EFFECTS OF WORK ENVIRONMENT TO THE HEALTH AND PRODUCTIVITY OF THE WORKERS OF IM DIGITAL PHILIPPINES, INC.

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ABSTRACT

This study aims to evaluate the work environment and determine its effect on the health and productivity of the workers of IM Digital Philippines Inc. This study will be specific in evaluating the Illumination, noise, and temperature and ventilation and its effect on the health of respondents. Also, this study evaluated the respondents' level of assessment in relation to work environment in terms of the quality and quantity of output. The researchers used the descriptive survey research method in this study with a total of 275 respondents (workers). The output was assessed as Need Improvement, Poor, Good and Very Good. The overall assessment in the work environment was "Good" but there were still health concerns and problems that need to be worked on. Then, majority of respondents assessed the level of assessment of work environment in terms of Quality of Output and Quantity of Output as Good with a rating of 79.52% and 78.02%, respectively. This study revealed that IM Digital Philippines Inc. provides good working environment, but there are still improvements needed. Thus, this study provided a recommended plan of action.

Keywords: *Productivity, Illumination, Noise, Temperature and Ventilation, Work Environment.*

INTRODUCTION

According to Ajala (2012), the environment is man's immediate surrounding which he manipulates for his existence. Wrongful manipulation introduces hazards that make the environments unsafe and impede the productivity rate of the worker. Physical environmental factors such as noise level, illumination and ventilation can have a direct impact to people's safety, health, comfort and performance. If these factors occur, there will be guidelines on the maximum allowable exposure then followed by possible solutions to lessen the exposure.

In order to increase human productivity, the first step is always creating healthy working environment. Design of the work environment has been known to play a role in influencing the productivity level of the company, the illumination, sound level and the temperature and ventilation are the following that can contribute to the optimal working design. It also leads to less injury.

Illumination is measured by candela. Illumination is the amount of light reflected back to the eyes from the surface of objects in the visual field. There are many factors that can affect the visual health of the employees, such as ensuring good legibility of information. If the visibility of information is insufficient this can result to eye strain and possibly to greater defects. This can be improved by providing appropriate lighting. The other one is by

avoiding direct light in the employee, another is by preventing reflections and shadows.

Proper lighting in the workplace can make all work tasks easier. It also enables the employees to perform their work comfortably and efficiently. It is said that people receive almost 85 percent of the information through their sense of sight which means that the lighting in the workplace plays a big role in the company in order to achieve great performance. Good lighting helps us to see and to recognize hazards because it reduces visual strain and discomfort while poor lighting may affect the workers health like eyestrain, migraine, and headaches. The workplace lighting's relationship in the productivity level of the workplace is that it affects the workers health which will eventually lead to injury that affects the productivity level.

Noise can be measured by decibels. A noise level that, over an 8 hour working day that exceeds 80dB on average, can damage hearing if it does exceeded it can lead to annoyance while performing the task or impaired hearing but it can also be avoided by setting limits for noise levels. Noise reduction is achieved in most cases by reducing or preventing the transmission of noise between source and the receiver. This can be done by keeping an adequate distance from the source of noise and by providing the appropriate personal protective equipment.

The sound pressure or acoustic pressure is the local pressure deviation from the ambient atmospheric pressure, caused by a sound wave. Long periods of repeated exposure to workplace noise between 75 and 85 dB presents a small risk of hearing disability to some people and it can affect the human health causing heart diseases or absenteeism due to work illness and tiredness. As noise levels increase, so does the risk. If this happens, personal protective equipments were needed. It is always recommended to control the noise level in the company. If they were unable to control it might cause negative effect on human productivity which leads to decrease in organization productivity and decrease in quality and quantity of services and products.

The workplace temperature also does affect the productivity level of the employees. It is vital to have the temperature controlled because it has a huge effect on the worker's body which can lead to different effects. Excessive workplace heat exposures create well-known risks of heat stroke, heat exhaustion and even death; it also affects the psychological health of the employee. Employee lethargy and tiredness as a result of increased body temperature lead to possible efficiency decreases. While if the temperature is low, it is said that employees made 44 percent more mistakes than at optimal room temperature. Low Temperature Levels decrease in efficiency due to cooler body heat and shivering. That is why it is recommended that the temperature should be controlled by the management to avoid the possible negative effects by it.

IM Digital Philippines, Inc. is a duly registered Eco-zone Enterprise facility based in Lot 21-A Phase 1A First Philippine Industrial

Park, Brgy Sta. Anastacia, Sto. Tomas, Batangas which specializes in providing products and services particularly High Precision Optical Solution, High Efficiency LED Lighting Solution, High SMPS Power Solution, High Reliable Healthcare Solution, and High satisfaction VCM Solution. The researchers chose IM Digital Philippines because it just started last 2010 and it means that it needs a lot of improvement, so the researchers believe that by doing this study it will be a great help in improving the work environment that will affect the health and productivity of the employees.

Statement of the Problem

The researchers evaluated the work environment and determine its effect on the health and productivity of the workers of IM Digital Philippines Inc.

Specifically, this study also sought answer to the following questions:

1. What is the respondent's evaluation of the work environment in terms of:

   1.1 Illumination;

   1.2 Noise; and

   1.3 Temperature and Ventilation

2. What are the effects of work environment to the health of respondents in terms of:

   2.1 Illumination;

   2.2 Noise; and

   2.3 Temperature and Ventilation

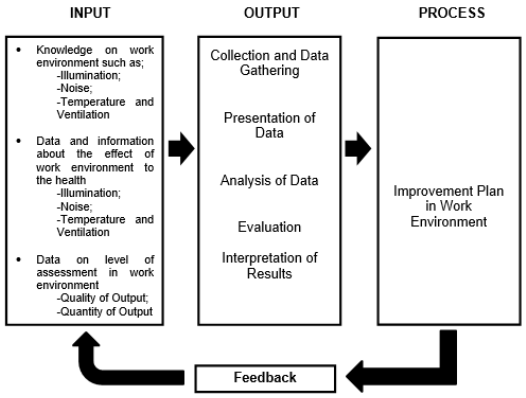
3. What is the respondent's level of assessment in the relation to work environment in terms of:

   3.1 Quality of Output; and,

   3.2 Quantity of Output.

4. What is the recommended improvement plan based on the finding of the study.

METHODOLOGY



3.1 Conceptual Framework

The Figure shows the research paradigm of the system that involves the beginning up to the end process regarding the Effect of Work Environment to Health and Productivity of the workers of IM Digital Philippines Inc. The input are independent variables that includes the knowledge on work environment in terms of illuminations, noise, temperature and ventilation, the data and information about the effect of work environment to the health in terms illuminations, noise, temperature and ventilation, and the data on level of assessment of work environment in term of quality and quantity of output. The process is the step in which the researcher will do including the

collection and data gathering ,presentation of data, analysis of data, evaluation and interpretations of the results of the study. The output will be the work environment improvement plan in terms of the illumination, noise, temperature and ventilation.

Research Methodology

The researchers used the descriptive survey type of a research method in this study. Descriptive method of a research is a fact-finding study with sufficient and accurate information of the findings. It described what actually exists in the current condition. Since the research focused on the work environments effect on the health and productivity of the workers of IM Digital Philippines Inc., the descriptive method of research was the most appropriate method to use.

The survey is appropriate in this study because it supports the researchers' formulation of generalization. The questionnaire was formulated to evaluate the work environment and know its effect to the health and productivity of the workers of IM Digital Philippines Inc.

Sample Size

The researchers conducted the study in IM Digital Philippines Inc., at First Philippines Industrial Park. There are a total of 880 workers or operators. Since it was a large population, the researchers used Slovin formula with a margin of error of 5%. The respondents were 275 operators of Video Camera Module products

The Subject

The researchers used the 275 workers or operators doing the Video Camera Module products of IM Digital Philippines Inc. as the subject of their study.

Since the study handled a large sample size, the method that used is the stratified random sampling.

Research Instrument

Data gathering and survey were employed by the researchers, as a tools and instrument in this study. The researchers gathered data in different resources such as books, related articles, journals and internet to get information about the topic.

Researchers used the survey questionnaire to gather data and analyze the results. It is consisted of the questions that can be answered by the employee's base on their level of productivity and assessment work environment and the health effect in term of illumination, noise, temperature and ventilation.

The questionnaire is consisted of three (3) parts. The first part gathers information about the respondent's assessment in work environment in term of illumination, noise, temperature and ventilation in which respondents should rate according to four (4) levels. The second part gathers information about health effect of work environment to respondent in terms of illumination, noise, temperature and ventilation. And the last part gathers information about the respondents 'level assessment in relation to work

environment in term of quality of output and quantity of output in which the respondents should rate according to four (4) levels.

The researchers used the following ranges in interpreting the results.

Rating	Scale	Verbal Interpretation	Interpretation of Result
4	3.50-4.00	Evident	Very Good
3	2.50-3.49	Slightly Evident	Good
2	1.50–2.49	Less Evident	Poor
1	1.00–1.49	Not Evident	Needs Improvement

In order to test the validity of the questionnaire used for the study the researchers tested the questionnaire validated by the researchers' adviser, Engr. RhodoraBuluran and Engr. Ryan Jeffrey P. Curbano. The researchers conducted the validation of the survey through 30 employees who were not employed in IM Digital Philippines Inc. The respondents as well as their answer were not part of the actual study process and were only used for testing purposes. After the questions have been answered, the researchers asked their adviser and the respondents for any suggestions or any necessary corrections to ensure further improvement and validity of the instrument. The researchers revised the survey questionnaire based on the suggestions of the adviser and respondents logics into simple ones in order to ensure comprehension. Using Cronbach Alpha, the reliability index of the questionnaire was r=0.847.

Data Gathering Procedure

The researchers had survey questionnaire validated by the adviser. It was given to the production operators of IM Digital Philippines Inc. at FPIP. Respondents answered the question based on their preference. After the retrieval of the questionnaires, the researchers tabulated and processed the data. After the questionnaire has been validated and tested for reliability, the researchers asked for the schedules of the employee who were employed in IM Digital Philippines Inc., from the HR Manager of the Human Resources Office. From the given schedule of the employee, the researchers conducted the survey during their Break time. The distribution of surveys to the employees was conducted in their respected areas.

Data Processing Method

After gathering all the completed questionnaires from the respondents, total responses for each item were obtained and encoded with the help of Microsoft Excel. The researchers used Microsoft Excel to analyze the data gathered.

Statistical Treatment

The data collected in this study are subjected to certain statistical treatments. The data are coded, are tallied and are tabulated for better presentation and interpretation of results. The statistical methods to be used are the following:

Weighted Mean Formula used to evaluate the work environment in term of illumination, noise, temperature and ventilation.

$$\bar{x} = \frac{\sum fx}{N}$$

Where: ∑fx = Sum of product of frequency and values

x = Number of Respondents

Percentage used to determine the health effects of the work environment in terms of illumination, noise, temperature and ventilation.

$$\% = (\frac{f}{N}) \times 100$$

Where: %= percentage

f = frequency

N = total number of respondents

PRESENTATION AND ANALYSIS OF DATA

Respondent's evaluation in working environment in terms of illumination

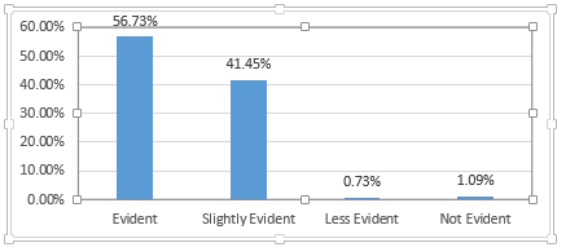


Figure 2: Appropriation of light in the working areas

The Figure 2 shows that 156 respondents of IM Digital Philippines Inc. or 56.73% agreed that it is evident that there is an appropriate light in the working area, 114 respondents or 41.45% also agreed that it is slightly evident, 2 respondents or 0.73% agreed that it is less evident and 3 respondents or 1.09% agreed that it is not evident. The weighted mean is 3.54 with a verbal interpretation of "Very Good".

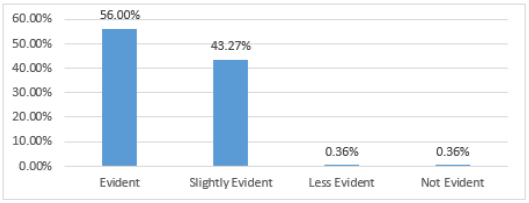


Figure 3: Sufficiency of light in the task

Figure 3 shows that 154 respondents of IM Digital Philippines Inc. or 56.00% agreed that it is evident that there is sufficient light for the task, 119 respondents or 43.27% also agreed that it is slightly evident, 1 respondent or 0.36% agreed that it is less evident and 1 respondent or 0.36% agreed that it is not evident. The weighted mean is 3.55 with a verbal interpretation of "Very Good".

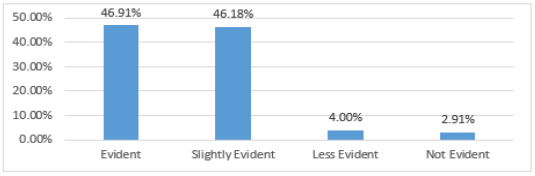


Figure 4: Normal line of eyesight

Figure 4 shows that there 129 respondents of IM Digital Philippines Inc. or 46.91% agreed that it is evident that there is no glare along or near the normal line of eye-sight, 127 respondents or 46.18% also agreed that it is slightly evident, 11 respondents or 4% agreed that it is less evident and 8 respondents or 2.91% agreed that it is not evident. The weighted mean is 3.37 with a verbal interpretation of "Good".

Respondents' evaluation in working environment in terms of noise

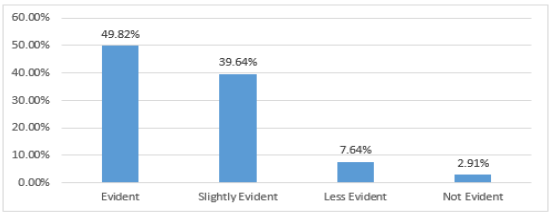


Figure 5: No deafening noise in the work area

Figure 5 shows that 137 respondents of IM Digital Philippines Inc. or 49.82% agreed that it is no deafening noise in the workplace, 109 respondents or 39.64% also agreed that it is slightly evident, 21 respondents or 7.64% agreed that it is less evident and 8 respondents or 2.91% agreed that it is not evident. The weighted mean is 3.36 with a verbal interpretation of "Good".

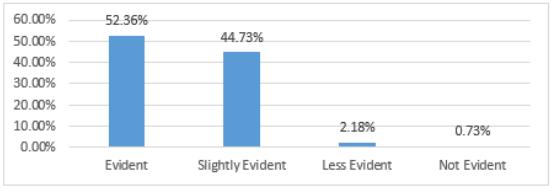


Figure 6: Clear communication of verbal auditory signals

Figure 6 shows that 114 respondents of IM Digital Philippines Inc. or 52.36% agreed that it is evident that verbal and auditory signals are clearly communicated and understood, 123 respondents or 44.73% also agreed that it is slightly evident, 6 respondents or 2.18% agreed that it is less evident and 2 respondents or 0.73% agreed that it is not evident. The weighted mean is 3.49 with a verbal interpretation of "Good".

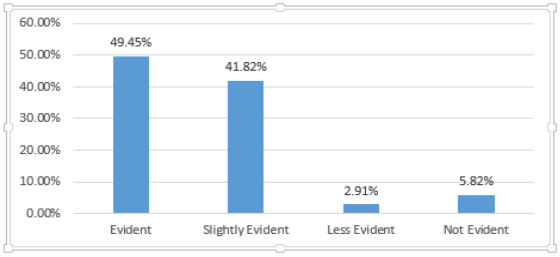


Figure 7: Maintaining of earmuffs

Figure 7 shows that 136 respondents of IM Digital Philippines Inc. or 49.45% agreed that it the earmuffs/plugs are worn and regularly maintained or replaced, 115 respondents or 41.82% also agreed that it is slightly evident, 8 respondents or 2.91% agreed that it is less evident and 16 respondents or 5.82% agreed that it is not evident. The weighted mean is 3.35 with a verbal interpretation of "Good".

Respondents' evaluation in working environment in terms of temperature and ventilation

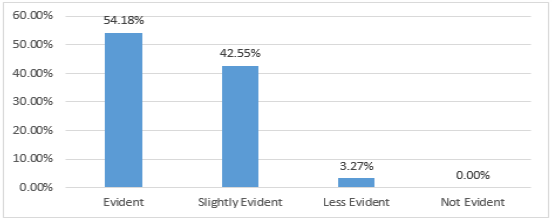


Figure 8: Sufficiency of ventilation throughout the work area

Figure 8 shows that 149 respondents of IM Digital Philippines Inc. or 54.18% agreed that it is evident that there is sufficient ventilation throughout the work area, 117 respondents or 42.55% also agreed that it is slightly evident, 9 respondents or 3.27% agreed that it is less evident and 0 or 0% agreed that it is not evident. The weighted mean is 3.51 with a verbal interpretation of "Very Good".

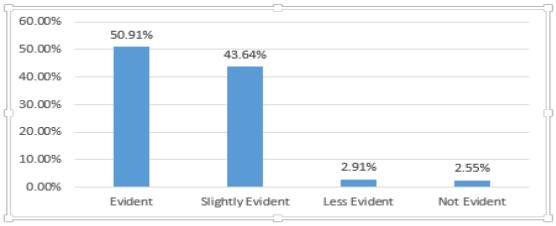


Figure 9: Maintaining of temperature in comfortable level

Figure 9 shows that 140 respondents of IM Digital Philippines Inc. or 50.91% agreed that the temperature in the workplace is maintained in comfortable level, 120 respondents or 43.64% also agreed that it is slightly evident, 8 respondents or 2.91% agreed that it is less evident and 7 respondents or 2.55% agreed that it is not evident. The weighted mean is 3.43 with a verbal interpretation of "Good".

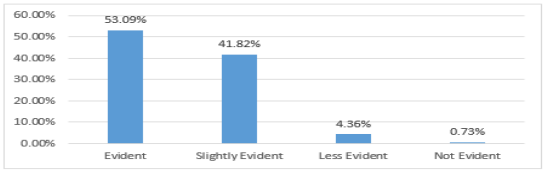


Figure 10: No foul odor in the workplace

Figure 10 shows that 146 respondents of IM Digital Philippines Inc. or 53,09% agreed that it is evident that there is no foul odor in the workplace, 115 respondents or 41.82% also agreed that it is slightly evident, 12 respondents or 4.36% agreed that it is less evident and 2 respondents or 0.73% agreed that it is not evident. The weighted mean is 3.47 with a verbal interpretation of "Good"

The effects of work environment on the health of respondents

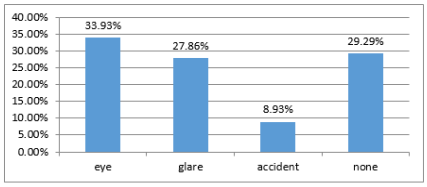


Figure 11: Effects of work environment to the health of respondents in terms of illumination

Figure 11 shows that there were 95 or 33.93% of the respondents of IM Digital Philippines have experienced eye strain, 78 or 27.86% have experienced glare, 25 or8.93% have experienced accident like slip and fall and 82 or 29.29% did not experience any of these.

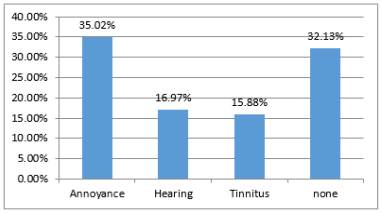


Figure 12: Effects of work environment to the health of respondents in terms of noise

Figure 12 shows that there were 35.02% of the respondents of IM Digital Philippines have experienced annoyance, 16.97% have experienced hearing loss, 15.88% have experienced tinnitus and 32.13% have experienced none of the following.

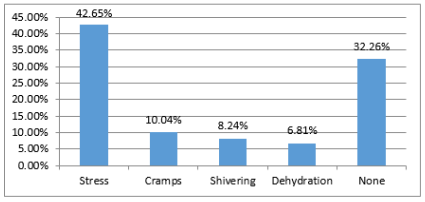


Figure 13: Effects of work environment to the health of respondents in terms of temperature and ventilation

Figure 13 shows that there were 42.65% of the respondents of IM Digital Philippines have experienced stress, 10.04% have experienced cramps, 8.24% have experienced shivering, 6.81% have experienced dehydration and 32.26% have experienced none of the following.

Respondents' level of assessment in relation to work environment in terms of Quality of output

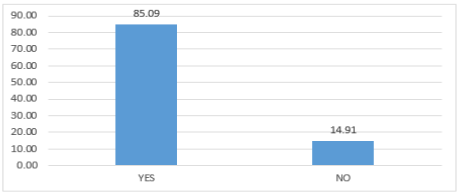


Figure 14: The standard operating procedures of every process is being followed regularly

Figure 14 shows that 234 of the respondents or 85.09% agreed that the operating procedures of every process is being followed regularly. However, 41 of the respondents or 14.91% disagreed that the operating procedures were followed regularly.

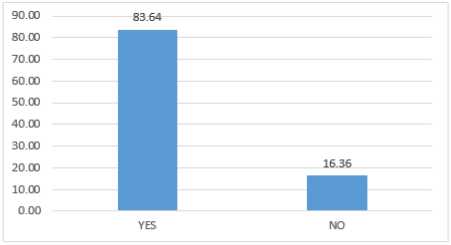


Figure 15: The work performed is consistent resulting no reject

Figure 15 shows that 230 of the respondents or 83.64% agreed that the work they performed were consistent resulting to no rejects. However 45 of the respondents or 16.36% disagreed that the work they performed were consistent therefor resulting to rejects.

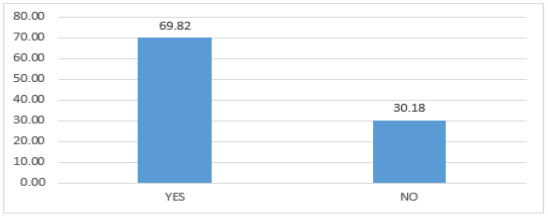


Figure 16: There is zero accident in the workplace

Figure 16 shows that 192 of the respondents or 69.82% agreed there is zero accident in the workplace. However, 83 of the respondents or 30.18% disagreed on zero accident on the workplace.

Respondents' level of assessment in relation to work environment in terms of Quantity of output

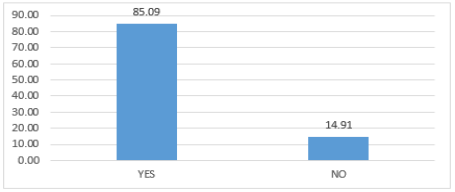


Figure 17: The process time in every operation is being followed on time

Figure 17 shows that 234 of the respondents or 85.09% agreed that the process time in every operation is followed on time. However, 41 of the respondents or 14.91% disagreed that the process time in every operation is followed on time.

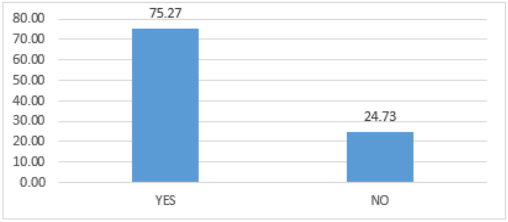


Figure 18: The target output in every operation is being met

Figure 18 shows that 207 of the respondents or 75.27% agreed that the target

output in every operation is being met. However, 68 of the respondents or 27.73% disagreed that the target output is being met.

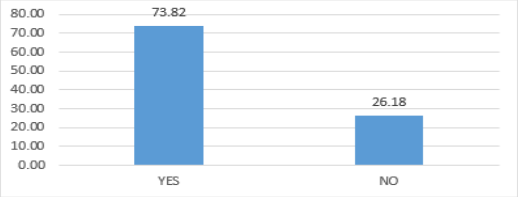


Figure 19: There is minimal inventory in Work in Process

Figure 19 shows that 203 of the respondents or 73.82% agreed that there is minimal inventory in Work in Process. However, 72 of the respondents or 26.18% disagreed that there is minimal inventory in Work in Process.

CONCLUSION

Based on the findings of the study the following conclusions are drawn:

1. The respondents evaluate the work environment of IM Digital Philippines Inc. in terms of illumination, noise, temperature and ventilation as “Good”. The evaluation tells that the IM Digital Philippines Inc.’s working environment provides a good level of illumination, noise, temperature and ventilation for its workers;

2. The evaluation of IM Digital Philippines Inc.’s working environment is good but there are still health concerns like in illumination most of them experienced eye strain in using their microscopes as a tool in doing task/job and few of them experience accident like slip and fall. Most of them experience annoyance and few of them experience tinnitus. In temperature and ventilation they experience stress and few of them experience dehydration. According to Government of South Australia, 2008, very loud sounds make the hair cells collapse and flatten temporarily, resulting in temporary deafness. This is referred to as a temporary threshold shift and may last hours or longer depending on the degree of noise exposure; and,

3. Majority of respondents answer is yes that the standard operating procedures of every process is followed and the work performed is consistent. This tells that the quality of making the product output is good and it results in minimal rejects. According to an article of CQI (Chartered Quality Institute), 2014, entitled “Performance Management” standards are targets to aim for but are also targets to change. If an organization had not managed to lower its product defect rate below 2% for many years, 2% defective becomes the norm and is built into budgets and estimates. Quality improvement takes place when the standard is challenged and a new level of performance achieved.

RECOMMENDATION

Based on the previous findings of the study, here are the following recommendations:

1. The researchers recommend that the company should follow the provided action plan in this study and conduct a further evaluation to determine what maybe other factors affecting their health problems and concern. The action plan can be used to improve the work environment, to reduce work environment related health effect and to improve productivity. In order to improve the overall assessment, the researchers recommend that the company should do periodical ergonomic audit to identify if there will be any enhancements in the work environment and to identify if there is any area that needs immediate action;

2. Work environment's effect in the health and productivity of the workers of IM Digital Philippines Inc. is recommended as a reference in doing another study like this. The data and results, and the conclusions of this study such as the evaluation of work environment, the health effect and the level of assessment in relation to the work environment would provide comparative results with any future study that is similar or related to this. To improve the study, they must include others factors such as age, gender, the personal protective equipment being use, materials storages and handling, the motivational aspect, machine safety, work design, hazardous substance, welfare facilities and the work organization.

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