A thematic analysis on work safety and ergonomics issues in Indonesian food-producing SMEs

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Abstract. Food-producing SMEs in a developing country like Indonesia involve a lot of physical work, as most of them are operating with manual equipment with high involvement of humans as workers. Due to its manual characteristic, work safety and Ergonomics and Human Factors (E/HF) are some major factors influencing the food-producing SMEs’ activities. The objective of this research was to understand work safety and ergonomics problems in the Indonesian food-producing SMEs. Semi-structured interviews were carried out with 11 owners and workers of three different types of products of Indonesian food-producing SMEs. Thematic analysis on the interview identified themes and sub-themes related to work safety and ergonomics issues, explaining the experiences of Indonesian food-producing SMEs. These consultations indicated that there may be some unsafe conditions, exposure to various work hazards and ergonomics issues were found. The owners and workers of the SMEs seemed to be aware of the unsafe working conditions and ergonomics issues, though the reasons for why changes have not been implemented are not yet known. The owners and workers are keen on making improvements, but there are several limitations, e.g. inadequate understanding and cost consideration. This type of interview study has been effective in collecting opinions and explanations of working conditions from people with different perspectives of the food producing SMEs and the thematic analysis has increased understanding of the different factors that can affect safety in this type of work.

1. Introduction
Human factors resulted in the potential of work mistakes and accidents could not be diminished from an SME’s problems and challenges. Seneviratne & Phoon [1] stressed that there has not been adequate consideration of Occupational Health and Safety in SMEs over the years, therefore appropriate methods to mitigate hazards are needed. Furthermore, owners of SMEs do not always take sufficient account of problems experienced by workers, as explored by Restuputri and Prastawa [2] at a food-producing SME in Indonesia.

The number of SMEs operating in East Java province in Indonesia reached 6,825,932 with 11,117,439 workers in 2018, with food-producing SMEs and workers reaching 356,047 units and 944,599 person, respectively [3]. Malang municipality is one major city in East Java province, home for over 110,000 units of SMEs with variety of sectors and products. Food-producing SMEs are estimated...
to account for 20% of them, mostly operating in micro and small scale. Food-producing SMEs in a developing country like Indonesia tend to require a lot of physical work, as most of them are operating manually with high involvement of human works. Due to its manual characteristic, work safety and Ergonomics and Human Factors (E/HF) are major factors influencing the food-producing SMEs’ activities. Some studies found that Indonesian food-producing SMEs workers are exposed to several work safety risk, with heat exposure from materials and equipment, body pain, and slip, trip, fall commonly found [4–6].

Despite its importance, it is considered that work safety and E/HF have not been explored adequately in Indonesian food-producing SMEs. They are rarely became the object of a study, with non-food businesses being more common, e.g. building construction, clothing, and health care [7–9]. Moreover, most research related to E/HF and work safety in Indonesian SMEs has not taken account their people’s (owners and workers) perspectives. Ergonomics studies like work posture analysis are common to determine work risk related to posture in an SME [10,11]. Tools used in these studies, e.g. REBA, RULA, OWAS, do not include workers’ inputs, although some subjective surveys have been used to measure complaints, e.g. the Nordic Body Map (NBM) and Standard Nordic Questionnaire (SNQ) [11,12]. These are usually closed questions surveys and do not examine the participants’ opinions and perceptions of risk. Further work is needed to understand questions such as “Do the workers really have the problems?” “How do the participants actually perceive and respond to the problems?” or “Do the proposed solutions reflect the actual needs?” Therefore, research that provides understanding and information on workers’ opinions and suggestions on their work conditions will be useful for further development. The objective of this research was to understand the work safety and ergonomics problems in the Indonesian food-producing SMEs.

2. Research Methods

2.1. Interview questions and participants

Semi-structured interviews were carried out to investigate ergonomics and work safety issues at Indonesian food-producing SMEs, using 22 questions, grouped into five categories of business profile, production process activity, work arrangements, E/HF experience and knowledge, and problems identification.

| No. | Interviewee            | Year started | Age (years old) | Work length (years) | Product     |
|-----|------------------------|--------------|-----------------|---------------------|-------------|
| 1   | SME 1_owner            | 2008         | 52              | 11                  | Tempe chips |
| 2   | SME 1_worker           | 38           | 8               |                     |             |
| 3   | SME 2_owner            | 1999         | 64              | 20                  | Tempe chips |
| 4   | SME 2_worker           | 30           | 5               |                     |             |
| 5   | SME 3_owner            | 2000         | 55              | 19                  | Tempe chips |
| 6   | SME 3 Worker 1         | 46           | 10              |                     | Tempe chips |
| 7   | SME 3 Worker 2         | 28           | 4               |                     |             |
| 8   | SME 4 Owner            | 1998         | 61              | 21                  | Tempe making |
| 9   | SME 4 Worker           | 40           | 11              |                     |             |
| 10  | SME 5 Owner            | 1995         | 51              | 24                  | Corn chips  |
| 11  | Head of association    | 2002 (as owner) | 50 | 17 (as owner) |             |
|     |                        | 2015 (as head) | 4 (as head)    |                     |             |

Examples of the interview questions are:
- Have you come across any problems or difficulties during the production or work activities? Can you explain more about these?
- Do you have any experience of ergonomics? Can you tell me more about that?
Do you think there are any problems with the following (work posture, work method/technique, work production layout, physical environment)? Please explain.

The total number of interviewees was 11, consisting of the owners and workers of five Indonesian food-producing SMEs in Malang municipality, East Java province, Indonesia. They were tempe (soybean cake) chips (SME 1, 2, 3), tempe making (SME 4), and corn chips (SME 5) producing SMEs. The head of association of tempe chips SMEs was also interviewed. Interviews were carried out during work hours at the SMEs. Before every interview, the interviewee was given an explanation of the study and signed a consent form. The profile of the interviewees is presented in Table 1.

2.2. Transcription and thematic analysis
All interviews were recorded and transcribed afterwards for analysis. Transcription was performed directly, by writing down the interviewees’ accounts while listening to them. This process was repeated several times to ensure the text transcription represented the interviews accordingly. Moreover, as the interviews were conducted in Bahasa Indonesia (Indonesian language), several parts of each interviews were transcribed into Bahasa Indonesia before translating them into English.

Thematic analysis was then performed on the interview results, applying six phases and 15-point criteria for good thematic analysis [13,14]. Examples of the criteria based on Braun & Clarke [15] are the transcription is in appropriate level of detail, themes have been checked against each other, and themes are coherent, consistent, and distinctive. These steps were done manually on the text transcription of the interviews. Moreover, a hybrid approach was applied for the thematic analysis, where themes were identified in an emergent way based on interviewees’ accounts (inductive) combined with a set of anticipated topics or themes (guided emergence) based on the research objectives and questions [16]. The six steps were:

- **Familiarising with the data.** Each interview transcription was read thoroughly to understand the information contained. This phase was performed several times during the whole process of analysis, to ensure the codes and themes represent the interview results accordingly.
- **Generating initial codes.** This phase of generating initial codes started during data familiarisation. After the whole transcription has been read completely and understood, initial codes were then generated. This was performed by highlighting and commenting on related text to produce labels or codes for further review.
- **Searching for themes.** Codes were collated into several groups to form themes. These are codes that have similarity or relationships among each other. In this study, sub-themes were generated to describe additional features of the final themes.
- **Reviewing themes.** Generated themes and sub-themes were reviewed several times to ensure they relate accordingly.
- **Defining and naming themes.** This phase was also performed during the previous phase of reviewing themes. Initial themes names and definitions were useful to indicate potential themes to be grouped or removed. Final names and definitions of the themes were then formulated to give clear description of what each theme explains.
- **Producing the report.** Analysis was performed using the initial established themes. The analysis involves relating the themes to the study objective and questions, as well as determining findings from the interviews.

3. Results and Discussion
The analysis has helped to elaborate on the five themes that were used in forming the structure of the questionnaire (business profile, worker management, production process, work safety, and ergonomics). As the objective of this paper is to observe work safety and ergonomics issues within Indonesian food-producing SMEs, the results and discussion will focus only on related themes, i.e. work safety and ergonomics issues. Main themes and associated sub-themes of work safety and ergonomics issues have been identified within this analysis, as seen in Table 2.
Table 2. Themes and sub-themes of work safety and ergonomics issues.

| No. | Themes            | Description                                                                 | Sub-themes               | Codes                                           |
|-----|-------------------|----------------------------------------------------------------------------|--------------------------|------------------------------------------------|
| 1.  | Work safety       | Work safety conditions and issues at the food-producing SMEs.               | Injuries                 | Occurrence of injuries                          |
|     |                   |                                                                           |                          | No record of injuries                           |
|     |                   |                                                                           |                          | Perceived as minor                              |
|     |                   |                                                                           | Work hazards             | Unsafe environment                              |
|     |                   |                                                                           |                          | Unsafe acts                                     |
|     |                   |                                                                           |                          | Materials                                       |
|     |                   |                                                                           |                          | Equipment                                       |
|     |                   |                                                                           | Attitude and perception  | Willing to improve                              |
|     |                   |                                                                           |                          | Aware to safety                                 |
|     |                   |                                                                           |                          | Low attention and ignorance                     |
| 2.  | Ergonomics issues | Ergonomics conditions and issues at the food-producing SMEs.               | Knowledge and experiences| Limited knowledge                               |
|     |                   |                                                                           |                          | Limited experience in ergonomics                |
|     |                   |                                                                           |                          | Not concerned                                   |
|     |                   |                                                                           | Work design              | Not designed for the activities                 |
|     |                   |                                                                           |                          | Undesired consequences                          |
|     |                   |                                                                           |                          | Non-involvement of workers                      |
|     |                   |                                                                           | Improvement              | Cost consideration                              |
|     |                   |                                                                           |                          | Willingness to improve                          |
|     |                   |                                                                           |                          | Limited understanding                           |

3.1. Work safety
Almost all interviewee (n=8) from all SMEs raised safety issues at their workplaces during the interviews. The interviewees stated work safety issues mostly during discussions on interview questions related to problem identification and production process activity. In general, the three most common work safety issues stated by the interviewees were injuries, work hazards, and attitude and perception, which then became sub-themes.

3.1.1. Injuries
Injuries are occurring in the workplace of food-producing SMEs, but there is they are not recorded. Owners and workers felt that injuries experienced are minor and not severe as they did not have a major impact when they happened. One worker explained that most workers do certain treatments after the work, to ease pain on their body resulting from the work. This indicated that the activities at the food-producing SMEs are currently exposing the workers to hazards.

“Although we do not have records of injury, it happens to the workers... so far I think they are only minor injuries that do not severely affect the workers or the activities.”” [SME 2_owner]
“Most of us, when we come home, we clean ourselves and have some treatment to ease our pain. Massage and warm water soaking are the common treatments.” [SME 5_worker]

Occurrence of injuries in occupational health and safety at work is a critical concern in the food industry [17]. Although the interviewees stated that there are no major injuries that disrupt the activities or severely injured the workers, its occurrence is still an important issue to be addressed.

3.1.2. Work hazards
It was found from the interviews that the work activities at the food-producing SMEs are exposed to several work hazards. These are found in all activities performed by the workers. Work hazards come from various sources, e.g. environment, equipment, and workers’ unsafe acts.

“Workers in frying activities have to deal with hot condition, as the frying uses a gas stove and performed close to the fire.” [SME 1_owner]

“…The situation in the crushing task is also quite dangerous actually, as the crusher is electric-powered while surrounded with water and wet conditions.” [SME 4_owner]

Work areas and equipment that are not designed for the work is the main reason for the existence of work hazards at the food-producing SMEs. There may be limited understanding of the risks at the food-producing SMEs.

3.1.3. Attitude and perception
People at the food-producing SMEs perceive the injuries as being minor. They seem to be aware that the work activities are unsafe, e.g. having hazards or injury-prone, but they do not think this is a serious problem. As long as their businesses are obtaining sales profits, they are not so concerned about some hazards in the environment, the need for safety equipment, and other safety-related matters at their work activities. Although cost may be one main limitation, in small businesses it is possible that profits may be prioritized over safety [18]. There are also limited suggestions on how to improve safety conditions.

“Injuries and complaints sometimes happen, but it seems that the workers still able to do their jobs. So we just keep on doing our business with what we have…” [Head of association]

“We are also aware that some activities like frying and cutting have risks of injury to the workers, for example heat burns and cuts… but in the end we kind of put safety in second place below financial profit.” [SME 1_worker]

3.2. Ergonomics issues
Respondents were not familiar with the term ergonomics when questioned. After receiving a brief description of ergonomics, the interviewees explained several issues related to ergonomics at their workplaces. All of the interviewees (n=11) from all SMEs raised ergonomics issues they experienced at their workplaces.

3.2.1. Knowledge and experience
Some of the interviewees emphasized the importance of a safe working environment, although they have very limited experience of ergonomics, with no formal education or training that contains ergonomics.

“What is that? …I don’t think I have experience on that, but I agree that our workers should work in a safe environment.” [Head of association]

“When I attended training by the Agency of Health, I think they said something about that, related to good work arrangement, environment, and safety.” [SME 3_owner]

“A few years ago, two university students spent time here studying the workers’ body shapes, measuring them, taking photos. I think it relates to what you mentioned (ergonomics). However, since then I did not hear of what were the results of the studies.” [SME 5_owner]
Olsen et al. [19] found that limited knowledge of safety and health effects are among characteristics of safety management systems in SMEs. It is understood that people at Indonesian food-producing SMEs have very limited knowledge of ergonomics, although they did respond with useful suggestions after explanation of the terminology. A few of them have experience from university students’ studies about work posture and training and certification by the government, though this was brief and without any follow up.

3.2.2. Work design
It is understood that the SMEs performed their production process at the owners’ houses. The work area and equipment were not designed specifically for the activities, introducing several work-related issues, e.g. excessive fatigue, hazards, risks, discomfort, body pain. Some equipment used the owners’ house utensils, e.g. laid down chair for the cutting worker to sit, and some workers feel that some tools are not convenient to use, e.g. seating, knife, crusher, and sometimes had to use their own tools when possible. Together with the manual work characteristics of most food-producing SMEs [4,20], this inappropriate design could resulted in work risk exposures. The workers could suggest improvements, discuss problems and then report these to the owners. However, the workers are not involved in the design of the facilities.

“I think the discomfort that we feel is because the tools are not designed particularly for this work. The tools are ready-to-use you can buy from a shop. My friend on cutting is even using a cupboard as seating to support him” [SME 1_worker]

“The work area is poorly ventilated while involving hot conditions. This resulted in excessive sweating for the workers to work without clothes on…” [SME 4_owner]

“We suggested a change of equipment and their arrangements if felt necessary… However, it is still the owner who decides on the purchase of equipment and arranges their placement in the work area.” [SME 3_worker]

3.2.3. Improvement
All SMEs are keen on improvement possibilities and willing to solve problems related to ergonomics, as they are aware that it could affect the workers’ well-being as well as having impact on the quality of products. However, they are currently unable to improve mainly due to cost considerations and inadequate knowledge and understanding of the appropriate solutions. They may not be giving sufficient consideration to work problems, and focus more on production achievements and financial income. Therefore, all SMEs carry on working with current conditions, with the risk of exposure to work problems. Legg et al. [21] also stated that SMEs tend to focus on daily operations rather than intervention, especially related to lack of time.

“We know that our workplace is not perfect, and some things could be improved. But currently we just carry on doing our jobs, as we do not know about how suitable the improvements is…” [SME 3_owner]

“If what you mean is to have a better workplace for the workers, I can not solve it in the meantime. It is mainly due to cost consideration, and we are currently able to run the business with what we have now…” [SME 4_owner]

“I would like to hear if there is any improvement for this, but so far no one seems to care about this. All we care about is that we achieve production targets instructed by the owner, and gain financial benefit from the business” [SME 5_worker]

4. Conclusions
Several unsafe conditions and ergonomics issues were identified during the interviews. The workers of food-producing SMEs are likely to be exposed to various work hazards with several potential consequences while performing their activities. Although the owners and workers of the SMEs seemed aware of the unsafe working conditions and ergonomics issues, the reasons for why changes have not
been implemented are not yet fully understood. Owners are keen on making improvements, but there are several limitations, e.g. inadequate understanding and cost considerations.

This research provides an approach, i.e. thematic analysis interview, which has not been commonly applied to understand problems in Indonesian food-producing SMEs. This type of interview study has been effective in collecting opinions and explanations of working conditions from people with different perspectives of the food producing SMEs and the thematic analysis has increased understanding of the different factors that can affect safety in this type of work.

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