



Research Paper

To study the influence of shift working of IT Workers based on Occupational health effects & compare with health effects of Industrial workers”

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ABSTRACT

In the today's ever growing competitive era of 24x7 working in IT Industries, IT workers are subjected to day night shift working to meet the target of Customers/Employer. Their Focus during this fluctuated working is solely on meeting the given target and ultimately on performance of IT Team and Company. More & more fields are encompassing IT to improve working. Hence IT working growth will be dynamic. But IT being sedentary & cognitional job, along with day night shift working, results in development of different types of health/Stress (mental) problems. Comparison of Health effects with that of Industrial workers is to demonstrate the difference between health factors & extent of occurrence.

KEY WORDS- Musculoskeletal Disorders, Ergonomics, Health Effects & Causes, Shift/Night Shift working

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I. OBJECTIVE & TARGET

Main objective of the thesis is to study different health problems along with their basic causes and compare with Industrial workers not connected with core IT. (This study Has already been done for post-graduation in Mechanical Engineering and present work is continuation but for IT Field.) For comparison data will be extracted appropriately from submitted paper.

The target of the study is-

- 1.To benefit those already working in IT as applicable.
- 2.It is proposed to open the topic with basics to make aware all budding who are planning for IT branch.
- 3.Now a days IT is being opted by other non-IT engineering branches & outside Engineering courses also. It is intended for them too.

II. METHODOLOGY & MATRIALS

Study has been based on browsing & studying Websites if found suitable to subject-vide -Bibliography A.

Research papers already published by Indians vide - Bibliography B

Research papers published by Global Authors-vide - Bibliography C.

Related photos from literature as above and used in the thesis , are as per - Bibliography D.

Ergonomical [Ergo-work, Nomos-Laws] factors i.e. from layout, furniture, lighting etc-also give rise to health problems to quite an extent – vide - Bibliography E.

Research papers on overall Performance of Individual/Supervisor/Manager due to induced health and Organisational factors- Vide - Bibliography F

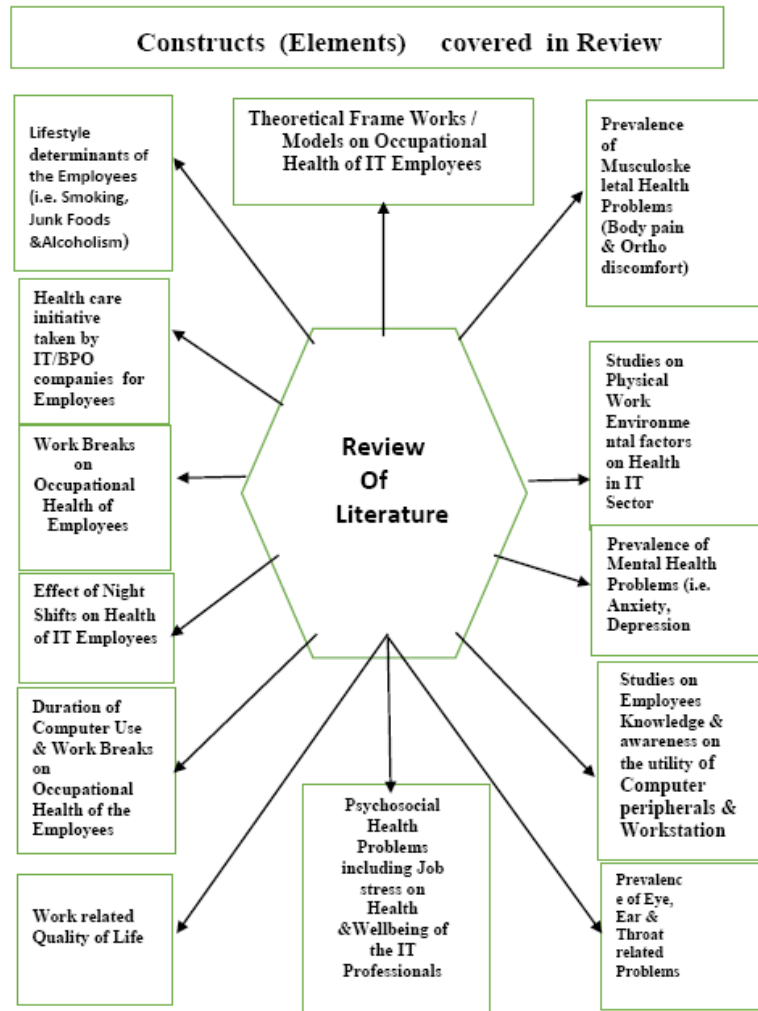
Through above references, focus has been on Health Issues with factors causing them and effects on Performance of the IT Workers. The same has been structured in form a figure vide-Figure – 1 below.

From research papers as above, most commonly referred health issues, have been selected and their data is tabulated, category wise i.e.-Websites/Indian authors/Global authors vide-Bibliography-A,B, C,D & E-respectively.

It is proposed to split the thesis in 3 parts.

REVIEW OF LITERATURE - STRUCTURE

Figure-1-[B-35-Chapter 2 – Page48]



Part-1 - FIELD RESEARCH

- a) Identification of various probable health parameters from A,B & C.
- b) Selecting most commonly referred, out of, the various parameters.
- c) To list them in tabulated form, vide - TABLE-1.
- d) To indicate bibliography wise paper's serial no. with Title of paper and fill which parameters are referred therein, by "Y"(Yes) marking in respective columns-vide TABLE-2 as an example.
- e) To total no. "Y"s as per A,B & C of respective parameters
- f) To add similar data from field research (as mentioned below)
- g) With Grand Total of "Y"s, Calculating % of each health parameters
- h) Selecting major parameters (commonly & prominently highlighted) for the thesis.

The tabulated format vide- TABLE-1 below, was submitted to IT Companies, Doctors(Ortho/Eye/) and known IT workers from different organisations, was circulated and obtained data on individual health status-vide-TABLE -2

Part-2 – THEORY & CAUSES – IT HEALTH PARAMETERS

Covers Theory behind health parameter and causes, ergonomical factors responsible and steps being taken towards efforts by Companies/Organisations/Management to minimize the effects of the health parameters. It further covers Probable preventive/precautionary steps as corrective measures/tips to control and minimise the extent of their harmful effects.

Part-3 – INFLUENCE OF SHIFT WORKING ON PERFORMANCE

Covers, apart from effect of health parameters, more factors influencing performance Of IT Team from Bottom to Top. Also, ways of computing individual performances need to be addressed. Comparison of Health effects with that of Industrial workers to demonstrate academically ,the difference. of degree of severity.

PART-1 – FIELD RESEARCH

Following occupational health problems are described in browsed Websites/ Research Papers of Indian Authors/Global Authors.

- Due to improper work system design [B-22,C-15,17,37,52,E-5,7]
- Fatigue – (common as Industrial workers but severity is different)[C-23,E-2]
- Stress - physical, job insecurity including future, rapid obsolescence of skills [A-11,A-17,B-5,24,25,29,33,38,39,50,C-64,66,68,75]
- Lighting -[E-5]
- Insomnia -sleep disorder- (common with Industrial workers also but severity is different)-[A-16,B-35,C-6,29,44,48,53]
- Pain-neck/shoulder/back (common as Industrial workers but severity is different) [C-10,14,17,18,19,22,27,39,50,59,74]
- Computer Vision Syndrome(eye/vision related)-CDT-CVDTS-Computer Visual Display Terminal - [B-13,19,52,C-2,22,23]
- Musculoskeletal Disorders or MSDs, induced ergonomically-[A-7,B-12,18,24,35,49,E-2]
- Mental/Anxiety (social problems such as loneliness, depression and anxiety.)- [C-9,16,28,29,31,E-7, F-2]
- Carpal Tunnel Syndrome –CTS-[A-4,12,B-2,4,8,C-3,28]
- Repeated Stress Injury- RSI- [A-4,B-2,12,21,26,37,45,52,C-43,48,50,73]
- “Electronic Screen Syndrome” (ESS) –An Unrecognized Disorder- [B-52,C-24,69]
- Ergonomically [B-7,E-1,E-2,E-3,E-4,E-5]
- Psychological/Mental-time pressure[B-18,B-26,C-9,11,40]
- Social / Family cut off -[B-27]
- Family related/Mental-[B-39,C-4,16]
- Knee
- BP- hypertension-[A-5,6,7,16,B-5,45,50,C-23,29,33,34,51,57]
- Gastro-irritable bowel syndrome acid peptic disease-[A-2,5,6,17,5,16,20,33,57,65]
- Dyslipidaemia- related with cholesterol[B-5]
- Alcohol / smoking/ tobacco related-[A-16,B-25,50]
- Continual skill up gradation due to ever increasing Cutthroat competition- [B-38,C-75]
- Environmental(Controlled atmosphere-AC, Working) [A-22]
- Factors associated with up and down in IT business – [B-27,38,C-61]
- **Pre Knowledge of above health effects-[B-43,B-44,C-41]**
- Environmental[B-14,39,C-7,E-5]
- Obesity-Sitting, Junk food, BMI -[A-6,B-5,41,C-81,82]
- Excess drinks-Cold/Hot-particularly Coffee
- Fear of loss of Job- [B-39, F-5]
- Net Addiction- Of Late-beyond Working- [F-29]
- Breathing-Asthma- [A-4,6,19,B-5,16, C-57]
- The correlation of prolonged periods of sitting and the development of diabetes/ Sugar- [A-2,3,5,6,16,B-5,34,42,50,C-77]
- Skin diseases- Dry skin[C-72]

- Heart-[A-7,10,16,21,B-3,12,50,C-6,23,33,44,57,65]

Out of above, following 15 parameters were more commonly referred in the literature

1. Musculoskeletal Disorders or MSDs
2. Carpal Tunnel Syndrome –CTS
3. Obesity
4. Computer Vision Syndrome(eye/vision related)-CVS-CVDTS-Computer Visual Display Terminal
5. Neck Pain
6. Lower Back Pain
7. Sugar
8. Stress/Mental/Anxiety
9. Repeated Stress Injury- RSI
10. Breathing Problem
11. Blood Pressure
12. Heart Problem
13. Stomach Problem
14. Insomnia
15. Net Addiction

The above parameters are tabulated as below-

TABLE-1
DATA COLLECTION FORMAT FOR SELECTED 15 MAJOR PARAMETERETERS

S n o	TIT LE *	BIBLIO GRAPHY REFERE NCE**	M S D	C T S	O B E S I T Y	CVS/ V D T S	NE CK P A I N	LO W E R B A C K P A I N	SU G A R	STRE SS/ M E N T A L/ A N X I E T Y	R S I	BR E A T H I N G	B P	HE A R T	ST O M A C H	IN S O M N I A	NET A D D I C T I O N
1																	
2																	
3																	
4																	
5																	

*Title - It is title of Website-Article-A/Research Papers-B,C, & E/

**Bibliography Reference- A- Website /B-Research Papers by Indians/C-Global Research Papers/ D-Photos /E-Ergonomics/F- Performance related Research Papers

For Example-

TABLE -2
MODEL FORMAT FOR DATA COLLECTION FROM RESEARCH PAPERS

S n o	TITL E	BIBLI OGRA PHY REFER ENCE	M D S	C T S	OB ESI TY	CVS/V DT/CV DTS	N E C K P A I N	LO W E R B A C K P A I N	SU G A R	STRESS/M ENTAL/ ANXI ETY	R S I	BRE ATHI NG	B P	HE A R T	STO MA C H	INS OM N I A	NETA D D I C T I O N
1	Occu pation al hazar ds – IT	B-2		Y	Y					Y	Y					Y	Y
2	Com mon Healt h Probl ems	B-3		Y *		Y	Y	Y		Y				Y		Y	
3	Healt h Probl ems &	B-4	Y	Y		Y	Y	Y		Y							

	Management																
4	Health Problems & Stress-IT	B-5	Y		Y			Y	Y	Y		Y	Y		Y	Y	
5	SUB** TOTAL	4	2	3	2	2	2	3	1	4	1	1	1	1	1	3	1

*Y-Yes- That particular health parameter drawn attention to

**Column -5-Sub Total- individual columns of the table i.e.-MSD 2/CTS-3-----NET ADDICTION-1

Total sum of Readings obtained across column-5 from MSD to Net Addiction=28

Likewise, total A-websites/B-Indian Research papers/C-Global Research papers were referred & actual articles selected for data collection, are as below-

A-21 out of 30 listed in Bibliography -Total Readings = 116

B-48 Out Of 53 listed in Bibliography -Total Readings = 273

C-68 Out of 87 listed in Bibliography -Total Readings = 339

Sub Total 728

Field Research Data Collected as below - Total Readings = 352

Grand Total = 1080

Thus the 1080 readings are consisting of 15 major parameters, as picked up from literature.

The same format was used to obtain data from IT professionals working in IT Companies from IT Park Area, Nagpur. Assorted IT professionals as met with and who kindly responded and filled the form. Hospitals were contacted including Ayurvedic one, two kindly agreed and filled the format.

Field Data Collection -Shown as Sample-

Actual data collection-

1.Seetech Energy Company -IT Park-Nagpur

Actual

To study the influence of shift working of IT Workers based on Occupational health ..

S N O	NAME	POST	MS D	CTS	OBE SITY	CVDT S/ VDT/ CVS (Eye)	NECK PAIN	LOWER BACK PAIN	SUGA R	STRESS/ ANXIETY/ MENTAL	RSI	BREAT HING	BP	HEAR T	STOM ACH	INSOMA NIA	NET ADD
1	Shweta mandade	Intern					✓	✓							✓		
2	Kunal Gaatre	CTO			✓	✓											✓
3	Suamini Subhedar	Intern					✓	✓		✓		✓		✓			
4	Sakshi Tadas	Intern				✓	✓	✓		✓					✓		
5	Vipul Sathpute	Intern															
6	Roshan Ghite	Asst. Mang Projects						✓								✓	
7	Shubham Jadhav	Project Engineer				✓											✓
8	Ashytosh Rai	Sales Engineer			✓					✓							
9	Devendra Nikhode	Finance manager			✓	✓											
10	Bandu Jarnade	Field engineer						✓									
11	Archana Dhakre	maid					✓										
12	Sandip Sohare	Assistant manager						✓									
13	Mayuri dadake	Field engineer				✓											
14	Himal Keshav Mahim Fandi	Field Engineer Project Incharge				✓		✓									

S N O	NAME	POST	MS D	CTS	OBE SITY	CVDT S/ VDT/ CVS (Eye)	NECK PAIN	LOWER BACK PAIN	SUGA R	STRESS/ ANXIETY/ MENTAL	RSI	BREAT HING	BP	HEAR T	STOM ACH	INSOMA NIA	NET ADD
1	Yogesh Bagde	Manager			✓	✓											
2	Prakash Popare	Back office assessment	✓	✓		✓											✓
3	Samiksha Shawar	Intern								✓							✓
4	Ashwini Barabatre	Assistant manager						✓					✓				
5	Avanti Vhande	Intern				✓											✓
6	Milind Chitambar	CEO							✓	✓						✓	✓
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	

2.TRUST SOFT-IT PARK NAGPUR-

2.COURTSEY DR.PRASAD APARAJIT-FRCS-ORTHO-NAGPUR-

S N O	NAME	POST	MS D	CTS	OBE SITY	CVDT S/ VDT/ CVS (Eye)	NECK PAIN	LOWER BACK PAIN	SUGA R	STRESS/ ANXIETY/ MENTAL	RSI	BREAT HING	BP	HEAR T	STOM ACH	INSOMA NIA	NET ADD
1	K.N. Deshmukh		✓				✓	✓	✓		✓		✓				✓
2	Nitin Swagalkar						✓		NI		✓		Normal				✓
3	Kishor Babale							✓	Yes.		✓		NI/ NI/				✓
4	Kunadu Ambade										✓						
5	Shayy Kiddle		✓	✓	✓	✓	✓	✓			✓		Normal	NI/			✓
6	Vimal Bewthekar		✓	✓	✓	✓		✓	✓				✓				
7	Amit Talame		✓	✓	✓	✓		✓	✓		✓		Normal	NI/			✓
8	Jyotsna SHRESH		✓	✓	✓	✓		✓			✓		NI/ NI/				✓
9	Nitin Deshpande		✓	✓	✓	✓		✓			✓		NI/ NI/				✓
10	Bhaji Babhulkar		✓	✓	✓	✓							NI/ NI/				✓
11	Sudhanu RAH		✓	✓	✓	✓		✓			✓		NI/ NI/				✓
12	Shreyas		✓	✓	✓	✓		✓			✓		NI/ NI/				✓
13	Jyoti Deshpande		✓	✓	✓	✓		✓			✓		Normal	Normal			✓
14	Nitin Borkhore		✓	✓	✓	✓		✓			✓		Normal	Normal			✓
15	Sandip Patil		✓	✓	✓	✓		✓			✓		Normal	Normal			✓

TABLE-3
SUMMARY OF DATA COLLECTION & ANALYSIS

SNo.	TITLE	REA DIN GS	MSD	CTS	O BE SI TY	CVS /VD T/C VDT S	NEC K PAI N	LO WE R BAC K PAI N	SUG AR	STRES S/ MENT AL/ ANXI ETY	RS I	B RE AT HING	BP	H EA RT	STO MA CH	IN SO M NI A	NET ADD ICTI ON
1	A+B+C	728	101	78	25	32	107	102	9	88	56	9	13	20	14	24	8
2	FIELD DATA*	352	29	30	36	37	35	53	6	18	28	3	9	7	11	9	41
3	GT	1080	130	108	61	69	142	155	15	106	84	12	22	27	25	33	49
4	%		12.03	10	5.64	10.09	13.15	14.35	1.39	9.81	7.78	1.11	2.04	2.5	2.31	3.05	4.53
5	MAJOR %		12.03	10		10.09	13.15	14.35		9.81	7.78						

*Other Companies-Trust Soft-IT Park /Assorted Professionals from different IT Set Up/Hospital of Dr. Prasad Aparajit-FRCS-Orthopaedic Surgeon/Dr.Mrs.Kanhere- Eye Specialist-All from Nagpur

ANALYSIS & INFERENCE

More Than 6% Parameters-

MAJOR- MSD + CTS + CVS + NECK PAIN+ LOWER BACK PAIN + STRESS+ RSI

% 12.03 + 10 + 10.09 + 13.15 + 14.35 + 9.81 + 7.78 = 77.21
SAY = 77%

REST - OBESITY + SUGAR+ BREATHING+ BP +HEART+ STOMACH+ INSOMNIA + NET ADDICTION

% 5.64 + 1.39 + 1.11 + 2.04 + 2.5 + 2.31 + 3.05 + 4.53 = 22.57
SAY = 23%

It would be noted that though Net Addiction (over & above IT working) is at 4.53% only but is evident from data of Dr.Prasad Aparajit , it is increasing rapidly and has already achieved a serious status. Already medical fraternity is working towards counselling/medication/psychological treatment and centres are coming up.

REVIEW & DISCUSSION

The rapid requirement of IT application in almost all fields around for better and speedy achievements in administration/defence /medicines/manufacturing/social welfare/banking/transportation /aviation/important statistical data collection etc.

Another imposing problem is going to meet day & night technological advancement in IT field. This challenge is even bigger as skill of IT workers will have to be upgraded, matching these changes , both by Management and IT Workers themselves.

To counter ,one way can be to modify Syllabus of IT course to include introduction of probable health problems[**Pre Knowledge of above health effects-[B-43,B-44,C-41]** to face with, as a preventive measures along with Technological Advancements. Indirectly this also means that there would be accelerated health problems as well as effect on Performance of IT Workers while upgrading skill. As they will have to work upon skill improvement while working and over & above regular working to meet the challenges to ensure continuity of stability of employment.Net addiction is of late phenomena, adding to health risk.

CONCLUSION-PART -1

As per above details, IT Workers can't escape the influence & effect of covered 15 major parameters, over the period of time and performance due to continually upgrade their own skill upgradation, to stay in employment.

Thankfully it has been studied by Researchers. Papers/Articles have already been being published all over World. These cover causes, analysis and suggestions towards steps to at least minimize the effects of said health parameters and thereby on performance. This is covered in Part-2.

Research have also shown that besides skill up gradation, there are organizational/ administrative causes which are also affecting performance. This is covered in Part-3.

PART-2 THEORY & CAUSES – IT HEALTH PARAMETERS

As purpose of this part to go into causes which develop the 15 major health parameters. Let us cover one by one.

1. Musculoskeletal Disorders or MSDs

Main major causes behind, development of MSD are-

- 1.Sedentary Work
- 2.Postural related
- 3.Improper workstation design/layout including furniture/
4. Prior Medical History
- 5.Physical Capacity-Lifting load particularly during bending/twisting
6. Repetitive Forceful Movements-mouse /fingers
7. Environmental conditions of Working Area
- 8.Working Hours due to target

9. Shift working-insufficient sleep
10. Less blinking than normal-dry eyes
11. BMI-Effect-Increased weight causes stress on body tissues& lesser flexibility
12. Net Addiction over & above IT working-Watching Wapp/movies/Games etc., with inclined neck for long time, gives rise to neck pain & sleep disorder.

Besides generating Neck/Lower back pain, MSD induces in Tingling & Numbness in fingers/ hand, pain in other parts like elbow/Thighs/feet/Trunk/Shoulders/ankle/hip/knees, i.e. poly arthralgia [pain in multiple joints] and muscle spasm and heel pain.

2. Carpal Tunnel Syndrome - CTS

The main symptoms are pain, numbness and tingling in the thumb, index finger, middle finger and the thumb side of the ring finger. Symptoms typically start gradually and during the night. Pain may extend up the arm. Weak grip strength may occur, and after a long period of time the muscles at the base of the thumb may waste away. In most cases, both hands are affected.

3. Obesity –

It is known that Metabolism is the process by which the body converts what one eats and drinks into energy. The number of calories your body uses to carry out these basic functions is known as one's basal metabolic rate. Burning calories requires regular movements. Sedentary position slows down burning of calories. . IT working is essentially a sedentary requirement, normally in a controlled environment like AC. This Cold temperature may contribute to a temporarily faster metabolism i.e. if the environment is cold, the resultant calories of a body demand compensatory strategies, including notably increased food intake to get its thermic balance. Feeling of hunger increases coupled with stress of work, and thus additional, ready to eat food /hot drink/cold drink, intake takes place. A person with high BMI will have more eating behaviour, thereby, they become more prone to have a weight gain, resulting in Obesity. Overweight yields a decreased postural stability and potentially negative impact on control of upper limb (the arm, located between the shoulder and elbow joints; the forearm, which is between the elbow and wrist joints; and the hand, which is located distal to the wrist.) There are 30 bones in each upper limb movements, but its effect on control of balance imposes constraints on goal-directed movements. From a clinical perspective, obese individuals might be less efficient and more at risk of injuries than normal individuals in a large number of work tasks and daily activities especially requiring upper limb movements performed from an upright position.

4. Computer & Visual Display Terminals / Visual Display Terminals-

Our eyes are not fully adapted to working in a new visual environment for prolonged hours. Computer vision syndrome is a complex of eye and vision problems related to the activities which stress the near vision, and which are experienced in relation to, or during, the use of the computer. They include eyestrain, headache, blurry near vision, slowness in changing focus, light sensitivity, eye irritation, dryness of eye etc. The distance between screen and operator has a significant effect on vision problems as stated above.

VDT syndrome, also known as IT ophthalmopathy, is a disease that affects our eyes, body, and mind as a consequence of prolonged work using VDTs. It is also called digital strain.

This phenomena initiates following problems-

1. Watering of Eyes
2. Photo sensitivity
3. Redness of eye
4. Double Vision
5. Blurring of Vision
6. Dryness-dry eyes
7. Itching
8. Burning
9. Gritty
10. Contact Lens related
11. Presbyopia -the gradual loss of your eyes' ability to focus on nearby objects.
12. Myopia -Near sightedness (myopia) is a common vision condition in which you can see objects near to you clearly, but objects farther away are blurry
13. Slowness of focus change
14. Less blinking-leading to dryness of eyes

5.STRESS/ANXIETY/MENTAL-

Stress is the body's reaction to pressure from a certain situation or event. It can be a physical, mental, or emotional reaction. Stress levels are high when variables such as workload, age, tenure, size of the organization and administrative handling, are at their lowest. Added by Family problems/illness, loan/money, job security, performance evaluation, career development etc.

Stress Symptoms-

1-Acute stress – Lasting for Short Time

Sometimes you can feel stressed for a short period of time. Usually, it's nothing to worry about. Like when you need to hand in a project, or you have to talk in front of a group of people. Maybe you feel "butterflies" in your stomach and the palms of your hands get sweaty.

These types of positive stressors are short-lived, and your body's way of helping you get through what could be a tough situation.

Chronic stress - Persisting for Long Time/Constantly Recurring/Long Lasting

If you let your stress spiral on for too long, it can have damaging effects on your physical, mental, and emotional health, especially if it becomes chronic. You need to be aware of the warning signs of chronic stress so you can take care of it.

2-Physical effects of chronic stress include:

- Headache
- Trouble sleeping, or sleeping too much
- Muscle pain or tension
- Digestive issues
- High blood pressure

Emotional effects of chronic stress include:

- Feeling you can't get things done
- Moodiness
- Anxiety [A-22]
- Restlessness
- Lack of motivation
- Irritability
- Sadness or depression

6. RSI-- REPETITIVE STRAIN INJURY

A repetitive strain injury (RSI) is an injury to part of the musculoskeletal or nervous system caused by repetitive use, vibrations, compression or long periods in a fixed position. Other common names include repetitive stress disorders, cumulative trauma disorders (CTDs), and overuse syndrome., repetitive stress injuries, repetitive motion injuries or disorders, occupational or sports overuse syndromes. Poor ergonomic techniques by computer users is one of many causes of repetitive strain injury.

Sore wrists, aching, pulsing pain, tingling, extremity weakness-Torn ligaments, Risk factors, Sedentary lifestyle (too much sitting or a way of working or lifestyle characterised by much sitting with little exercise), smoking, alcohol consumption.

Symptoms of RSI or an overuse injury can be any of the following:

- It is burning, aching or shooting pain.
- Tremors, clumsiness and numbness.
- Fatigue or a lack of strength.
- Weakness in the hands or forearms /elbow/wrists
- Difficulty with everyday activities, e.g. opening doors, chopping vegetables, turning on a tap.ie coordination in hands
- tightness, discomfort, stiffness
- Pain that wakes you up at night, tingling, coldness or numbness in hands

7 & 8-NECK/LOWER BACK PAIN

Work System Design layout is effective only when basic concepts of Ergonomics and the Health effects arising out it.

But the main idea is to understand that the lower back and the spine, from L1 to L5 is the centre of the balance and the energy of the body, which means when we are not balanced in life, we feel the pressure on the lower back, which is why over large no. of the population suffer from lower back pain.

Another thing that happens to one's body these days is long sitting hours in front of the computer, or driving, most of us sit 10-12 or more hours a day, move mouse with one hand, and we can feel pain in the neck, and don't always know why. So, what we need to do, is sit correctly, and to move during the day, but this won't solve all problems. Effects of Net Addiction, already covered vide-Sno.1 as above.

9. SUGAR-DIABETES

The following factors cause sugar/insulin level to happen/induce-

1. Inheritance /Hereditary
2. Overweight
3. Overeating / Junk food –high calorie/protein/fatty/carbohydrate
4. Irregular meal timings
5. Irregular Sleep/less sleep
6. Insufficient physical exercise
7. Drink-Coffee /Cold/Alcohol
8. Smoking
9. No regular blood /medical check up
10. Stress
11. long-time Sitting

If care is not taken through, regular medical checkup, preventive steps for above factors, disciplined food & meal habits, surely medication is going to be a lifelong phenomenon. It also means affecting other organs as well.

10.BREATHING -

Can be attributed to-

- a) poor posture
- b) anxiety can cause shortness of breath
- c) more people in the working room
- d) improper ventilation and thereby poor air quality in the room
- e)Outside air pollution
- f) Exposure to AC for long time
- g) hereditary inducement

IT Offices are commonly centrally air conditioned and lack proper ventilation, in proportion to no. of persons seated in the hall. Quality of air (Level of CO₂ etc) gets disturbed and thereby less oxygen level in the hall space. If brain receives less oxygen over a period of time, possibility of effecting memory /concentration, thereby, anxiety and normal blood circulation.

11. BLOOD PRESSURE-

Blood pressure is determined both by the amount of blood your heart pumps and the amount of resistance to blood flow in your arteries. The more blood your heart pumps and the narrower your arteries, the higher your blood pressure. A blood pressure reading is given in millimetres of mercury (mm Hg). It has two numbers. Systolic - Diastolic . The risks include both improper workstation design and faulty posture as prolonged sitting for extended periods leads to poor circulation i.e. leading to blood pressure. There is an association of autonomy and work-environment with hypertension ,hereditary diabetes and having obesity & Stress, can also increase the risk for developing high blood pressure as seen above.

12.HEART -

The function of the heart is known as below-

- a) pump and supply pure oxygenated blood to all parts of body
- b) pump back the impure circulated blood to heart and then to lungs for purification
- c) repeat

d) and becomes ongoing cycle /process.

Due to extreme work pressure/high BMI/untimely meals/junk food- cholesterol / drinks /stress-physical & mental /long sitting hours/ lack of exercise & sleep/shift work etc. are some of the major causes for the heart problem.

13.STOMACH –

The intestines push the food ahead with their special movements called peristalsis. If you sit for longer hours daily for years, the intestine becomes sluggish. It is also due to improper timing of the meals that is observed in the IT professionals. The intestines then give up their work or become too slow. This results in indigestion and forming of hard stools and piles too. Needless to say, when the stool remains in your intestines for longer duration, the filthy material causes a lot of infection. Irritable bowel syndrome is due to long sitting, frequency 2-3 times in a month 10-20% of surveyed IT workers Lack of proper diet and exercise lead to gastric problems. Gastrointestinal disorders are more common in shift workers than in day workers. Common complaints are pain and alterations in bowel habits, especially constipation and diarrhoea. Shift workers may experience temporary variation in bowel habit in association with night work. The vital organs that could be affected more refer to: liver, stomach, kidneys and heart. These ailments may be connected to eating significant amounts of junk food at irregular hours and to continuous loads of stress to meet the frequent deadlines.

14. INSOMNIA-

Sleep plays a vital role in physical and mental wellbeing. Sleep improves attention, learning, problem-solving skills and creativity. Inadequate sleep is associated with depression, impulsivity, depression and low academic performance. Insomnia or difficulty sleeping is one of the common health problems seen in software professionals. Many IT workers use their electronic devices late into the evening. But staring at an illuminated screen before bedtime can alter the body's production of melatonin, a hormone that helps you fall asleep. As time passes, the release of this hormone alters permanently, leading to chronic insomnia and it can lead to other health problems as above. Many effects of a lack of sleep, such as feeling grumpy and not working at your best are very well known. However, there are some more serious side effects that may not be as well known. Everything from people's memory to their looks, their weight and their overall health can be impacted by a lack of sleep, especially if the habit becomes chronic. It mostly has to do with working odd hours, waking up at odd hours and losing your normal pattern of day-to-day activities due to work.

Sleep and wakefulness are governed by two biological processes that work in tandem. The first process is often referred to as the sleep-dependent process, and builds pressure for sleep with wakefulness, and dissipates with sleep. As such, sleepiness may occur as a result of excessive buildup of sleep pressure from prolonged wakefulness, or inadequate dissipation of sleep pressure due to curtailed sleep. The second process is referred to as the sleep-independent circadian process, which is reflected by a rhythmic variation of sleep propensity that is governed by a circadian oscillator. Apart from biological impediments to achieving adequate sleep, shift workers may also curtail sleep in order to meet family and social obligations.

Exposed to shift working in comparison to non- exposed controls regarding working memory, processing speed, psychomotor vigilance, cognitive control as well as visual attention. Neurological perspective explains these negative effects via the disruption of the circadian system due to shift working.

Health hazards sleep deprivation can lead to accidents, brain slackness & forgetfulness, weight gain risk of cardiovascular status and impairing judgment. Some studies have indicated depression is also becoming common. In Japan long work hours and deprivation of sleep exert vital exhaustion and mood changes, resulting in disease conditions such as depression and ischemic heart disease. Sleeping Disorder leads to decrease in Productivity.

15.NET ADDICTION-

Net addiction can be over working on computers and on mobile thereafter.

It is off the late phenomenon- particularly after smart mobiles became affordable. Digitalization of the essential systems like- on line banking/EMI/Aadhar/pan card/billing of electricity/recharge etc. have made once life hassle free. But other than essentials, after working hours, attraction and gluing to u-tube /news/sports/Wapp groups/games/movies/online marketing etc. are on increase rapidly. Now gambling apps are also on rise. Together It's a unstoppable & impulsive craving when not at computer work.

Use of smart / is very common in young employee/students. The time on these gadgets vary from 3hours to 6hrs daily. Extensive smart phone use gets associated with sleep disorders. The result of this study highlights some significant issues linked to computer-related health problems among IT workers/university students. Using the computer at night and enhanced in interaction with mobile phone use thus losing sleep was associated with most mental health outcomes for both men and women.

An internet-addicted individual spends most of his or her time using the internet, which he or she would normally spend with his or her friends and family. The individual starts to put off his or her duties at home or at work. This

situation causes him or her to stay away from his or her own real living environment and to dream of the virtual world. The individual becomes an Introvert person, which decreases his or her productivity. When the individual is offline, he or she feels himself or herself unhappy and behaves angrily to others. An internet-addicted person isolates himself or herself from society and feels depressed. Addiction to the internet also damages his or her relationships with friends and society. The craziness of the internet use all around the world has changed daily life thoroughly. Overall, it is bound to take prime place in causes for health problems shortly.

CONCLUSION-PART-2

Through above explanation, though in a brief way, on each of the 15 major health issues, it would throw a review light on basic factors/theory, causing or triggering those problems.

Now Researchers have also shown that besides health problems, there are equally responsible organizational, administrative, overall working set up, causes, continuous skill up gradation etc. are also affecting one's performance. Such as lack of working staff support, method of evaluating performance, turnover and so on. It has been studied that these factors are equally responsible to trigger health problems like anxiety, stress/mental stress and the chain goes on.

No wonder it affected increase in medical budget & attracted attention of Management & Researchers. It has been and being studied extensively by Researchers. Papers/Articles are being published all over World. These cover causes, analysis and suggestions towards steps to at least minimize the effects of said health parameters and thereby on performance.

PART-3- INFLUENCE OF SHIFT WORKING ON PERFORMANCE

IT Performance(Individual/Group/Company level) can be practically defined as Input vs Output with specified requirement of given time, Accuracy and within cost limit, to the satisfaction of the Client, vis a vis set performance by Management

For IT business, the task/project can be Global. Therefore, it has to be carried out as per time cycle of that particular Country, so that any doubts/clarification/changes can be sorted out during execution. For example, time difference between us and USA is 12 hrs. Night shift working thus becomes compulsion. Again, execution depends on scope of the given project/task i.e. spread over a day/few days and so on. This is true for day shift working too.

Information Technology is gripping almost all types of activities around -Be Industrial/Legal/Governmental/social/Financial/Banking/Related with Hospital/Aviation and so on.

Every day, more & more new applications are coming up. Government also rapidly adopting digitalization. The IT Organisations are expected to develop and deploy solutions that improve competitive advantage and stay in business. They have also to face cancellation of projects, which affects overall performance of IT Company and individual worker. [E-8]

Having already automated many aspects of production and supply chain operations, manufacturers/Businessmen now recognize that the next frontier for high performance is the workforce.[E-17]In other words People are most important resources/assets for Company's existence in the competitive World.[E-7]

New avenues are coming up as a challenge day by day .Requirement IT professional is increasing leaps and bound. Shift working –day and night-has become integral part of an IT Business.

The working time arrangement is a key issue in work organization as it is the basic condition linking human capacities with production means. This issue has acquired a growing importance in recent decades in relation to the development of new technologies and the extension of basic services to general populations, requiring continuous human assistance and control over the work processes during the 24-hour day. This issue is also associated with the increasing economic competition among companies and countries, due to the progressive globalization of the labour market and productive strategies, which entail an increasingly intensive and extensive exploitation of productive systems.[E-1-page1]

The modern “24-hour Society” is the expression of this condition, where IT TEAM are both consumers and producers at the same time, requiring, on the one hand, the availability of goods and services and, on the other hand, making consumption and production possible at any time of the day and the night [E-1-page1]

The large increase of epidemiological and clinical studies on this issue document the severity of this risk factor on human health and wellbeing, at both social and psychophysical levels, starting from a disruption of bio- logical

circadian rhythms and sleep/wake cycle and ending in several psychosomatic troubles and disorders, likely also including cancer, and extending to impairment of behavioural changes/performance efficiency as well as family and social life. And , with a consequent high economic and social cost for both the individual and society. **[E-1-page1]**

The effects of shift working on various health parameters have already been covered in detail as above.

So also true for Industrial/Manufacturing field also. Please refer page no – of Section -1. Yearly Data was collected on monthly , day vs night shift basis, for production of Foundry Additives. The difference was found to be 4% less in night shift. Effect on Health parameters were discussed through mathematical model & graphically with Comments. Let us now consider what is IT Performance and effects on it due to shift/shift rotation working.

Overall Performance Effectiveness gives companies the ability to analyse the cumulative effect of three workforce factors on productive output-

- Availability: the percentage of time the skilled & other workforce spends making effective Contributions.
- Performance: the number of tasks delivered vis a vis scheduled time.
- Quality: the percentage of perfect or saleable product produced vis a vis total product Produced **[E-20 page 1&2]**

The combined effect of above three on the Management goal of business, can be shown as below- Improvements made to any one of these factors can have an enormous influence on profitability. The historical challenge for many manufacturers has been to avoid the unintended consequences that can result when efforts to improve in one area have a rebound effect. For example, an initiative to improve quality might end up impairing output performance by slowing down the output. Data Study/Analysis helps, expose, these interrelationships and provide a real-time view of progress, so managers can keep all three measures in balance. **[E-17-page2]**

As IT work encompasses n number of projects at a time in a setup, performance measurement becomes quite a complex issue for the coordinating Supervisor/Leader/Manager. First requirement for them becomes to be skilled in the jobs being executed as they have also to perform responsibilities as under- Supervisors are responsible/ overall role is to communicate organizational needs, oversee employees' performance, provide guidance, support, identify development needs, and manage the reciprocal relationship between staff and the organization so that each is successful

- Aligning individual performance expectations with organizational goals
- Developing performance goals collaboratively with their direct reports
- Ensuring that performance goals are clearly communicated and current
- Providing fair, constructive, and timely performance feedback . expectations and goals
- Aiding, guidance, and coaching support as needed
- Ensuring that staff have professional development plans in place
- Conducting performance evaluations according to established systems and policies
- Problem solving responsible person too.
- Fully available work force with capability
- Skill development from time to time as needed
- Absenteeism –engage temporary work force- (may affect output to an extent)
- Keep instruments/work environment/cleanliness/lighting in order
- On going Analysis of performance to suggest improvements **[E-25page-9]**

The profile of coordinating responsible Manager is as below-

An IT Manager is a professional who ensures that all employees have the technology they need to get their job done, from a reliable laptop and VPN (Virtual Private Network) access for remote workers who can't be reached otherwise, to up-close coordination with other departments like HR or finance so data is secure.**[E-26-page1]**

IT Manager responsibilities include:

- Managing information technology and computer systems
- Controlling and evaluating IT and electronic data operations
- Managing IT staff

Responsibilities

- Manage information technology and computer systems
- Plan, organize, control and evaluate IT and electronic data operations
- Manage IT staff by recruiting, training and coaching employees, communicating job expectations and appraising their performance

- Design, develop, implement and coordinate systems, policies and procedures
 - Ensure security of data, network access and backup systems
 - Act in alignment with user needs and system functionality to contribute to organizational policy
 - Identify problematic areas and implement strategic solutions in time
 - Audit systems and assess their outcomes
 - Preserve assets, information security and control structures
 - Handle annual budget and ensure cost effectiveness
- Requirements and skills
- Proven working experience as an IT Manager or relevant experience
 - Excellent knowledge of technical management, information analysis and of computer hardware/software systems
 - Expertise in data centre management and data governance
 - Hands-on experience with computer networks, network administration and network installation
 - Ability to manage personnel.[E-26-page1]

IT Managers are responsible for connecting our office to the world. From managing voice, video and data connections on-site at each location as well as checking in with remote workers about their tech needs– they make sure the company is always connected.

One of the main responsibilities of an IT Manager are the supervision and maintenance of all computer systems within a company. They will ensure that these services run smoothly by monitoring their efficiency as well as security measures taken against any vulnerabilities in software programs used on a day-to-day basis, ensuring secure operation throughout every department.

An IT Manager is responsible for maintaining all systems on-site and remotely. They work closely with and train Systems & Database Administrators. Additional day-to-day colleagues can range from Engineers, Operators, Security Practitioners, Product Managers and others throughout the company. [E-26-page2]

Another important factor is the Retention of employees plays vital role as lot of attractive salary package/perks/ are offered in IT market.

Superior managers over above said team, are busy with Clients/marketing/economic performance/Policies. Human Relation department also plays important role in hiring/training/retention of employees/ behavioural development.[E-8 page 13]

This may keep them away from periodic interactions with working team, which is vital to retain the employees. Quitting is usually less about an employee's willingness to work harder and more creatively, and more about a manager's ability to build a relationship with their employees where they are not counting the minutes until quitting time.[E-24page1]

It is obvious that if Manger is an average performing, the employee turnover may increase.

Therefore, the Management has to be on alert through HR Depatt., on the issue. A good manager with proper work environment, employee's coordination & performance ratings can motivate team to go the extra mile.[E-24 page 2]

Thus, it would be clear that measuring of IT performance is really a complex issue as covered above.

Now a days with nuclear family size has forced the Companies to have policies for Work Life Balance. Work from home is one of the hot steps in this direction. It got revealed during COVID pandemic when IT working was forced to be executed from home to keep business going. Which otherwise would have a continuity of work from Company campus.

Having covered a general review of factors involved in overall performance of individual/group/coordinating supervisor / manager/senior manager/HR, now let us see how effect of Shift work on performance-

Both managers and in charges, with the working time organization, as well as involved workers, must be adequately informed on the possible negative effects of shift work.

The former have to understand which may be the negative consequences of shift work on worker's health and performance, and hence also on productivity, absenteeism, and company costs, in order to plan the best possible countermeasures in terms of work organization and workers management.

The latter have to understand which troubles and disorders are more related to shift and night work and what are the best coping strategies to prevent or limit them, in particular with reference to sleep habits, diet, physical fitness, and leisure times. It has been evidenced that good social support from co- workers and supervisors at work, as well as from family members, is able to significantly improve adaptation and tolerance.[E-1-page-8]

It is quite obvious that careful health surveillance has to proceed in parallel with corrective and preventive actions on working time organization, and in particular shift scheduling

Therefore, shift schedules should be designed according to some ergonomic criteria, recognized to be suitable to lessen stress and limit adverse effects on health and well-being by avoiding or minimizing circadian disruption and accumulation of sleep deficits and fatigue, such as:-

- a) limit night work as much as possible.
- b) avoid a large number of consecutive night shifts.
- c) prefer quickly rotating (every 1-3 days) shift systems to slowly rotating (i.e. weekly or longer) ones and to permanent night work (also for social reasons);
- d) prefer clockwise rotation (morning/afternoon/night) to the counterclockwise (afternoon/morning/night) rotation;
- e) set the length of shifts according to psycho-physical demands.
- f) avoid morning shifts that start too early.
- g) set an adequate number of rest days between shifts, particularly after night shifts.
- h) keep the shift system as regular as possible.
- i) allow flexible working time arrangements according to worker's needs and preferences.[E-1-page9]

Employees have also equal important responsibilities- Employees are responsible for:

- Communicating workload challenges
- Communicating progress towards performance goals
- Identifying and communicating professional development needs and opportunities
- Achieving performance and professional development goals as identified in individual work plans and individual development plans.[E-25-page 9]

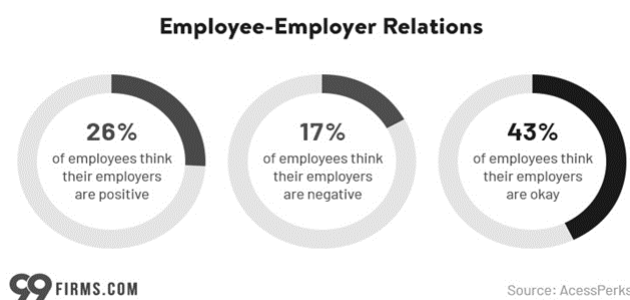
It is now clear that the contribution of immediate Supervisor and Managers play vital roles in the performance of Ground Team and subsequently IT project handling individual.

Above excerpts clearly throw light as how complex are the roles of individual contributors/bottom line executing staff/coordinating Supervisor & managers.

A professional, matured & unbiased analysis of performance, timely feedback to ground team, required skill development from time to time by above two levels, play great role in achieving the overall company target in terms of retention of employees, turn over and profitability.

It has been researched by many scholars and found out that due to ever changing skills/speed, a gap in competence and not following sound principles of Management, of & by reviewing authorities, gets created in the performance measurement, due to ultimately affecting not only company target, but also in staff turnover, making situation alarming to manage. Sample related findings is as below-

1. Vide E-10-by :Ivan Blagojević



26% Employees think that Employer is positive,

17% Employees think that Employer is negative

43% Employees think that Employer is OK

Further

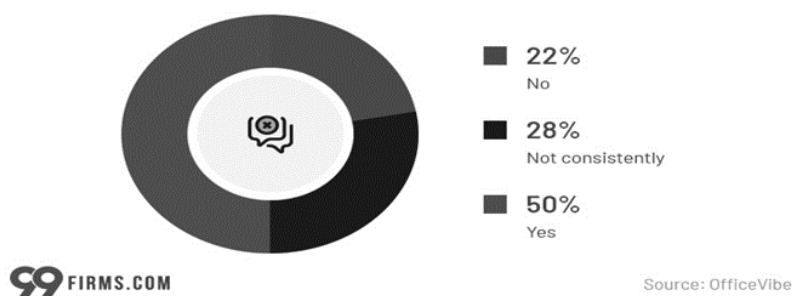
1A- 32% wait for 3 months to receive feedback

1B.19% ok to receive feedback once a year

1C. 50% unhappy with their performance feedback ratings

1D.2/3 rd., HR professionals rated their organization 6.1 on the scale of 1-10, for supportive performance feedback system in place.

Distribution of Employees That Act on Received Feedback



22%- No action on feedback

28%- Do but not consistently

50% -Do act

Ratings distinguish top performers from the rest and help employees correct their mistakes on the way to achieving better results. Who knows, maybe they could even become A performers at some point. Although this process might be time-consuming, every company should have an adequate model of performance management, statistics above confirm. Because effective feedback, if done correctly, carries benefits to all parties. Having reviewed about health and performance of IT Sector as above, it would be appropriate to consider the basic difference or comparison between Industrial Working and IT Working. The chart below shows the comparison of working pattern and indirectly hinting to an outward extent, that Industrial working, is not that severe, as with IT working-

BASIC DIFFERENCE BETWEEN INDUSTRY vis a vis IT WORKING PATTERN

	INDUSTRY	IT
1	Teamwork- mainly production, Stores, Planning	Mostly Individual
2	Field Work involving physical movements	Sitting-Sedentary
3	Uncontrolled Atmosphere	Closed & Controlled Atmosphere- mostly AC
4	Efficient English not a must.	Efficient English must
5	Use of Analytical Mind with experience	Needs High Analytical Mind
6	Higher Education not a must	Higher Education must
7	Skill to perform is basic	High skill required with continuous up gradation
8	Normally a routine production work-Batch/Lot	Changing From Project to Project
9	If helper is available, can rest for some time	Mostly Has to be Online except personal basic needs
10	Physical Stress more medium	Physical Stress High
11	Mental Stress-less due to routine production-Batch/Lot	Mental Stress more due to Individual Working and work pressure
12	Physical Movements are frequent-Say to Stores/Arranging Finished Materials/Quality Inspection etc less sedentary	Sitting for long time -Sedentary
13	Exposed generally to overhead and on machine lighting but focused on job. No direct exposure	Besides overhead lighting, Exposed directly to computer at short distance

14	Shift Rotation-handing over to next	Normally Till completion of project individually
15	Social Association fairly satisfactory	Reduces considerably
16	Comparatively slow rise in salary/ organization	Good salary/accelerated rise
17	Quick changeover may not yield expected salary/position	Common picture in IT Field and yields high salary/position
18	Auto modes CNC/Vertical m/c centre ,are becoming common but with attention	Has to be done manually on Computer- understanding & executing to meet specified time limit
19	Less Intake of junk food/cold drinks/coffee as mostly Tea is provided from Company mostly Twice. Dinner from home tiffin	To avoid sleepiness and maintain energy, more intake of Junk food / cold drinks/coffee/Snacks/Tea -Mostly In house Canteen Facility /near by
20	No work from home once leaving Industry except if required to work overtime	Can work from home online. But if necessary to continue working from home, on urgent projects, even in nights. This can be frequent requirement. Adding fatigue etc.
21	Net Addiction after working hours	Net Addiction over & above working online
22	BMI +/- around normal due to physical work	Less physical work due to Sedentary position, BMI likely towards Obesity
23	Basic Plant /Ergonomical layout can be sufficient	Careful Ergonomical lay out including Computers/Furniture/lighting/ controlled environment/wellness policy

Various factors ,which go into Performance review of IT workers, as covered above, show that it's a quite complex. It requires competence, maturity & fast& timely tracking analysis. Otherwise, it results into undesired turn over and can cause customer dissatisfaction/financial loss.

Comparatively performance review of those working in Industries is not that complex. They are covered in a declared pay scale and pay scale of workers are governed by revision of in minimum wage payment after every 6 months. Over & above ,the Management declares a % of increment, depending upon yearly financial performance.

The performance rating in IT sector is supposed to be 100% even working on 24hrs basis, to remain in the breakneck competition.

A survey across MIDC,Hingna was conducted on face-to-face basis with Production In charges, to get feedback on the shift wise productivity performance in respective Industries. General feedback was in consistent. Mostly it was a statement that meet target given.

However, one Industry ,making Foundry Additives, showed yearly productivity data on day shift and night shift working, **only on confidential basis**. Average yearly Productivity of Day shift was 96% & productivity of night shift was 92%.

The difference was mainly due to delay in coordination with power interruption/break down-making alternate arrangement in case of unplanned absenteeism at start of night shift/accident/product quality problem/Product Change etc. All the above requires coordination & support from relevant In- charges.

As regards health problems, general feedback was-

- 1.Indigestion Problem-Gas-Due to irregular timings
- 2.Sleep Disturbance -Taking short nap with mutual consent ,is common amongst night working team

3.Fatigue

Feedback also indicated that workers prefer night shift, in spite of above problems.

As day gives them time , even after taking rest, towards social gathering/attending day to day family requirements/medical treatment. Also, some become LIC/Postal /Cooperative Bank monthly pigmy collection etc., to earn extra income.

CONCLUSION -PART-3

To summarise, severity, complexity & susceptible to multiple health problems in IT Workers are high, added by self-ambition to earn more. In comparison, health problems of Industrial workers are manageable.

Such comparison is also applicable to IT and Industrial workers working in other continual sectors like Power/Steel/Hospitals /Hotels/Public Utilities/Defense/ Security/Petroleum

Industry/different types of IT working like Call Centers etc./Air Traffic-Pilot /Transport etc.

It's a huge list now a days. To fulfill the gap between supply & demand, 24 working has - become need of survival.

Needless to say, that this is true for all Countries in World.

It would be worth mentioning that History shows that such "abnormal" night working hours are not a modern phenomenon.

Bernardino Ramazzini, (1633-1714-http://en.wikipedia.org/wiki/Bernardino_Ramazzini -) noted that bakers, innkeepers, medical team and soldiers worked such hours.

Bernardino Ramazzini is considered the founder of occupational/industrial medicine. He was an Italian physician, who was born on November 3, 1633, at Carpi Modena, and who died on November 5, 1714, in Padua, Venice.

His studies of occupational diseases and advocacy of protective measures for workers, encouraged eventual passage of as on date, factory safety and workmen's compensation laws.

Only differences are that there was no IT then and no industrial development as on today.

But credit to him can not be denied that his work initiated the need of continual studies on such topics. Thankfully the spirit is maintained by modern Researchers and contributing to Society.

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