

Assessment of the Physical Ergonomic Factors of Pearl Drillers in Medellin, Cebu

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Abstract: The primary objective of this study was to assess the satisfaction levels of pearl drillers with regard to seven physical ergonomic factors. The study used a descriptive qualitative design. Data was gathered through self-administered survey questionnaires, wherein the 14 respondents were required to select one answer out of five options per factor. Based on the findings, the lighting conditions, posture and seating arrangements are reported to have good conditions. Similarly, the ergonomic features of tools and equipment of the workers are adequate, with room for improvement. The noise level in the workstation are moderate and was revealed to have caused moderate distractions. Furthermore, the layout of the workstations of the workers are reported to be well organized. Most workers conveyed that the safety measures in place are good. The findings revealed that an average level of job satisfaction among pearl drillers in all of the physical ergonomic factors, while also highlighting the effects of these factors.

Keywords: lighting, pearl industry, work posture, temperature, workstation, tools and equipment, noise levels.

1. Introduction

The issue of job satisfaction has garnered significant attention in recent years, as researchers seek to understand its underlying dynamics and impact on individual and organizational outcomes. Job satisfaction is intricately tied to the perceptions and experiences of individuals within the workplace, highlighting the importance of a positive and efficient partnership between workers and managers (Jahanbani et al., 2018). If workers have enthusiasm, happiness, and a high spirit, they steer their talents and abilities toward organizational ends (Ali et al., 2018). Despite the acknowledged significance of job satisfaction and the growing recognition of ergonomics in shaping a conducive work environment, there remains a gap in understanding how specific physical ergonomic factors impact the job satisfaction of pearl drillers in Medellin, Cebu

Assessing the job satisfaction of pearl drillers in the unique context of the pearl industry, with a specific emphasis on eight physical ergonomic factors: lighting conditions, temperature and ventilation, tools and equipment, posture and seating arrangements, noise level, workstation layout, and safety measures and protocols are crucial elements in providing a

conducive work environment. The factors' influence on the job satisfaction of pearl drillers remains inadequately explored in the existing literature.

2. Materials and Method

A. Research Design

This research study was based on a descriptive qualitative analysis of the job satisfaction and well-being of pearl driller workers, based on eight (8) physical ergonomic factors. Qualitative research refers to the examination of the characteristics of phenomena and is particularly suitable for addressing inquiries regarding the reasons behind the presence or absence of certain observations (Busetto, Wick & Gumbinger, 2020) and it is heavily dependent on the researcher's analytic and integrative skills and personal knowledge of the social context where the data is collected (Bhattacharjee, 2019). Drawing on a qualitative method, the researchers explored the satisfaction levels of pearl drillers in-depth, capturing the workers' perceptions related to the seven physical ergonomic factors. The study collected data through self-administered survey questionnaires and a checklist, which provided insights into the subjective experiences of 14 respondents, offering a comprehensive understanding of their perspectives on the ergonomic factors of their jobs. This approach enables a more holistic assessment of the factors influencing the overall satisfaction of pearl drillers and helps identify specific areas requiring improvement. The researchers deemed the qualitative approach appropriate for this study to achieve its research objective.

B. Population of the Study

A population, as defined by Shukla (2020), is the complete collection of units that demonstrate a variable characteristic being studied, and is used to generalize research findings. In this study, the target population pertains to the community of pearl drillers in Medellin, Cebu. The researchers used self-administered surveys to gather data, and they received 14 responses from a diverse group of participants in terms of age, gender, experience, and education.

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C. Data Collection Tool

Specific instruments were employed to gather adequate and dependable data for this research. In this study, Survey questionnaires were the primary data collection method used. According to Bhattacharjee (2021), questionnaires are research tools that contain standardized questions or items to collect responses from respondents in a consistent and structured manner. For this research, a self-administered survey questionnaire was used to gather data. Respondents were responsible for answering the survey independently and returning it to the researchers. The reliability of the information gathered through the survey questionnaire is critical to the success of the research. Therefore, appropriate data collection tools and techniques are pivotal in ensuring the accuracy and validity of the results.

3. Results and Discussion

The total number of Pearl drillers at Medellin, Cebu, is fourteen (14), and an equivalent number of questionnaires were printed and distributed to the respondents for data collection. The questionnaire included seven (7) ergonomic factors, along with the required demographic and occupational profile information of the respondents. The following is an analysis of the collected data;

A. Demographic and Occupational Profile

The survey included some demographic and occupational variables (age, years of experience, and educational background), since they are factors that conform to the different characteristics of human populations. Table 1 below provides a summary of the overall demographic profile of the survey's respondents. The profile takes note of their age, years of experience, and educational background. The category of sex was omitted since all fourteen (14) respondents are women, suggesting a notable trend within this specific segment of the pearl industry, possibly indicating exclusive opportunities for

women.

The study results revealed that the majority of the survey respondents were women aged 46 years or older, accounting for 36% of the population. The age groups 16-20, 21-25, 31-35, and 41-45 also contributed to the study, each representing 14% of the population. On the other hand, the age group 36-40 accounted for the smallest percentage, with only 7% of the respondents.

The educational background of the respondents showed that 43% of the population had graduated from either elementary or high school, while the remaining 7% were senior high school graduates. The distribution of educational background revealed that a significant proportion of the respondents had lower educational attainment, while a smaller proportion held senior high school diplomas. It is noteworthy that no college graduates participated in the survey, which could indicate that they did not pursue a career related to pearl drilling after graduation.

Regarding work experience, half of the respondents (50%) reported having 0-5 months of experience, while 21% had 21-25 months of experience, and 14% had 11-15 months of experience. None of the respondents had only 16-20 months of experience. The distribution of work experience revealed that the majority of the respondents had less than six months of experience as pearl drillers, while 21% had been working in the industry for two years. This could suggest that most pearl drillers do not remain in the industry for more than two years.

These demographic and experiential data could prove useful to organizations in designing targeted interventions or strategies that cater to the needs of different age groups and educational backgrounds within the context of the research.

B. Physical Ergonomic Factors

The collected survey data pertains to physical ergonomic factors, as presented in Tables 2-8. A total of fourteen respondents participated and responded to seven physical ergonomic variables, with options for selection being limited to

Table 1
Demographic and Occupational profile

Respondents' Profiles	Category	Frequency	Percentage	Total
Age (Years)	16-20	2	14%	14%
	21-25	2	14%	28%
	31-35	2	14%	42%
	36-40	1	7%	49%
	41-45	2	14%	63%
	46 and older	5	36%	100%
Educational Background	Elementary Graduate	6	43%	43%
	High School Graduate (Old Curriculum)	6	43%	86%
	Senior High School Graduate	2	14%	100%
Work Experience (Months)	0-5	7	50%	50%
	6-10	1	7%	57%
	11-15	2	14%	71%
	21-25	3	21%	93%
	26 and above	1	7%	100%
Respondents' Profiles	Category	Frequency	Percentage	Total
Age (Years)	16-20	2	14%	14%
	21-25	2	14%	28%
	31-35	2	14%	42%
	36-40	1	7%	49%
	41-45	2	14%	63%
	46 and older	5	36%	100%

five. The presented tables showcase the findings of the survey clearly and concisely, providing insight into the ergonomic conditions of the respondents. These variables include lighting, temperature, ventilation, tools and equipment, posture and seating arrangements, noise level, workstation layout, and safety measures. The tables highlight the importance of each variable in terms of respondent satisfaction. The data presented in this study offers valuable insights for pearl drillers in Medellin, Cebu, and other similar industries seeking to optimize their work environment, employee productivity, and overall job satisfaction.

1) *Lighting Condition*

The table illustrates the satisfaction of 14 respondents, on the lighting conditions present in their workstations.

Table 2 shows that eight respondents (R2, R3, R4, R5, R6, R7, R8, & R9) rated the lighting conditions at their workstations as above average, suggesting that a significant portion of workers viewed their workstation lighting as conducive, with minimal strain and optimal visibility. Four respondents (R1, R10, R11, R13) expressed an average level of satisfaction with the lighting condition which has led to discomfort, squinting, and inadequate illumination. In contrast, 2 respondents (R12 & R13) contended that the lighting is excellent, providing a well-

illuminated workspace that fosters comfort and minimizes eye strain.

2) *Temperature and Ventilation*

The table illustrates the satisfaction of 14 respondents with the temperature and ventilation conditions present in their workstations.

As depicted in Table 3, a majority of the workforce (R1, R2, R3, R4, R5, R6, R10, R11) reported an average level of satisfaction with the temperature and ventilation conditions at their workstations. While these conditions are generally deemed acceptable, there exists an opportunity for improvement to enhance overall comfort and concentration. Notably, two respondents (R6 & R13) perceive the temperature and ventilation as comfortable, featuring good airflow and minimal discomfort. Additionally, another two respondents (R12 & R14) express the view that the temperature and ventilation are excellent, contributing to a pleasant and productive work environment. In contrast, a smaller fraction of respondents (R8 & R9) have a divergent opinion, asserting that the temperature and ventilation are below average, leading to occasional discomfort, distractions, and a perceived need for improvement in temperature control and airflow.

Table 2
Pearl Drillers' perception of lighting condition

Respondents	Answers				
	(A1) The lighting is insufficient	(A2) The lighting is below average	(A3) The lighting is adequate	(A4) The lighting conditions are good	(A5) The lighting is excellent
R1			✓		
R2				✓	
R3				✓	
R4				✓	
R5				✓	
R6				✓	
R7				✓	
R8				✓	
R9				✓	
R10			✓		
R11			✓		
R12					✓
R13			✓		
R14					✓

Table 3
Pearl Drillers' perception of temperature and ventilation

Respondents	Answers				
	(A1) The temperature and ventilation are uncomfortable	(A2) The temperature and ventilation are below average	(A3) The temperature and ventilation are acceptable	(A4) The temperature and ventilation are comfortable	(A5) The temperature and ventilation are excellent
R1			✓		
R2			✓		
R3			✓		
R4			✓		
R5			✓		
R6			✓		
R7				✓	
R8		✓			
R9		✓			
R10			✓		
R11			✓		
R12					✓
R13				✓	
R14					✓

3) *Tools and Equipment*

The table illustrates the satisfaction of 14 respondents with the ergonomic features of the tools and equipment used by the respondents.

According to the findings presented in Table 4, a majority of workers (R1, R2, R3, R4, R5, R6, R8, R9, R10, & R11) expressed average satisfaction with the ergonomics of the tools and equipment used in their roles as pearl drillers. These ten respondents believe that the tools are generally comfortable and adhere to ergonomic standards, yet they also acknowledge the potential for enhancements in their design to ensure optimal user comfort. In contrast, a smaller subset of respondents (R12, R13, & R14) believes that the ergonomic features of the tools and equipment are already good, designed to prioritize user comfort and thereby promote efficiency while reducing the risk of repetitive strain injuries. Notably, a sole respondent (R7) perceives the ergonomic features of tools and equipment as excellent, facilitating both efficient and comfortable use while minimizing the risk of physical discomfort.

4) *Posture and Seating Arrangements*

The table illustrates the satisfaction of 14 respondents with the posture and seating arrangements while they were doing

their work.

As shown in Table 5, the majority of the respondents (R1, R2, R3, R4, R5, R6, R7, R10, R11, R13) expressed an average level of satisfaction regarding their posture and seating arrangements. A smaller segment, comprising four of the respondents (R8, R9, R12, & R14), regarded their posture and seating arrangements posture and seating arrangements as good, involving moderate physical strain.

5) *Noise Level*

The table illustrates the satisfaction of 14 respondents on the noise levels present in their workspace.

According to the findings in Table 6, a majority of the respondents (R1, R2, R3, R4, R5, R6, R10, & R13) perceived that the noise levels are moderate, causing moderate distractions but moderate noise could still potentially lead to disruptions. Furthermore, four out of fourteen respondents (R7, R8, R9, & R11) expressed that the noise levels are low, causing minimal distractions, although disruptions during work hours could still occur. On the contrary, a minority segment of respondents (R12 & R14) expressed that the noise levels are minimal, contributing to a quiet and focused workspace.

Table 4
Pearl Drillers' perception of tools and equipment

Respondents	Answers				
	(A1) The tools and equipment have uncomfortable features	(A2) The ergonomic features of tools and equipment are below average	(A3) The ergonomic features of tools and equipment are adequate	(A4) The ergonomic features of tools and equipment are good	(A5) The ergonomic features of tools and equipment are excellent
R1			✓		
R2			✓		
R3			✓		
R4			✓		
R5			✓		
R6			✓		
R7					✓
R8			✓		
R9			✓		
R10			✓		
R11			✓		
R12				✓	
R13				✓	
R14				✓	

Table 5
Pearl Drillers' perception of posture and seating arrangements

Respondents	Answers				
	(A1) The posture and seating arrangements are uncomfortable	(A2) The posture and seating arrangements are below average	(A3) The seating and posture support is acceptable.	(A4) The posture and seating arrangements are good	(A5) The posture and seating arrangements are excellent
R1			✓		
R2			✓		
R3			✓		
R4			✓		
R5			✓		
R6			✓		
R7			✓		
R8				✓	
R9				✓	
R10			✓		
R11			✓		
R12				✓	
R13			✓		
R14				✓	

6) *Workstation Layout*

The table illustrates the satisfaction levels of 14 respondents with the layout of their workstations.

The data presented in Table 7 highlights that almost half of the respondents (R2, R3, R4, R5, R6, & R11) expressed that the workstation layout is well-organized, promoting ease of movement and efficient task completion. This organized arrangement has contributed to a workspace that fosters both

ease of movement and the expeditious completion of tasks. Furthermore, four respondents (R1, R8, R9, & R10) conveyed that the layout of the workstation is acceptable, although they suggest that certain improvements could be implemented to enhance the overall efficiency and functionality of the workspace. In contrast, two respondents (R7 & R13) perceived the workstation layout as below average, emphasizing the need for adjustments to enhance workflow and safety. Additionally,

Table 6
Pearl Drillers' perception of noise level

Respondents	Answers				
	(A1) There is excessive noise	(A2) The noise levels are high	(A3) The noise levels are moderate	(A4) The noise levels are low	(A5) The noise levels are minimal
R1			✓		
R2			✓		
R3			✓		
R4			✓		
R5			✓		
R6			✓		
R7				✓	
R8				✓	
R9				✓	
R10			✓		
R11				✓	
R12					✓
R13			✓		
R14					✓

Table 7
Pearl Drillers' perception of the layout of the workstations

Respondents	Answers				
	(A1) The layout of my work station is unsafe	(A2) The layout of my work station is below average	(A3) The layout of my work station is acceptable	(A4) The layout of my work station is well organized	(A5) The layout of my work station is excellent
R1			✓		
R2				✓	
R3				✓	
R4				✓	
R5				✓	
R6				✓	
R7		✓			
R8			✓		
R9			✓		
R10			✓		
R11				✓	
R12					✓
R13		✓			
R14					✓

Table 8
Pearl Drillers' perception of safety measures and protocols

Respondents	Answers				
	(A1) The safety measures are inadequate	(A2) The safety measures are below average	(A3) The safety measures are adequate	(A4) The safety measures are good	(A5) The safety measures are excellent
R1				✓	
R2				✓	
R3				✓	
R4				✓	
R5				✓	
R6				✓	
R7					✓
R8			✓		
R9			✓		
R10			✓		
R11				✓	
R12				✓	
R13			✓		
R14					✓

another two respondents (R12 & R14) reported the workstation layout as excellent, indicating that it optimizes workflow and ensures a safe and efficient workspace.

7) Safety Measures and Protocols

The table illustrates the satisfaction of 14 respondents regarding the safety measures and protocols in the workplace.

As illustrated in Table 8, a noteworthy percentage of employees (R1, R2, R3, R4, R5, R6, R11, & R12) have conveyed their assessment that the safety measures in place are commendable. This observation signifies the provision of a secure working environment, effectively mitigating potential risks to both health and well-being. Conversely, a subset of four respondents (R8, R9, R10, & R13) has expressed the view that the existing safety measures are deemed adequate but could benefit from enhancements to address potential risks more comprehensively. A smaller cohort of participants (R7 & R14)

has attested to the excellence of safety measures, emphasizing the cultivation of a workplace culture that prioritizes well-being and actively prevents accidents.

C. Findings

The findings of the study underscore the significance of these factors in shaping the work experience of pearl drillers. Specifically, regarding lighting conditions, more than half of respondents rated their lighting as above average. Similarly, temperature and ventilation, tools and equipment, posture and seating arrangements, and workstation layout all contributed significantly to the overall satisfaction of pearl drillers, with varying degrees of positive feedback across these dimensions. Furthermore, the study revealed that posture and seating arrangements have the highest positive rating among all factors, as evidenced by 10 of the respondents reporting that their posture and seating arrangements are an average satisfaction. Researchers have also observed that respondents aged 46 years old and above exclusively reported excellent satisfaction with safety measures and protocols, noise levels, tools and equipment, temperature and ventilation, and lighting conditions. This implies that younger age groups generally express lower levels of satisfaction regarding these factors. Additionally, the findings highlighted two factors—temperature and ventilation and workstation layout that were reported with below-average satisfaction by one or two respondents. Given that respondents rated these as below average, it is

recommended to prioritize interventions and improvements in these specific areas. Although most of the factors received average to high satisfaction ratings, there is still a need for improvements in those factors to make them ergonomically excellent.

4. Conclusion

The study conducted a comprehensive assessment of various physical ergonomic factors among pearl drillers in Medellin, Cebu. Valuable insights were obtained from the responses of the 14 respondents regarding their perception of the physical ergonomic factors influencing the job satisfaction of pearl drillers. A detailed overview of the respondents' satisfaction levels across key physical ergonomic factors, including lighting, temperature and ventilation, tools and equipment, posture and seating arrangements, noise level, workstation layout, and safety measures and protocols, is presented in the survey results depicted in Tables 2-8.

These findings emphasize the critical relationship between ergonomic factors and job satisfaction among pearl drillers. Implementing targeted improvements in the identified factors can contribute to a more productive and highly satisfying work environment in the pearl drilling industry.

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