March - April 2020
ISSN: 0193-4120 Page No. 4874 - 4878

Ergonomic Practices and Organizational Performance of Car Manufacturing Companies in Laguna

Antoniette T. Mollejon[1], Juliet O. Niega[2], Oliver D. Manaig[3], Rizal M. Mosquera[4], Ryan John L. De Lara[5], Noel T. Florencondia[5], Michael John M. Villar [6]

[1,2,3,4,5,6] Nueva Ecija University of Science and Technology

Article Info
Volume 83
Page Number: 4874 - 4878
Publication Issue:
March - April 2020

Abstract

Scholars and renowned Ergonomist avowed that Ergonomic practices implementation leads to excellent organizational performance. This study sought to find relationship between Ergonomic practices and organizational performance. Four car manufacturing companies in Laguna participated in the research. Combination of Velasco's Ergo Tech Leap System Model and Shahnavaz's Theoretical Model for Ergonomic Intervention was used as the theoretic frame in the determining the relationship between Ergonomic practices and organizational performance. Research was pursued using Explanatory Mixed Method. Quantitative research made use of survey questionnaire. Demographic data were analyzed with the use of descriptive statistics in terms of mean and standard deviation. Pearson's Correlation was employed to test the relationship of the variables. In- depth interviews with manager and three supervisors were pursued in the qualitative research. Result revealed that there is a significant relationship between Ergonomic practices and organizational performance. Companies are strong in the implementation and commitment to safety and served as an avenue that provides safety trainings, skills formation, seminars, education and competition for personal growth and organizational growth. Company representatives believed on the positive outcome they will reap upon implementing these practices. Thus, lack of top management support pinpointed as the lead barrier to successful implementation of Ergonomic intervention. Government regulation and market condition only shared small percentage of the barrier.

Article History
Article Received*: 24 July 2019*
Revised*: 12 September 2019*
Accepted*: 15 February 2020*
Publication*: 27 March 2020*

Index Terms: *Ergonomic practices, organizational performance, workers' productivity, organizational productivity, workers' health and safety, quality of a product.*

I. INTRODUCTION

The automobile industry was acknowledged as 'the industry of industries' and is considered one of the most globalized industries in today's time (Wad, 2009). However, the problem of unfavorable working condition or poor workplace ergonomics is causing lot of damage on the industry in terms of health (DOLE Philippines, 2000), increased incidences of work related injuries recorded by OSHA (Rethaber, 2011), quality of life of workers, economic results of employers and economy as a whole deteriorate (Otto and Scholl, 2011; Pao and Kleiner, 2001).

It has become evident that Ergonomics have yielded a positive reaction in manufacturing industry. Integrating Ergonomic interventions into production processes led to improve working condition in the Asia Pacific Region and other countries across the globe. Although there has been a growing body of literature supporting the view that applying Ergonomics pays off in terms of organizational productivity, workers' productivity, workers' health and safety and quality of a product, it is still necessary to analyze on which type of Ergonomic practices are most effective just like in the case of Motor Vehicles and Manufacturers in Europe:

Published by: The Mattingley Publishing Co., Inc.

March - April 2020
ISSN: 0193-4120 Page No. 4874 - 4878

Ergonomic findings by Industrial European Trade Union with situation of intense discomfort and suffering among workers in the assembly line. The limited studies of car manufacturing companies and its unclear performance outcomes might be an obstacle for firms seeking to justify Ergonomic implementation. There has been an insufficient research-based knowledge in Human Factors Engineering and Ergonomics in the Philippines. Theories to support the study are rarely seen in most of the available related literatures. The continuing arguments in the literature whether or not ergonomic application may lead to excellent organizational performance. Since automotive industry is one of the key drivers of the Philippine economy according to Department of Trade and Industry (2013), the study was therefore pursued.

The goal of the study was to ascertain that there is a relationship between Ergonomics and the organizational performance. The study specifically aimed to:

1. Determine the Ergonomic practices being employed by car manufacturing companies in Laguna;

2. Determine whether there is any relationship between Ergonomic practices and workers' productivity, organizational productivity, workers' health and safety and quality of a product; and

3. Identify the barriers to the successful implementation of Ergonomics in the car manufacturing companies in Laguna.

II. METHODOLOGY

This study employed Explanatory Sequential Mixed Method Design. It is a methodology for conducting research that involves collecting, analyzing, and interpreting quantitative and qualitative research in a single study or inquiry. The rationale for using this form of research is that the quantitative and qualitative research results were used to provide contextualized explanation on the combined analysis and conclusion of the study.

A. Phase I- Quantitative Research

A total of four car manufacturing companies in Laguna participated in the research. Data were collected using survey questionnaire. The questionnaire was pretested using the Test- Retest which resulted to 0.84 correlation rating indicating a good reliability at $p \leq 0.05$ level of confidence. For content validity; four experts reviewed the instrument- two from the industry and another two from the academe. Their suggestions were used to draw the final draft of the question items.

The researcher purposively selected 10 representatives from each of the participating car companies to obtain 40 operator respondents. Data were analyzed with the use of descriptive statistics presented in terms of mean and standard deviation. Pearson's Correlation coefficient (r) was employed to test the relationship between Ergonomic practices and Organizational performance. Four point likert scale was used to interpret the items in the survey questionnaire. The responses were based on the respondents' perception, personal experience and knowledge about Ergonomic practices in their current company.

B. Phase II- Qualitative Research

For the semi-structured in-depth interview, an interview guide was designed to ensure that the same general areas of information have been collected from each respondent. The interview guide includes main questions for determining the Ergonomic practices being employed and its effect to the interviewee's company performance. The qualitative research instrument was submitted to four experts, to attest to its appropriateness in measuring what it intends to measure. Their suggestions were used to draw the final draft of the question items.

Published by: The Mattingley Publishing Co., Inc.

March - April 2020
ISSN: 0193-4120 Page No. 4874 - 4878

A purposive sampling was employed in the qualitative phase of the study.1 manager and 4 supervisors participated in the interview provided that all recorded interviews will be treated with utmost confidentiality and will only be used for the purpose of this research. The entire interview process was audio recorded to ensure that there are no missing information and responses from the respondents. A combination of deductive approach and thematic content analysis were conducted.

III. RESULTS AND DISCUSSION

The goal of this study was to explore and identify the relationship between Ergonomic practices and organizational performance of car manufacturing companies in Laguna. Six research questions were formulated to help guide the study. A null hypothesis was also formulated to aid the researcher in answering the research questions. Hence, this chapter presents the results descriptive statistics and Pearson (r) correlation carried out by the researcher in the quantitative phase and the content analysis used to analyse the qualitative data. Results for both quantitative and qualitative phase of the study were presented. Specifically, the chapter presents and discussed the result of the Explanatory Mixed Method Design responded by 44 participants; 40 respondents for quantitative research and 4 participants for qualitative research.

Based on the findings of the study, the following conclusions are drawn;

1. Ergonomic practices were widely practiced to a great extent by the participating car manufacturers with overall means of 3.28 (CMF1), 3.15 (CMF2), 3.26 (CMF3) and 3.28 (CMF4). Companies believed on the benefits Ergonomic practices will bring to the organization in terms of productivity, health and safety and quality of a product. The companies are strong in the implementation and commitment to safety. Individual companies served as an avenue that provides safety trainings, skills formation, seminars, education and competition for personal growth and organizational growth.

Table I. Extent to which Ergonomic Practices are implemented by Car Manufacturing Companies

Category	Mean per Company				Interpretation
	CMF 1	CMF 2	CMF 3	CMF 4	
Physical Ergonomics	3.24	3.12	3.06	3.28	To a great extent
Cognitive Ergonomics	3.20	3.18	3.10	3.18	To a great extent
Organizational Ergonomics	3.39	3.20	3.73	3.34	To a great extent
Overall Mean	3.28	3.15	3.26	3.28	To a great extent

Note: Interpretation is based on the following scale. Not at all (1.00-1.50), To a small extent (1.51-2.50), To a great extent (2.51-3.50), To a very great extent (3.51- 4.00); Company Code- CMF1, CMF2, CMF3 and CMF4

2. With the given results of p-values equal to 0.000 < 0.01 as presented on Table 2, the researcher concludes that there was a significant relationship between Ergonomic practices and organizational performance. Apart from Ergonomic practices, workforce and technology played an important role in producing good organizational performance. However, sustaining the good results of Ergonomic intervention would require management support, participation among members and knowledge support. Technology, management support and knowledge support are strong points evident to four participating car manufacturers. Active participation among members was the one that needs to be intensified.

Table II. Relationship between Ergonomic Practices and Organizational Performance

Category	r-value	p-value	Interpretation
Workers' productivity	0.725***	0.000	Significant
Organizational productivity	0.848***	0.000	Significant
Workers' health and safety	0.651***	0.000	Significant
Quality of a product	0.664***	0.000	Significant

Published by: The Mattingley Publishing Co., Inc.

March - April 2020
ISSN: 0193-4120 Page No. 4874 - 4878

** p-value <0.01, significant

3. Lack of top management support ranked 1 with mean of 2.48 and standard deviation of 0.88. Lack of time with a mean of 2.60 and a standard deviation of 0.81 ranked 2.5 the same ranked as lack of resources with mean of 2.60 and standard deviation of 0.71.

Result of survey pinpointed lack of top management support as the lead barrier to successful implementation of Ergonomic intervention according to CMF3 and CMF1 followed by lack of time and resources. However, it is contradicting the result of the interview that management recognized the importance of Ergonomic intervention and there were appropriate projects to support it. It is concluded that CMF3 and CMF1 have problem communicating with the top management their ideas as stated in the survey questionnaire. External barriers are government regulations with a mean of 1.06 and a standard deviation of 2.53; ranked 1 and market condition with a mean of 1.01 with a standard deviation of 2.53 ranked 2.

Top management support is considered to be of high impact behind a successful project. However, presence of resources and time were also essential to a successful Ergonomic intervention. Government regulations and market condition were among the external barriers. Apart from the legal and financial cost, participating companies embraced it on a positive way to stay competitive in the market and eventually gain profit in the long run.

IV. RECOMMENDATION

Based on the findings and conclusions presented, the following recommendations are suggested;

Recommendations for participating car manufacturing companies

1. Although the understanding of Ergonomics is evident among car manufacturing companies in Laguna, it will be more beneficial to deepen the company's understanding about Ergonomic knowledge such as (1) structure of the human body (2) energy expenditure in body movement (3) ergonomic implication of working posture (4) fatigue and prevention of fatigue (5) ergonomic relations between, human, equipment and process of work (6) psychological implication of job satisfaction and Ergonomic tools and the long term benefits they could get from it.

2. Workforce is the most important resource of the organization, workers' welfare is imperative for an Ergonomic intervention to succeed. It is fundamental to establish bottom- up and top- down communication to ensure that there will be no barrier to intercept the innovative change. Give every employee the necessary information needed to be an active participant of the Ergonomic intervention or innovative change and that we call "Participatory Ergonomics". Active participation of workers will lead to common understanding of the problems that need to be resolved. It will also result to workers' acceptance of change. Clear loop of communication between the upper and the lower level will unblock the barrier.

Recommendations for further research

1. The study covered only four car manufacturing companies involving only 44 participants; 40 operators for the quantitative phase and 4 managers or supervisor for the quantitative phase. Follow up study involving more car manufacturing companies with more research participants may be pursued. Increasing the number of participants will increase the reliability of the data.

2. Substantial research is needed on Anthropometric measurement of the Filipino workers. The data will be of great help in designing manufacturing assembly line, tools, machineries and equipment. This will contribute to the Philippine employers, Filipino workers and even multinational companies with Filipino workforce.

Published by: The Mattingley Publishing Co., Inc.

3. Further study can be pursued on OHSAS 18001 Occupational Health and Safety Management System and the benefits the organization will get upon implementing it; improve corporate image and credibility, ensure health and well-being of employees, reduce accident and work related injuries, increase workers' motivation through a provision of a safer workplace This will contribute to business sectors without practical understanding on OHSAS 18001.

Recommendation for Occupational Safety and Health and Department of Labor and Statistics

1. OSH Philippines should collaborate with the Department of Labor and Statistics in conducting comprehensive evaluation and review of work related injuries and illness reporting system in car manufacturing industries and other business sectors. Examining the possible gaps and barriers to delivering real time report would be a great topic to be studied because it is necessary for the general public to have a reliable, time to date and accessible data that will reveal real numbers and trends of work related injuries and illness in the Philippines.

REFERENCES

[1] Otto, A., & Scholl, A. (2011). Incorporating ergonomic risks into assembly line balancing. European Journal of Operational Research,212(2), 277-286. doi:10.1016/j.ejor.2011.01.056J. U.

[2] Pao, T., & Kleiner, B. H. (2001). New developments concerning the occupational safety and health act. Managerial Law,43(1/2), 138-146. doi:10.1108/03090550110770462

[3] Rethaber, J. D. (2011). Bridging the performance gap with ergonomics: A case study. Performance Improvement,50(7), 33-37. doi:10.1002/pfi.20230

[4] Velasco, A. (n.d.) (1998). Ergonomics: An Agenda for Philippine Productivity in the New Millennium.

[5] Shahnavaz, H. (1997). Interactive effect of ergonomics and production engineering on shoulder-neck exposure — A case study of assembly work in China and Sweden

[6] Wad. P. (2009). The automobile industry of Southeast Asia: Malaysia and Thailand. Journal of Asia Pacific Economy. 14 (2). 172- 193. doi: 1080/ 13547860902786029