THE QUALITY OF WORKING LIFE IN DISASTER-PRONE AREAS

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ABSTRACT

This research discusses The Quality Of Work-Life (QWL) of workers in disaster-prone areas. It measures how geographic conditions, workforce productivity, occupational stress, social support, and physical work environment affect QWL. The sample area considered for the present study is Padang in Indonesia, an area prone to earthquakes and tsunamis. This study uses 384 workers as respondents from various job categories classified by the Central Bureau of Statistics (BPS). The sampling applies a proportionate stratified random sampling approach and area sampling. Hold in Tsunami red zones and safe zones, based on the evacuation map prepared by the Indonesian National Board for Disaster Management (BNPB) with the Padang city government. Quantitatively analysis of multiple linear regression equations was performed using the STATA program. The results indicate that geographic conditions, productivity, social support, and physical work environment significantly affect QWL. Meanwhile, occupational stress has a significant adverse effect on QWL.

Keyword: Labor, Qualty of Work Life, Geographic Condition, Productivity, Occupational Stress, Social Support, Physical Work Environment, Earthquake, Tsunami
JEL Classification: F62, F64, F66, J24

INTRODUCTION

Geographically, Indonesia is an archipelago that is prone to natural disasters (UNISDR, 2018). Padang is a city in Indonesia located on the coast of the island of Sumatra. A large earthquake hit this city in 2009, with 7.6 on the Mw scale. According to seismologists, Padang can face a Megathrust earthquake and a Tsunami based on the historical seismic data (Konca et al., 2008; Natawidjaja et al., 2007); it has a significant earthquake cycle every 200 years. The Indonesian National Board for Disaster Management (BNPB) categorizes Padang as the most earthquake-prone area and moderate risk tsunami zone (BNPB, 2019). Natural disasters are proven to cause physical, social (Williams & Drury, 2009), and economic losses (Kellenberg & Mobarak, 2011; Nanto et al., 2011; Noy & Vu, 2010). Disasters that hit a country's economy will also affect the labour market (Fumio et al., 2012; Padli et al., 2010) because the loss of jobs leads to the disruption in the demand and supply of labour. After the disaster, the workforce has not fully recovered (Ismail et al., 2017). They lost their jobs and even experienced severe stress (Basoglu et al., 2003), leading to depression (Aslam & Tariq, 2010). Victims who experience physical injuries experience decreased quality of life (Sudaryo et al., 2012), which becomes a psychological burden. To reduce future risks, the Padang city government aggressively implements various disaster mitigation programs and conducts evacuation simulations in the face of an earthquake and Tsunami. The local government and BNPB mapped Padang into a red zone and a safe zone for the Tsunami, based on the distance between the location and the coastline. However, disaster mitigation in

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Padang is yet to touch upon the labour aspect because it still creates anxiety for them about the safety factor at work, especially for those in the Tsunami red zones. In our opinion, understanding the needs of workers in disaster-prone areas is to be considered not only from the work environment aspect but also concerning how the overall geographical conditions have changed their Quality Of Work-Life (QWL).

The work environment is proven to be an essential aspect in QWL (Akter & Banik, 2018; Becker, 1984), and QWL is a form of workforce satisfaction observed when workers enjoy their work (Kondalkar, 2007; Rantanen et al., 2011). In simple terms, the QWL concentration discusses the organization's relationship with workers in the field of work (Martel & Dupuis, 2006). Most of the QWL measurements involve a various factors from the interaction of individuals and organizations in the work environment. In this study, we hypothesize that geographic conditions have a role in shaping QWL in disaster-prone areas because they relate to the need for a sense of security and an element of safety when working. In March 2021, the Meteorology Climatology and Geophysics Council (BMKG) recorded 23 earthquake activities that had occurred. Vigorous earthquake intensity triggers anxiety that can affect the routine activities of the residents of Padang.

Padang and the coastal areas of Sumatra are constantly alerted of the risks of further disasters that may occur at any time. Muhammad (2016) simulated the magnitude of the Megathrust earthquake with three scenarios of magnitude up to Mw 9 with a maximum tsunami wave height of 20 meters. Moreover, it estimated that there would be up to 30 minutes of lag between the earthquake and the Tsunami if it hits Padang city (Singh et al., 2010). According to the Central Bureau of Statistics (BPS), most of Padang city residents live in areas with an altitude of 0-10 meters above sea level (BPS, 2019b); this means that economic activity held in red zones. We see workers spending more of their time at work because of career demands and motivation to increase income. Therefore it is necessary to provide a good work environment in order to create a high QWL. This research aims to find out how geographic conditions affect the workforce in disaster-prone areas by looking at their QWL experience.

LITERATURE REVIEW

Earthquakes are a series of shocks and vibrations resulting from the release of pressure on active faults and volcanic activity areas (Thomas, 2016), earthquakes cause liquefaction, landslides, fires, and tsunamis (UNISDR, 2017). The word “tsunami” has Japanese origins and is scientific means a large wave of water that moves in a short time (Cartwright & Nakamura, 2008). Earthquakes and tsunamis are classified as the most dangerous disasters because they are unpredictable, harm many casualties quickly. Earthquake damage leads to economic losses (Martinez & Arroo, 2004), and in low-income countries, the impact of disasters last longer (Stromberg, 2007). Thus, a stable economic condition becomes the strength to anticipate the impact of disasters. The workforce plays an essential role as the backbone driving the economy, with the fulfilment of their needs will optimize this role.

The workplace's needs are as important as the necessities of life. This study adopts the QWL measurement using the need satisfaction and spillover approaches (Sirgy et al., 2001), based on Maslow's needs theory and Porter's need satisfaction questionnaire. Satisfaction in one area of life can affect satisfaction in other areas. Workers bring their various needs to the workplace and feel satisfied if their need matches, this satisfaction is part of the Quality of Work-Life (QWL). The concept of measuring QWL is growing, and this study uses variables of geographic conditions, productivity levels, and work dimensions in measuring QWL. Other variables in this study based on previous research and understanding the research objective, namely disaster-prone areas.

Geographic conditions can change human life (Orme & Harden, 2008), including economic aspects. Such as how geography affects workers' income (Mendoza & Rosas, 2012). Satisfaction

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with the income received determines the QWL level of workers (Islam, 2012). These changes mean humans react to geographic circumstances and influence their daily behaviour and behaviour in the workplace, which is described by productivity. We estimate productivity impact on QWL through workforce satisfaction with self-actualization needs. Job satisfaction with performance related to each other (Kinicki & Fugate, 2018), and good performance will create productivity (Slack & Johnston, 2010). Workers have different task and targets, and high productivity makes it easier to reach them. High productivity triggered job satisfaction and achieved work targets, which Will ultimately increase QWL.

According to Hackman (1987), the work dimension is a whole category that determines the job. This study's work dimension includes occupational stress, social support, and a physical work environment. Stress can be caused by excessive workload and responsibility (Mani et al., 2014; Rekhi & Sharma, 2018). Besides, a sense of workplace security also affects stress (Feizabadi et al., 2012), and work stress is believed to harm QWL (Bolhari et al., 2012). We assume that work stress comes from work, but it will create new stress and problems for workers regarding their need for security when working in a disaster-prone area. The problems faced at work will be easier to overcome when they get social support (Amini & Chinaveh, 2016; Ferguson et al., 2012), both in the workplace and in their families. Workers who have good relationships with various parties have a high level of satisfaction in their work; thus, social support determines the level of QWL. In addition to the social environment, the workforce requires a good physical work environment in equipment and facilities that make their work easier. A conducive work environment affects workforce health (Romm & Browning, 1998). Moreover, the availability of a physical work environment can affect job satisfaction (Lee & So, 2006); this satisfaction will determine the level of QWL. Thus the need for health and satisfaction at work is a basic need related to QWL.

METHODOLOGY

Population and Sample

This study uses five independent variables—geographic conditions, productivity, occupational stress, social support, and physical work environment—by looking at their effects on QWL. The study population comprises the workforce in Padang, amounting to 395,981 people (BPS, 2019a). A sampling unit of 384 respondents was determined using the Table for Determining Sample Size From A Given Population (Krejcie & Morgan, 1970). The sampling design is Probability Sampling/Complex probability sampling using a proportionate stratified random sampling approach and area sampling (Sekaran & Bougie, 2016). Thus, the number of sampling quota units is proportional to the presentation of the main industry criteria according to BPS. Samples located based on the evacuation map consists of safe zones and six Tsunami red zones. The Tsunami safe zone is the lowest threat risk per research results (Oktiari & Manurung, 2010): Lubuk Kilangan sub-districts and Pauh sub-districts; these are low-risk zone. BPS main industry can be seen in table 1.

Table 1
BPS MAIN INDUSTRY

No	Main Industry
1.	A. Agriculture, Forestry, and Fishing
2.	C. Manufacturing
3.	G. Wholesale and retail trade, I. Accomodation and foodService Activities
4.	O. Public administration and defence; Compulsory Social Security, P. Education, Q. Human Health and Social Activities, R,S,T,U Other Service
5	B. Mining and Quarrying, D. Electricity and Gas, E. Water Supply, Sewerage, Waste management,

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	F. Konstruction, H. transportation and Storage, J. Information and Communication, K. Financial and Insurance Activities, L. real estate, M,N Business Activities

Source : BPS 2019

Variable and Measurement Data

Primary data comes from a structured questionnaire related to research variables, and this data is a cross-section (Gujarati, 2003). The questionnaire used as a research instrument is adapted from the previous research questions and was developed according to current research needs. For QWL, occupational stress, social support, and physical work environment variables were determined using Likert scales. QWL variable consists of eight questions adapted to the research (Sirgy et al., 2001). Nine questions measure the occupational stress variable, four questions from previous research (Jamal & Baba, 1992), and five newly developed questions related to potential disasters. Social support includes eight questions, six questions adapted from previous research (Canty-mitchell & Zimet, 2000; Ducharme et al., 2007; Sundin et al., 2007), and two additional questions. Measuring physical work environment variables uses eight questions, four questions from research (Lee & So, 2006; Martel & Dupuis, 2006), and four questions adjusted according to disaster-prone areas' needs.

The location of the respondents was determined randomly based on the evacuation map. Each point on the map is assigned a number, and then a randomization process is carried out. The number that appears is the location to be visited. In assessing each respondent's geographic condition, we use the help of the Global Positioning System (GPS) to determine the height of the respondent's workplace to sea level and its distance from the coastline. The geographic data collected is assigned with value, and this value indicates the threat of disaster risk based on the workplace location. This data gives information; the higher value of geographical conditions means the lower potential disaster threat in the workplace.

Next, to measure the productivity level variable, we use the working hours approach, as described by the Full-Time Equivalent Employee (FTEE) method (Ball, Johnsont & Slattery, 1986). One way to measure labour productivity can be based on working hours (Golden, 2012). According to the Ministry of Manpower and Transmigration (2016), labour productivity is 40 hours in one week or an average of 8 hours for five working days. The FTEE method uses the ratio between the total working hours of one month divided by the number of hours worked and multiplied by the number of working days in one month. FTEE values can be grouped into three categories; High, medium, and low. Operational variables and measurement can be explained in the following table 2.

Table 2
VARIABLE OPERATIONAL AND MEASUREMENT

No	Research variable	Attributes/Measurement	Scale
1.	**Dependent**		
	Quality of work life Adapt research questions (Sirgy et al., 2001).	• Physically and mentally healthy • Fe • el safe at work • Work Satisfaction • Pay satisfaction • Have good co-worker • Leisure time off work • Feel appreciated • Enjoying life	4-point likert scale ranging from 1 (strongly disagree) – 4 (strongly agree)
2.	**Independent**		

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a.	Physical geography Self-Developed based on geographical conditions	• The altitude of the workplace • Distance of the workplace from the coastline • Tsunami zone based evacuation map	rasio
b.	Productivity Adapted formula Full-Time Equivalent Employee (FTEE) method (Ball et al., 1986).	• Total hours worked for the month • Number of working hours per day • The total working day for the month	rasio
c.	Occupational Stress Adapt research questions: a. (Jamal & Baba, 1992) b. Self-developed related to potential disasters.	• Work pressure [a] • Nervousness at work [a] • Work deadlines [a] • Workload [a] • holiday [b] • Earthquake during working hours [b] • Keep on working after an earthquake [b] • disaster raises anxiety [b] • Stress cause financial losses [b]	4-point likert scale ranging from 1 (strongly disagree) – 4 (strongly agree)
d.	Social Support Adapt research questions: a. (Sundin et al., 2007) b. (Ducharme et al., 2007) c. (Canty-mitchell & Zimet, 2000) d. self-developed to measure the variable.	• Share problems with supervisor [a] • Supervisor support [a] • Supervisor leniency [d] • Co-worker support [b] • Share information with co-worker [b] • Family support [c] • Share problems with family [c] • Feeling of kinship [d]	4-point likert scale ranging from 1 (strongly disagree) – 4 (strongly agree)
e.	Physical Work Environment Adapt research questions: a. (Lee, So, 2006), b. (Martel & Dupuis, 2006) c. adjusted according to disaster-prone areas' needs.	• Storage [a] • Workspace [a] • Noise [b] • Equipment and tools [b] • work safety equuipment [c] • Disaster survival equipment [c] • Shelter [c] • affects productivity [c]	4-point likert scale ranging from 1 (strongly disagree) – 4 (strongly agree)

Source : from several previous studies and self-developed related to variable.

This research uses quantitative analysis with multiple linear regression equations processed with the STATA program. In estimating the regression equation, the Likert scale questionnaire results in ordinal data. Moreover, they are converted into interval data using the Method of Successive Interval (MSI). This action avoids correlation problems and fulfils the regression model assumptions(Ningsih & Dukalang, 2019). The regression model analyzed based on theory, and previous research has obtained the following functions.

$$QWL=f(G,P,OS,SS,PWE,\varepsilon)$$

$$QWL=\alpha_{10}+\gamma_{11}G+\gamma_{12}P+\gamma_{13}OS+\gamma_{14}SS+\gamma_{15}PWE\ \varepsilon_{...}(1)$$

Where

QWL=Quality of Work Life

G=Geographical conditions

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P=Productivity
OS=Occupational stress
SS=Social support
PWE=Physical work environment
α_{10}, $\gamma_{11} - \gamma_{15}$=Regression coefficient
ε=Error standard

RESULTS

This study conducted a validity test and a reliability test to analyze the questionnaire items on the QWL, occupational stress, social support, and physical work environment variables. The total number of questions is 33. The results of the validity test show the r-value of the question items>0.25. This result explains 33 questions that are valid to use.

The reliability value of the variables tested in this study is fulfilled. All variables show a Cronbach alpha value above 0.60; the questionnaire will be reliable if it exceeds 0.60, and more excellent reliability is expected with increasing values (Nunnally & Bernstein, 1994). variable reliability value presented in Table 3.

Table 3
RELIABILITY VALUE

No	Variabel	Cronbach's alpha	N Questions
1.	Quality of work life	0.758	8
2.	Occupational stress	0.763	9
3.	Social support	0.768	8
4.	Physical work environment	0.747	8

Source : Processed from data primer 2020.

The results of data regression processing using STATA are described in table 4 below.

Table 4
REGRESSION RESULT

Variabel	Coeficient	Std. error	prob
C	1.416716	0.4988706	0.005
Geographical conditions	0.2375029	0.0653018	0.000
Productivity	1.541354	0.5153086	0.003
Occupational stress	-0.2483512	0.0432927	0.000
Social support	0.2615216	0.0439233	0.000
Physical work environment	0.1079028	0.0492338	0.029
R^2	0.2224		
N	384		
F- hitung	21.63		
Prob > F	0.0000		

Source : Processed with STATA 2020.

The data interpretation results show that the F test value is 0.0000; if the value <0.05 at the 5% significance level, it means that all independent variables significantly affect the QWL variable simultaneously. The R-Square value of 0.2224 means that the independent variable can explain the QWL of 22.24%. Moreover, other variables outside the regression model influence the rest. The partial t-test value is significant at 5% or p-value <0.05, it can be seen that all the independent variables significantly affect QWL. From processing the data above into a regression equation as follows:

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QWL=1.416+0.237 G+1.541 P– 0.248 OS+0.261 SS+0,107 PWE +e.

DISCUSSION

The respondents' geographic condition is determined based on three indicators; the height of the work location from sea level, the distance of the work location from the coastline, and the working zone according to the Tsunami hazard map. The results of the study found that geographic conditions affect the QWL of 0.237. A high geographic value indicates a better QWL, meaning that workers who are located higher than sea level and away from the coastline have better QWL levels. Because the work location which is in the red zone raises workers' concerns about their safety from the threat of disaster, worries are increased on feeling an earthquake while working. According to Maslow's hierarchy of needs, the need for a sense of security in the workplace and at home is part of the basic needs.

Labour productivity has a significant positive effect on QWL. The FTEE method results show a high level of productivity at 38.28%, medium scale 59.64%, and 2.08% low scale. It illustrates the level of labour productivity to meet the target working hours that have been determined. Workers who move in the informal sector, such as retail traders, construction workers, food and beverage sellers, have high working hour productivity. The level of productivity is the achievement and form of self-actualization of the workforce. Fulfilment of self-actualization needs will provide satisfaction and increase QWL. The higher the level of productivity, the need for self-actualization will be quickly fulfilled, so we see that labour productivity is proven to influence QWL.

Stress conditions at work influence workers. Job stress occurs when workers cannot cope with work pressure (Hart & Cooper, 2001). Stress will appear when the target and individual workload are excessive (Takahashi & Takahashi, 2010), stress will impact the psychological burden of the workforce (Ganster & Rosen, 2013). By looking at the relationship between disasters during working hours, we find that disaster threats can increase stress. So that stress has a negative effect of -248 on QWL. Disasters are proven to raise anxiety, which can consequently increase worker stress (Makwana, 2019). From BMKG data, it is noted that the intensity of the earthquake is still often felt. Respondents agree that this can increase their stress levels. Feeling unsafe at work is a problem that can reduce QWL.

Problems at work can be resolved quickly with help from colleagues and superiors. Workers who get sufficient social support are considered more capable of overcoming the problems at hand. Social support obtained in the work environment is another alternative that can increase workforce motivation. The social support that workers need can come from families (Allen, 2001), colleagues and superiors (Kossek et al., 2011). Social support is advice and assistance provided by others for work (Karasek, 1979). People working in disaster-struck areas also require social support (Paton, 2003). They must have the strength to deal with the psychological impact of a disaster. This study found that social support has a positive and significant effect of 0.261 on QWL. Workers in disaster-prone areas receive high social support from colleagues and superiors. Colleagues and superiors often show leniency to them regarding the work completion time and attendance levels when a disaster occurs. Coworkers and superiors maintain good relationships with them and create a sense of kinship to make them feel respected. It helps them to meet their social needs and increases workforce QWL. High social support can improve workers' mental health (Felix & Afifi, 2015), thus, encouraging workers to complete tasks and deal with work problems.

This study found that the physical work environment has a positive effect of 0.107 on QWL. The physical work environment has a broad meaning covering all objects and materials felt by workers. According to Elsbach & Pratt (2008), the physical work environment forms buildings, equipment, air quality, light emission, and workspace. Workers in disaster-prone areas also need

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equipment related to disaster safety while at work. Those who work in the Tsunami-prone zone hope that there will be shelters or tall buildings used as an evacuation place if a Tsunami warning sign appears. The availability of a complete physical work environment in the workplace will simplify and speed up the time for completion of work so that workers are satisfied with their work and can improve QWL. The available safety equipment and shelter will increase the sense of physical security while in the workplace. These conditions also increase the QWL experienced by workers.

This research is expected to contribute to the community, especially the workforce, as a disaster mitigation awareness step. By providing information on the workforce situation and the work environment in areas prone to earthquakes and tsunamis, it is hoped that the results can be used by the government and employers while making policies related to labour. Knowing QWL can help employers to respond to the workforce regarding the effectiveness of the policies that have been implemented. We find that the work environment and geographical conditions are essential because a safe work environment increases QWL and impacts other areas of the work scope.

CONCLUSION

Economic development implicitly provides guarantees in reducing the impact of disasters (Kahn, 2005). It means that good economic conditions will accelerate rehabilitation and reconstruction, minimize casualties, and increase public awareness of the threat of disasters. Work locations that are in a safe zone can eliminate workers' worries in carrying out their duties. Employers need to pay attention to work comfort, and the goal is to maximize labour productivity. This effort will support the workforce because a good response from the employer makes workers feel valued and thus creates a quality work life.

Disaster damage creates new life patterns for workers. They should be encouraged to adapt to similar potential threats that can occur unexpectedly. We find that the workforce's concerns about the threat of disaster still exist, especially those who work in the Tsunami Red Zone. This condition is reflected in their higher stress level compared to their peers in the green zone or far from the coastline. Thus, work stress is proven to reduce work-life quality due to insecurity during work arising from disaster threats.

The government is expected to continue to provide education to the public regarding earthquake and tsunami disaster information so that people's concerns can be controlled and their fear in carrying out their daily activities can be reduced. Other efforts that the Padang city government has made include simulating a Tsunami evacuation route and constructing a building that will function as a Tsunami shelter. Padang already has thirteen buildings that can be used as shelters, but these can only accommodate 7.64% of the population in the Tsunami red zone (Ashar et al., 2014). Thus, infrastructure development for evacuation and safety needs still needs to be improved. Researchers found a need for types of equipment related to work safety and protection from disasters. By fulfilling it, a sense of security is provided that can improve the quality of working life.

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