



Strategy to Applied Ergonomics on MSMEs during Pandemic Covid-19

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Abstract

Pandemic COVID-19 impact is very hard on the people's economy, especially the tourism industry in Bali. Many businesses closed, and workers lost their jobs and started businesses independently, as micro, small, and medium enterprises (MSMEs). However, with less basic business knowledge, it is vulnerable to the risk of surviving its business. Therefore, to cope with these conditions, it needs the support of strategic management, business strategy, and attainability with ergonomics principles. Ergonomics science is used to harmonize workers with their work tools, workstations, workplace, work environment, and social environment. Meanwhile, participatory ergonomics methods aim to increase workers' health, safety, comfort, and productivity to attain human well-being. This is revealed in a case study of the rearrangement of workspace for "Nasi Koco" production. It makes a workstation wider, creating a better workplace and work environment. The workers are safe, comfortable, and work more efficiently, which indicated an increase in productivity.

Keywords: *MSMEs; Strategic Management; Business Strategy; Ergonomics*

Introduction

The waves of pandemic COVID-19 have struck the world for more than two years, even though every country has solutions and efforts against the pandemic and economic deceleration. However, the variants of COVID-19 are growing, spreading, and becoming more deadly, and global economies are slowly recovering. Moreover, the pandemic and the economy cannot be dealt with separately; it is also hardly possible to recover both at the same time.

The economic impact of the pandemic on people is very hard, particularly for those who rely on income from the tourism industry, especially in Denpasar, Bali. Many tourism businesses closed, and workers lost their jobs. However, despite an unfavorable situation, there is an opportunity to survive. People are trying to recover their economies independently. They sought another job; some returned to

their village as farmers. And others started home-based microbusinesses, identified as MSMEs (Micro, Small, and Medium Enterprises). For those with finite capital, limited space, and a relatively low risk of loss, a microbusiness is a reasonable choice. However, running a business of any kind and size is always fraught with risk. Until now, there has still not been an adequate economic solution to this condition. During the pandemic, MSMEs are mostly trying to survive on their own due to the deteriorating economy and the pandemic. Even though the government is trying to optimize support, it is also experiencing a deceleration in its economic capacity.

There are medium and large companies that have many employees and are well managed. Unfortunately, during pandemics, the majority of them collapse. However, surprisingly, almost at the same time, new micro- and small-scale enterprises with numerous variants have emerged. A micro-enterprise is mostly a home-based business managed by at least one or two people; it is called an individual business or independent business. Although, to survive, they have to face the risks of collapse. Therefore, supporting their survival through the implementation of strategic management, business, and ergonomics principles to minimize the risks. Furthermore, involving them actively in ergonomics intervention is known as participatory ergonomics. This certainly has a positive impact on participants as independent businesses; they can develop knowledge and awareness of their health, safety, and productivity.

One of the microenterprises now in great demand is culinary businesses, such as the “*Nasi Jinggo*” stall, since eating is everybody’s need. The price is also cheap and loved by various groups, especially those who are trying to survive during economic difficulties. And their stall does not require a lot of space, sometimes using a small terrace in front of the rented room. This business does not need many people to run; some have been run by two workers. And for strategic marketing of their product, they use networking and information technology, which is now popular in terms of MSMEs’ digitalization.

Objective of MSMEs

In Indonesia, the MSMEs (Micro, Small, and Medium Enterprises) are under Regulations Number 20 of the Year 2008. Regulations are known as “*Undang-Undang*” (UU) No. 20/2008. Article 1 (one) defined by the Government of Indonesia (2008) is:

“(1) Micro-Enterprises are productive businesses owned by individuals and/or individual business entities who meet the micro-enterprise criteria set forth in this law. (2) Small-Business is a productive economic business that stands alone, which is carried out by individuals or business entities that are not subsidiaries or not branches of companies that are owned, controlled, or become part either directly or indirectly of Medium Enterprises or Large Businesses that meet the Small Business criteria as referred to in this Law. (3) Medium Enterprises are productive economic businesses that operate independently and are carried out by individuals or business entities that are not subsidiaries or branches of companies that are owned, controlled, or become a part of either directly or indirectly with small or large businesses with total net assets or annual sales proceeds as defined in this law.”

The Government of Indonesia (2008) mandates through Regulations (UU) No. 20/2008 article 3 (three) that, “Micro, Small and Medium Enterprises aim to grow and develop their businesses in the context of building a national economy based on just economic democracy.” The criteria for MSMEs have been determined in article 6 (six), paragraph (1) of UU No. 20/2008, as follows: “Micro Enterprises Criteria are as follows: (a) have the most net worth Rp. 50,000,000.00 (fifty million rupiahs) not including land and buildings for business premises, or (b) has the most annual sales Rp. 300,000,000.00 (three hundred million rupiahs)” (Government of Indonesia, 2008).

Since the pandemic, a survey on 8 – 23 October 2020 conducted by the team of *Badan Pusat Statistik Provinsi Bali* (Bali Province Central Statistics Agency) measured the pandemic COVID-19 impact on 852 businesses in Bali. The result is, that 13,04% temporary closed and 9,05% closed (Yahya et al., 2020). And that temporarily closed could be closed if the impact of the pandemic has not subsided yet, it might increase more than 25% are closed. Therefore, for sake of the aims and survival of the MSMEs, is necessary support from the management, business, and ergonomics fields.

Research Methods

The study focuses on reviewing the library used as a desk research method; searching for information by online techniques to collect data from scientific publication sources. Some research results and other scientific publications related to solving the problems are also included. And a case study of “*Nasi Koco*” production is done by the participatory ergonomics approach. The analysis technique used is a descriptive qualitative analogy.

Literature Review

Human Resources Strategy

Human resources management needs strategy to improve the quality of workers. The discussion on intellectual capital has grown widely, and several businesses have acted on this understanding. Because employees are dynamic assets that possibly increase their capabilities, they are not the same as physical assets that are easily replaced. This long-term investment in corporate strategies for securing its resources. Aside from performance and financial corporate, there is another attention-getter: “corporate social responsibility” (CSR). This emphasizes the statement by Dul *et al.* (2012) that “Corporate Social Responsibility (CSR) means going beyond fulfilling the minimum legal expectations regarding planet and people.” Furthermore, Dul *et al.* (2012) state that “poor or minimum standards in health and safety may damage a company’s image concerning CSR, which would be a direct threat to the value of the CSR effort and the continuity of the business.” Therefore, ergonomics contributes continuously to improving the organization’s corporate culture through knowledge transfer before applying an intervention plan. Tacit knowledge, in its various sections, provides the best experience in handling tasks and jobs passed down through generations. And each section of the corporation, such as engineering staff in processes of product design, product manufacturing, assembly design, equipment design and selection, supply chain management, work environment and facilities, and maintenance, all should be trained by the participatory ergonomics method. It produces various benefits in performance, finances, and ergonomics for workers and corporations.

Noro (2003) argues that “communication between workers in related fields, whether product development, office work, or factory work, should ideally involve common knowledge or tacit understanding.” Whereas Polanyi and Sen (2009) describe that “tacit knowledge that cannot be easily formalized and put into exact words has a sweeping presence in the world and is also a central feature of our knowledge of that world,” it means there is a background process of knowing to knowledge that is difficult to express in words. Therefore, Wheelen *et al.* (2018) state that “tacit knowledge, in contrast, is knowledge that is not easily communicated because it is deeply rooted in employee experience or in a corporation’s culture.” And good tacit knowledge is based on the best experience in practice and has been passed down through generations among workers. Meanwhile, the ideal goal of ergonomics is to make people understand ergonomics as tacit knowledge and make it a part of their work-life culture.

In the meantime, during the pandemic, MSMEs as individual businesses have developed various variants. Therefore, the strategy of human resources is to develop and improve individual quality more independently. Every business certainly has a unique strategy and issues to overcome. This cannot be

handled in terms of “one-for-all,” one method for all problem solutions. There is a saying, “Just because you have a hammer, then all problems are nails.” This does have implications for the method of approach used to address it. In this case, the best choice is participatory ergonomics.

Participatory Ergonomics (PE)

The ergonomics principles are to harmonize workers with their work tools, workstation, workplace, and work environment; this is directly connected to the worker’s safety and health factors. And the goal is to make workers comfortable and increase productivity. It must be contextual to “the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data, and methods to design to optimize human well-being and overall system performance” (IEA, 2022). And “optimizing human well-being must be seen as improving the environment for humans to be humane” (Marhaendra, 2016). Therefore, “ergonomics is the structured plan of action for optimizing human activity to achieve human well-being” (Marhaendra *et al.*, 2021). Furthermore, Marhaendra (2022) states that “management, economics, ergonomics, and work psychology are closely related because the main goal of these fields is to study human performance and productivity.” There are two basic areas of human performance studies. The first area deals with the study of a physically demanding job. The second area is associated with studying the performance of mentally demanding tasks, in which the physical component of work is significantly reduced. According to Dul *et al.* (2012), “By fitting the environment to the human, two related system outcomes can be achieved: performance (e.g., productivity, efficiency, effectiveness, quality, innovativeness, flexibility, safety and security, reliability, sustainability) and well-being (e.g., health and safety, satisfaction, pleasure, learning, personal development).” This is the challenge of how to fulfill the overall system’s performance to attain human well-being.

Antle and Miller (2017) state, “Traditionally, ergonomics was taken to enterprises with a consultancy approach, where external experts provided advocacy after a short period of observation and then left the workplace to implement solutions on their own,” which is also vulnerable to application in the workplace of an individual business or independent business. Concerning this, Antle and Miller (2017) said, “Even an external consultant on their own is not able to assess all of these factors in investigations and the conceptualization of solutions.” According to Theberge *et al.* (2006), this happens since “workplace issues involve physical, psychological, psychosocial, and organizational factors.” Also, it should consider aspects of spiritual and cultural values rooted in its community. Therefore, it needs transliteration when applying ergonomics principles that are carried out by the participatory ergonomics method.

The participatory ergonomics (PE) method used to attain the ergonomics goal is necessary to determine. According to Haines and Wilson (1998), in their Research Report define PE as “the involvement of people in planning and controlling a significant amount of their work activities, with sufficient knowledge and power to influence both processes and outcomes to achieve desirable goals.” There are many different concepts and dimensions of PE; however, they are complementary to each other. Furthermore, Haines and Wilson (1998) states, “participatory ergonomics is a complex concept involving many different dimensions.” Therefore, Brown (2005) emphasizes that “PE can be found in virtually all other ergonomics methods to some degree, and its applications in ergonomics design and analysis are endless.” Therefore, PE could also mean that all workers, as participants in their section, actively find the solution together to solve the problems with sufficient knowledge of ergonomics principles. Personnel in other sections, such as maintenance, purchasing, marketing, and production employees, all need to be trained after the technical workers. With the participatory ergonomics method, it is possible to make a reasonable and logical chain of events. Employees can identify ergonomic risk factors earlier and seek solutions together. Meanwhile, technical workers are skilled at comprehending and developing specific solutions to reduce or eliminate hazards. Otherwise, there will be real divisions between the worker and management when risks are discovered; however, nobody can fix them. Related to those, Noro (2003)

states, that “participatory ergonomics is suitable for solving occupational safety problems, health problems, and human error.” Therefore, the first step is the transliteration and socialization of ergonomics principles according to their work experience, business needs, and corporate culture. Moreover, “the Internet is an extremely effective medium of information for participatory ergonomics with the general public” (Noro, 2003).

Cost Justification on Ergonomics Intervention

People say, “Take care of your health because health is expensive” or “Health is the most important thing in life.” Everybody agrees with those statements. Even though they do not demand a deep explanation, “expensive” and “the important thing” are subjective values. However, they have a detailed explanation when they get sick or injured by accident and seek medical treatment. This subjective value becomes the real value, and rectifying it depends on money in the pocket or whether it can (or cannot) be covered by the assurance. Also, whether they will be able to resume normal activities after recovering from illness. This is known as tangible and intangible values, which interact dynamically with one another.

When it comes to ergonomics advice in business, ergonomists and management frequently disagree about the cost that must be paid for ergonomic interventions. Since there are misunderstandings in the ergonomist’s advice, they are mostly avoided or ignored by management. Therefore, as Oxenburg and Marlow (2006) state, “ergonomists need to use the language of accountants and finance managers to argue for the ergonomics interventions required.” It is necessary for the manager as part of their basic responsibility to the corporation. However, there is a way out of this issue, which is through cost-benefit analysis. This is also revealed by Oxenburg and Marlow (2006), that “cost-benefit analysis is one tool that can be used to rectify this absence of balance.” Furthermore, they explained that “The costs derive from the implementation of better working conditions while the benefits come from a safer workplace with lower injury costs, higher productivity, reduced warranty costs, improved staff retention, multi-skilling, etc.” (Oxenburg and Marlow, 2006).

Business individually as micro-enterprises which running in the worker at the same time is the owner, and might along with her or his as spouse. The characteristics of individual businesses as home-base business types are as follows: (a) informal procedures and communication methods; (b) responsibility for all positions; (c) the business tends to be made by order; (d) less business and ergonomics knowledge; and (e) less documentation of business activity. However, the impact of the business is significant for their community and environment. Therefore, it is necessary to support surviving MSMEs. Although this has the implication that an ergonomics approach should fit the culture and needs of their business, the more important thing is how to articulate ergonomic principles to the workers, who actively involve themselves in occupational safety and health to improve their productivity.

To reduce the cost of carrying out ergonomic interventions, ergonomists can take advantage of local wisdom possessed in the social environments of micro-entrepreneurs. Such as in Bali, there is a cultural value that is deeply rooted in the community, namely the spirit of “*gotong-royong*” (mutual cooperation). The spirit of *gotong-royong* is social behavior in which people work together to solve problems that are mutually beneficial. In principle, it is covering each other’s shortcomings with their respective advantages. Therefore, the values of togetherness in difference are well preserved. That spirit is fitting to support the implementation of participatory ergonomics.

Transliterations Ergonomics Principles

There has to be intensive interaction to recognize their work experience, corporate culture, and business needs before translating ergonomic solutions. Indeed, experts in each of those scientific fields have many theories, definitions, methods, and ways of determining standards for safety, health, comfort, and productivity. It is essential for ergonomists to have this basic knowledge. As the director behind the

scenes, let those sciences alone. However, people who lack sufficient education and work independently, as an individual business, frequently do not need an idealistic description of the notion. Therefore, it needs art and patience to communicate ergonomic principles until they can imagine it in their common sense and do it themselves. This is the meaning of transliteration knowledge of ergonomic principles in participatory ergonomics. There is a popular idiom that says, “All roads lead to Rome.” It does not matter how people perceive and understand ergonomics; what is more important is that they live by ergonomic principles even if they do not realize it. However, it would be better if they knew what they were doing in terms of ergonomics. And the following are some ergonomics understandings that, among other terms, have been transliterated, at least according to their native language and culture.

Safety means they are not stressed or anxious about their job and tasks (physical and mental workloads), work tools, workstation, workplace, and work environment. The first (fundamental) step that workers must realize is that they are aware (understandable) of the risks associated with their job or task. Then, various efforts are made to eliminate, minimize, or protect from various factors that are potentially harmful. Furthermore, as expected or precautionary, workers consciously use adequate personal protective equipment, thereby minimizing the risks associated with their job or task activity.

Comfortable means the workers can use work equipment according to their abilities and limitations, free from forced or unnecessary movements, and without awkwardness when interacting with tools at workstations. Therefore, they must understand the tools’ uses and designations. If necessary, make modifications to the equipment to provide optimal functionality during use. Likewise, an understanding of the best practices for the work procedures and the organization of work equipment with the materials to be used are easily accessible. For that reason, it does not require extra energy (awkward moving and forced stretching) to perform its job or task, and the workers do not get tired quickly.

Healthy means that with the fulfillment of safety and comfort factors, workers can organize their activities of work, rest, exercise, and vacation proportionally and obtain adequate nutritional intake to maintain their stamina. Therefore, by maintaining workability and possibly increasing work performance at the same workload as before, in this condition, workers have the opportunity to attain a better career path or work.

Productivity means the fulfillment of health, safety, and comfort factors. Workers can work faster and better than previously (without getting tired quickly), producing more products or services in both quality and quantity, thus increasing their income. Therefore, the workers can improve their performance along with their quality of life. In other words, the overall goal of productivity is to attain human well-being.

Unfortunately, their understanding of those ergonomic principles leads them into their own logic, which is not intended for the purposes. This is misleading ergonomics; for instance, for the sake of safety, the materials of the protective equipment that they used mostly do not meet the standards. Usually, they prefer cheap prices, and they use it since they have learned from the mistakes they have made, not from the other worker’s failures or precautions. Sometimes, due to the other work demands, they improvise haphazardly to lower the workloads while at the same time maintaining the quality of products or services, which does not match ergonomic principles. And, because of their stamina, they take on the other work, even if it is a forced job or task activity. According to them, productivity is when they have the opportunity to get another job and get more money. Eventually, the majority of them disregard the fact that the risk has increased in tandem with increased work activity. There are numerous implications for health that are unknown in terms of their additional jobs or tasks.

Case Study: “Nasi Koco” Production

“Nasi Koco” production is included in the category of MSMEs, the name of a home-based business that produces packaged rice; this is one of the variants of *Nasi Jinggo*. Komalasari *et al.* (2021a)

described *Nasi Koco* as “small in shape, wrapped in banana leaves, simple side dishes, and spicy taste – the hallmarks of *Nasi Jinggo*.” Moreover, Komalasari *et al.* (2021a) revealed that the product that has been given a unique name, “*Nasi Koco*,” to distinguish it from the other variants of *Nasi Jinggo*, has a remarkable taste compared to most *Nasi Jinggo*.



Figure 1. One of the variants of *Nasi Jinggo* is *Nasi Koco*

According to Komalasari *et al.* (2021a), the business owner and initiator, as well as the worker of *Nasi Koco*, Ni Nyoman Puji, strive in the culinary business field “to improve the welfare of her family and environment.” And she is fully supported by her husband in running the business. They use the terrace of a rented room in front of the bedroom as the workplace. The dimension location of the workplace is 200 × 170 cm, and the width area of the workstation is 80 × 90 cm.



Figure 2. The workplace and workstation for processing *Nasi Koco* and the menu display

Before the COVID-19 pandemic, they had a stall on Gajah Mada Street in Denpasar, Bali, and many people ate and ordered food there. However, during the COVID-19 pandemic, the stall was closed, and all activities, from preparation, processing, and placement of processed products to the packaging, were in one location, which is in their rented room. Aside from direct orders at the location, reservations were also made via smartphone application or social media and delivered by *Gojek* (Wikipedia, 2022), and other types of delivery.

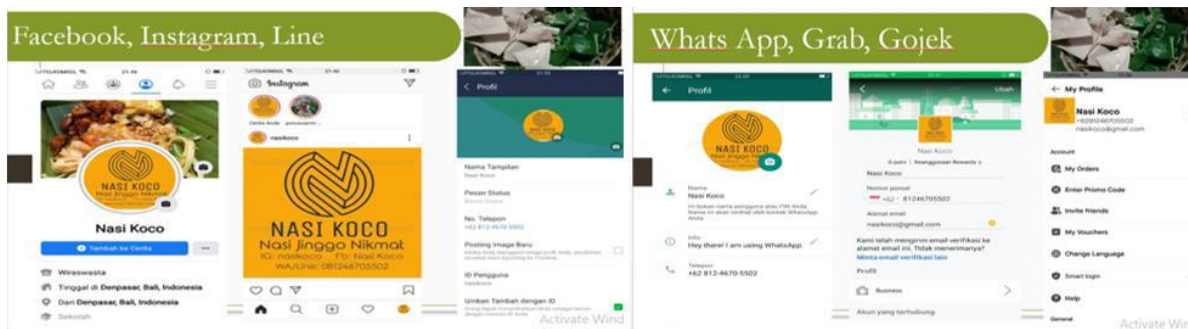


Figure 3. Digitalization marketing by social media (Komalasari *et al.*, 2021a)

MSMEs' digitalization, particularly in marketing, has been beneficial to their business. Komalasari *et al.* (2021b) revealed that, "The initial activity focused on using digital marketing to overcome the impact of the COVID-19 pandemic; as a result, they began to rise and achieve a very significant increase in sales, and sales turnover increased by 65% from before at the beginning of the COVID-19 pandemic, which was able to sell an average of 100 packs per day now 165 packs per day and continues to increase, due to a wider range of consumers." However, most people are unaware the issues that good marketing leads to increased sales, which leads to increased income and profit. Its consequences are more difficult and harder on workers' workloads. This is how nature works in business, and participatory ergonomics is a method of organizing for the purpose of harmonizing the input, process, and outcome of those activities.

Finding

At the workstation where *Nasi Koco* processes ingredients, she often stands up and makes awkward movements when picking up the processed ingredients. She acknowledged that sometimes her right elbow was nudged by a hot frying pan. In addition, the long-standing activities and awkward movements are certainly uncomfortable for her body. After work, especially when she wakes up in the morning, she often experiences pain in her back, waist, and right shoulder, which feels stiff. These complaints lead to symptoms of WMSDs (work-related musculoskeletal disorders), which state in Stack *et al.* (2016) that "force, repetition, and awkward postures, especially when they occur at high levels or in combination, are most commonly associated with the occurrence of WMSDs." It was also revealed by Carrivick *et al.* (2005) that "Performance of manual tasks which involve high exertion, long duration, awkward or static postures, or repeated similar movements, and especially combinations of these characteristics, increases the risk of musculoskeletal disorders in the body regions involved." This indicates there are some needs to be addressed, especially those that cause awkward movement, namely the placement of materials, processing, and presentation, which have not been well organized. If the workplace is not improving accordingly, it will harm the safety and health of workers, resulting in a decrease in productivity. Therefore, it is important to improve the workstation to meet ergonomics principles.



Figure 4. Awkward movements in the workstation with the position of food processing

Applied Participatory Ergonomics on "Nasi Koco" Production

The workplace needs to be rearranged to meet ergonomics principles for safety, health, comfort, efficiency, and the effectiveness of the worker's body functions. The expectation with an ergonomics workplace arrangement is to have a positive impact of the products in the quality and quantity. Therefore, workers can organize their work to increase productivity. However, the arrangement for ergonomic workplaces with the participatory ergonomics method attempted to be as economical as possible by involving the students and owner as active participants, modifying existing materials, and supporting

some essential materials, then tidying up the area to make it more representative. Thereby, the workstation becomes more spacious, the bedroom window can open at any time, and air circulation and lighting in the bedroom will be better.

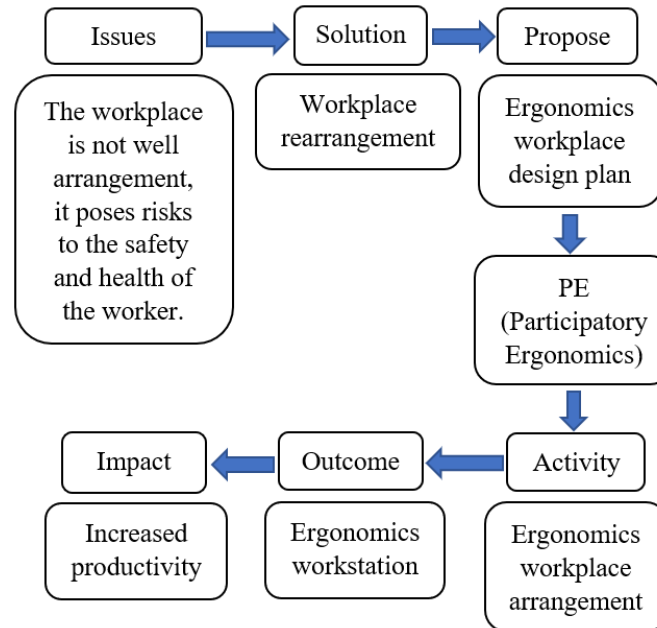


Figure 5. Workplace Arrangement Action Plan with PE

The method of participatory ergonomics involves participants (students and owner) and socialization of ergonomics principles among the manager (owner) and students, who are actively involved in workplace arrangements. The reason is provided in an overview of the design plan for the workplace layout. Although the dimensions of the workplace are fixed, certain arrangements allow workers to obtain a suitable workstation. Therefore, it needs permission to rearrange the workplace. After obtaining permission from the owner and involving them as active participants, the rearrangement is carried out according to the layout design, using existing materials and preparing the new essential materials.



Figure 6. The workstation before the rearrangement.



Figure 7. Rearrangement process for the new layout workplace

Monitoring and evaluation were carried out on a regular basis for several days following an ergonomics intervention in the workplace in accordance with the layout design. Monitoring in the form of observation and interviews with the employee (owner) to determine changes and adjustments in her work behavior at the “new workstation.” This is important to do since changes in the workplace will certainly have an impact on safety, health, work behavior, and productivity.



Figure 8. Workstation after rearrangement workplace

After rearrangement of a workstation, it creates additional space for work activities, which was previously around 80×90 cm but is now around 100×120 cm after an ergonomic arrangement. There is about 8% more than before. Therefore, the worker can work safely and comfortably, with no more forced movements and awkward positions in her work activities. Besides that, moving the food processing, which before was under the window, to the open area makes air circulation better. This is creating a work environment much better than before.



Figure 9. Workstation before (left) and after (right) rearrangement

In general, the success of the workplace rearrangement will be seen as minimal after a week of routine activities at the workstation, and the new workplace has not changed. And on the seventh day, observations and dialogues with workers revealed that there was no change in the new workplace. The results of the interview state that the worker feels comfortable with her ergonomic workstation. It means she enjoys work with adequate time for rest, which is indicated by a decrease in complaints due to work

activities. The owner (worker) stated that compared to before, the current workstation is more spacious and makes her comfortable at work. Currently, she can move freely; unlike before, she always moves sideways, and his right elbow sometimes nudges the hot frying pan. Therefore, in terms of quality, she has enough time to prepare and process better, and in terms of quantity, it depends on the order. Since she works more efficiently than before, these indicate an increase in productivity.

Conclusion

The pandemic COVID-19 impact is very hard, especially in the areas that rely on income from the tourism business, particularly in Denpasar - Bali. However, despite an unfavorable situation, there is an opportunity to survive. Many of them changed jobs and started micro or small businesses, known as MSMEs. During the pandemic, the MSMEs founders mostly tried to survive the economy's prolonged decline. However, people who have less education and experience work independently in critical conditions every day. There is a need to manage pieces of knowledge as a strategy for human resources to improve the quality. The participatory ergonomics method could address these issues through transliterations and socialization of ergonomic principles to the worker as an active participant. The case study of rearrangement *Nasi Koco* production has proved that participatory ergonomics successfully creates an area of the workstation about 8% wider than before. Therefore, besides safety and health, we also obtained a better work environment. The results of the dialogue state that the worker feels comfortable at her workstation. Meanwhile, in terms of quality and quantity, since she works more efficiently than before, there is an indication of an increase in productivity.

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