	22
Education Level	Diploma	19
	Bachelor's Degree	92
	Master's Degree	86
	Doctorate	18
Work Experience	1 to 4 years	45
	5 to 9 years	66
	10 to 14 years	57
	15 to 19 years	30
	20 to 40 years	17

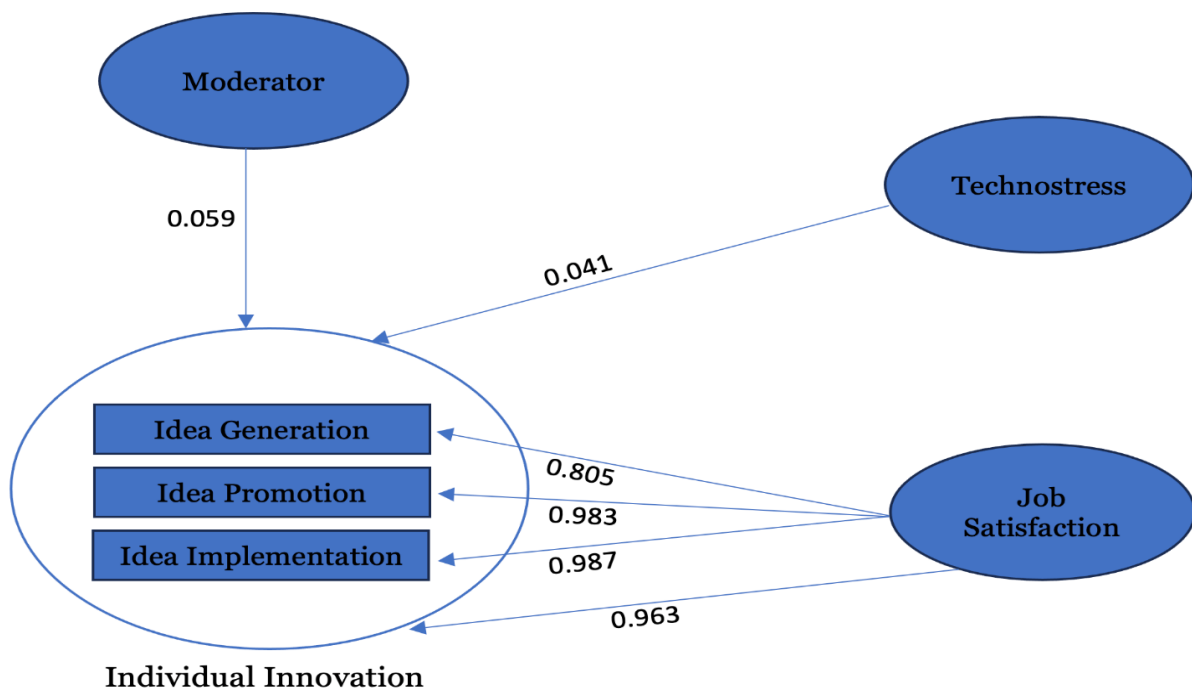


Figure 1 - Factor Loadings on the Path.

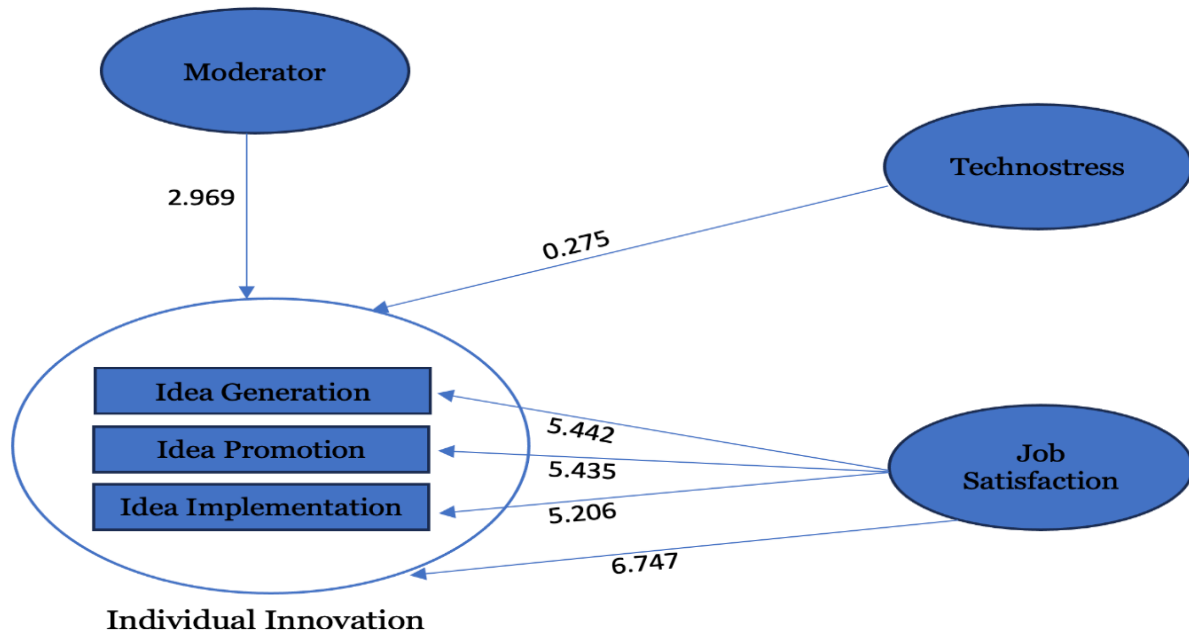


Figure 2 - T-Statistic Values.

Table 3 - Hypotheses Examination, Path Coefficients, and T-Statistics.

Hypothesis	Path	Loading Factors	T-Statistic	Confirmation Rejection
1	Job Satisfaction → Individual Innovation	0.963	6.747	Confirmed
2	Technostress Moderating the Relationship between Job Satisfaction and Individual Innovation	0.059	2.969	Confirmed
3	Job Satisfaction → Idea Generation Component	0.805	5.442	Confirmed
4	Job Satisfaction → Idea Promotion Component	0.983	5.435	Confirmed
5	Job Satisfaction → Idea Implementation Component	0.987	5.206	Confirmed
6	Technostress Moderating the Relationship between Job Satisfaction and Idea Generation Component	0.079	3.216	Confirmed
7	Technostress Moderating the Relationship between Job Satisfaction and Idea Promotion Component	0.082	2.708	Confirmed
8	Technostress Moderating the Relationship between Job Satisfaction and Idea Implementation Component	0.011	0.292	Rejected

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Finally, considering the research findings, it should be noted that two types of models are examined in Partial Least Squares (PLS) models. The Outer Model is equivalent to the measurement model, and the Inner Model is like the structural model in other software models such as LISREL, EQS, and AMOS. For evaluating the fit of the Outer Model, the Average Communalities were used, and for the structural model fit, R² was employed. The Average Communalities indicate the percentage of indicator variance explained by the corresponding constructs, and researchers have suggested an acceptable level for communalities greater than 0.5 (Lee & et al., 2008). The R², which demonstrates the model's ability to explain the structure, is higher than 0.5, indicating a suitable fit for the proposed model, as presented in Table 4.

Table 4 - Model Fit.

Variables	Average Communalities	R²
Job Satisfaction	0.8879	-
Individual Innovation	0.93	0.8718
Technostress	0.8703	-
Idea Generation	0.9343	0.7969
Idea Promotion	0.9151	0.8091
Idea Implementation	0.9406	0.8292
Technostress × Job Satisfaction	0.9594	-

Discussion

This study represents the first internal investigation focusing on the role of technostress in the relationship between job satisfaction and individual innovation. Given the increasing proliferation of technology in people's lives (Mohammadi et al., 2023), technostress undeniably stands as one of the most influential factors affecting organizations, institutions, and hospitals. The research results indicate a very strong influence of job satisfaction on individual innovation. Similar findings were reported in the study by Shipton et al., conducted among 3717 employees from 28 British production organizations, indicating that job satisfaction plays a crucial role in innovation within production, organizational, and employee contexts (Shipton & et al., 2006).

Analyzing the results regarding the relationship between job satisfaction and the components of individual innovation, the evidence suggests that job satisfaction significantly and meaningfully affects idea generation, idea promotion, and idea implementation. Thus, one of the crucial factors affecting individual innovation and its components is job satisfaction. Organizations must consistently work towards increasing employee job satisfaction to enhance individual innovation. To encourage and foster job satisfaction, organizations should provide appropriate rewards to employees who seek new methods at work and assist their colleagues. Managers should support the implementation and easy execution of new ideas. To increase job satisfaction, employees' opinions should be sought before adopting new systems, and their assistance should be enlisted in aligning new systems with organizational needs and goals.

Intra-organizational systems should be tailored to employees' needs, and an interactive and open environment for communication with managers should be established.

Furthermore, the research results indicate that technostress moderates the relationship between job satisfaction and individual innovation. In examining the components of individual innovation, it was found that technostress moderates the relationship between job satisfaction, idea generation, and idea promotion. Therefore, organizations aiming to enhance both individual innovation and job satisfaction must work towards reducing technostress in their environment. Managers should encourage employees to share their knowledge about new technologies and motivate them to work together and solve innovative problems through group work and collaboration. Organizations should limit unnecessary information and emails to control and decrease technostress. Efficient information systems should be implemented and managed within the organization, utilizing knowledge-based companies for organizing and managing internal information. Continuous technical support and assistance should be provided to employees for using new technologies, especially during crises and significant challenges. However, it is crucial to note that technical support requires specific features, such as being accessible to employees, being ready to respond during working hours, and involving knowledgeable and experienced individuals. In conclusion, organizations must prioritize job satisfaction and reducing technostress to enhance individual innovation. These efforts will improve employees' well-being and foster a more innovative and productive work environment.

Conclusion

In the dynamic realm of contemporary business, understanding the dynamics of innovation is paramount. This study illuminates the pivotal relationship between job satisfaction and individual innovation, elucidating their integral connection. The research reveals a robust and positive correlation between job satisfaction and various facets of innovation, including idea generation and promotion, highlighting the indispensable role content employees play in fostering creative initiatives. Moreover, the study nuances this relationship by introducing the moderating element of technostress. While job satisfaction fuels innovation, technostress, especially in idea generation and promotion stages, acts as a significant hurdle. Recognizing this, organizations must prioritize strategies that enhance job satisfaction through conducive work environments and recognition and tackle technostress head-on. In response to these findings, organizations are urged to adopt targeted measures. Elevating job satisfaction can be achieved through employee-centric policies, skill development opportunities, and recognition programs. Simultaneously, managing technostress necessitates investment in digital wellness initiatives and training programs to equip employees with coping mechanisms. In this era of technological interconnectivity, the dual approach of enhancing job satisfaction and mitigating technostress emerges as the cornerstone for fostering workplace innovation. Organizations embracing these strategies are poised to nurture a culture of creativity and empower their workforce to navigate the challenges of the modern, technology-driven workplace effectively. These proactive steps are vital for organizations

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aspiring to remain agile, competitive, and innovative, ensuring a resilient future in the face of evolving industry demands.

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