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Neha Arya
M.Sc. Research Scholar,
Department of Family Resource
Management, College of Home
Science, G.B.P.U.A.T.,
Pantnagar, Uttarakhand, India

Seema Kwatra
Professor, Department of Family
Resource Management, College
of Home Science, G.B.P.U.A.T.,
Pantnagar, Uttarakhand, India

Workstation assessment and suggestions to optimize comfort level for banks employees in Udham Singh Nagar district

Neha Arya and Seema Kwatra

Abstract

Banking sector is one of the highly demanding sectors where employees are pressurised to work for more than 8 hours in static position in front of computers. Workstation is an important element in banking sector which has direct impact on employees performance and health. Thus the present study was planned to assess the workstation and suggest improvements to optimize comfort for bank employees. The study was carried out purposively in selected Public Sector Banks (SBI, PNB, UNION) of Pantnagar and Rudrapur in Udham Singh Nagar District. A total of 90 employees were selected from 13 banks for collecting descriptive data. Out of total, 23 female and 67 male employees were assessed. For assessing computer workstation (furniture, equipments or tools), postural and working environment for bank employees, Office Ergonomic Hazards Identification Checklist was adopted. Dutch Musculoskeletal Questionnaire was adopted for assessing general health and associated musculoskeletal discomfort among bank employees. On the bases of results it was found that (74.4 percent) employees reported that computer workstation was not equipped with adjustable design features. Employees were forced to adjust with fixed design features and had complaints related to pain in lower back, neck and shoulders due to poor workplace setting. Majority (81.1 percent) of the employees reported that chairs were not equipped with lumbar support that cause pain in lower back of the employees. None of them had palm support on keyboard surface which cause pain in wrist and palm portion of the hand of the employees. 68.88 percent employees reported that armrest was not designed appropriately. It was observed that (87.7 percent) of the employees worked in slightly bending posture with forwarded neck for long period of time, that cause pain in upper extremities of the body. Around 68.8 percent of the employees stated that they were not able to take breaks between work due to high work load.

Keywords: Bank employees, computer, ergonomic hazard, workstation, awkward posture, pain & discomfort

Introduction

In recent years rapid use of computers has changed the work environment drastically. Paper work is replaced by computer based work and now computer is a basic need for many working sectors where work is being carried out on computers. Therefore computer based workstations should be designed for suitability. For designing any workstation Ergonomics play a vital role for enhancing the efficiency and productivity of the employees, keeping in mind the capabilities and limitations of the worker. A well designed workstation is an basic requirement in any working sector to perform any task in a better way. Banking sector is one of them where importance of workstation is not considered seriously, employees were unaware about the health problems associated with the poor workstation. Workload is very high in banks and employees have to spend 8 to 9 hours in banks and do repetitive tasks for the whole day in static position in front of computers. Therefore workstation is considered as a most important key element in banks. If the workstation is not equipped with adjustable chairs with lumbar support, proper arm rest, keyboard with palm support, ergonomically designed mouse, adjustable desk etc. it will cause fatigue, frustration, anger and end with pain or injury in upper and lower extremities. That will affect the whole process of work and employees. Employees are force to work uncomfortably and are adjust with the workplace, which affects their work and faced many health related problems. Shikdar and Sawaqed (2003) [10] stated that ergonomics play important role in workplace design therefore little attention and consideration has been given to ergonomics when designing workstation.

Postural discomfort is very common among all working sectors having tedious job for long hours in static position specially in banks to perform task in front of computers without taking breaks that leads to severe health problems.

Corresponding Author:
Neha Arya
M.Sc. Research Scholar,
Department of Family Resource
Management, College of Home
Science, G.B.P.U.A.T.,
Pantnagar, Uttarakhand, India

Sangwan *et al.* (2005)^[7] stated that incorrect body posture for long duration may cause tiredness and fatigue that may increase the energy expenditure, leading to permanent damage of the body. Bank employees are unaware about the ill effects of wrong working posture on their health. Gangopadhyay *et al.* (2003)^[4] stated that prolonged work activity, high repetitiveness and remaining in static position for long period of time may increase the risk of cumulative trauma disorder (CTD).

If workstation, equipment and tools are to be fit for the worker it will reduce the physical and mental stress on worker and eliminate work related musculoskeletal disorders. Along with that poor lighting, temperature, humidity, noise level at workplace also affects the employee, physically and mentally. Akinbinu and Mashalla (2014)^[1] revealed that the employees who spent six to eight hours on computers daily having high computer vision syndrome then those employees who used computers for six hours daily.

Scope of the study

This study helps to know the existing workstation design, including workplace setting, tools/ equipment used, working posture and environmental conditions in banks. Poorly designed workstation leads to fatigue, frustration and ends with painful and costly injury. Therefore there is an emerging need for proper workstation design for enhancing the work efficiency of the employees and productivity of the organization. This study also try to bring out some suggestions to optimize comfort level for banks employees that will improve their health as well as their performance.

The present study was planned with the following objectives-

- To assess general health and associated musculoskeletal discomfort among bank employees.
- Assessment of workstation and its improvements for optimization of comfort among bank employees.
- Assessment of working posture and working environment of the bank employees.

➤ **Pain/ discomfort among Bank employees (sometimes and regularly) at work**

Material and methods

The present study was carried out purposively in selected Public sector banks of Pantnagar and Rudrapur in Udham Singh Nagar District of Uttarakhand in 2016-2017. The locale of Udham Singh Nagar district was purposively selected. A total of 90 employees were selected for descriptive data, out of which 23 were female and 67 were male employees. For assessing computer workstation (furniture, equipments or tools), postural and working environment for bank employees, Office Ergonomic Hazards Identification Checklist was adopted. Dutch Musculoskeletal Questionnaire was adopted for assessing general health and associated musculoskeletal discomfort among bank employees.

Result and discussion

Dutch Musculoskeletal Questionnaire was adopted for assessing general health and associated musculoskeletal discomfort among bank employees. It was found that 49.25 percent of male employees and 30.43 percent of female employees health was good. More than one third 47.76 percent and 34.78 percent of male and female employees and 44.44 percent of the total employees reported that they were physically very tired at the end of the day respectively. While 56.71 percent of male and 39.13 of female employees complained that they were mentally very tired at the end of the day. Out of total selected employees 52.22 percent of employees were mentally exhausted at the end of the day. High work load, wok pressure and shortage of staff were main reason for this. Around more than half of the male employees, 47.82 percent of female employees and 52.22 percent of the total employees reported that they were tensed at work. While 56.71 percent and 52.17 percent of male and female employees, nearly 55.55 percent of the total employees were stressed often due to high work load respectively. Only 23.88 percent of male and 21.73 percent of female employees and 23.33 percent of total employees reported that they consulted doctors in past six months.

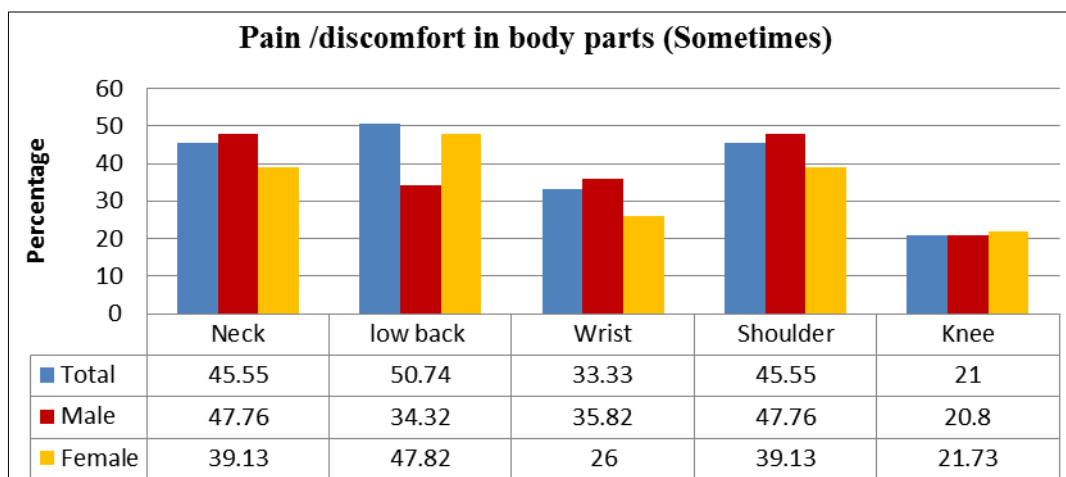


Fig 1: Percentage distribution of employees with respect to pain / discomfort (Sometimes)

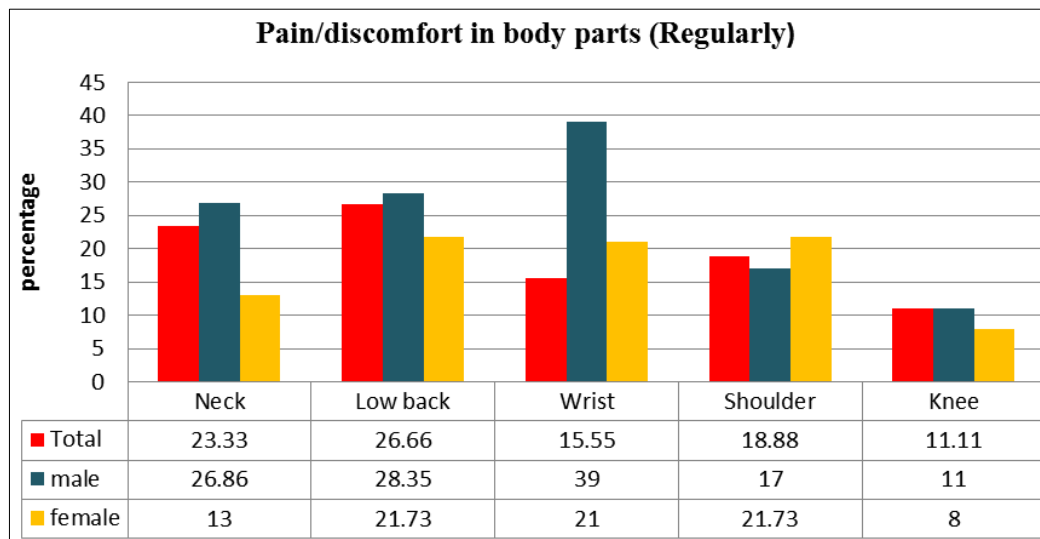


Fig 2: Percentage distribution of employees with respect to pain / discomfort (Regularly)

Office Ergonomics Hazard Identification Checklist was adopted for assessing the workstation of bank employees. The data given in Table 1 denoted that out of total employees 71.64 percent and 82.6 percent male and female employees reported that their chairs did not have adjustable design features respectively. Out of total 74.4 percent employees reported that their chairs were not equipped with adjustable design features. Majority 79.10 percent of male employees and 86.96 percent female employees stated that their chairs did not have adjustable lumbar support. Out of total 81.1 percent employees said that their chairs were not equipped with lumbar support and had complaints related to their upper extremities. They were suffered from pain in shoulders, neck, upper and lower back due to prolonged seated posture for more than 8-9 hours without having any back support. 3/4th of the male and 73.91 percent females employees said that seat pan was poorly designed. Majority 74.44 percent of total employees reported that seat pan was not designed properly in their chairs and were not satisfied while seated on chair. Rempel *et al.* (2006)^[6] stated that correctly adjusted chair has shown to significant reduction in neck pain for seated workers.

Table 2 revealed that out of the total employees none of the employees had monitors with adjustable features. Only 52.22 percent employees had front facing monitor. While rest of employees had monitors placed on side of the desk as per their availability of space for work. It was observed that out of total employees, 46.66 percent of employees positioned their keyboard in front of the desk. While, 53.33 percent disagreed with the statement. The reason they stated that according to the position of monitor on desk they had to adjust their keyboard to work easily. It was observed that out of total employees, 43.33 percent of employees were found to place mouse were close to them when they are performing any task. The rest 56.66 percent employee's mouse were not close to them.

Table 3 revealed that more than half of the total employees reported that keyboard surface was not adjustable. Out of total employees, no one had palm rest on keyboard surface and employees had pain in wrist and palm portion of the hand. Similar results were shown by Chandwani *et al.* (2019)^[3], that sustained static and awkward posture, inadequate chair

design, placement of keyboard and mouse, non availability of footrest were considered as most common cause for musculoskeletal discomfort.

Table 3 stated that in all selected banks it was found that desk were at fixed height no one was adjustable. Fifty five percent of employees stated that there was not adequate space for comfortable sitting and movement of knee.

The results are in line with Chandwani *et al.* (2019)^[3] who revealed in his study that desk workers were not satisfied with the comfort, material, height, adjustability and ease of the use of tables and chair while working with computer.

From table 4 it was found that out of total employees majority (87.77 percent) of employees carried out the work with slight bending posture while performing the task and suffered from pain in upper extremities. Similarly Sulainman *et al.* (2015)^[11] stated that lower and upper back pain and muscles pain could be due to incorrect seating, which also affects the cervical spine and neck muscles that leading to pain. Around 47.77 percent of total employees had slightly twisted posture while work. This may be due to side positioning of the computer and keyboard.

Out of total employees 70 percent of the employees had forwarded neck posture that cause pain in neck among employees. The results are in line with Cagnie *et al.* (2007)^[12] who revealed in his study that computer height has shown to affect neck alignment, with prolonged neck posture is either bent forward or backward, associated with neck pain in computer users. Overall it was found that more than half of the employees were having acceptable mouse posture while working with mouse and rest of employees working posture was not acceptable. Out of total only one third of the employees had upright posture with their head, neck were relaxed, upright and chin 'in' and elbows bent at 90 degree when working in seating posture. Remaining 65.55 percent employees posture were not acceptable. 55.55 percent employees denied that their feet were not reaching to the floor surface because chairs had no adjustable features. More than half of employees reported that foot rest were not available so they were forced to keep their feet on chairs foot stand. Majority 68.8 percent employees reported that they were not able to take breaks between work due to high work load nor any time for refreshments while working.

Table 1: Office Ergonomics Hazard Identification Checklist (chair) (n= 90)

	Chair	Males (n = 67)		Females (n = 23)		Total	
		Yes	No	Yes	No	Yes	No
1	Familiar with adjustment mechanism on chair	41 (61.19)	26 (38.80)	10 (43.47)	13 (56.52)	51 (56.66)	39 (43.33)
2.	Chair equipped with adjustable design features	19 (28.35)	48 (71.64)	4 (17.39)	19 (82.6)	23 (25.55)	67 (74.4)
3.	Adjustment mechanism in good working order	12 (17.91)	55 (82.08)	4 (17.39)	19 (82.6)	23 (25.55)	67 (74.4)
4.	Adequate, adjustable lumbar support in chair	14 (20.89)	53 (79.10)	3 (13.04)	20 (86.96)	17 (18.88)	73 (81.1)
5	Seat pan well-designed	17 (25.37)	50 (74.62)	6 (26.08)	17 (73.91)	23 (25.55)	67 (74.44)
6.	Chair's seat be adjusted in height	35 (52.23)	32 (47.76)	12 (52.11)	11 (47.8)	47 (52.22)	43 (47.77)
7.	Armrest well designed	21 (31.34)	46 (68.65)	7 (30.43)	16 (69.56)	28 (31.11)	62 (68.88)
8.	Casters appropriate for the floor surface	36 (53.73)	31 (46.26)	10 (43.4)	13 (56.52)	46 (51.11)	44 (48.88)
9.	Back rest is at angle of 100 degrees to seat pan with hand fist gap between the seat pan and the back rest	14 (20.89)	53 (79.10)	3 (13.04)	20 (86.96)	17 (18.88)	73 (81.1)
10	1-3 fingers width clearance between the front edge of the seat and the back of the knees	21 (31.34)	46 (68.65)	8 (34.78)	15 (65.21)	29 (32.22)	61 (67.7)

Note: Values in parenthesis indicates percentage

Table 2: Office Ergonomics Hazard Identification Checklist (Monitor, Keyboard and Mouse), (n=90)

	Monitor	Males (n = 67)		Females (n = 23)		Total	
		Yes	No	Yes	No	Yes	No
1.	Monitor height can be adjustable	Nil	67 (100)	Nil	23 (100)	Nil	90 (100)
2.	Monitor position directly in front so letter 'H' on the keyboard aligned with the centre of the monitor	32 (47.76)	35 (52.23)	15 (43.47)	8 (34.78)	47 (52.22)	43 (47.7)
3.	Monitor screen adjust at eye level or slightly lower	Nil	67 (100)	Nil	23 (100)	Nil	90 (100)
4.	Viewing distance approximately at 18-24 inches	32 (47.76)	35 (52.23)	13 (56.52)	10 (43.47)	45 (50)	45 (50)
5.	Comfortable level of brightness, contrast and font size	52 (77.61)	15 (22.38)	13 (56.52)	10 (43.47)	64 (71.11)	26 (28.8)
	Keyboard						
1.	Keyboard is positioned directly in front at a distance from the edge of the desk that feels comfortable and supportive for arms/shoulders	27 (40.30)	40 (59.70)	15 (65.22)	8 (34.78)	42 (46.66)	48 (53.33)
2.	Wrists are straight (not bent up / down/to the side) while using the keyboard	27 (40.30)	40 (59.70)	14 (60.87)	9 (39.13)	41 (45.55)	49 (54.44)
3.	Keyboard is appropriate for the work being performed	27 (40.30)	40 (59.70)	13 (56.52)	10 (43.48)	40 (44.44)	50 (55.55)
4.	Fingers are slightly bent and strike the keys softly when keying	29 (43.28)	38 (56.72)	14 (60.87)	9 (39.13)	43 (47.77)	47 (52.22)
5.	Keyboard surface have a well designed palm rest	Nil	67 (100)	Nil	23 (100)	Nil	90 (100)
6.	Adequate space for both the keyboard and the mouse on the same surface	25 (37.31)	42 (62.69)	15 (65.22)	8 (34.78)	40 (44.44)	50 (55.55)
7.	Mouse is located close to the employee	26 (38.81)	41 (61.19)	13 (56.52)	10 (43.48)	39 (43.33)	51 (56.66)
8.	Enough space for comfortable mouse use	24 (35.82)	43 (64.18)	11 (47.83)	12 (52.17)	35 (38.88)	55 (61.11)

Note: Values in parenthesis indicates percentage.

Table 3: Office ergonomics hazard identification checklist (Keyboard surface, desk and work surface/ equipment layout), (n = 90)

S. No.	Keyboard Surface	Males (n = 67)		Females (n = 23)		Total	
		Yes	No	Yes	No	Yes	No
1.	Keyboard is placed at an optimal height for keyboarding	28 (41.79)	39 (58.21)	16 (69.57)	7 (30.43)	44 (48.88)	46 (51.11)
2.	Solid and stable support for the keyboard when keying tasks	60 (89.55)	7 (10.44)	17 (78.26)	6 (21.74)	77 (85.55)	13 (14.44)
3.	Adequate space for both the keyboard and the mouse on the same surface	25 (37.31)	42 (62.69)	15 (65.22)	8 (34.78)	40 (44.44)	50 (55.55)
4.	Keyboard surface adjustable	28 (41.7)	39 (58.2)	15 (65.22)	8 (34.78)	43 (47.77)	47 (52.22)

5.	Keyboard surface have a well designed palm rest	Nil	67 (100)	Nil	23 (100)	Nil	90 100
Desk							
1.	The (seated) desk, whether fixed height	67 (100)	Nil	23 (100)	Nil	90 (100)	Nil
2.	Cable holder or other fixture encroaching into leg room	27 (40.30)	40 (59.70)	13 (56.52)	10 (43.48)	63 (70)	27 (30)
3.	Store items under the desk that encroach on this space or compromise posture	27 (40.30)	40 (59.70)	14 (60.87)	9 (39.13)	58 (64.44)	32 (35)
Work Surface / Equipment Layout							
1.	Height of the work surface appropriate for paper-work	27 (40.30)	40 (59.70)	15 (65.22)	8 (34.78)	42 (46.66)	48 (53.33)
2.	Adequate work surface space for all required equipment (phone, calculator, computer equipment, etc.)	29 (43.28)	38 (56.72)	15 (65.22)	8 (34.78)	44 (48.88)	46 (51.11)
3.	Adequate space for non-computer work (reading, paper work, etc.)	26 (38.81)	41 (61.19)	11 (47.83)	12 (52.17)	37 (41.11)	53 (58.88)
4.	Adequate space for the knees, to allow for movement and comfortable sitting	27 (40.30)	40 (59.70)	14 (60.87)	9 (39.13)	40 (44.44)	50 (55.55)
5.	Easy movement from one area of the workstation to another	34 (50.75)	33 (49.25)	14 (60.87)	9 (39.13)	49 (54.44)	41 (45.55)

Note: Values in parenthesis indicates percentage.

Table 4: Working posture of bank employees while performing task on computer, (n = 90)

S. No.	Working posture	Total	
		Yes	No
1.	Slightly bent with your trunk	79 (87.77)	11 (12.22)
2.	Slightly twist with your trunk	43 (47.77)	47 (52.22)
3.	Slightly bent posture for long period	79 (87.77)	11 (12.22)
4.	Slightly twisted posture for long period	44 (48.88)	46 (51.11)
5.	Neck in a forward posture for long period	63 (70)	27 (30)
6.	Neck in a twisted posture for long period	44 (48.88)	46 (51.11)
7.	The same movements with arms, hands and fingers many times per minute	83 (92.22)	7 (7.77)
Mouse/Pointing Device		Yes	No
Mouse posture involves			
1.	Shoulder relaxed	48 (53)	42 (46.6)
2.	Elbow close to side of body	46 (51.11)	44 (48.88)
3.	Forearm lightly supported on desk top	43 (47.77)	47 (52)
Desk			
Work posture seated			
1.	Head/neck relaxed, upright and chin 'in'	31 (34.44)	59 (65.55)
2.	Elbows bent at about 90 degrees	31 (34.44)	59 (65.55)
Seated work posture with hands on keyboard		Yes	No
1.	Shoulders relaxed and symmetrical, head in midline	32 (35.5)	58 (64.4)
2.	Elbows vertical alignment with shoulders, approximately tennis ball sized gap between waist and elbow with elbows slightly higher than wrists.	32 (35.5)	58 (64.4)
3.	Navel approximately in line with desk	32 (35.5)	58 (64.4)
4.	Wrists in functional position (slightly extended-10-20 degrees)	29 (32.22)	64 (71.1)
5.	Hips slightly higher than knees	31 (34.44)	59 (65.5)
6.	Thighs not making contact with under –surface of desk	41 (45.55)	50 (55.55)
7.	Feet flat on the floor or footrest (not dangling)	41 (45.55)	50 (55.55)
8.	Breaks in every 30 minutes to stretch working muscles	28 (31.11)	62 (68.8)

Note: Values in parenthesis indicates percentage.

Table 5: Environmental parameters at bank

S. No.	Environmental parameters	Recommended limits	Customer dealing counter	Sitting area for customers
			Months- (April –May)	
1.	Light (Lux)	500-1000 (Grandjean,1975)	265	213
2.	Noise (dB)	55-85	74.2	
3.	Humidity (%)	40-50 (Saha, 1980)	39	
4.	Temperature (°C)	20-23 (Saha, 1980)	31	

Note: Values in parenthesis indicates percentage.

Table 5 revealed that environmental parameters considered under the study were close to the normal but light at the workstation was lower than the normal recommended limits. Humidity was average but temperature was a little higher.

Noise level was also considered normal but it should be varied according to the customers visiting to the bank in working hours. Sarode and Shirsath (2014)^[8] Stated that poor lighting, may diminish individual's performance as well as

productivity, because those who have to work related with reading have a serious problem with their vision, specially fatigue or eyestrain. High or low temperature has different effects on person's body, increased body temperature leads to lethargic and tiredness as a result of efficiency decreases.

Conclusion

On the basis of the research findings it was found that due to poor workstation and lack of knowledge of ergonomics and its use at workplace, employees had faced many health related problems such as pain in various body parts. Employees were unaware or having less knowledge about the proper working posture while working on computer which cause pain in neck, back and shoulders. Therefore ergonomic evaluation of workstation will help the employees to recognize ergonomic hazards caused by workplace layout or design that may be contributing to an employee's stress or physical discomfort. The use of Ergonomics and its design principals will be helpful to minimize those worst effects, if used while designing the workplace. Ergonomically designed furniture should be used at workplace such as (chairs having adjustable features, adequate lumbar support, seat pan with cushion support with adjustable features. Thus optimizing comfort at workplace ergonomically designed computer accessories should be used, such as (Monitors with height adjustable feature, antiglare screen, keyboard should be restructured for comfortable and congenial use. Padded palm rest should be designed for reducing the pressure on palm while computing. Generating awareness and imparting knowledge among employees through workshops, training and campaigns regarding ergonomics and its use in workplace and good posture while working on computer, will be helpful for enhancing the work efficiency and productivity of the employees, improve safety, increase comfort and reduce fatigue.

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