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Ergonomics Analysis in Ensuring Service Quality in Ceramics Manufacturing Factories

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Abstract

The research aimed to identify if the working hours affect the service quality and analyze the ergonomics that interact with the working hours using the Correlational research. A detailed examination of working conditions and ergonomic considerations as service quality indicators in ceramic production facilities was considered. In order to quantify the

various aspects of working environments survey questionnaire and observational studies. The findings revealed that the number of working hours spent by the workers is 7.75 hours per day. There is no correlation about working hours with service quality. On the other hand, ergonomics and working hours show a correlation.

Keywords: Workplace, Performance, Workers' Capabilities, Working Environment, Workload, Working Requirements

1. Introduction

In a highly adaptive economy, ceramics businesses strive to produce high-quality products that can withstand time. A wide range of factors contribute to quality, including the central role of ergonomics.

Acquiring dependable and high-quality products is crucial for any company to succeed over the long term in the ever-changing manufacturing industry. Ergonomics is an essential component that has a significant impact on these variables. Concepcion (2023) ^[5] highlights that ensuring a positive working environment for people requires considering the human body's limitations and capabilities.

According to Leitão *et al.* (2019) ^[9], workers' performance is affected by employees' health, well-being, and working hours, which significantly impact worker ability to perform tasks. On the other hand, Bienkowska and Tworek (2020) ^[3] assert that employees' ability to deal with a rapidly changing environment directly affects the performance of their functions in the workplace. In addition to increasing overall productivity, profitability, and employee morale, performance plays a crucial role in the success of an organization (Hafeez *et al.*, 2019) ^[7].

The main concern of all companies is the performance of their employees. Workloads are implemented to maximize employee performance. Rajan (2018) ^[10] explains that working hours determine employee performance. The targets set during the working period shall be the basis for the work of the staff. An evaluation of staff performances is usually carried out after the end of the period to assess their needs (Astuti & Navi, 2018) ^[11]. At the same time, excessive working hours can lead to fatigue, breakdown, and dissatisfaction, which may result in them leaving for less demanding jobs. Inegbedion *et al.* (2020) ^[8] study shows that workload and worker capabilities should align to create a harmonious workplace free from injuries.

In the Philippines, where pottery has been a long-standing tradition. Ayo (2020) ^[2] states that the ceramic industry in the local scene is greatly influenced by its geography and started even before the Spaniards arrived, in which rock and soil were used for ceramics production, and that material is still relevant today as a primary raw material. Moreover, the locale of Liloan, Cebu, is known as one of the pottery suppliers and exporters of ceramic goods, offering various products such as terracotta jars, painted jars, clay pots, firebricks, roof tiles, and assorted jars.

Despite its popularity, the ceramic industry faces significant problems that need to be addressed, such as outdated machinery, the working environment, and excessive workloads. Six ceramics manufacturing factories, namely Bonjing Ceramics, Dodz and Bebz Ceramics Manufacturing, Kenneth Pottery, Yuson Ceramics, De Arca Pottery, and Luz Ceramics and Pottery, have identical job requirements for every worker, enduring long hours of creating small and big ceramic pots. On regular working days, workers assigned to mold smaller pots can produce 100 pots, while workers assigned to bigger pots, which require triple

work time, can create 5-10 pots daily. Even though workers can make a maximum pot daily, they endure extended hours to ensure service quality. Thus, workers can only achieve a maximum beyond the standard of 7.5 working hours.

This study aims to assess the workers' working hours in ensuring service quality in ceramics manufacturing industries. To evaluate the service quality of ceramics production, researchers are investigating how ergonomic factors, which focus on aligning work requirements with workers' abilities, can affect the working hours in ceramics production.

2. Materials and Methods

In order to satisfy the objectives, the study, quantitative research is used, specifically correlational research was conducted. The research will take place at the Liloan, Cebu factories dealing with pottery and ceramics as it is known for being one of the famous pottery makers in Cebu. Direct observation, interviews, and surveys for the factory workers to obtain relevant data.

The researchers used materials such as mobile phones to record workers' responses, as it helps researchers keep accurate records of interviews vital during data gathering.

Additionally, the researchers used a notebook and a pen to note additional information needed to conduct the study and internalize what was being said by the respondents, which was essential to obtain relevant data. This strategy helped the researchers keep information from interviewing and recording interviews with the participants, enhancing the data quality obtained. The researchers requested permission from the factory owners to conduct a study, and the owner permitted the researchers. The information gathered by the researchers will be confidential, ensuring the participants' privacy. The researchers visited different factories dealing with ceramics and proceeded to use the direct observation

procedure. The observation was mainly based on the observers, who are the researcher's personal judgment and subjective interpretation. To gather data, researchers directly observe how workers created ceramics, what workers felt while making the ceramics, and how ergonomics contributed to service quality and working hours. Upon careful observation, each factory has unique styles, sizes, shapes, and designs. The researchers also noticed that most workers have awkward body positions and sitting postures while making ceramics. Factory workers experienced discomfort after spending an extended period making ceramics, affecting workers' performance. Demjanovicova and Varmus (2021)^[6] stated that workers' burdens must be reduced. If the worker's burden is reduced, it will improve their physical and mental conditions, thus enhancing service quality.

Additionally, Bubeliny *et al.* (2021)^[4], different factors must be included, such as age and gender, as older workers experienced more discomfort and pain. Shang *et al.* (2020)^[11] studied the relationship between musculoskeletal disorders and ergonomics. The worker is aware of the risks that may affect their health while working, they are still forced to work. The researchers observed that ceramics makers were compelled to produce more to meet specific standards despite their discomfort.

The researchers prepared questions for each worker to obtain detailed and relevant information for the study. The researchers used the Likert scale to quantify the answers to survey questions, which used five scales to measure the worker's level of agreement. The worker's response will determine if there is a relationship between the worker's working hours and service quality and assess if ergonomic factors affect working hours. The researchers' quantitative data from observation, interviews, and surveys will be considered, analyzed, and tabulated.

Scoring Procedure for Service Quality

Category	Value	Range	Description
Strong Disagree	1	1.00-1.80	Respondents affirmed that service quality is highly unfavorable.
Disagree	2	1.81-2.60	Respondents affirmed unfavorably in terms of service quality.
Neither/ Nor agree	3	2.61-3.40	Respondents affirmed that the service quality is neither favorable in providing service quality.
Agree	4	3.41-4.20	Respondents affirmed that the service quality is favorable regarding the quality output of pottery.
Strongly Agree	5	4.21-5.00	Respondents affirmed that the service quality is highly favorable regarding the eagerness to improve output to fit the company's quality.

Scoring Procedure for Ergonomics

Category	Value	Range	Description
Strong Disagree	1	1.00-1.80	Respondents affirmed that ergonomics while working was highly unfavorable.
Disagree	2	1.81-2.60	Respondents affirmed unfavorably in terms of ergonomics while working.
Neither/ Nor agree	3	2.61-3.40	Respondents affirmed that the service quality is neither favorable in terms of ergonomics while working.
Agree	4	3.41-4.20	Respondents affirmed favorably in terms of ergonomics while working.
Strongly Agree	5	4.21-5.00	Respondents affirmed highly favorable in terms of ergonomics while working.

3. Results and Discussions

Table 1: Number of Working Hours:

Average Working Hours	7.73 hours per day
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The data in Table 1 presents the average number of working hours each respondent spends daily. It shows that most workers work for more than 7 hours a day. Since the workers have targets set during the working period, this shall be the basis for the staff's work of the staff. This implies that the more tasks there are, the longer the working hours.

Table 2: Interview Questions in Terms of Service Quality

Statement	Mean	Verbal Description
I make sure I stand for quality output pottery	3.73	Respondents affirmed that the service quality is favorable regarding the quality output of pottery.
I make sure to meet or exceed quality standards	3.62	Respondents affirmed that the service quality is favorable regarding meeting or exceeding quality standards.
I deliver accurate service, making sure to submit my outputs on time.	3.23	Respondents affirmed that the service quality is favorable regarding delivering accurate service and submitting timely outputs.
I am willing to do extended work assignments for production	3.65	Respondents affirmed that the service quality is favorable regarding willingness to do extended work assignments for production.
I make sure to access designed tools and materials to enhance my ability to deliver high-quality service.	3.38	Respondents affirmed that the service quality is not favorable regarding access to designed tools and materials to enhance the ability to deliver high-quality service.
I am eager to improve my output to fit the quality of the company	4.31	Respondents affirmed that the service quality is highly favorable regarding the eagerness to improve output to fit the company's quality.
My workspace noticeably enhances the quality of service I provide.	3.50	Respondents affirmed that the service quality is favorable regarding the workspace, noticeably enhancing the quality of service provided
I make sure to suggest possible creative designs or improve my output.	3.73	Respondents affirmed that the service quality is favorable regarding suggesting creative designs or improving output.
Over-all Mean	3.64	Respondents affirmed favorably in terms of providing service quality.

The data in Table 2 reveals that the respondents affirmed favorably regarding providing service quality. This indicates that the workers can provide quality outputs while abiding by work assignments.

Table 3: Relationship between working hours and service quality

Service Quality:	Pearson Correlation	Interpretation
Quality output pottery	.140	Significant Relationship
Exceeding quality standards	-.174	No Significant Relationship

Delivering accurate service	-.018	No Significant Relationship
Abiding work assignments	.138	Significant Relationship
Ability to deliver high-quality service	.192	Significant Relationship
Eager to improve outputs	-.017	No Significant Relationship
Workplace enhances quality service	-.020	No Significant Relationship
Improving outputs	-.046	No Significant Relationship

Table 3 shows the correlation between working hours and service quality, denoting no correlation. The results suggest that working hours and service quality show no significant relationship. The quality of service will be sufficient regardless of the duration of the operating hours. This means that the quality of the service provided is not affected by the time spent by the workers. Whether the worker operates for a shorter or longer period does not affect the level of service.

Table 4: Ergonomics

Statements	Mean	Verbal Description
I implement ergonomic measures to use my time efficiently	4.12	Respondents affirmed that ergonomics is favorable regarding implementing ergonomic measures to use time efficiently.
I make sure to allocate breaks for body rest.	4.31	Respondents affirmed that ergonomics is highly favorable regarding allocating breaks for body rest.
Ergonomic conditions play a crucial role in maintaining error-free service delivery.	4.35	Respondents affirmed that ergonomics is highly favorable regarding ergonomic conditions playing a crucial role in maintaining error-free service delivery.
Ergonomic considerations affect my ability to deliver services within the expected time frame consistently.	4.23	Respondents affirmed that ergonomics is highly favorable regarding ergonomic considerations that affect the ability to deliver services within the expected time frame consistently.
The ergonomic setup of my workspace contributes to the overall service I provide.	4.50	Respondents affirmed that ergonomics is highly favorable regarding the ergonomic setup of the workspace contributing to the overall service provided.
Better ergonomic conditions would enhance my service delivery.	4.42	Respondents affirmed that ergonomics are highly favorable regarding better ergonomic conditions, which would enhance service delivery.
Access to ergonomically optimized tools and equipment has improved my service delivery.	4.38	Respondents affirmed that ergonomics are highly favorable regarding access to ergonomically optimized tools and equipment, improving service delivery.
Comfortable and ergonomic work conditions have positively impacted the consistency of my service provision.	4.19	Respondents affirmed that ergonomics are favorable regarding comfortable and ergonomic work conditions and have positively impacted the consistency of service provision.
Over-all Mean	4.31	Respondents affirmed highly in terms of ergonomics in the workplace.

The data in Table 4 shows that respondents affirmed high ergonomics while working. This indicates that workers can use the tools and equipment provided by their employers to maximize efficiency and productivity. The results show, in general, that workers consider the importance of ergonomics while working.

Table 5: Relationship between ergonomics and working hours

Ergonomics	Pearson Correlation	Interpretation
Implementing ergonomics for time efficiency	.532	Significant Relationship
Allocating breaks for body rest	.185	Significant Relationship
Maintaining ergonomics for error-free service	-.292	No Significant Relationship
Ergonomics affects the ability to deliver service	.124	Significant Relationship
Ergonomics in the workplace contributes to over-all service	.246	Significant Relationship
Ergonomics enhances service delivery	.352	Significant Relationship
Ergonomics tools and improved service delivery	.173	Significant Relationship
Comfortability impacts consistency of providing service	-0.096	No Significant Relationship

Table 5 reveals a correlation between working hours and ergonomic factors, denoting a correlation. This implies that the workers can continue working quickly and produce more products at a specific time if ergonomics is applied. However, workers may experience discomfort lengthening the working hours if they do not comply with proper ergonomic standards.

In summary, the data suggests that working hours show no correlation with service quality. On the other hand, ergonomics and working hours show a correlation. Therefore, ergonomics significantly affects working hours. According to Akinbola and Popoola (2019), if ergonomics is applied in the workplace, workers can continue their work quickly, creating more products in a specific time than usual. If the workers are not following the proper ergonomic standards, they might feel discomfort, thus affecting work and increasing working hours.

4. Conclusion

There was no significant relationship between working hours and service quality. No matter how long the operating hours, service quality is not affected. On the contrary, ergonomics significantly correlates with working hours. Working hours are reduced if ergonomics is applied efficiently and effectively. If ergonomics is not used effectively and efficiently, it affects work and increases operating hours. The more ergonomics is observed, the fewer the working hours will be.

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