



# Impact of Ergonomics Practices on Commercial Banks' Employee Performance in Nepal: Evidence from Structural Equation Modeling

Ankit Nepal<sup>1</sup> & Ranjana Koirala<sup>2\*</sup>

<sup>1</sup>Quest International College,  
Pokhara University, Gwarko  
Lalitpur, Nepal

<sup>2</sup>KIST Medical College and  
Teaching Hospital, Tribhuvan  
University, Gwarko, Lalitpur, Nepal

\*Corresponding Email:  
[ranjanakoirala2070@gmail.com](mailto:ranjanakoirala2070@gmail.com)

Received: 17 January 2024

Revised: 12 June 2024

Accepted: 25 July 2024

Published: 30 August 2024

## How to cite this paper:

Nepal, A., & Koirala, R. (2024).  
Impact of Ergonomics Practices  
on Commercial Banks' Employee  
Performance in Nepal: Evidence  
from Structural Equation Modeling.  
*Quest Journal of Management and  
Social Sciences*, 6(2), 175-194.  
<https://doi.org/10.3126/qjmss.v6i2.69094>

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## Abstract

**Background:** Organizations today face multiple challenges to maintain the health and performance of employees. Ergonomics is a strategy to reduce occupational disease rates and improving general working conditions for employees in order to improve productivity. Despite the importance of ergonomics in workplace, research in this field is needed to be explored more. It is well practice in world but still new concept in Nepal.

**Objective:** The objective of the study is to investigate “Impact of Ergonomics Practices on Commercial Banks' Employee Performance in Kathmandu Valley”.

**Method:** The Exploratory research design was adopted for the study with the foundation of Theory of Ergonomics. The population of this study consists of commercial banks' employee in Kathmandu valley. Under the probability sampling technique, simple random sampling using structured questionnaire 203 responses are collected with the help of KOBO toolbox. SEM is used to analyse the impact of ergonomics practice in commercial Banks of Nepal. The data was statistically examined using descriptive and inferential analysis utilizing the structured questionnaire approach and the KOBO toolbox.

**Result:** This study finds that ergonomics practice in Nepalese commercial bank as at infant stage. Physical ergonomics factor such as, work design area, thermal comfort, furniture, work hours, lighting has significant effect on employee performance respectively. Physical exhaustion, mental stress, back pain are most frequent problems faced by bankers. Mitigation over this problem by designing employee compatible workplace and adopting ergonomics intervention reduce mental stress, physical exhaustion, back pain and fatigue and motivates the employee and increase their performance.

**Conclusion:** Ergonomics adoption on workplace to enhance the productivity level by reducing health related problem and building employee friendly work environment is milestone to enhance employee performance. Based on the finding and conclusion, the study recommends that work area design, thermal comfort, space, lighting should be considered while designing employee compatible workplace to enhance employee performance in Nepalese Commercial banks' employee.

**Paper Types:** Research Paper

**Keywords:** Ergonomics, Employee Performance, Employee productivity, Employer health issue, Banks.

**JEL Classification:** C13, C83, I12, J28, J81

## Introduction

The word ergonomics in English is derived from the Greek words ergo (labor) and nomos (health) and refers to labor health and can be regarded as a strategic tool that is to provide maximum productivity and minimal cost by improving the workplace ergonomic (MacLeod, 1988; Koirala & Nepal, 2022). Therefore, organizations believe that innovation and creativity culture can be encouraged by setting up a healthy workplace, which also increases employee engagement and makes people feel safe and secure (Akinbola & Popoola, 2019; Kahare, 2014). Wojciech Jastrzebowski first used it in a Polish newspaper in 1857. The concept of ergonomics has been practised since the Stone Age, with hand tools being used since the dawn of time (Helander, 1997). Likewise, Wilson (2000) discussed that the modern history of ergonomics which can be tracked back from 1939 to 1945 world war. In United Kingdom, different experts from multiple disciplines were intent in the effectiveness of human performance and significance on theory and methodology that made the foundation of the discipline of ergonomics. From 60s to the 90s, various developments were made in the field of ergonomics. Some of these included cognitive ergonomics, organizational ergonomics, positive ergonomics, and spiritual ergonomics (Mokdad & Abdel-Moniem, 2017). After the emergence of occupational safety and health, ergonomics has become a growing issue for the organization and has obtained more attention to designing a safe workplace (Pun, 2011).

Corporate and business organizations have been dealing with the issue of reorganizing their workplaces in innovative ways for decades (MacLeod, 1994; Hignett et al., 2005; Koirala & Nepal, 2022). Furthermore, the trend toward is more interesting and flexible office architecture, as well as the necessity to accommodate the various and expanding expectations and requirements of different employees, has resulted in a surge in discussions about how and where effective work is accomplished (Harris, 2016). Merino-Salazar et al. (2017) revealed that ergonomics risk factors including lighting, noise, temperature, vibration, heavy lifting, repetitive motion, workstation design, tool design, machine design, chair design, and footwear design could affect workers' performance and health. In India, the number of people suffering from occupation-related that illnesses is rising at an alarming rate due to the poorly designed workplace (Chowdhury et al., 2017). Ergonomics is the latest practice for most of the organization in Nepal (Koirala & Maharjan, 2022). Nepalese government has begun to pay attention by enforcing a number of laws and regulations (Shrestha et al., 2019; Koirala & Nepal, 2022). The term related to the ergonomics such as healthy workplace and occupational health and safety are familiar term but poorly designed work environments can have a major impact on workers' performance and wellbeing, and hence on production (Ojha, 2014). The principle of environmental comfort expands further than just recognizing the necessity for a safe and healthy work environment, which includes physical, psychological, and functional comfort to determine if employees have the physical instruments they need to do their jobs, based on the notion of ambient as a tool for completing work (Al Horr et al., 2016).

Financial motivation used to be most strategic factor to enhance job performance in previous decades (Thapa, 2015). But in the present scenario, ergonomics factor has come in scene to affect the motivation level and employee performance (Gautam & Prasai, 2011). The performance and satisfaction of employee majorly base on the physical working environment (Bista et al., 2023) and thus organization focuses on designing more comfortable working environment and adoption of ergonomics principle to design a comfortable physical working environment (Soewardi et al., 2016).

Likewise, reducing cost, improving productivity, improving employee engagement and promoting the safety culture are some reasons for the adoption of ergonomics (Socacio, 2012). Thus, rapid advancement in technology has transformed the role of ergonomics and to adjust the changing role management has to include direct worker participation and awareness in designing workplace (Dimberg et al., 2015). The most effective way for removing, rethinking or redesigning manual jobs has been offered participatory ergonomics programs to reduce the occurrence of occupational musculoskeletal illnesses

(Burgess-Limerick, 2018). Despite of the advantages, adopting ergonomically standard workplace and equipment which fit employee comfort are costly (Mokdad et al., 2019). To be in the standard of ergonomics office design, organizations need to adopt the latest technology to meet employee comfort and replacement on such technology incurred huge investment for organization (Dimberg et al., 2015).

In developing country like Nepal, Ergonomics is still a new concept and organizations are unaware of adopting workplace on the basis of ergonomics design. Further, managements are unable to incline ergonomics practice in organization culture and system (Gautam & Prasain, 2011; Koirala & Nepal, 2022). Due to less knowledge of diverse concept of ergonomics several questions were unanswered in the context of ergonomics, which need to be addressed: What is the general understanding about ergonomics among the employees in bank? What is the impact of ergonomics practice on employee performance? What is the problem faced by employee due to bad workplace? What is the management strategy for ergonomics practice to enhance employee performance? The study plan of this research is to understand about ergonomics practices and whether bankers are aware of ergonomics or not? Furthermore, this study identifies impact of ergonomic factors on employee performance. It also highlights the problem faced by employees due to bad ergonomics workplace and management strategy for ergonomics practice to enhance employee performance. Our findings indicate that ergonomics practices in banks are still in their early stages, but increasing awareness among firms and employees is gaining significance. The study highlights the substantial impact of working hours, workspace design, ventilation, acoustics, and lighting on employee performance in Nepalese commercial banks. Therefore, adopting ergonomics in the workplace holds significant potential as an alternative strategy to boost employee productivity. It underscores the necessity for ergonomics training, interventions, and government-led awareness programs to improve workplace conditions and overall productivity in commercial banks.

## Research Method

### *Theories on Ergonomics*

Ergonomics practices and ergonomics factors influencing employee performance are influenced by several theories from sociology, psychology, work design, job design and ergonomics. Several theories like Socio technical system theory (Sony & Naik, 2020), Social exchange theory (Nagraj & Jeyapaul, 2020), Activity theory (Kaptelinin & Nardi, 2018), Balance theory (Jones, 2015) and theory of ergonomics (Akinbola & Popoola, 2019). Socio-technical systems theory refers to a set of collaborative optimization approaches for designing systems with open system features and helps to understand social and technical aspects of the organization to enhance the performance of employees and improve the organization design (Sony & Naik, 2020). Similarly, Social exchange theory explains how employee perception on organization ergonomics and workplace design may lead to employee outcome when workers have acceptable and pleasant working conditions (Nagraj & Jeyapaul, 2020). Likewise, Activity theory investigates both the individual subject and the social reality through mediating activity, filling the gap between the individual subject and social reality reflect a significant influence on the formation of ergonomics and human factors (Kaptelinin & Nardi, 2018). Moreover, the balance theory was developed in an effort to provide a more realistic and holistic approach to work system design which offers an integrated, holistic method to identifying work system aspects, as well as a set of principles for work system design or modification which outcomes are broad, including job satisfaction and stress, as well as worker health, safety, and well-being, and are consistent with an integrated approach that bridges many disciplines (job/organizational design, job stress, and human factors and ergonomics (Jones, 2015). Finally, theory of ergonomics studies the interaction between people and machines and the factors that affect the interaction. Its scientific applications improve the efficiency, safety, and comfort of the working environment (Akinbola & Popoola, 2019). Thus, this study opted the theory of ergonomics. As it helps to know the adoption of workplace design to avoid

musculoskeletal discomfort, increase productivity and job efficiency, lower production costs, and improve human well-being and deals with the psychical comfort of workplace.

Based on the theory mentioned above several hypothesis were conducted for the study. The details of hypothesis development is discussed separately and provided hypothesis separately as per its heading.

### ***Space Management***

Working in a productive atmosphere requires the use of space. Employees strive more to compensate for their difficulties at work when the circumstances are unfavorable. One of these aspects is workplace space which has a direct impact on an employee's ability to deliver better results (Bhatia & Arora, 2021). Space can be viewed as a component of the process of continual improvement in the pursuit of increased productivity. A badly designed work area that is incompatible with the design of work and ignores ergonomics and psychological components will certainly result in unsatisfactory performance (Villarouco et al., 2012).

H<sub>1</sub> : There is a significant relationship between space management and employee performance

### ***Working Hour***

An organization's working hours must be addressed effectively in order for the human resources to get enough rest. Working hours that prioritize proper rest periods allow for efficient and effective completion of the activity. Working shifts without getting enough rest can cause fatigue and stress in a person (Makhbul & Muhamed, 2022).

H<sub>2</sub> : There is a significant relationship between working hour and employee performance

### ***Work Area Design***

For an efficient and effective workstation, a comfortable work environment is vital. In particular job sectors, a comfortable workstation is critical for maintaining a smooth workflow and increasing employee productivity. Poor workspace design can contribute to workplace stress (Jensen & van der Voordt, 2020). A crowded and congested workplace may have a detrimental impact on an employee's performance. Office congestion and discomfort have been related to a loss of attention and privacy, which can contribute to an increase in workplace stress (Garland et al., 2018).

H<sub>3</sub> : There is a significant relationship between work area design and employee performance

### ***Seating Arrangement***

The seating arrangement is critical when it comes to ensuring the comfort of a workstation. Ergonomic chairs can improve workers' performance by minimizing tiredness and tension. The pressure on shoulder and arm muscles can be reduced by using adjustable seats with strategically placed armrests. It can also alleviate the pain in the neck area. The use of an ergonomic chair not only allows workers to complete their tasks but it also speeds up the process (Kim et al., 2019).

H<sub>4</sub> : There is a significant relationship between seating arrangement and employee performance

### ***Ventilation System***

The ventilation system of a company helps employees work more efficiently, and vice versa. Employees may become tired and emotional if the temperature in the office is too high. Too much cold can cause musculoskeletal problems and harm employees' health. Excessive temperatures, as well as a dusty or unclean environment, are two major contributors of stress in the workplace. Extreme cold and heat, or temperature, is negatively connected with individual performance and stress levels, according to ergonomics research (Makhbul & Muhamed, 2022).

H<sub>5</sub> : There is a significant relationship between ventilation system and employee performance

### *Acoustic System*

An ergonomic workstation environment also includes acoustic elements to guarantee workers' comfort and wellness. Employees can also concentrate on their works without being distracted by noise. Noise-cancelling devices and equipment, such as glass dividers between workstations, acoustic ceilings, and printer cabinets, are required for this. Excessive and unexpected noises can damage work performance and induce emotional strain (Makhbul & Muhamed, 2022). The acoustic component of this environmental element relates to respondents' perceptions of noise, which might interfere with a person's ability to focus on their activity. Phone conversations, ringing phones, typewriters, road traffic, and organizations near a building site, and a variety of other factors could create these noises (Appel-Meulenbroek et al., 2020).

H<sub>6</sub> : There is a significant relationship between acoustic system and employee performance

### *Lightening System*

Lighting is critical for doing jobs efficiently and productively. Poor lighting system causes visual discomfort such as eye strain, wet eyes, headaches, and blurred vision. Within a company, lighting requirements vary depending on the type of work done, and it has a strong link to job dissatisfaction (Makhbul et al., 2011).

H<sub>7</sub> : There is significant relationship between lightening system and employee performance

### *Variable and its Definition*

Varieties of variables of ergonomics and employee performance are discussed in this section. 8 items of ergonomics factor and 5 items of employee performance were adapted for the study (Table 1). By the time of the study more variables need to be incorporated and listed variables below aren't only variables used in the study. The variables under SME are described in detail as follows:

**Table 1: Variable Table**

Construct	Observed Variables	Variables Notation	Explanation
Work Area Design	Comfort Working Area	WA_1	Workstation provides comfortable working area
	Comfortable	WA_3	Computer monitor, keyboard arranged in comfortable way
	Sufficiently Equipped	WA_5	Typical need is sufficiently equipped
Working Hour	Working Hour	WH_1	Working hour is long
	Rest Period	WH_2	Sufficient rest periods in working days
	Disturb	WH_3	Work duration disturbs personal life
Seating Arrangement	Repetitive Movement	SA_4	Repetitive movements for long period
	Armrest Comfortable	SA_5	Working chair has comfortable armrests
	Comfortable Furniture	SA_6	Comfortable furniture boosts productivity

Construct	Observed Variables	Variables Notation	Explanation
Ventilation System	Hot	VS_2	Interior temperature is hot
	Minimal	VS_3	Minimal ventilation at my work area
	Affect	VS_5	Room temperature affects normal productivity
Acoustic System	Distracting	AS_2	Noise distracts the work
	Effort	AS_3	Efforts in minimizing the level of noise
	Conversation	AS_4	Conversation and sound of machines distract from the work
Lightening System	Satisfactory	LS_1	Lightening at work is satisfactory
	Slightly Dark	LS_3	Lighting from the lights and window slightly dark
	Irritating Light	LS_4	Office lighting irritates the eyes
Space Management	Work Space	SM_1	Arrangement of workspace
	Multipurpose	SM_3	Workspace serves multipurpose function
	Sufficient Space	SM_4	Sufficient workspace increases performance
Employee Performance	Boost	EP_1	Standard furniture boost performance
	Great Delight	EP_3	Good spatial arrangement adds great delight
	Dissatisfied	EP_6	Long working hour dissatisfy employees

*Notes:* The items including WA\_2 and WA\_4 from construct 1; WH\_4 and WH\_5 from construct 2; SA\_1, SA\_2 and SA\_3 from construct 3; VS\_1 and VS\_4 from construct 4; AS\_1 and AS\_5 from construct 5; LS\_2 and LS\_5 from construct 6; SM\_2 from construct 7 and EP\_2, EP\_4, EP\_5, EP\_7, EP\_8 and EP\_9 from construct 8 were drop after performing Confirmatory and Explanatory Factor Analysis and these items value remains below 0.5.

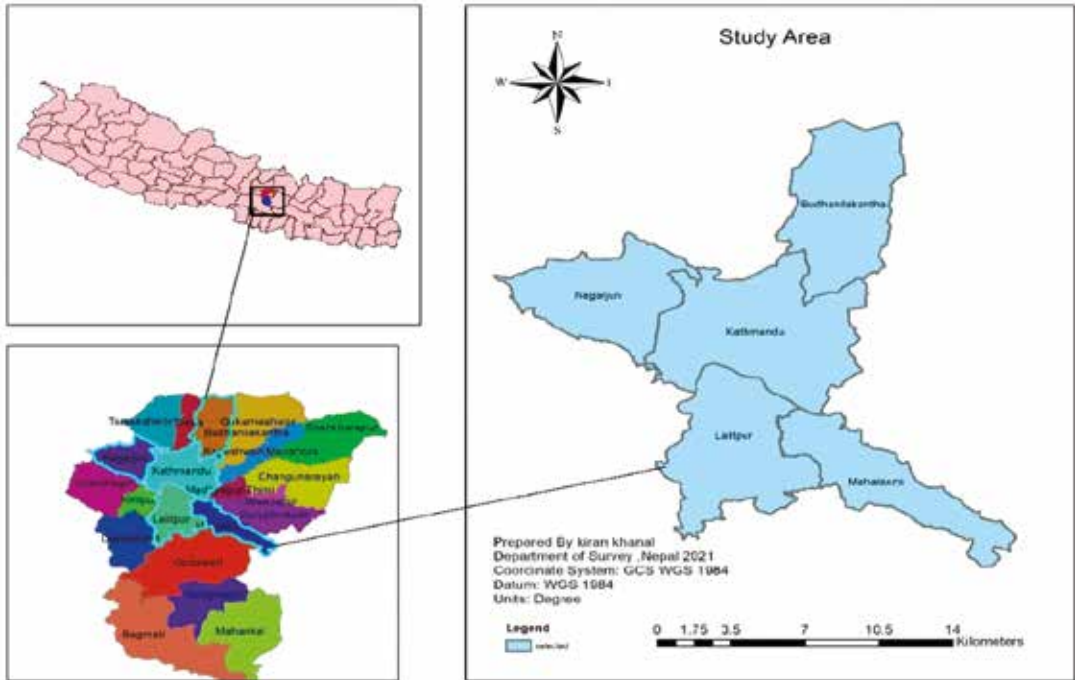
### ***Study Area and Population***

The research is concentrated on the Kathmandu valley, which comprises the districts of Kathmandu, Lalitpur, and Bhaktapur (Shrestha et al., 2020; Devkota et al., 2022). The longitudes of the Kathmandu valley are 85°11'31" and 85°31'38" east, and the latitudes are 27°32'13" and 27°49'10" north (Bhandari et al., 2021). Kathmandu, Lalitpur, and Bhaktapur, the valley's three districts, cover an area of 899 square kilometers, while the valley as a whole covers 665 square kilometers. The Kathmandu valley is bowl-shaped and encircled on all sides by the Mahabharat Mountain. The researcher chooses Kathmandu



valley (see figure 1) as the research area because people from all over the country have come to the capital, the valley has the most bank head offices and branch offices (Paudel et al., 2021). There are 28 commercial banks operating in Nepal. This study focuses on ergonomics practices in these banks as suggested by Dhakal et al. (2023). Moreover, the total number of branches of commercial banks in Kathmandu valley is 930. According to Nepal Rastra Bank (2021), a total of 40,938 individuals have employed by commercial bank all over Nepal and around 18% i.e. 7500 are employed in different commercial banks within Kathmandu valley.

**Figure 1: Study Area**



Source: Field study, GIS ArcMap

### ***Sampling, Data Collection and Analysis***

The researchers have used probability sampling and opted to choose a convenience sampling approach. Likewise, the sample size was calculated by using  $n = N * X / (X + N - 1)$  formula. Where,  $X = Z_{\alpha/2} \cdot 2 \cdot p * (1-p) / MOE$ ,  $Z_{\alpha/2}$  is that the critical value of the traditional distribution at  $\alpha/2$  (e.g., for a confidence level of 95%,  $\alpha$  is 0.05 and also the critical value is 1.96). A finite population correction has been applied to the sample size formula where  $X$  is 267. Moreover, researchers add non-respondent error 5% (i.e. 13 respondents). The final sample size is 271 for this study but due to COVID-19 most of the bank employees didn't show interest to fill up the questionnaire and researchers were in the constraints of time frame. So, only 203 sample size were collected. Lastly, data analysis was performed through descriptive analysis and for inferential analysis KOBO Toolbox, MS-Excel, SPSS version 26.0, AMOS were utilized.

## **Data Analysis and Results**

### ***Socio-Demographic Status***

This section describes the personal attributes of Kathmandu valley bankers. Several socio-demographic characteristics such as gender, age, education, position, job and experience were examined. The

findings indicate that out of 203 respondents, 50.25% are male and 49.75% are female who have at least Bachelor's degree (52.71%), working as junior assistant (33.99%) for 1-5 years (72.42%) (See table 2). Moreover, maximum number of respondents belong to the age group of 22-26 and 27-31 i.e. 34.48% representing that young people are attracted towards the banking job in the Nepal. As Devkota et al. (2021) the banking sector is considered as a lucrative sector for work after completing Management and Economics related degrees. Hence, many graduates aspire to enter this sector, as shown in this study as well Bachelors' completed respondents are getting more chance on banking sector. Table 2 shows the details.

**Table 2: Socio-demographic characteristics**

Variable	In Number	In Percentage
<b>Sex</b>		
Male	102	50.25%
Female	101	49.75%
<b>Age</b>		
22-26	70	34.48%
27-31	70	34.48%
32-36	33	16.26%
37-41	15	7.39%
42-46	9	4.44%
Above 47	6	2.95%
<b>Education Level</b>		
Higher Secondary	5	5
Bachelor's Level	107	107
Master's and Above	91	91
<b>Experience (Years)</b>		
1-5	147	72.42%
6-10	36	17.74%
11-15	14	6.89%
16-20	5	2.46%
<b>Position</b>		
Trainee Assistant	16	7.88%
Junior Assistant	69	33.99%
Assistant	40	19.70%
Senior Assistant	38	18.71%
Assistant Manager	11	5.41%
Manager	9	4.43%
Junior Officer	9	4.43%
Senior Officer	11	5.41%



## ***General Understanding on Ergonomics Practice on Workplace***

This section outlines the Nepalese Commercial Banks' general awareness of ergonomic practices. The findings indicate that employees of Nepalese commercial banks are unaware (85.22%) about the term ergonomics. The findings show that most respondents only take 15-20 minutes of breaks throughout their 8-hour workday, and they reveal that over half of respondents were dissatisfied with their working hours, with insufficient rest time being one of the factors contributing to this. They also claim that they work in hygienic workplace (79.8%) and declares that even seating arrangements have an impact on their performance in a company. Likewise, 63.05 % are unaware about the ergonomic principles that relate to the use of computer technology and majority 75.8% of banking employees believe that office chair, desk and computer affect the performance. So, these factors should be considered by the organization to boost performance of the banking employees.

## ***Impact of Ergonomics Factor on Employee Performance***

Under this section various factors about impact of ergonomics factors on the employee performance of the commercial bank are described in order to know about the present information about ergonomics. Eight variables: work area design, working hour, seating arrangement, ventilation system, Acoustic System, Lightening System, Space Management and Employee Performance are mentioned. These variables are measured in five scale under Likert scale (1 = strongly agree, 2 = Agree, 3 = Neutral, 4 = Disagree, 5 = strongly Disagree).

Within the beneath of work area design, comfort working, comfortable and sufficiently equipped are the explanatory variables used in this study. It was revealed that most of the respondents i.e. 96 agree that their banks provide the comfortable working area, where workstation computer monitor, keyboard are arranged in the comfortable way and make employees efficient to work. Similarly, working hours contains the explanatory variables such as no. of working hours, rest period and disturbance. The study revealed that most of the respondents i.e. 116 agree that working hour of the bank is long, whereas 104 respondents agree that they are not given sufficient rest period within their working days. Likewise, 107 respondents agree that working duration disturb their personal life, all these factors greatly play role in the employee effectiveness and performance which conclude that Nepalese commercial banks are unable to reduce work hour and they aren't providing sufficient rest to the employees (Basnet et al., 2023). This study contradict with the study of Deshpande (2013), revealed that 47 % of respondents are satisfied with working hour but in our study 57% of respondents agree that they are not satisfied with working hour.

Likewise, repetitive movement, armrest comfortable and comfortable furnitures are explanatory variables of seating arrangement where the findings revealed that most of the respondents i.e. 155 agree that they do repetitive movement work for long period of time, whereas 149 respondents agree that working chairs in their banks contain comfortable armrest. Likewise, 157 respondents agree that adequate and comfortable furnitures affect the productivity positively. It tells that Nepalese banks have ergonomics-based seats as most of the respondents agree that their banks have comfortable armrest. Employees are aware of seating arrangement affecting their performance. The study conducted in Bangladesh by Khan (2022), revealed that 61% of respondents disagree that seating arrangement i.e. working chair and furniture are not comfortable which contradicts with this study.

Moreover, Ventilation System has explanatory variables such as hot, minimal and affect used in this study. The findings revealed that most of the respondents i.e. 89 are neutral about the temperature as neither hot nor cold in their workstation, whereas 135 respondents agree that there is minimal

ventilation at the work area. This shows that Nepalese banks are unable to create favorable air temperature condition in the work area. Likewise, 150 respondents agree that room temperature of the work area affect the normal productivity level. The study conducted by Pickson et al. (2017), revealed that 37.5% of respondents are satisfied with temperature and ventilation system of the organization as their organization pay concern in the ventilation system while designing workplace.

Similarly, Acoustic System consists of distracting, effort and conversation as the explanatory variables whose result indicates that most of the respondents i.e. 122 agree that noise in the workplace distract them from their work. At the same time 102 respondents agree that their organization makes effort in minimizing the level of noise in the surrounding of workstation so that employee can work in noise free environment. Likewise, 116 respondents agree that the sound of the phone, conversation and the machines in the organization distract them from doing work. Thus, this study can conclude that bank hadn't designed their workplace on the acoustic sounding model which may affect the employee performance as they cannot fully concentrate on their work.

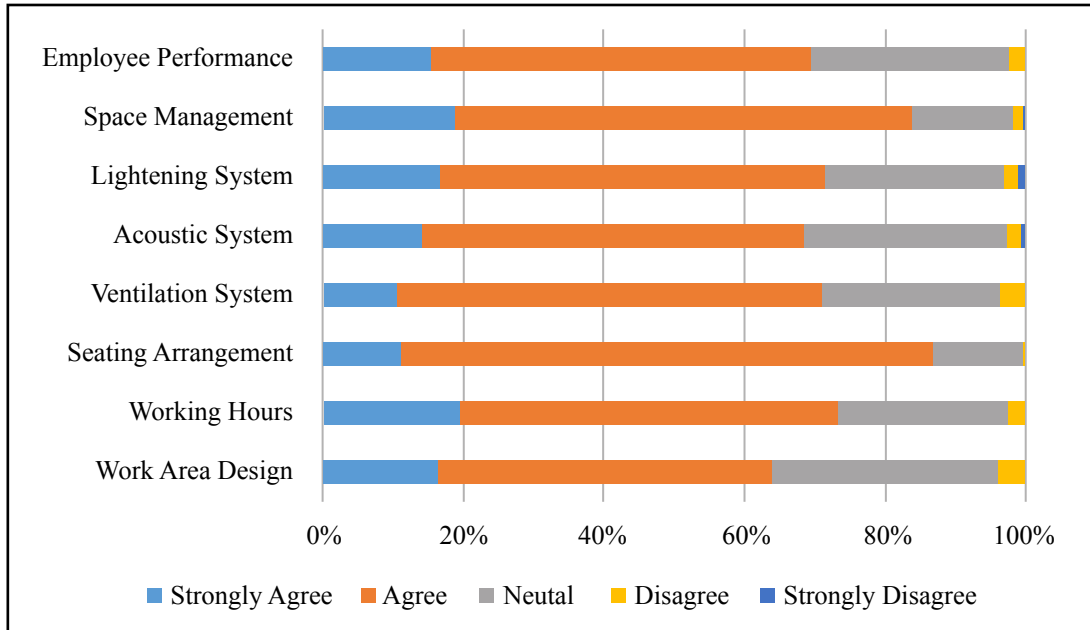
Likewise, Lightening System includes satisfactory, slightly dark and irritating light as the explanatory variables. The result indicates that most of the respondents i.e. 122 agree that lighting at their workplace is satisfactory only, 102 respondents agree that lighting from the lights and the windows of the organization is slightly dark. Similarly, 110 respondents agree that lighting of the organization irritates and blinding their eyes. This study concludes that Nepalese banks are trying to have proper lighting system but result isn't satisfactory. As employees spend more than 8 hours in the bank but their workstation is located on that place where sun light cannot reach. Lack of sunlight leads to the deficiency in vitamin D which may increase absenteeism and affect the employee performance.

Moreover, space management has explanatory variables such as work space, multipurpose and sufficient space. The result revealed that, most of the respondents i.e. 133 agree that their work station has a comfortable workspace, 133 respondents agree that the arrangement of the workspace and seat in their workstation are done in proper way. Likewise, 130 respondents agree or believe that sufficient space on their workplace increases the work performance and productivity. This study concludes that Nepalese banks are concerned about the management of space for the efficient workflow and bank employees also believe good space and spatial arrangement increase the productivity.

Likewise, employee performance includes boost, great delight and dissatisfied as the explanatory variables. The finding under this variable revealed that most of the respondents i.e. 113 agree that sufficiently equipped office with ergonomics furniture increase the employee performance as they feel comfort while doing work. Similarly, 104 respondents agree that with good spatial arrangement in the office, work is made a great delight for them and increase their productivity on work and lead to the increment in employee performance. Likewise, 112 respondents agree that facing a long working hour feel dissatisfied and it negatively affects the performance. The study concludes that most of the employees believe ergonomics factor affect their performance. The study conducted by Sheila (2020) shows that 51 % of respondents agree that office equipped with ergonomics furniture boost employee performance, where as 43.22 % of respondents agree that good spatial arrangement made work more delight and improve performance. Similarly, 40.12 % of respondents agree that facing long work hour made dissatisfied and affect the performance.

The overall information about the ergonomics factor influencing employee performance can be further elaborated in figure 2. Most of the variables are above 3.5, it indicates that ergonomics factors influence the employee performance.

**Figure 2: Overall discussion of variables**



Challenges faced by banking employees and Managerial solution to mitigate bad ergonomics challenges in working environment

This study investigates about the problem face by bank employees due to the bad work environment i.e. workplace ergonomics. Results indicates that 88% of respondents face the health-related problems due to bad working environment, where as 12% of respondents oppose that they hadn't faced the problem related to health due to bad ergonomics workplace. Similarly, out of 203 respondents who were asked multiple choice question, majority (46.31%) of employees feel physically exhausted and mental stress accounting to 45.31% followed by back pain (45.32%) (see table 3).

**Table 3: Problems Due to Bad Ergonomics Workplace**

Problem	No of respondents	Percentage
Physically Exhausted	94	46.31%
Mental Stress	94	46.31%
Back Pain	92	45.32%
Eye Stress	84	41.38%
Neck Pain	45	22.17%
Visual Discomfort	39	19.21%
Lack of Vitamin D (Sunlight)	36	17.73%
Frequently Sickness	33	16.26%

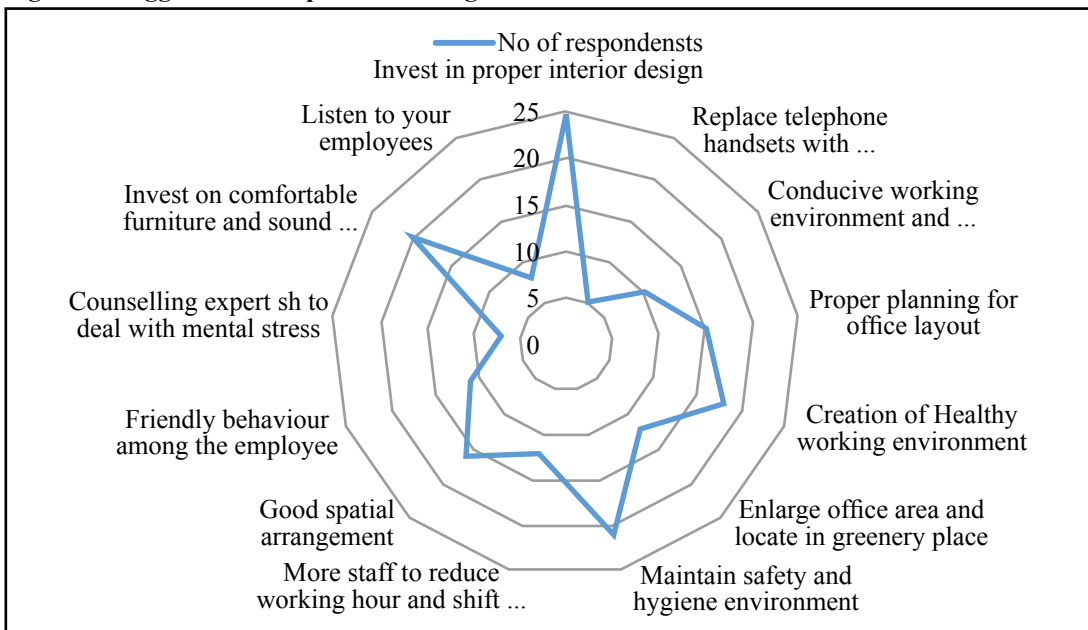
Source: Field Survey

Respondents were asked whether the challenges due to bad ergonomics could be manageable in Nepalese commercial banks. The result indicates that 83% of respondents believe such challenges can

be manageable by implementing friendly working environment (16.75%), properly managed work environment including proper seat arrangement (14.78%), organization should have the workstation in the open building for the presence of sunlight and fresh air (11.82%), workplace should design accords to the employees' comfort (8.37%), good furniture i.e. comfortable chair with proper armrest (7.39%), reduce in work hour (5.91%) and work load (4.93%), flexible working hour and periodic rest time system (5.42 %), proper lighting system with ventilated room (4.93%), renovation of workplace (3.94%), proper brightness adjustment of computer and periodic break (3.94 %), entertainment factors (1.97 %) can solve the problems that occur due to bad ergonomics workplace.

Similarly, respondents were asked about suggestion to improve the existing working environment. The result shows that respondents think to invest in proper interior design, good spatial arrangement, friendly behavior among employees, enlarging office area, maintaining safety and hygiene environment, creation of healthy work environment and counselling expert should have kept by the bank to deal with mental stress. Some of the other suggestion are well-designed ergonomic desk setups allow employees to move naturally and sit in an aligned position that reduces stress on their bodies and listen to employees when they express concerns about work-related discomfort (figure 3).

**Figure 3: Suggestion to Improve Working Environment**



Source: Field Survey

### ***Inferential Analysis***

#### **Summary Statistics and Exploratory Factor Analysis (EFA)**

Results of the descriptive study disclosed that the mean value is between 3.56 and 4.08 and standard deviation lies in the range from 0.49 to 0.78 indicates that the response has low dispersion. Likewise, the value of skewness of data lies from -2 to +2 and all the measure of kurtosis lies in between -3 to +3 indicating that data is free from normality problem. Exploratory analysis is the statistical approach for summarizing data into a smaller number of summary variables and exploring into the underlying theoretical framework (Hidayat et al., 2018). The Kaiser-Meyer-Olkin sample adequacy measure (KMO) is 0.872 > 0.7 and has the p-value of 0.000 for the Bartlett's test of sphericity which is less than 0.05, indicating that there is no problem with data dependability and validity.

### Common Method Bias and Confirmatory Factor Analysis

CMB occurs when the same measurement method is used to estimate the relationships between two or more constructs. The single factor test of Harman is used to evaluate if the study exhibits common method bias. The overall variation for a single element in this study is 38.22 %, which is less than 50%, indicating that the study is free of common method bias. Similarly, CFA is employed to test the goodness of fit, and metrics such as CMIN/DF, RMR, RMSEA, GFI, IFT, TLI, and CFI were utilized where CMIN/DF (1.893<5), RMR (0.025<0.08), IFI (0.946>0.90), GFI (0.861>0.80), CFI (0.945>0.90), TLI (0.932>0.90) and RMSEA (0.067<0.08) indicate the good fit. Thus, this study has excellent model fit since all of the indicators meet the requirements for good fitting.

### Measurement Model

In the form of a linear mixture, the measurement model quantifies the interactions between hypothetical frameworks which may or may not be quantifiable components and observed variables that represent a certain imaginary construct. Convergence validity and discriminant validity were used to establish the data's reliability and validity, as indicated in table-4. The data must meet the conditions of CR>0.70 and AVE>0.50 in order to verify convergence validity. Similarly, the data must meet the conditions of AVE >MSE and square root of AVE > correlation to indicate discriminant validity, which is met. Thus, the result of this investigation exhibits both convergence and discriminant validity (table 4). Cronbach's Alpha is used to measure internal consistency. The higher value of Cronbach's alpha indicates greater internal consistency. Our finding revealed that the value of Cronbach's alpha is greater than 0.80 that represents good internal consistency among variables and the table 5 shows the latent construct correlation of variables.

**Table 4: Reliability and Validity**

Construct	Indicators	Factor Loading	Cronbach's Alpha	CR	AVE	MSV
Work area design	WA1	.753	0.878	0.914	0.781	0.196
	WA3	.895				
	WA5	.806				
Working hour	WH1	.714	0.878	0.886	0.723	0.340
	WH2	.885				
	WH3	.875				
Seating arrangement	SA4	.762	0.811	0.839	0.635	0.022
	SA5	.765				
	SA6	.775				
Ventilation system	VS2	.748	0.788	0.795	0.567	0.466
	VS3	.778				
	VS5	.691				
Acoustic system	AS2	.836	0.914	0.921	0.795	0.226
	AS3	.861				
	AS4	.890				

Construct	Indicators	Factor Loading	Cronbach's Alpha	CR	AVE	MSV
Lightening system	LS1	.908	0.949	0.954	0.873	0.300
	LS3	.911				
	LS4	.904				
Space management	SM1	.896	0.918	0.941	0.841	0.008
	SM3	.873				
	SM4	.867				
Employee Performance	EP1	.810	0.902	0.891	0.732	0.466
	EP3	.861				
	EP6	.826				

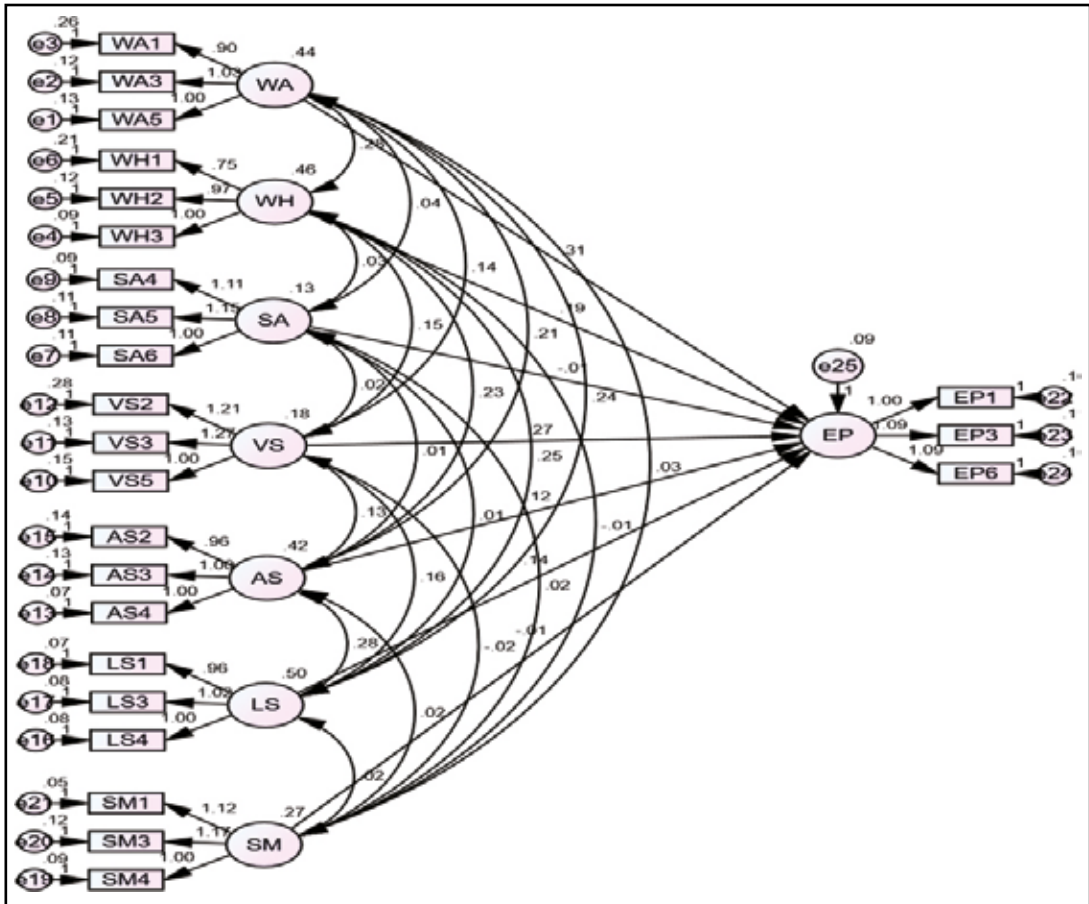
**Table 5: Latent Construct Correlation**

	SM	WA	WH	SA	VS	AS	LS	EP
<b>SM</b>	<b>0.893</b>							
<b>WA</b>	0.097	<b>0.846</b>						
<b>WH</b>	-0.020	0.628	<b>0.851</b>					
<b>SA</b>	0.126	0.149	0.108	<b>0.768</b>				
<b>VS</b>	-0.077	0.506	0.531	0.102	<b>0.756</b>			
<b>AS</b>	0.059	0.501	0.526	0.032	0.465	<b>0.885</b>		
<b>LS</b>	0.060	0.515	0.526	0.030	0.553	0.605	<b>0.928</b>	
<b>EP</b>	0.023	0.747	0.709	0.100	0.651	0.619	0.657	<b>0.869</b>

### *Path Analysis and Hypothesis Testing*

This study is based on the responses of 203 people, and it considers 8 constructs and 24 variables following a trial and error approach. The results of this study are based on the output of the AMOS software, which was used to conduct the path analysis. This model has three variables: latent variables, observable variables, and error variables, as seen in figure 4.

**Figure 4: Path Analysis**



This section looks at the hypothesis statements to evaluate if the study’s findings are statistically significant. The outcomes of this procedure will also determine whether hypotheses on which this research is based should be accepted or rejected. Table 6 shows that only five are significant and other were insignificant.

**Table 6: Hypotheses Table**

Hypotheses	Estimate	S.E	C.R	P	Hypothesis result
H <sub>1</sub> : Space management → Employee performance	-.010	.053	-.194	.846	Insignificant
H <sub>2</sub> : Working hour → Employee performance	.190	.061	3.143	.002	Significant
H <sub>3</sub> : Work area design → Employee performance	.311	.063	4.991	.001	Significant
H <sub>4</sub> : Seating arrangement → Employee performance	-.009	.081	-.114	.909	Insignificant
H <sub>5</sub> : Ventilation System → Employee performance	.272	.098	2.784	.005	Significant
H <sub>6</sub> : Acoustic system → Employee performance	.116	.058	2.011	.044	Significant
H <sub>7</sub> : Lightening system → Employee performance	.139	.055	2.511	.012	Significant



## Discussion

This study has revealed several interesting findings that among the respondents 50.25% male, 52.71% with at least a Bachelor's degree, 33.99% junior assistants, 72.42% with 1-5 years' experience, who are predominantly aged 22-31. Aligned to Solanki and Mehta (2022) in their study also observed that the majority of respondents are male; similarly as Sheila (2020) in their study observed respondents with the age group of 20 -37; and Makhbul et al. (2022) found bulk of respondents have the Bachelor's degree in their respective study. Interesting finding of this study is that the employees of Nepalese commercial banks are unaware (85.22%) about the term ergonomics, which is similar to the case of other Asian context. In their study, Agnihotri et al. (2018) in India and Khan (2022) in Bangladesh disclose the fact that even their surveyed respondents were also unaware about term ergonomics. Based on the results, it can be generalized that most of the employees in South Asia are unaware about the term ergonomics. Findings align with previous research, such as Deshpande (2013) Indian study indicating mixed comfort levels in workstations. However, disparities arise, as Khan's (2022) Bangladeshi study contrasts the comfort of seating arrangements. Additionally, Pickson et al. (2017) report varying satisfaction with organizational ventilation systems, highlighting divergent workplace concerns compared to Deshpande (2013) study on working hours satisfaction. Awareness promotion could be important aspects of the government and concern authorities to develop various ergonomics factors such as physical factor, cognitive factor, organizational factor, and environmental factor, which affect performance of employees. Studies mentioned that such awareness and good practices helps to enhance performance of the employees. Comfortable furniture as described by Ravindran (2020) working hour (Makhbul & Muhamed, 2022) and clean workplace (Keer et al., 2018) is vital for employee performance and is likely to have a significant impact. It can be concluded that the mentioned ergonomic factors should be considered by the organization to boost performance of employees.

For the hypotheses testing, relationship between variables were tested and established using the reliability test and multiple linear correlations. Among 7 hypotheses tested, 5 were satisfied and remaining 2 were unsatisfied (see table 6). The accepted hypotheses 2 and 3 state that working hours and work area design affect the employee productivity and performance. These 2 hypotheses provide the similar results to that observed by Khan (2022) flexible working hour, sufficient rest period on working days, comfortable working area and typical need in the working area will help to boost the employee performance as supported by the study of Makhbul and Muhamed (2022). Long working hour demotivates the employees as a result of fatigue and in the managerial position due to diverse responsibility it affects the personal life of employees which would negatively affect the employee performance (Deshpande, 2013).

From hypotheses 5, 6, and 7, it can be stated that ventilation system, acoustic system, and lightening system affect the employee performance. It means that temperature of workstation, control over air condition, air passing ventilation system, noise level from people and machines, flexible lightening in work station, level of sunlight on the workplace play the major role for employee illness and increase the absenteeism. Increment in the absenteeism degrades the productivity and performance of employees. These partially contradict the results of Raja et al. (2019) who observe no relationship between ventilation/ temperature of workstation and employee performance and other two hypotheses acoustic and lightening system affirm this study.

The insignificant hypotheses 1 and 4 state that space management and seating arrangement of workstation affect the employee performance. It means that adjustable chair, repetitive movement on work, comfortable armrest, congested workplace, workplace serving for multi-purpose function affect the employee performance (Ahmadi et al., 2015). Hypothesis 1 contradicts with the study conducted by Raja et al. (2019) who observe the relationship between space management and employee performance. The study conducted by Riaz et al. (2017) revealed that the significant relationship between seating arrangement and employee performance contradicts with our study as there is insignificant relationship

between seating arrangement and employee performance.

This study tested theory of ergonomics and observed that five out of seven constructs were significant, indicating that the change we want to measure were observed with the help of responses received. It indicates that they hold true in the context of Nepal. In order to confirm and compare the study, previous research in the field of ergonomics were analyzed in this study and supported the findings of this study to determine if there were any commonalities or difference in finding.

## Conclusion and Recommendations

This study investigates the impact of ergonomics practices on commercial banks' employee performance, employee awareness on ergonomics practices in their workplace, problem faced by employee due to bad ergonomics workplace and management strategy for ergonomics practice to enhance employee performance. The findings also revealed that employees of Nepalese commercial banks are almost unaware about the term ergonomics. Bank employees express dissatisfaction with working hours, insufficient rest, and discomfort caused by office furniture. Despite approval for comfortable workstations, the study reveals a prevailing issue of extended work hours, particularly in private banks, disrupting personal lives. While spatial management and furniture garner positive feedback, concerns arise regarding inadequate ventilation and distracting noise, impacting employees' concentration. Lighting conditions receive mixed reviews with satisfactory lighting but complaints of darkness and eye irritation. The study reveals that working hours, work area design, ventilation system, acoustic system and lighting system impart significant impact on employee performance in the bank sector employees.

Employees face health issues, including physical exhaustion, mental stress, and back pain due to a poor working environment. Respondents suggest mitigating challenges by implementing a friendly work environment, proper seat arrangements, open buildings for sunlight and fresh air, employee-centric workplace design, comfortable furniture, reduced work hours and workload, flexible schedules, periodic breaks, adequate lighting and ventilation, workplace renovations and entertainment options. They emphasize the importance of well-designed ergonomic setups, allowing natural movement and aligned sitting positions, and stress the need for employers to listen to and address employees' concerns about work-related discomfort. The results of multivariate analysis indicate established relationships between variables. Out of the 7 tested hypotheses, 5 were satisfied, affirming the impact of working hours, work area design, ventilation, acoustics, and lighting on employee performance. The study underscores the relevance of ergonomic theories in Nepal, emphasizing factors influencing employees' illness, absenteeism and overall productivity. While ergonomics adoption in banks is in its early stage, increasing awareness among firms and employees enhance an alternative strategy to increase employees' productivity and performance. This study recommends ergonomics related training to employees, adoption of ergonomics intervention as must and government should conduct research and awareness programs.

The findings of this study provide valuable insights for multiple stakeholders, including the Ministry of Industry, Commerce, and Supplies, the National Planning Commission, the Bankers Association of Nepal, government bodies at central, provincial, and local levels, decision-makers, and development partners associated with the banking sector. These insights primarily involve raising awareness about ergonomic practices in various office setups. However, it's essential to acknowledge that ergonomics encompasses physical, cognitive and organizational domains. Future research endeavors should extend their focus to the cognitive and organizational aspects of ergonomics. Moreover, researchers can apply the methodologies developed in this paper to assess ergonomic practices among employees in organizations beyond the banking sector. This approach would provide a broader perspective and enhance our understanding of job-related ergonomic issues, contributing to the overall improvement of current workplace conditions.

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