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Perceptions of work safety and risk in Indonesian small food-producing businesses

by

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Abstract

Issues related to work safety seem to be prevalent in Indonesian small food-producing businesses, with indications of hazardous and risky work conditions. Despite the prevalence of work safety issues, there are currently few studies that have involved sufficient consultation with those involved in the operation, supervision, or enforcement activities associated with the work and work safety in Indonesian small food-producing businesses. This PhD project therefore aimed to investigate perceptions of work safety and risk in Indonesian small food-producing businesses, with the intention of explaining the current conditions of work safety in the workplaces, and considering necessary improvements or interventions.

This research has four objectives which were addressed in four studies, conducted in an exploratory approach with multi-methods involving qualitative and quantitative data collections and analyses. Study 1 was designed to understand work and work-related issues in Indonesian small food-producing businesses, using observations and semi-structured interviews. Findings of Study 1 were followed up in Study 2 to explore thoughts and opinions on work safety and risk among the people of Indonesian small food-producing businesses, using in-depth scenario-based interviews and phenomenology approach.

Findings of Study 1 and Study 2 were then used to develop Study 3, which included development and application of questionnaire surveys to investigate factors influencing perceptions of work safety and risk among the people of Indonesian small food-producing businesses. Principal Component Analysis (PCA) and Structural Equation Modelling (SEM) were used in Study 3, to investigate the structure of factors and the relationships among the factors influencing perceptions of work safety and risk. The findings of the first three studies were then used within a focus group discussion with various stakeholders in the final Study 4, to collect their feedback on the research findings and explore recommendations relating to work safety in Indonesian small food-producing businesses.

The general findings of this research are that, whilst the people of Indonesian small food-producing businesses perceived their workplaces and work activities as unsafe, there were indications of acceptance and personal feelings of safety about their current work conditions. This is mainly due to their perceptions of low frequency and severity of unsafe events and injuries, and the priority of production and sales can still be achieved, in spite of the various work-related issues. It was also found that perceptions of work safety and risk among the people of Indonesian small food-producing businesses are influenced by the implementation of safety management in the businesses and their knowledge of safety. This research contributes to understanding about the perceptions of work safety and risk in Indonesian small food-producing businesses. Additionally, recommendations for work safety in the observed businesses were explored.

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Chapter 1

Introduction

1.1. Research background

Small businesses have an important role in a country as major contributors in employment and economic activities (Legg et al., 2015; Struwig & Lillah, 2017). In developing countries, small businesses often fall within the informal sector in which they are abundant and account for a significant portion of the nation's economy (Porta & Shleifer, 2008; Rothenberg et al., 2016). In Indonesia, one developing country in South East Asia, micro and Small and Medium Enterprises (SMEs) are emphasised as particularly important parts of the economy (Jaswadi et al., 2015). In 2020 as reported in Statistics Indonesia (2022), the abundance of small business in Indonesia was reflected by its total number of 4,209,817 including micro businesses, compared to 29,499 number of medium and large businesses. In the same year, micro and small businesses in Indonesia employed a total of 9,647,542 workers, compared to 5,889,674 workers in medium and large businesses.

It has been understood that the characteristics of small businesses are different from the larger ones. Compared to large businesses, small businesses have characteristics such as independent and personal ownership, as well as informal organisation (Legg et al., 2015; Nicolescu, 2009). Additionally, work safety and related issues in small businesses may also be different than in larger businesses. The workplaces of small businesses can have more hazardous and riskier work conditions, with potentially higher rates of injury (Eakin et al., 2000; Hasle & Limborg, 2006). Champoux & Brun (2003) also suggested that most small enterprises have a low level of safety management, in which there may be no prevention programme related to safety and an absence of safety personnel. Furthermore, Hasle & Limborg (2006) pointed out that issues of health and safety are often pushed aside in small businesses, due to a focus upon survival.

Among Indonesian small businesses, there are indications of various issues related to work safety. Mufti et al. (2019) stated that, despite the importance of health and safety in small scale industry, safety issues are often neglected in the workplaces of small or household industries in Indonesia. Restuputri et al. (2021) also suggested that, despite the importance of SMEs in Indonesia, problems of safety are commonly found among Indonesian SMEs workers. Problems related to work safety tend to be ignored and are of less importance in Indonesian SMEs, in which there is reluctance to implement safer and more appropriately designed work environments (Restuputri et al., 2021).

In the context of Indonesian small food-producing businesses, the issues around work safety are also prevalent. Dewi et al. (2020) observed the workplace of a small *tempe* (soybean cake) factory in Malang municipality Indonesia, to understand the occupational safety and health conditions. The results of their study showed that the workplace is unsafe with various hazards and risks, and there are conditions such as unavailability of PPE and emergency equipment. In a small crackers factory in Tulungagung regency Indonesia, Rahayuningsih (2019) conducted risk assessment of the work activities. They found various hazards and risks exposures from various sources in the workplace, such as risks of finger cuts from equipment and slips from slippery floors. Furthermore, in October 2017, a fire accident broke out at a *tempe* home industry in Malang municipality, East Java province, Indonesia resulting in a number of fatalities (Adhi, 2017).

Despite the prevalence of work safety issues in Indonesian small food-producing businesses, in-depth investigation on the topic seems to be limited. Firstly, non-food industries seem to be more common as a research object in human factors and safety research in Indonesia, as indicated in Hermawati et al. (2014). These include businesses such as building construction (e.g. Sucita & Broto, 2011), clothing factory (e.g. Restuputri, 2018), and health care (e.g. Ramdan & Rahman, 2017). Secondly, while studies in Indonesian small food-producing businesses which primarily focused on work posture analysis (e.g. Yuslistyari & Setianah, 2018), anthropometry analysis (e.g. Silviana et al., 2021), and risk assessment (e.g. Arifin & Wakhid, 2018; Irpan et al., 2019)

were able to investigate specific forms of safety and risk in the workplaces and recommend improvements, there is still lack of information on the wider opinions on safety and risk among the people of the businesses. Therefore, research that provides greater understanding of work safety and risk involving the people of Indonesian small food-producing businesses will be useful for further and more systematic development.

The perceptions of relevant people are important in explaining work safety and risk in a workplace. Zohar (2000) implied that perceptions regarding safety may explain the relatively low priority given to safety below productivity and speed in manufacturing processes. Schulte et al. (2018) pointed out that improving work safety in the SMEs should start with understanding their perception of risk, as it may have an important role in people's motivation and reception of work safety. In small workplaces, Eakin (1992) also argued that if there is a perception that safety and health are not a problem, then promoting work safety may be challenging in small businesses. Additionally, perceptions of safety and risk may be influenced by other factors such as knowledge as pointed out by Vu et al. (2022) and Zhao et al. (2021). In the Indonesian small food-producing businesses, despite the indications of various work-related issues in their workplaces, a study which explores the people's perceptions of work safety and risk is limited. Research on this area is expected to provide greater understanding of perceptions of work safety and risk among the people of Indonesian small food-producing businesses.

Consisting of four studies, this research is expected to contribute by providing greater understanding of work safety and investigate perceptions of work safety and risk in Indonesian small food-producing businesses. Additionally, recommendations for improvement of work safety in Indonesian small food-producing are also identified. Furthermore, as previously mentioned, research in human factors and safety disciplines involving Indonesian small food-producing businesses thus far is mostly conducted using an observational or technical approach. The multi-method and exploratory approach taken in this research is expected to demonstrate an alternative approach to studying work safety for future research, particularly in work settings similar to Indonesian small food-producing businesses.

1.2. Research aim and objectives

The overarching aim of this PhD research was to investigate perceptions of work safety and risk among the people of Indonesian small food-producing businesses. This aim was supported by four objectives as follows.

1. To understand work and work-related issues in Indonesian small food-producing businesses.
2. To explore thoughts and opinions on work safety and risk among the people of Indonesian small food-producing businesses.
3. To investigate factors influencing perceptions of work safety and risk among the people of Indonesian small food-producing businesses.
4. To obtain feedback on the research findings and explore recommendations relating to work safety in Indonesian small food-producing businesses.

1.3. Research scope

The scope of this research was limited to the following.

1. The Indonesian small food-producing businesses that were involved in this research were located in Malang municipality, East Java province, Indonesia. This location was selected as it is one location where existence of small food-producing businesses is abundant. Moreover, the researcher is a lecturer-researcher at Universitas Brawijaya located in the municipality and has past experience with some of the businesses, which provided initial knowledge and contacts for this research.
2. The Indonesian food-producing businesses that were involved in this research were small businesses, rather than medium or large businesses. Following the definitions as in Statistics Indonesia (2022) and Indonesian Constitution No. 20/2008 (2008), small businesses in Indonesia are businesses which either employed 5 to 19 workers or have annual income more than Rp 500,000,000 but less than Rp 2,000,000,000 (Rp=Indonesian currency of Indonesian Rupiah (IDR)).

3. The Indonesian small food-producing businesses that were involved in this research were in three types of products of *tempe* (soybean cake) chips, raw *tempe*, and corn flakes. These types of products were selected based on indications of work safety and work-related issues in the workplaces as indicated in some studies, such as Dewi et al. (2020) and Silalahi et al. (2018b).

1.4. Thesis overview and structure

This thesis is presented in eight chapters, starting with **Chapter 1. Introduction** in which the background, aim and objectives, scope of the research, and overview and structure of the thesis are presented. Review of literature that is relevant to this research is presented in **Chapter 2. Literature review**, in which gaps in research and knowledge that were addressed by this research are also identified. In the next **Chapter 3. Research methodology**, the overview and rationale for the methods that were used in the studies are explained. Afterwards, this thesis continues with presentation of the four studies that were conducted.

Chapter 4. Study 1 contributes to understanding work and work-related issues in Indonesian small food-producing businesses. Study 2 investigates people's thoughts and opinions on work safety and risk, presented in **Chapter 5. Study 2**. Study 3 investigates influences on perceptions of work safety and risk, presented in **Chapter 6. Study 3**. In **Chapter 7. Study 4**, feedback on the findings of this research and recommendations for work safety in Indonesian small food-producing businesses are presented. The results of the research are then discussed in **Chapter 8. General discussion and conclusions**, in which a review of the research aim and objectives, reflections on the methodology, and limitations of the research are also discussed. The contributions of the research, recommendations for future research, and concluding statements are also presented in Chapter 8, which is the final chapter of this thesis. The structure of the thesis is presented in Figure 1.1.

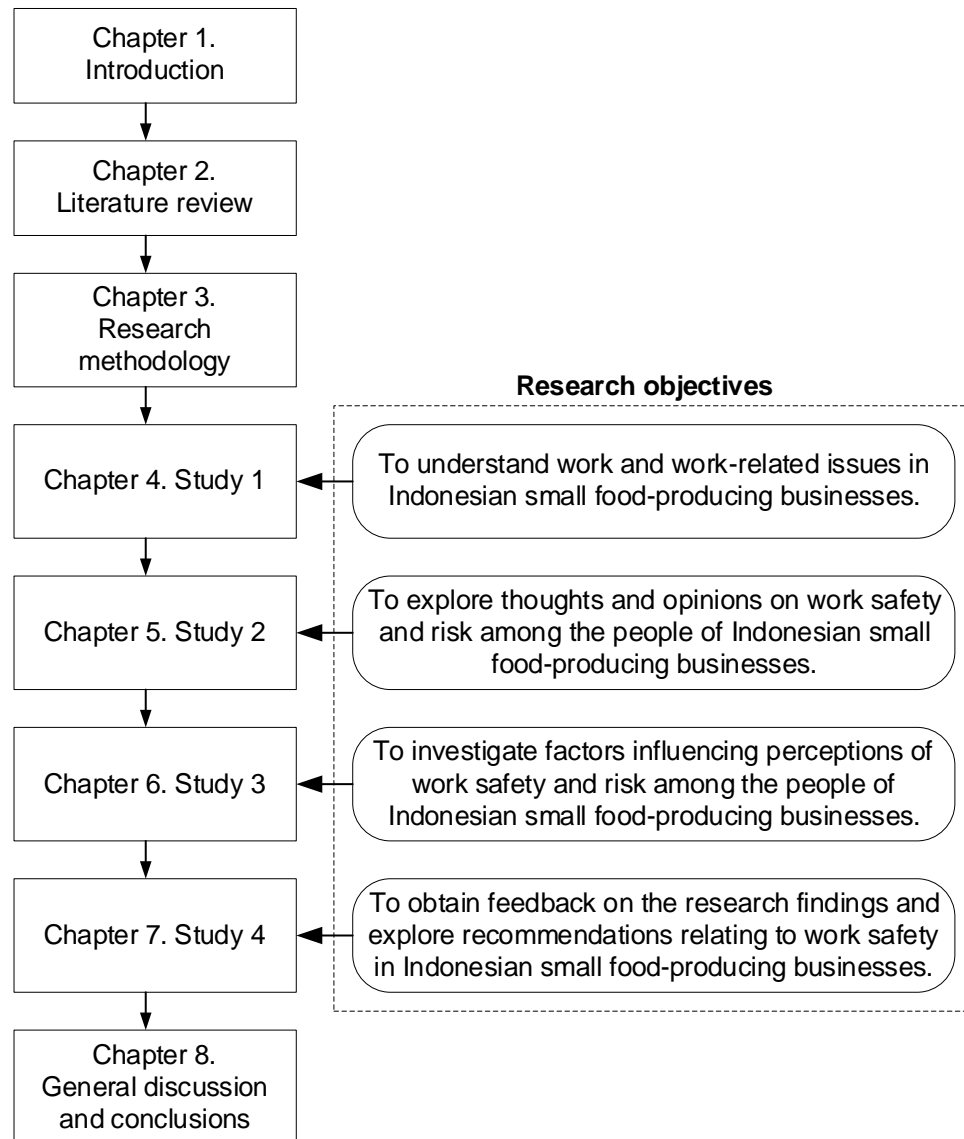


Figure 1.1. Structure of the thesis

1.5. Chapter 1 summary

The background of this research surrounding the needs for investigation on perceptions of work safety and risk was presented in this Chapter 1. This established the overall aim of the research to investigate perceptions of work safety and risk in Indonesian small food-producing businesses, which is supported by four objectives. The scope of this research is also presented, in which this research was conducted in three types of products of Indonesian small food-producing businesses located in Malang municipality, Indonesia. The overview and structure of the thesis are also presented, in which this thesis will be presented in eight chapters.

Chapter 2

Literature review

2.1. Overview of the literature review

This chapter presents the review of literature that influenced the approach of this research, defining concepts relevant to this research, and identifying gaps in existing research and knowledge. The materials that were searched and reviewed were mainly journal articles, conference papers, and books. The literature was sourced from some scientific databases as follows.

1. The University of Nottingham library (<https://nusearch.nottingham.ac.uk>), Science Direct (<https://sciencedirect.com>), and Scopus (<https://scopus.com>). These databases were used to search literature relevant to the topic of research, with several keywords such as 'work safety in small business', 'workplace risk perception', 'safety in food business', and 'ergonomics and safety in developing countries'.
2. Indonesian Journal Database (<https://garuda.kemdikbud.go.id>) and Google Scholar Indonesia (<https://scholar.google.co.id>). These databases were mainly sought to search relevant literature in Indonesia or in Bahasa Indonesia (Indonesian language), with several keywords such as '*keselamatan kerja UKM* (SMEs work safety)', '*K3 di UKM makanan* (work safety in food SMEs)', and '*persepsi keamanan kerja dan risiko* (perceptions of work safety and risk)'.

The search and review of the materials focused on two main areas of work safety and perceptions of work safety and risk. In the first area of work safety, general conditions of work safety in developing countries and small businesses are presented. In the second area of perceptions of work safety and risk, theories surrounding perceptions of work safety and risk are presented. Furthermore, literature on factors influencing perceptions of work safety and risk and the methods to investigate perceptions of work safety and risk are also presented.

2.2. Work safety in developing countries

2.2.1. Descriptions of work safety in developing countries

One widely used classification of developing countries is countries with low-to-middle income as defined by The World Bank (2016). Farias (2019) summarised the characteristics of developing countries as technology importers or recipients of assistance to develop, having low income per capita, and having low living standards. Indonesia is a country located in the South East Asia region which is classified in the category of a lower-middle income country (The World Bank, 2023), indicating Indonesia's status as a developing country. Rosenstock et al. (2006) stated that most of the global workforce (approximately 80%) resides in developing countries. Additionally, most workers in many developing countries are working in the informal sector (The World Bank, 2019), described by The OECD-ILO (2019) as individual or family owned enterprises operating in a small scale with a low level of organisation.

In the informal economy of developing countries, there has been a lot of discussions and arguments surrounding the relatively poor conditions of Occupational Safety and Health (OSH). OSH throughout this thesis will often be referred as work safety, and is concerned with protecting the safety, health, and welfare of people involved in work, by arranging the work environment to maintain physical, mental, and social wellbeing (Micheli et al., 2018). As described in EMCONET (2007), the informal economy and sector in developing regions such as South America, Asia, and Africa often have characteristics of lack of regulations in OSH, lack of injury insurance, and poor working conditions. Kortum et al. (2011) pointed out that various workplaces in developing countries worldwide have poor working conditions with various hazards and injuries, and a lack of accident prevention. Additionally, informal workers in developing countries often work in places such as roadsides and homes, in which they are exposed to poor, unsafe, and unhealthy workplaces with potential negative impacts to their health (Alfers, 2009; Alfers & Rogan, 2015; London & Bailie, 2001; Romero et al., 2010).

Chen et al. (2020) pointed out that there is inadequate governance and systems to support OSH in developing countries, and problems around OSH can be more serious compared to developed countries. Kortum et al. (2011) and Chopra (2009) also implied that there are differences between developed and developing countries in workplace standards and environments, and working conditions, standards, awareness, and related policy need to be improved in developing countries. As reported in EMCONET (2007), there are more challenges of occupational injuries and work-related diseases in workplaces located in developing countries due to more exposure to hazardous materials. Additionally, Joseph & Arasu (2023) argued that there is low awareness of OSH among the community and workforce in developing countries.

Several studies have provided overviews of work safety conditions in developing countries. Despite the growing economy in the region, Hamalainen et al. (2006) and Takala et al. (2014) pointed out estimates of high numbers of occupational accidents and fatalities in the South East Asia region. Hamalainen et al. (2006) gave examples of the higher number of occupational accidents in countries such as Cambodia and Vietnam, compared to the more developed countries such as Australia and Japan. While studying contractor sectors in the region, Manu et al. (2018) emphasised the generally inadequate practices of health and safety management in developing countries in South East Asia, which needs to be addressed to reduce injuries, accidents, and illnesses.

Furthermore, in an investigation in South African industries, Rikhotso et al. (2022) emphasised the difficulty in reducing occupational health hazards, with consequences of fatalities remaining a possibility. They pointed out the importance and necessity of surveillance and control mechanisms to protect the workers of South African industries. Kortum et al. (2011) also explained that in the workforces of developing countries such as African and South East Asian countries, musculoskeletal problems and accidents from forceful and repetitive tasks are common, in addition to respiratory disorders and psychosocial stress.

In Indonesia, effort to implement and support OSH is reflected by various national regulations, as accessible in <https://jdih.kemnaker.go.id/> (Ministry of Manpower of Indonesia). There are various regulations, from general regulations such as implementation of a work health and safety management system and general OSH, to more specific regulations such as fire in the workplace and safety when working at heights. In addition to regulations, the effort to support OSH in Indonesia is reflected by several organisations which are responsible for monitoring OSH in Indonesia. There are national level organisations such as The Directorate General of Employment and Occupational Health and Safety Monitoring and Development (<https://kemnaker.go.id/unit/binwasnaker-k3>), and regional level organisations such as The Technical Implementation Unit of Work Safety for East Java province (<https://k3.disnakertrans.jatimprov.go.id>).

However, despite the various regulations and organisations as previously mentioned, the implementation of OSH in workplaces of various sectors in Indonesia still seems to be unsatisfactory. Lamba et al. (2019) argued that, despite the claim by related regulators that OSH Management Systems (OSHMS) have been successfully implemented in the construction sector, empirical data showed low levels of implementation of OSH. Lamba et al. (2019) explained that a large portion of the construction sector in Indonesia still have not adequately applied regulations and standards on OSH. This has also been observed in other work settings, such as in the manufacturing industry of hospital equipment products, where Abidin et al. (2021) found various injuries from materials (e.g. broken fingers and eye injuries), which resulted in hospitalisation.

Between 2019 to 2021 as reported by the Ministry of Manpower of Indonesia (2022), there was an increasing trend of reported work accidents and fatalities as shown in Figure 2.1. It is worth noting that the surge of fatalities between 2020 and 2021 was due to Covid-19-related fatalities, which were included in the data as the cases happened in the respective workplaces as noted in Ministry of Manpower of Indonesia (2022). Furthermore, the numbers of work accidents may be higher in reality as the numbers only cover companies which participated in the worker insurance scheme, mostly in

formal large businesses. Some large businesses which are obliged to report cases of work accidents sometimes did not comply by not reporting. One reason for this non-compliance for reporting is the fear of the businesses for any possible sanctions that may be imposed on them from the occurrence of the work accidents, as explained in the report by Ministry of Manpower of Indonesia (2022).

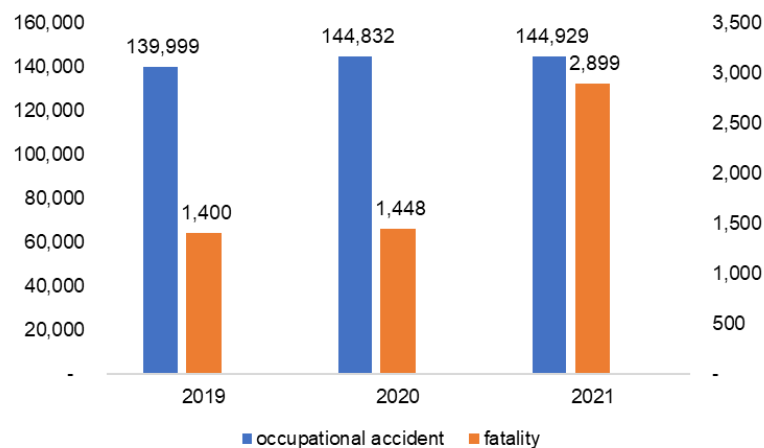


Figure 2.1. Reported occupational accident and fatality in Indonesia (2019-2021)

2.2.2. Work safety research in developing countries

Arooj et al. (2022) argued that work safety has not gained adequate research attention and may be overlooked in less developed countries despite its importance, partly due to the indications of low numbers of major accidents. They highlighted that less research is conducted on safety climate or perceptions in the Pakistani power sector, as major safety issues are rarely reported and catastrophic accidents rarely happen in the work sector. Additionally, while pointing out that the majority of previous studies on topics of safety such as safety climate were in the context of developed countries (e.g. The USA and The UK), Arooj et al. (2022) implied that similar studies in developing countries would be beneficial.

Issues of OSH in developing countries are mainly neglected, often reflected by the low priority and limited resources of OSH, as well as inadequate research (Nuwayhid, 2004). Compared to developed countries, there are several challenges for work health and safety research in developing countries such as limited access to data, limited accident and disease

reporting systems, and difficulties in converting the research findings into effective policies (Alfers & Rogan, 2015; Nuwayhid, 2004). In India for example, research on work health and safety is often complicated by the informal sectors that dominate the country, lack of data, and lack of dedicated personnel related to work health and safety (Agnihotram, 2005; Joseph & Arasu, 2023).

In a review on OSH research, Fan et al. (2020) found poor coverage of OSH research in developing countries, in which most of the research was heavily concentrated in developed countries. They also pointed out that OSH research in developing countries mostly covers technical aspects (e.g. process safety and hazard analysis), whereas theoretical and empirical research in OSH (e.g. organisational and cultural aspects related to safety) still lag behind developed countries. Similarly, a review by Hermawati et al. (2014) indicated that health and safety is the least researched topic in the human factors discipline in Indonesia, compared to the more technical aspects such as work posture analysis and manual materials handling.

Research on OSH in developed countries has been progressing further than developing countries, with better funding and data systems, combined with better interventional studies, alignment between research and policy, and looking beyond workplace hazards (Fritschi & Smith, 2019; Lalloo et al., 2019). Fritschi & Smith (2019) implied that OSH research in developed countries has been moving towards a system-based approach involving interventions and economic evaluations of OSH. Furthermore, Joseph & Arasu (2023) argued that research on work health and safety in developing countries should move on from identification and measurement of workplace hazards to approaches which recognises the people's perspectives. Joseph & Arasu (2023) added that to improve workers' understanding of the work-related risk in their workplaces, they can be involved activities such as workshops regarding the safety and risk in their workplaces.

2.3. Work safety in small businesses

2.3.1. Descriptions of work safety in small businesses

The definition or classification of small business varies across regions and is sometimes defined differently depending on the type or sector of the businesses. Classification of small business in Indonesia and examples in other regions are presented in Table 2.1.

Table 2.1. Classification of small business in some regions

Criteria	EU/UK ^a	Australia ^b	Thailand ^c	Indonesia ^d
Number of employment (person)	10 to 49	Less than 20	<ul style="list-style-type: none"> • 6 to 50 (manufacturing) • 6 to 30 (service and merchandising) 	5 to 19
Annual income (respective currency)	2 to 10 million Euros	Less than 2 million Australian Dollars	<ul style="list-style-type: none"> • Up to 100 million Thailand Baht (manufacturing) • Up to 50 million Thailand Baht (service and merchandising) 	500 to 2,500 million Indonesian Rupiah

^aEuropean Commission (2020), ^bGilfillan (2015), ^cMinisterial Regulations on the Designation of the Characteristics of Small and Medium Enterprises Promotion Act, 2020, ^d Indonesian Constitution No. 20/2008 (2008); Statistics Indonesia (2020)

Small businesses are often termed together with medium enterprises as Small and Medium Enterprises (SMEs), in which SMEs have grown in recognition in recent decades due to their contribution to economic and social development (Legg et al., 2015). This is reflected by the high proportion of SMEs both in number and employment in a country or region. In the EU for example, the number of SMEs accounts for 98% with 50% employment of all enterprises, and reaching 97% in number and 30% employment of all businesses in New Zealand (Legg et al., 2015; Targoutzidis et al., 2014). The abundance of small businesses is also commonly found in developing countries, in which small and informal enterprises may account for at least half of economic activities of a developing country (Porta & Shleifer, 2008). In Indonesia, as reported in Statistics Indonesia (2022), micro and small businesses account for 99% of all enterprises and 62% of total employment.

Due to their high numbers and importance, the creation of healthy work systems through safety management in the SMEs is an important issue to be

addressed (Legg et al., 2015). However, Legg et al. (2015) implied that management of health and safety to create and maintain a healthy and safe work environment is challenging for SMEs, compared to larger enterprises which mostly have the capability to implement it. Eakin et al. (2000) indicated a difficulty to reach small businesses regarding promotion and prevention of OSH, due to their less formal employment and organisation which may lead to less relations with authorities, and it is also difficult for small businesses to change regarding OSH. The pressure of market competition, fewer human resources, and finance leave little time for SMEs to think about OSH, which are often viewed as not relevant to their business and production operations (Olsen et al., 2012; Stave et al., 2008). Due to these challenges, there are significant differences of OSH management in small enterprises, in which small enterprises are generally inactive or have low level of OSH management activities (Champoux & Brun, 2003; Gardner et al., 1999).

Establishing a clearer picture of safety in SMEs remains challenging, due to the common lack of data related to safety performance and potential under-reporting of injuries and accidents (Champoux & Brun, 2003; Legg et al., 2009, 2015). Eakin et al. (2000) described some characteristics of OSH in small workplaces as having less access to external support, having fewer internal capabilities related to risk prevention and mitigation, and are often excluded from OSH regulations. In the case of exclusion of SMEs in regulations related to OSH in some countries, this may be because the OSH policy makers may find that the sector of small businesses have challenges and an inadequacy of financial and capability to comply with OSH regulations (Eakin et al., 2000; Legg et al., 2015).

Furthermore, Champoux & Brun (2003) pointed out that leaving the responsibility of their own workplace safety to the workers is often the preferred approach of OSH in small-sized enterprises. It has been implied that owners or managers of small businesses tend to regard OSH as a matter of individual behaviour of each worker (Eakin, 1992; Gardner et al., 1999; Holmes et al., 1997). Owners or managers of small businesses also often have close social relationships with their workers, as well as involvement in the work, which may make them feel less authoritative about work safety

(Eakin, 1992; Gardner et al., 1999). Additionally, Champoux & Brun (2003) also mentioned difficulties among people in small-sized enterprises to identify barriers to improve work safety, mainly due to a lack of understanding and information around management of OSH.

Another characteristic of work health and safety in small businesses is that the conditions of OSH are often poorer in the SMEs, compared to larger enterprises (Micheli et al., 2018). One term that is often used to describe work safety conditions of a workplace is hazard, which can be defined as a set of circumstances that can lead to illness, injury, or property damage, including the environment, equipment, tasks, and the human who is being involved (Wogalter et al., 2021). Sorensen et al. (2007) described that the work environment in small enterprises is more hazardous than in large enterprises, particularly related to physical and chemical hazards. Zhao et al. (2013) stated that the seemingly more hazardous and riskier workplaces in small businesses is not restricted to the more developed regions, but also affect many developing countries in which small businesses are important.

One term which is closely related to hazard is risk, which can be defined as the occurrence probability of an unwanted event resulting from a hazard, that can lead to negative consequences (Bahr, 2015; Ostrom & Wilhelmsen, 2012). In work safety, risk is often referred to as a measure of the probability and severity of unfavourable consequences (Lowrance, 1976). Probability in risk can be defined as an estimate of how likely an event would occur, while severity refers to the degree of magnitude of losses (e.g. number of fatalities, financial loss) of consequences of an undesirable event (Aven & Renn, 2009; Ostrom & Wilhelmsen, 2012). Additionally, Kaplan & Garrick (1981) noted that, frequency and probability are closely connected and sometimes used interchangeably related to risk. They added that while frequency is the measurable number of an occurrence, probability often required more calculation based on knowledge, belief, or confidence.

It has been often argued that, due to the prevalence of more hazardous work conditions, there is a higher exposure of work risks in small enterprises with higher risk of accidents compared to large enterprises (Champoux & Brun, 2003; Hasle & Limborg, 2006; Hasle & Refslund, 2018). Micheli & Cagno

(2010) similarly pointed out that the frequency and severity of accidents may be higher in enterprises with micro and small size. Some other reasons for the higher work-related risk in small businesses have also been considered, such as low safety management to control risk, more risk from more physical and environmental hazards, and informal organisation and culture which may downplay risk (Eakin et al., 2000; Hasle et al., 2011; Sørensen et al., 2007). Additionally, financial constraints, lack of knowledge of OSH, and less concern for OSH and workplace conditions improvement may also contribute to the riskier work conditions in small businesses (Eakin et al., 2000; Hasle & Limborg, 2006; Jilcha & Kitaw, 2017; Nguyen & Vu, 2023).

Several studies have described various situations of work safety in small businesses in various regions. In construction SMEs in Spain, Canamares et al. (2017) pointed out the difficulty to integrate OSHMS and OSH legislation in the daily activities of the businesses, as well as the difficulty to establish a risk prevention culture. Rodrigues et al. (2020) described that practices of OSH management vary across micro and small Portuguese waste management enterprises, in which only some of them gave OSH training to the workers and carry out OSH actions. Savkovic et al. (2019) described barriers to improve OSH management in SMEs in Serbia such as lack of management commitment, lack of financial resources, and lack of knowledge and training. In the cleaning sector small businesses in Sweden, Landstad et al. (2022) explained that while there is a good OSH leadership by valuing, promoting, and delegating responsibilities of OSH, there is still a need for OSH training activities and education to further improve OSH management.

In Indonesia, Rachmawati (2017) explained that workers in clothing fabric SMEs are working in unsafe environments with various hazards, also with inappropriate work postures. Suparwo et al. (2019) described conditions of work environment and safety in Indonesian garment SMEs as hazardous, in which PPE is unavailable and accidents occur. In Indonesian brass metal SMEs, Dharmawan et al. (2018) found that the workers are working with various physical and chemical hazards, as well as experiencing body pain issues such as low back pain and sore arms. In an industrial centre of wood furniture SMEs in Indonesia, Novie et al. (2018) stated that the work conditions

are risky and hazardous due to the materials such as wood dust and colour chemicals, manual and dangerous tools such as grinders and drills, and repetitive manual material handling.

2.3.2. Work safety in small food businesses

The food-industry includes a variety of factories and sectors from pre-processing, processing, and other preparation of foodstuffs such as fruits, vegetables, and biscuits (Naeini, 2015). Most major sectors of countries in the world include SMEs for food processing and products, such as in China and India (Seth et al., 2018). Siaw & Rani (2012) also emphasised the importance of food SMEs to the economy and development of Malaysia. Indonesia is also a country where the existence of food SMEs is abundant. Among the total number of micro and small businesses in Indonesia in 2018, micro and small food businesses accounted for 37% in number with 38% employment of the overall micro and small businesses (Statistics Indonesia, 2020). Ushada et al. (2015) highlighted the contribution of Indonesian food SMEs to the nation's food sovereignty, and how they are also fundamental to Indonesian industries' production system.

Food production roughly accounts for half of the economic activity in the world, with most of them in small scale enterprises operating in family ownerships (Budnick et al., 2012). Newman et al. (2015) pointed out that interest and attention in the food industries are focused on food safety topics such as foodborne and microbial disease, while less attention is paid to the health and safety of the workers. This should be addressed as the rate of occupational morbidity is high in the food production industries, including in food manufacturing and food preparation sectors (Food Chain Workers Alliance, 2012; Newman et al., 2015). Furthermore, it has been argued that the food manufacturing sectors are often overlooked in terms of OSH. Atiq & Akhlaq (2022) pointed out that the food manufacturing industry in Pakistan has not given much attention to the hazardous work conditions and OSH issues and challenges. Syron et al. (2017) also pointed out that OSH studies are limited in the US seafood industry despite the need for improvement.

Several studies have captured the conditions of work safety in small food businesses in various regions in the world. In a food production SME in Malaysia, Fazi et al. (2017) explained that the workers are exposed to poor work postures due to the poorly designed workplace and equipment. Gaspar et al. (2019) described that there are various OSH issues in the workplaces of Portuguese food processing industries, such as vibrations and chemical agents, unavailability of safety equipment, and poor manual material handling. In the US, while occupational fatalities are relatively rare, the rate of occupational illness and injuries in most of sectors of food industries is higher compared to non-food industries (Newman et al., 2015). Additionally, Syron et al. (2017) found high rates of musculoskeletal injury risk resulted in disability in the US seafood industry.

The conditions of work safety in Indonesian small food businesses have also been captured in some studies. Dewi et al. (2020) described work conditions of a food-producing business SME in Indonesia as hazardous and risky with various hazards and risk such as fire, as well as unavailability of PPE and safety and emergency equipment. Setiawan (2017) described poor work conditions in manufacturing of fishcakes and crackers in SMEs in Palembang municipality, Indonesia. Investigating working environments in several types of food producing SMEs in Indonesia, Ushada & Okayama (2018) pointed out the commonality of hot work environments. Rahayuningsih (2019) explained that work conditions at a cracker factory expose workers to risk of slips and fall and injuries, as well as exposure to dangerous tools.

2.3.3. Work safety research in small businesses

Hadjimanolis et al. (2015) noted that it will be interesting to investigate safety in smaller firms, as they may have different characteristics and safety problems compared to larger firms. While health and safety is one issue that is often pushed aside in small enterprises due to their focus on dealing with business constraints to survive, Hasle & Limborg (2006) reported that scientific interest and research on health and safety in small businesses has been growing. Targoutzidis et al. (2014) similarly implied that although SMEs have previously received less attention from OSH research in most countries,

there has been a growing interest to identify OSH issues in SMEs by scientists and policy makers. The growing interest of human factors and OSH focus in the SMEs is also mentioned by Legg et al. (2015), in which there is also a growing integration among academic researchers and practitioners in addressing safety management in the SMEs.

Currently, various approaches have been used to investigate and capture aspects of work safety in small businesses. Quantitatively, a questionnaire survey followed by particular quantitative or statistical analyses is commonly applied. An example is Horvathova et al. (2023) who developed a questionnaire to conduct a survey with manufacturing family enterprises in The Czech Republic from micro, small, to medium sizes, to explore the level of occupational safety and health promotion. By conducting some statistical analyses such as ANOVA, they found that OSH is not well-promoted in the surveyed enterprises. Another example is Rodrigues et al. (2020) who conducted a questionnaire survey in Portuguese waste management micro and small enterprises to investigate the practices of OSH management. The nested multiple regression analyses conducted by Rodrigues et al. (2020) to the results of the questionnaire survey showed differences of level of OSH management practices across the studied enterprises, such as in their accident recording mechanism and OSH policies.

Qualitatively, there are various methods and analyses that have been applied in investigating various aspects of work safety in a workplace. Landstad et al. (2022) conducted interviews with owners of small businesses in the cleaning sector in Sweden, to investigate management responsibilities in relation to OSH. They analysed the interviews with qualitative content analysis, and concluded that that the knowledge of OSH among the owners of the surveyed businesses still need to be improved. Another example of the use of a qualitative methodology is shown by Canamares et al. (2017), who conducted qualitative focus group to investigate the implementation of occupational risk-prevention among construction SMEs in Spain. Based on their qualitative analysis on the focus group results, they pointed out the difficulty of integrating risk prevention culture in the management activities of the surveyed SMEs.

More specifically in the context of small food businesses, several methodologies have also been used in studies which investigated work safety in the businesses. Qualitative interviews were carried out by Atiq & Akhlaq (2022) to understand the workplace conditions and OSH practices among food manufacturing small businesses in Pakistan. In addition to revealing the low level of OSH practices, the thematic analysis done to the interview results revealed that there are perceptions among the businesses that OSH practices are costly, and they are reluctant to follow OSH standards (Atiq & Akhlaq, 2022). To investigate factors sustaining OSH management practices, Hassan et al. (2019) conducted a questionnaire survey involving a number of Pakistani food business SMEs. They analysed the survey results with regression analysis, and concluded that OSH management practices in the surveyed businesses are affected by some factors, such as knowledge and government support.

There are also various studies on different topics of work safety in Indonesian small food businesses. Dewi et al. (2020) conducted observation to identify hazards and interviews about PPE in a soybean cake producing SME in Malang municipality, Indonesia. Although the analysis technique is not clearly described, they described that the workplace of the observed SME is hazardous and risky with unavailability of safety equipment. Arifin & Wakhid (2018) carried out Hazard Identification, Risk Assessment, and Risk Control (HIRARC) to analyse work safety risk in a tofu production SME in Indonesia. By doing this, they were able to identify various hazards and risks in the work activities, resulting from the materials and equipment used in the activities. Another examples is Muslim et al. (2018) who deployed questionnaires of Work Improvement for Safe Home (WISH) and Quick Exposure Check (QEC) to investigate work conditions in a rice crackers home industry in Sukoharjo regency, Indonesia. The results indicated that all activities in the workplaces pose high risk of injury to the workers, and improvement on the work design and equipment is needed (Muslim et al., 2018).

2.3.4. Challenges on work safety research in small businesses

Hasle & Limborg (2006) pointed out that, although OSH in small enterprises is growing rapidly as a research field, it is still necessary to improve the quality of the research. Legg et al. (2015) also reported that policy and research on work environment and OSH still mainly covers large enterprises. They argued that this is because larger enterprises typically have more resources to interact, influence, and contribute to research and policy development, which are not possessed by SMEs. This is evident in The Czech Republic for example, where issues around OSH mainly cover larger enterprises while little attention is given to OSH in SMEs, which may be problematic and beyond reach of various OSH obligations (Horváthová et al., 2020, 2023). Additionally, Lenhardt & Beck (2016) found indications of ignorance to work-related health and risk among small companies in Germany, which present a challenge to do a study related to safety and risk in the companies.

Schulte et al. (2018) reported that there is a research gap in the best way to communicate OSH with SMEs, in which there is a need to understand the characteristics of the SMEs and tailored OSH communication based on it. They also stated that OSH communication with SMEs should be viewed from a larger perspective of how OSH communications influence the SMEs to reduce issues such as occupational injuries. Furthermore, Schulte et al. (2018) argued that while workers' inputs are important for effective OSH programmes, workers are often overlooked in thinking about work safety. In communicating OSH with the SMEs, it should start with research on understanding workers' intention, motivation, and reception of OSH, in which risk perception may have an important role (Schulte et al., 2018; Schwarzer, 1992).

Champoux & Brun (2003) argued that OSH research methods and models which are developed specifically for larger enterprises cannot be directly transferred to smaller enterprises. Cagno et al. (2014) similarly implied that the currently available conceptual models of OSH performance are not fully applicable to SMEs. Due to their different characteristics on the

organisation and management styles, as well as different production systems, approaches to OSH for small workplaces need to be different from model and theoretical assumptions of OSH management in larger businesses (Eakin et al., 2000). Cagno et al. (2014) explained that a research in the topic of OSH which involves SMEs should consider three main features of systemic, intervention-oriented, and SMEs-specific. Cagno et al. (2014) emphasised that all OSH-related factors in SMEs and the potential interactions should be identified when understanding OSH in the SMEs, which is important to formulate appropriate policy for intervention.

Vinberg (2020) suggested researchers and practitioners who deal with small enterprises obtain better knowledge of OSH in small enterprises to provide effective OSH interventions. In doing so, it is important to involve the people of the small enterprises themselves. The different perspectives of people who understand more on methods and theories of work improvement (e.g. researchers), combined with the people who understand the actual work conditions in small workplaces (e.g. the workers), will be useful in providing appropriate action and improvement that may be taken (Itani, 2011). Studies that involve people in small enterprises working together on OSH improvement are needed, as OSH resources are limited in small enterprises (Itani, 2011; Vinberg et al., 2016). This is because small businesses often have limited human and financial resources, and low priority of OSH, which may make them have little attention to work safety (Nuwayhid, 2004; Olsen et al., 2012; Savković et al., 2019; Stave et al., 2008).

Across different regions, SMEs may be defined differently usually by employment size (e.g. 5, 50, 500 employees). In addressing and trying to improve OSH in SMEs, Schulte et al. (2018) suggested considering the size differences as they may have different complexity and characteristics. Although still bracketed in the category of SMEs, bigger businesses may mean different work characteristics, management of safety, and knowledge of safety. Therefore, Schulte et al. (2018) emphasised the usefulness to group small businesses into more homogenous categories, as they may require different approaches and may have different complexity and challenges in OSH. Micheli & Cagno (2010) similarly implied the necessity to differentiate

micro, small, and medium size of businesses when observing their OSH, due to the possibility of differences in frequency and severity of accidents.

2.4. Perceptions of work safety and risk

2.4.1. Descriptions of perceptions of work safety and risk

It is difficult to establish a single definition of perception, as perception is a diverse and rich field (Attneave, 1962; Prinz & Bridgeman, 1996). One definition of perception is a person's meaningful interpretation of a stimuli or situation based on their experience, but may be different from reality (Lindsay & Norman, 1972; Pickens, 2005). Perception is closely related to attitudes, in which attitude is a person's mindset to act in a certain way based on emotion and experience (Pickens, 2005). Pickens (2005) added that attitude is often referred to explain a person's behaviour. Furthermore, while pointing out that thinking and perceiving tend to be interlinked and converged, Wagemann (2018) stated that a person's thoughts are influenced by perceptions of a situation or thing that is being thought about.

In regards to safety, safety perception is workers' perceptions on safety practices, values, beliefs, principles, and norms (Cooper & Phillips, 2004; Silva et al., 2004; Zohar, 1980, 2000), which is often associated with and forms part of safety climate (Cox & Flin, 1998). The difference is that while safety climate is defined as shared perceptions regarding practices, policies, and procedures of safety of the people involved in the workplaces (Zohar, 2003), safety perception refers to the workers' individual perception of the state of safety of a workplace at a given time (Cox & Flin, 1998; Mearns & Flin, 1999).

In recognising the importance of safety at a workplace, Barling & Hutchinson (2000) stressed the importance of understanding workers' perceptions on safety and health. They also mentioned that workers' safety perception in an organisation is one predictor of safety outcomes of the organisation. Hayes et al. (1998) similarly pointed out that perceptions of workplace safety are related to workers' safety behaviours and accident rates. They argued that workers who are involved in fewer accidents may perceive their jobs as safe, while workers who are involved in a higher number of

accidents will perceive their jobs as more dangerous. Additionally, Guastello (1992) reported that lower exposure to work environment hazards may contribute to workers' perceptions that their workplaces are safe. Singh & Misra (2020) explained that understanding workers' perceptions on safety of a workplace would possibly explain their behaviour related to safety.

While risk itself refers to uncertainty and severity of consequences of activities, risk perception is associated with a person's subjective judgment on risk (Aven & Renn, 2009). Similarly, Slovic (1987) defined risk perception as a person's judgment in characterising and evaluating risks of hazards. Risk perception can also be defined as assessment of an individual of the possibility of undesired events (Rohrmann & Renn, 2000), and its level can be different depending on the kind of risk (Gierlach et al., 2010; Reisinger & Mavondo, 2005). Slovic et al. (1984) emphasised that risk is interpreted differently by people based on their experiences, and is determined by various characteristics such as the person's knowledge about the risk and the potential severity of the risk. They further explained that people's indifference and aversion to hazards could be caused by inadequate information or misperception of risks.

Wang et al. (2016) summarised that, along with external factors such as work culture and environment, workers' internal factors such as risk attitude and risk perception are considered some of the reasons for unsafe work conditions and unsafe behaviours. They added that risk perception plays an important role among the factors. Workers often have inadequate information about the effect of their jobs on their safety and health, and often learn about and estimate the risks related to safety by experience when doing the jobs (Liu & Hammitt, 1999). Slovic (2001) raised an important question to be addressed in risk management about what is risk to the people involved, where perception and acceptance toward risk which is influenced by social values and trust have a role in people's definition of risk. It is important to understand what the people know and value about risk, so that understanding of risk is not only among the experts, but offers people the chance to understand what they are at risk against and can make decision about what actions to take (Fischhoff, 2012; Florig & Fischhoff, 2012).

2.4.2. Perceptions of work safety and risk in small businesses

Eakin (1992) implied that even when there is an awareness of the hazard among the people, an effort to promote workplace health and safety in small workplaces is challenging if the people perceive that health and safety is not a problem. Eakin (1992) gave an example of how professionals may perceive that the probability of an injury is high, whilst the people of small workplaces may see it as very low. Eakin (1992) also emphasised the role of the cultural environment at work, which likely contributes to different perspectives between the people of small workplaces and health and safety professionals. Additionally, Cunningham & Sinclair (2015) found different perceptions of OSH across various small businesses, such as the perceptions in small construction businesses that safety training is necessary but cannot interfere with busy activities, and OSH is perceived to be complicated in general industry. Cunningham & Sinclair (2015) also explained that food service small businesses are more concerned with food safety than OSH.

Gardner et al. (1999) indicated poor risk perception and a tendency to accept and normalise hazards in workplaces of small businesses. Perception of risk in SMEs may be lower due to the general assumption of low level of occurrence of injuries and accidents, which gives a different priority towards OSH and approach to risk control (Cagno et al., 2011). Cagno et al. (2014) pointed out that better understanding of risk perception, OSH-related factors, and OSH management practices in the SMEs would allow better planning and priorities for intervention. Walters et al. (2018) suggested that qualitative research on OSH in micro and small enterprises would be useful to represent SMEs workers' points of view and perceptions regarding practices of OSH in SMEs. Walters et al. (2018) also indicated that while there are various sources of information on implementation of OSH in the micro and small enterprises in different countries, there is a gap in information on perceptions of the people of the micro and small enterprises on the usefulness of aspects of OSH such as training.

In addition to barriers such as low knowledge and informal workplaces, MacEachen et al. (2010) and Masi & Cagno (2015) pointed out different

perceptions on risk and underappreciation of risk as other barriers in addressing OSH in small businesses. Furthermore, in their report on investigation of safety and health in micro and small businesses in some EU countries, Walters et al. (2018) found that most of the businesses perceived risks as something that is certain and inevitable and not much can be done about it. Walters et al. (2018) described that while most workers and owners of micro and small businesses are aware of the main and more obvious risks, they may have less recognition of more subtle risks with long term effects such as work stress and repetitive tasks. Bonafede et al. (2016) explained that OSH risk and management are perceived to be less useful in smaller enterprises compared to the bigger ones, among various sectors of companies in Italy.

In their study among SMEs in Japan, Kawahara et al. (2018) found that higher physical activity in the jobs would elicit higher risk perception among the workers. Involvement of more physical activity would make the workers perceive more that their jobs may affect their physical condition. In small construction firms in Australia, Gray & Sadiqi (2015) found that in addition to the lack of concern and awareness of safety, one significant barrier to good practice of OSH is the people's wrong or underestimation of risk. In their study to investigate improvement on safety in small metal enterprises, Kines et al. (2013) found differences in safety perception before and after safety management intervention.

Research on perceptions of work safety and risk involving small businesses in Indonesian is limited. In investigating perceptions and attitudes towards work safety in mining SMEs in Indonesia, Soejadi (2017) explained that people generally perceive that work safety in their workplaces can be improved, and that profit is prioritised over safety in their businesses. In investigating the impact of safety climate on safety behaviour among workers of wood furniture SMEs in Indonesia, Novie et al. (2018) found low perceptions about PPE and safety rules or procedures. The workers thought that rules or procedures related to safety are not completely followed, and PPE is not always used, as the workers perceived that they are not relevant to their jobs.

Other studies on perceptions of work safety and risk in Indonesia mostly involved large businesses such as Kumala (2016) in a pharmaceutical

company, and other non-small business participants such as among hospital nurses (Ismara et al., 2019), car drivers (Salihat & Kurniawidjaja, 2010), and construction workers (Qolbi & Muliawan, 2020). Similarly, studies on perceptions of work safety and risk involving Indonesian small food businesses are also limited, which only Nugroho et al. (2019) conducted a study on workers safety perceptions in a large food business. In their study, Nugroho (2019) explained that the workers perceived that work safety is still inadequately practiced in the workplace, reflected by poor availability of safety equipment and poorly placed safety signs.

2.5. Factors influencing perceptions of work safety and risk

Rasmussen (1997) and Leveson (2011) emphasised that perceptions of risk of accident or injury can be influenced by multilevel factors, from characteristics of the individual, work environment, work task, to organisational, governmental, or cultural factors. Harclerode et al. (2016) pointed out that perception of risk is shaped by interactions of various institutional, social, and personal factors. Additionally, Han et al. (2019) implied that workers' perceptions of safety in their workplaces may be affected by their experiences, the existence of hazards, and the occurrence and severity of accidents.

Furthermore, there may be differences in safety perceptions across different groups in a workplace, such as between workers and management (Chen & Jin, 2015; Han et al., 2019). Differences of employees' perceptions of safety can be due to various factors. In their study comparing safety perception between local and foreign workers in the Korean construction industry, Korkmaz & Park (2018) revealed that age, education level, and language ability have multiple effects on the workers' safety perception. Han et al. (2019) also found differences in employees' safety perceptions on the different demographics of age, gender, and education level among construction employees.

One factor that has been shown to influence perceptions of safety and risk is safety management. Integrated in an organisation to control the hazards exposing workers' health and safety, safety management relates to roles, functions, and practices associated with safety (Kirwan, 1998; Labodová, 2004). Vinodkumar & Bhasi (2010) used the term 'safety management practices', which they defined as the activities, strategies, policies, and procedures implemented by the organisation's management regarding their employees' safety. They included management commitment, safety training, workers' involvement, safety communication, safety rules and procedures, and safety promotion policies as factors reflecting safety management practices.

In an investigation on perceptions of safety and risk in a construction industry in South Korea, Park et al. (2022) explained that safety management may influence employees' perceptions of safety and risk. Investigating influences on perceived risk among offshore oil installation employees, Rundmo (1997) found that employee's risk perception is influenced by safety commitment. In his study, Rundmo (1997) explained that together, safety commitment of the management, supervisors, and fellow workers influenced the employees' risk perception. Furthermore, Pandit et al. (2019) found that factors related to safety management such as commitment to safety and provision of PPE positively influence the risk perceptions of construction workers.

Among Chinese chemical industry workers it was found that safety leadership, which in the study is formed of safety policy, safety concern, and safety motivation, influenced perception of risk severity and probability (Zhao et al., 2021). Vu et al. (2022) found an influence of workplace safety management practices on perceived risk, when investigating these in Vietnamese workers related to Covid-19 pandemic. Their study revealed that work safety management practices increased workers' Covid-19 perceived risk. Vu et al. (2022) explained that while the management is putting practices and effort on commitment, training, rules and procedures, and employee involvement in mitigating risk of Covid-19, it actually increased employees' risk perception of Covid-19.

Another factor that may have an influence on perceptions on safety and risk is safety knowledge. Characterised as an employee's understanding of safe operating procedures (Hofmann et al., 1995), safety knowledge also refers to workers' understanding of safety-related information such as regulations and operating procedures (Burke & Sarpy, 2003; Burke & Signal, 2010; Griffin & Neal, 2000). A direct impact of safety knowledge on perception of risk severity, but not on perception of risk probability, was found by Zhao et al. (2021) in their study on chemical industry workers in China. They pointed out that while an increase in safety knowledge would have direct and positive impacts on the workers' perception of risk severity, safety knowledge does not have direct impact on perception of risk probability. Atombo et al. (2017) found that, among workers of transport industries in Ghana, perceptions of safety and health would be improved by education around risk in the work environment.

Positive effects of the workers' knowledge of their risk perceptions relating to various hazards at their workplaces were found among construction workers in Malawi (Chaswa et al., 2020). They pointed out that increasing knowledge around safety would also increase the workers' risk perceptions of work hazards at their workplaces. Safety training, which predicted safety knowledge (Vinodkumar & Bhasi, 2010), is found to have insignificant impact on safety perception among construction industry workers in The Republic of Korea (Korkmaz & Park, 2018). They argued that carrying out safety training would not change the workers' awareness and perceptions of safety at their workplaces. Pandit et al. (2019) found that worker's perceptions of safety in their workplaces of construction projects in The USA are related to their motivation and knowledge on safety, as well as the leadership regarding safety. Pandit et al. (2019) also explained that perceptions of safety among workers in a workplace is an important factor to ensure satisfactory safety criteria such as reducing injury rates and improving hazard recognition.

The characteristics of the tasks or jobs have also been implied to possibly influence workers' perceptions of safety and risk. A significant association between work characteristics and workers' subjective perceptions of safety and risk was explored in a study among construction workers by

Wang et al. (2016), indicating that how workers perceived safety and risks depends on the characteristics of the jobs. Investigating influences of physical working conditions on risk perception among offshore oil installation workers, Rundmo (1997) found a strong effect of physical working conditions on perceived risk. Workers would have higher perceived risk, if they were exposed more to conditions such as noise, vibration, and heat. Rundmo (1997) further explained that safety measures such as inspection, safety instruction, and safety equipment, had direct effects on risk perception.

2.6. Methods to investigate perceptions of safety and risk

Various methods of data collection and analysis have been deployed in studies investigating perceptions of safety and risk. Involving construction employees in China, Han et al. (2019) developed questionnaire surveys followed by ANOVA and Relative Importance Index (RII) analyses to explore the influence of workers' demographic factors on safety perceptions. Han et al. (2019) revealed differences of safety perceptions between different demographics, such as the tendency of older employees to underestimate the danger of safety hazards. Ulubeyli et al. (2014) developed a questionnaire survey and conducted descriptive statistical analysis to investigate health and safety perceptions among construction site workers in Turkey. It was found in their study that there are perceptions among the workers that safety training is not important, and they are not willing to use some PPE (Ulubeyli et al., 2014).

Martinez-Fiestas et al. (2020) adapted several factors from other studies to conduct a questionnaire survey to compare perceptions of risk among firefighters of different nationalities. The ANOVA and Chi Square tests used to analyse the survey results indicated no significant differences of risk perception between different nationalities. Singh & Misra (2020) adopted the Workplace Safety Scale developed by Hayes et al. (1998) to carry out a questionnaire survey to investigate employees' perceptions of safety in the Indian construction industry. The results of the survey were analysed with

Dominance-based Rough Set Analysis (DRSA), showing the roles of experience and education level in affecting employees' safety perception. In a furniture industry in Indonesia, Susanto et al. (2019) adopted the NOSACQ-50 questionnaire developed by Kines et al. (2011) to investigate perceptions of safety in the workplace. Descriptive statistics were used to analyse and describe the results, resulting in the understanding of different safety perceptions between workers and management, such as the lower priority of safety among the workers.

In addition to questionnaire surveys, some studies used qualitative methods to investigate perceptions of safety risk. Choudhry & Fang (2008) conducted interviews to explore factors contributing to workers' unsafe behaviours in construction sites in Hong Kong. The results of the interviews were analysed with a grounded theory approach and identification of emerging themes, such as management, perceived risk, and working environment. In investigating their perceptions of safety in their jobs, Jeong & Kang (2021) conducted a phenomenology study with in-depth interviews with nurses in South Korea. Using descriptive phenomenology analysis for the interview results, they explained that there are psychosocial hazards and risks such as bullying and insufficient time to rest, in addition to physical hazards such as ergonomics and chemical hazards.

In addition to studies with the aim of exploring people's perceptions of work safety and risk as previously presented, various studies were aimed at investigating relationships of factors related to perceptions of work safety and risk. In investigating factors influencing risk perceptions among chemical industry workers in China, Zhao et al. (2021) adopted questionnaire items from several other related studies to conduct a questionnaire survey. The results of the survey were then analysed with Structural Equation Modeling (SEM) and System Dynamics to observe the influencing factors. Based on a literature review and interviews, Wang et al. (2016) developed a questionnaire to explore influencing factors related to risk perception. Confirmatory Factor Analysis (CFA) was then carried out to observe the structure of factors, and SEM was used to analyse the relationships among the observed factors. Xia et al. (2017) adapted various studies to conduct a questionnaire survey in the

Chinese construction sector on risk perception. In addition to carrying out CFA to explore the questionnaire suitability, linear regression was performed to test and analyse relationships of factors related to risk perception.

It can be understood that, based on the aims, research on perceptions of work safety and risk can be broadly divided into two groups. The first group is studies which focus on exploring people's perceptions of work safety and risk in a specific work setting. Secondly, there are studies which explore relationships between factors and their influences on perceptions of safety and risk. In exploring people's perceptions of safety and risk, questionnaire survey and interviews are the two methods that are commonly deployed. In studies which conducted questionnaire surveys, the questionnaires were developed based on a previous study or literature review, or adaptation or adoption of available related questionnaires. Furthermore, in investigating relationships between influencing factors and their influences on perceptions of safety and risk, researchers often conducted a questionnaire survey, with analyses of relationships such as regression analysis or SEM.

2.7. Gaps in research and knowledge

Several gaps in research and knowledge to be addressed in this research were identified as follows:

1. *There is currently limited depth of understanding on work and safety and the surrounding issues in Indonesian small food-producing businesses.* Although some research has explored and identified various work-related issues in Indonesian small food businesses such as Rahayuningsih (2019) and Setiawan (2017), those were conducted with approaches which did not accommodate in-depth investigation of the users' opinions, despite the importance of understanding and involving the users. A further study is needed to provide greater understanding of work and safety and the related issues in Indonesian small food-producing businesses, by involving the perspectives of the people who work in the businesses.

2. *Currently, no study is available which focuses on perceptions of work safety and risk in Indonesian small food-producing businesses.* As previously explained, studies on perceptions of work safety and risk in Indonesia mostly involved non-food and large-sized businesses, such as Nugroho et al. (2019), Soejadi (2017), and Novie et al. (2018). Earlier studies such as Cagno et al. (2014) and Walters et al. (2018) have indicated that it is important to understand perceptions of safety and risk in small businesses, as a basis for follow up on work on implementing solutions for safety. Further study is needed to explore perceptions of work safety and risk among the people of Indonesian small food-producing businesses.
3. *There is currently limited understanding of factors that influence perceptions of work safety and risk in Indonesian small food-producing businesses.* Although various studies have identified and showed several relationships and influences around perceptions of work safety and risk, they involved different people in work settings with different scale and characteristics compared to Indonesian small food-producing businesses, such as construction sectors (e.g. Chaswa et al., 2020; Pandit et al., 2019) and mining industries (e.g. Griffin & Neal, 2000). This research is expected to contribute to identification of factors that influence perceptions on work safety and risk in Indonesian small food-producing businesses, which will be useful for further studies.
4. *The research literature is currently lacking a research questionnaire instrument to investigate perceptions of work safety and risk in the type of work settings that are similar to Indonesian small food-producing businesses.* While some questionnaires to investigate perceptions of work safety and risk are available such as in Williamson et al. (1997) and Hayes et al. (1998), these were developed for different workplaces with different characteristics from Indonesian small food-producing businesses and in different countries with different cultural perspectives. Previous studies have implied the necessity to consider the characteristics of the work settings, as these may influence the perceptions of safety and risk (Han et al., 2019; Harclerode et al., 2016;

Leveson, 2004; Rasmussen, 1997). Further research is therefore needed to develop a questionnaire to collect better information on perceptions of work safety and risk and the various influencing factors that have been identified previously in the literature, relevant to the type of Indonesian small food-producing businesses.

5. *There is currently limited understanding of the challenges and recommendations for improving work safety in Indonesian small food-producing businesses.* Although several studies have presented recommendations related to improvements in the work activities in some Indonesian small food-producing businesses such as Yuslistyari & Setianah (2018) Arifin & Wakhid (2018), they were generated based on observational and technical approaches such as risk assessment and work posture analysis, which did not accommodate people's opinions and perspectives. On the other hand, perspectives and inputs of relevant people such as workers are important in studying safety in a work setting (Joseph & Arasu, 2023; Schulte et al., 2018). There is a need to consider and involve the users' perspectives to identify challenges and recommendations for improvements for work safety in Indonesian small food-producing businesses.

2.8. Chapter 2 summary

The chapter presents a review of literature to describe the background to the PhD research and support the approach to the design of studies in this programme of research. In summary, it is necessary to investigate work safety and risk in Indonesian small food-producing businesses, due to the limited depth of understanding of safety and risk, despite initial indications of unsatisfactory conditions of work safety in the workplaces. Additionally, there is also a need for studies that consider and involve more on the perspectives and perceptions of the people of Indonesian small food-producing businesses in understanding work safety and risk in their workplaces. Several gaps in existing research and knowledge have been identified and these will be considered in the series of studies in this PhD programme.

Chapter 3

Research methodology

3.1. Introduction to Chapter 3

In this Chapter 3, the overall methodology to achieve the aim and objectives of the research is presented. This includes introduction of the methods that were used in all studies conducted in the research, while discussing the background and rationale of their utilisation. The analyses that were done in each study are also discussed. Furthermore, the challenges relating to the methodology and ethics considerations surrounding the research are also presented. As for the details for the application of the methods for each study, these will be presented in the respective method sections in the chapters presenting the studies (Chapter 4 to Chapter 7).

3.1.1. Overall methodology

In overview, this research investigated perceptions of work safety and risk in Indonesian small food-producing businesses, which have not been explored previously. Additionally, there was a need for more in-depth understanding of the work and work-related issues in the workplaces, by including the perspectives of relevant people. Due to the needs of exploration and understanding in the area, an exploratory approach was considered suitable in this research. Exploratory research aims to add understanding of a field of study where little work has been done and little is known (Patton, 2002). Evenson et al. (2008) implied that exploratory studies would lead to descriptions of a setting and the people involved, which would support the aim and objectives of this research.

The four objectives of this research were addressed in four respective different studies, in which both qualitative and quantitative methods were applied. Qualitative methods are often exploratory, involving interactions with people through techniques such as interviews and observations to interpret phenomena in a setting and understand people's experiences and attitudes,

producing non-numerical data such as words (Berlin & Adams, 2017; Denzin & Lincoln, 2011; Pathak et al., 2013; Punch, 1998). Berlin & Adams (2017) suggested that a qualitative approach such as observations and interviews can be used in initial learning about a topic, which can provide detailed and rich descriptions. In this research, qualitative methods of observations and interviews were deployed in Study 1, Study 2, and Study 4. Observations and interviews were conducted, as they were needed to give a broad view of the work safety in Indonesian small food-producing businesses, by taking the people's perspectives into account.

Furthermore, quantitative research attempts to explain phenomena through numerical data collection, which are then analysed particularly by using mathematically based methods (Creswell, 1994). Berlin & Adams (2017) implied that quantitative studies are suitable for measuring and examining relationships within concepts. Punch (1998) also suggested that, if examination of relationships among variables or factors is the aim of the study, then quantitative methods should be considered. In this research, methods that can support investigation of factors influencing perceptions of work safety and risk were needed. Therefore, quantitative methods using questionnaire surveys were deployed in this research, specifically in Study 3.

The four studies in this research were sequential, in which results of a preceding study were used as inputs to develop the subsequent study. The findings of each study were then discussed to reach general conclusions of the research. This approach reflects multi-methods research, which is the utilisation of different methods in sequence or parallel studies but are not integrated, as defined in Johnson (2007). A multi-methods approach was used to achieve the different objectives and expected outputs for each study of this research. Multi or mixed method has been demonstrated to be useful in research on perceptions of work safety and risk such as Wang et al. (2016), Coppola & Silvestri (2020), and Paivinen (2006), which was also expected to be useful in this research to achieve the aim and objectives. The overview of design of the overall research is presented in Figure 3.1.

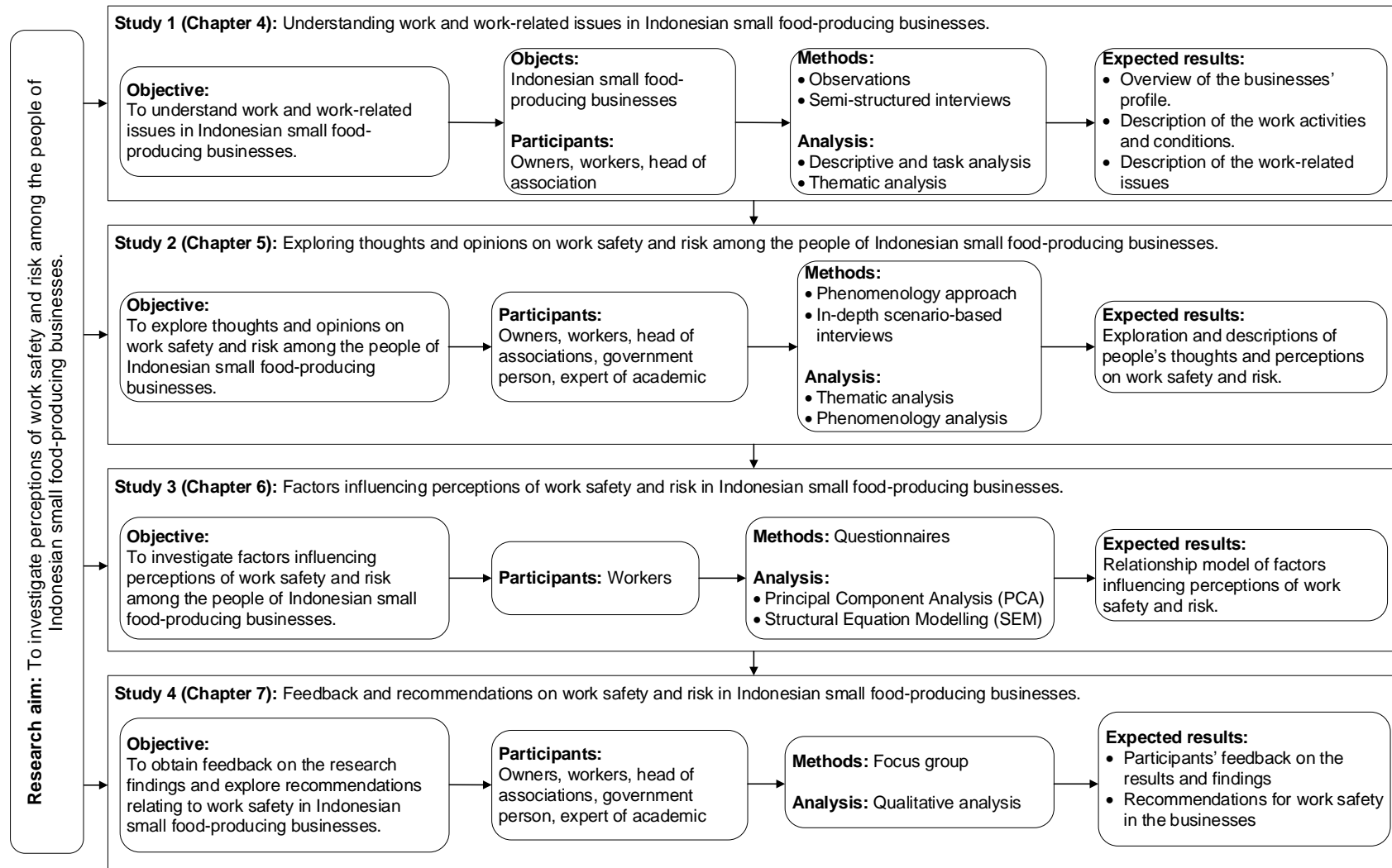


Figure 3.1. Overview of the research design

3.1.2. Role of the researcher

In this research, the researcher generally acted as a researcher who investigated work safety in Indonesian small food-producing businesses, particularly related to understanding the work-related issues and perceptions of work safety and risk. The exploratory approach includes investigation, examination, and analysis of the studied topic, involving presence of the researcher in the field of study (Boulding, 1958; Stebbins, 2001). In this research, particularly in the earlier study, the researcher conducted observations and interviews in the workplaces. These were useful for understanding the work and work-related issues in the workplaces as foundations of this research.

In exploratory qualitative research, the researcher should involve themselves in the studied context, usually through interaction with participants by interviews or observations to learn the experiences and meanings (Sciarra, 1999). To explore participants' perspectives through qualitative methods such as interviews, the researcher should enter the participants' world as a learner, rather than thinking that they know more (Bogdan & Biklen, 1992). In this research, the researcher kept his role as researcher to follow and understand participants' responses during the interviews. The design and questions of the interviews were developed to be able to explore participants' responses in a more general and open-ended manners, avoiding any suppositions.

Furthermore, this research involved participants from different roles such as owners, workers, and government personnel. They have different profiles such as on formal education, knowledge, and experiences, particularly relating to work safety. In working with different characteristics of research participants, it has been suggested that these differences should be viewed as an opportunity and welcome to new perspectives, rather than trying to unify them (Ryan, 2020; Ulrich, 2004). This was considered in designing the qualitative Study 1, Study 2, and Study 4, in which the interview questions and prompts were designed to be general without any judgment or tendency. The interviewees were given opportunities to describe and explain their responses. Additionally, in the quantitative Study 3, the researcher attempted to ensure that the wordings of questionnaire items would be clearly understood by the

respondents. This involved reviews of the questionnaire by Indonesian nationals of an expert and an experienced head of a business association, in addition to review from the PhD supervisors.

The researcher is a lecturer-researcher at Universitas Brawijaya, Indonesia, taking temporary leave during the PhD programme. In addition to involvement in team teaching of Work Design and Ergonomics module, the researcher has published some publications in ergonomics topics (Silalahi et al., 2011, 2014, 2018b, 2018a; Wahyudi et al., 2015). Most of these publications are the outputs of several ergonomics research studies in Indonesian small food-producing businesses. Additionally, the researcher has been involved in consultation activities with some Indonesian small food-producing businesses, working on some ergonomics topics. These experiences provided the researcher with knowledge on the general conditions of Indonesian small food-producing businesses, as well as related contact persons, which were useful in conducting this PhD research.

3.1.3. Research ethics consideration

Data for this research were mainly from primary sources, obtained from the participants involved in each study. Primary data sources included observations (Study 1), interviews (Study 1 and Study 2), questionnaire surveys (Study 3), and focus group discussion (Study 4). Additionally, some secondary data sources were included to provide relevant information, such as the number of small businesses and the workers as presented in Chapter 1. These secondary data were obtained from official online published data from the respective sources of a governmental agency or ministry.

As this research involved human participants in the four studies conducted, the research ethics for each study were fully considered. An ethics application for each study was submitted to and approved by The Research Ethics Committee, Faculty of Engineering, The University of Nottingham, before the respective study started. The ethics applications covered ethical aspects such as data storage and handling, participants' rights, and participants recruitment which were compliant with The University policy. Each participant involved in every study was provided with information explaining

the respective study and the ethical aspects such as their right to withdraw, and consent form to indicate their agreement to participate. The ethics approvals of all studies conducted in this PhD research are presented in Appendix 3.1.

3.2. Qualitative methods

3.2.1. Observations and semi-structured interviews

In starting this research programme, there was a need to understand the work and work-related issues in Indonesian small food-producing businesses. Although some studies have provided descriptions of the work activities and work-related issues in some types of Indonesian small food-producing businesses such as Dewi et al. (2020) and A'yunin et al. (2021), comprehensive descriptions of work activities and work-related issues in Indonesian small food-producing businesses are still limited. One reason contributing to this is the lack of inclusion of perspectives of the people involved in the workplaces, such as the workers. On the other hand, it is important to understand the perspectives of the people such as workers and owners in studying work safety in small businesses, as they are the users who are regularly involved in the activities and their inputs are important for work safety in their workplaces (Itani, 2011; Joseph & Arasu, 2023; Schulte et al., 2018; Vinberg et al., 2016).

Based on the need to understand work and work-related issues in Indonesian small food-producing businesses, therefore, qualitative methods of observations and interviews were conducted in Study 1. Observations and interviews were chosen as methods of the first study of this research, as a combination of workplace observation and interviews can provide an overview of what is being done in a workplace, and identify the possibility of work-related risks in the workplace (Berlin & Adams, 2017). Walters et al. (2018) also suggested that qualitative research on OSH in micro and small enterprises would be useful to represent SMEs workers' points of view regarding practices of OSH in SMEs. By conducting observations and interviews, it was expected that the work and work-related issues in the observed Indonesian small food-producing businesses would be understood and described comprehensively.

Observations can be used to analyse a workplace and are useful to examine conditions of a work system where the activities occurred, which involves observing the work-related activities that are being performed by the individuals (Hendrick, 2005; Stanton et al., 2013). Previous studies have shown that observations are useful in understanding activities in a workplace and the potential work-related issues that may exist. Gunduz & Laitinen (2018) conducted observations in Finnish construction SMEs with assistance of several safety indexes, to observe the practices of safety. In the shoe industry in Indonesia, Sukpto et al. (2019) conducted direct observations to identify the tasks and potential hazard and risks. By carrying out observations in Study 1, the activities that are being conducted and the potential work-related issues were expected to be understood and described, which would support Study 1 objective.

Furthermore, the interviews that were carried out to understand work and work-related issues in this research were semi-structured interviews, as suggested by Hendrick (2005) that semi-structured interviews can be useful to identify problems in a work system and gain insights of what kind of human factors intervention may be done. Additionally, unstructured or semi-structured interviews are typically used to gather knowledge around a human factors topic, particularly in the early stage, and the results of the interviews can then be followed up to develop further study (Bisantz et al., 2015; Hendrick, 2005). It was expected that by conducting semi-structured interviews in the first study of this research, the results could be used as a foundation to develop the subsequent studies.

Some studies have demonstrated that interviews can be useful for understanding work and work-related issues in a workplace. Conducting interviews, Ouellet (2022) was able to understand the conditions of the work and health and safety among technicians in telecommunications sectors. The practices and issues around OHS in Pakistani food manufacturing companies were able to be investigated with interviews by Atiq & Akhlaq (2022). Similarly, the semi-structured interviews in this research were expected to provide a comprehensive understanding and description of the work and work-related issues in the observed Indonesian small food-producing businesses.

3.2.2. Phenomenology approach

In this research, particularly in the second study, it was considered necessary to further investigate thoughts and opinions of the people in the observed Indonesian small food-producing businesses on work safety and risk. To support this objective, methods and approaches that would be able to provide in-depth investigation on people's thoughts, opinions, and experiences on work safety and risk were needed. An approach of phenomenology was applied as it focuses on what goes on within, and can access people's experience, feelings, and thoughts (Groenewald, 2004; Wilson, 2015). Holloway & Galvin (2017) explained that exploration and description of phenomena, such as people's everyday experiences of a situation or condition, is the aim of phenomenological research. By applying a phenomenology approach, it was expected that experiences, perceptions, and opinions among people of Indonesian small food-producing businesses regarding safety and risk in their workplaces could be explored.

On the topic of safety, phenomenology approach has been used in several studies. Mehri et al. (2019) applied a phenomenological approach in semi-structured in-depth interviews and focus group discussions with taxi drivers. In addition to the finding that the taxi drivers are experiencing the pressures of economic and social prestige, they also emphasised the need for a strategic planning to enable the taxi drivers to work in a friendly, respectful, and supportive environment. Additionally, Jeong & Kang (2021) conducted interviews in their phenomenological study in exploring nurses' perceptions of safety in their jobs. They identified that personal protection systems and safety support systems are needed to establish safe and healthy practices for nurses in doing their jobs. In this research, similarly, it was expected that a phenomenology approach would support the exploration of people's thoughts and opinions on work safety and risk in Indonesian small food-producing businesses.

3.2.3. In-depth scenario-based interviews

The phenomenology study in this research was conducted by in-depth interviews, as suggested by Creswell (2013) that in-depth interviews would

support the data collection of a phenomenology study. Patton (2002) also suggested that, when understanding people's perceptions, feelings, and knowledge is what a researcher seeks in an interview, then an in-depth interview is suitable. The in-depth interviews that were conducted in this research were combined with the utilisation of a scenario. Scenarios can provide people's perspectives by describing work-oriented circumstances, and what the users will do when using the systems (Carroll & Rosson, 1990; Rosson & Carroll, 2002). Therefore, it was considered that in-depth scenario-based interviews were suitable to investigate people's thoughts and opinions on work safety and risk in more depth and detail.

In regards to the topic of safety, a scenario-based approach would engage interviewees in participatory and open exchange about actions which can develop understanding of safety problems and solutions (Nielsen et al., 2013). It has been employed in some studies in safety topics such as Eggerth et al. (2018) and Olson et al. (2016), in which they suggested that such approach is useful and effective to share stories related to safety and prevention recommendations. The use of a scenario in the interviews of this research, particularly in the second study, was expected to elicit the interviewees' opinions and thoughts regarding safety and risk in the workplaces of Indonesian small food-producing businesses.

3.2.4. Focus group discussion

Prior to this research, a study which investigated perceptions of work safety and risk in Indonesian small food-producing businesses was limited. Additionally, although some studies have provided descriptions of work and work-related issues in Indonesian small food-producing businesses such as Dewi et al. (2020) and A'yunin et al. (2021), a more comprehensive understanding was still needed which this research provides. This research applied approaches which accommodated people's perspectives in investigating safety and risk, which have not previously been taken in Indonesian small food-producing businesses. Therefore, a method which was able to provide people's feedback on the findings of this research, and

opportunity to explore recommendations for work safety in the observed workplaces was needed.

To support the need to obtain feedback on the findings of this research and explore recommendations for work safety in the observed businesses, a focus group was considered suitable. A focus group is one way to obtain people's views, attitudes, and experiences involving a small group of people in a focused discussion around a certain topic (Hydén & Bülow, 2003; Wilkinson, 2011). Wilkinson (1998) also stated that a focus group can be designed to be a follow-up exploratory aspect or an initial exploratory phase of a study. As previously mentioned, this research was expected to provide findings around work safety and risk and the people's perceptions of them, which have not been explored previously. Therefore, the focus group was considered suitable to provide feedback on the findings of this research, by involving people relevant to the observed businesses. Additionally, the focus group was also aimed to have discussions around challenges and recommendations for work safety in Indonesian small food-producing businesses.

Focus groups have been used in various topics related to safety, such as in the following examples. Focus group discussion was conducted by Xu et al. (2023) in a construction industry, enabling the identification of key indicators of safety leading to safety management, such as commitment, training, and safety climate. Focus group interviews with hospital nurses was conducted by Berland et al. (2008), resulting in the finding that a demanding environment and minimal support from colleagues have an impact on patients' safety. Song & Guo (2019) also conducted focus groups with nursing interns, in investigating the implementation of nursing safety event reporting systems. Their study revealed some barriers to the systems, such as the inconvenience of the reporting systems and lack of knowledge, while recommending improvement on the reporting systems. As shown in the mentioned studies, a focus group is useful to provide understanding on various topics related to safety, which was also expected in this research.

3.3. Quantitative methods

In addition to qualitative methods, a quantitative method was also needed in this research, to achieve the objective of the third study of investigating factors influencing perceptions of work safety and risk in Indonesian small food-producing businesses. Studies which investigated relationships between perceptions of safety and risk with other factors often started by administering a questionnaire survey. This is shown in various studies such as Man et al. (2021), Zhao et al. (2021), and Danso et al. (2022). These studies then used the results obtained from the questionnaire surveys to conduct an analysis to examine the relationships between the factors included in the studies, namely Structural Equation Modelling (SEM). A similar approach was considered suitable in this research, in which questionnaire surveys were administered with the intended participants, followed by SEM analysis to investigate the relationships among the observed factors.

In this research, there were considerations to develop a questionnaire which would be suitable to be used. This is because although some questionnaires related to work safety and risk perceptions were available from other studies, they were developed in work settings with different characteristics from the observed workplaces in this research. Some examples are questionnaires which were developed in construction works such as Man et al. (2021) and Danso et al. (2022), and in the chemical industry such as Zhao et al. (2021). A questionnaire which developed in similar work settings compared to the Indonesian small food-producing businesses was limited. Therefore, in this research, a questionnaire was developed based on the results of qualitative interviews and literature review as demonstrated by Wang et al. (2016) and Man et al. (2019).

3.4. Qualitative analysis

3.4.1. Descriptive and task analysis

In this research, descriptive analysis was used in analysing the observations results. As shown by Mulders & Meers (1991) who investigated the impacts of automation in an industry on the work conditions and

environment, results of observations can be analysed and presented descriptively. They described that the automation in the industry led to improved work conditions, particularly in the physical and environmental conditions. Spaepen (1991) also descriptively analysed observations of work hazards and risks in the packaging line of a factory. They described that the workers may be exposed to different physical loads due to the different methods used, which should be standardised. In this current research, descriptive analysis was considered suitable to describe the work and work-related issues in the observed Indonesian small food-producing businesses.

Another analysis that was performed on the observation results is task analysis with operational sequence diagrams. Berlin & Adams (2017) pointed out that observations can be useful to provide descriptions of the tasks and how tasks are performed and interconnected, which also can be used to identify risks. Kirwan & Ainsworth (1992) explained that task analysis involves data collection, representation, and analysis of the task, in which observation and operational sequence diagram can be used to describe the work system activities. In this research, operational sequence diagrams were constructed, which were expected to provide understandings and descriptions of the observed work activities.

3.4.2. Thematic analysis

One technique to analyse results of qualitative interviews is thematic analysis, which is a method to identify, analyse, and report patterns or themes within qualitative data (Braun & Clarke, 2012). Braun & Clarke (2006) suggested that thematic analysis is a useful and flexible tool of analysis, which can provide detailed and rich information from the data. Thematic analysis was chosen to analyse the semi-structured interview results, as it was considered suitable to support the interview objective which sought to obtain information regarding the observed businesses, particularly on the work activities and work-related issues.

Thematic analysis has been used in various studies and shown to be useful in understanding work activities and work-related issues in a work setting. By carrying out thematic analysis on the results of a focus group

discussion, Nunfam et al. (2019) explored work conditions and the related issues among mining workers. Oakman et al. (2018) conducted interviews and thematic analysis to investigate practices of workplace risk management in two industrial sectors of logistics and residential care. In developing hazard prevention strategies in chemical plants, Ahmad et al. (2019) conducted thematic analysis to describe the exposure of hazards and risks. In this research, complementing the observation results, the thematic analysis on the semi-structured interview results was expected to provide understanding and descriptions of the work and work-related issues in the observed Indonesian small food-producing businesses.

3.4.3. Thematic and phenomenology analysis

In analysing the results of the phenomenology study in this research, methods which are able to provide depth information on people's thoughts and opinions were needed. Schutz (1962) suggested that phenomenology is related to thematic analysis which seeks to understand the meanings of experiences that the people give, which in this study is regarding safety and risks. Thematic analysis is powerful and suitable to seek understanding of thoughts and experiences across a data set, in which deep interpretation of data on people's experiences in thematic analysis would suit well with phenomenology (Braun & Clarke, 2012; Fereday & Muir-Cochrane, 2006; Joffe, 2011; Kiger & Varpio, 2020; Smith & Osborn, 2015). As thematic analysis is suitable to analyse results of a phenomenology study and to add depth to the analysis, it was chosen to analyse the phenomenology study in this research.

Sundler et al. (2019) further pointed out that thematic analysis will be useful in analysing lived experiences in phenomenology, by aiming to understand the complexity of meanings of the data. In the analysis of the phenomenology study in this research, the generation of codes and themes was performed based on the generated meaning units from the data. Compared to the thematic analysis of the first study of this research, in which the codes and themes generation was based directly from the data, the thematic and phenomenology analysis would add analysis of meanings to the

complexity and subtlety of phenomenology (Joffe, 2011). It was expected that the thematic and phenomenology analysis would be able to clearly derive and explain participants' intentions from the possible emerging plethora of codes and meanings from their accounts, as Daly et al. (1997) explained that themes gathered in thematic analysis would importantly describe the phenomenon that is being studied.

3.4.4. Qualitative analysis of the focus group

Krueger & Casey (2000) suggested that analysis of a focus group is a purposeful and deliberate process which should be systematic in a sequential manner, verifiable, and a continuing process. Krueger & Casey (2000) also pointed out that analysis of a focus group should be driven by the purpose, in which it should refer back to the study's intention. As previously mentioned, the overall aim of the focus group in this research was to have people's feedback on the findings of this research, while also exploring potential recommendations for work safety in Indonesian small food-producing businesses. It was considered that the aim can be achieved by describing and summarising the focus group results.

In addition to data familiarisation, coding, and categorising as the fundamental activities in qualitative data analysis (Maxwell & Miller, 2008), Miles & Huberman (1994) suggested various analytic techniques for analysing qualitative data such as arranging information into different clusters and creating a matrix of categories with the evidence. Furthermore, in reporting the results of a focus group, Krueger (1994) suggested that a narrative or bulleted report can be presented. Krueger (1994) also suggested that a written report of a focus group can include a descriptive summary, raw data, or an interpretative approach. The analysis of the focus group in this research was carried out by combining the previously mentioned suggested analysis and reporting of a focus group, and the fundamentals of qualitative data analysis such as familiarisation with the data and coding.

3.4.5. Trustworthiness of the qualitative analysis

Although validity and reliability are more associated with quantitative analysis, they remain pertinent in a qualitative study (Morse et al., 2002). Therefore, validity and reliability of the qualitative methods and analysis in this research were also ensured. Lincoln & Guba (1985) defined the terms validity and reliability into the qualitative context by introducing the term trustworthiness. Trustworthiness of a qualitative research can be achieved by ensuring its credibility, transferability, confirmability, and dependability (Lincoln & Guba, 1985; Shenton, 2004). These trustworthiness criteria of qualitative analysis were considered in this research, with the descriptions and strategies to achieve these criteria as presented in Table 3.1.

Additionally, to achieve trustworthiness of the qualitative analysis of thematic and phenomenology analysis, the criteria of reflexivity was also taken into consideration. This refers to the suggestion from Sundler et al. (2019), that reflexivity should also be considered in analysing qualitative data of a phenomenology study. Reflexivity is the researcher's subjectivity and position while questioning the connection between results and data throughout the research process (Sundler et al., 2019; Sutton & Austin, 2015). The strategies that can be applied to achieve reflexivity were comparing data with the derived themes, questioning the findings (Sundler et al., 2019), and involvement of multiple researchers to give supplementary views and questions (Malterud, 2001).

Table 3.1. Strategies to achieve qualitative analysis trustworthiness

No.	Criteria	Description	Strategies to be applied
1.	Credibility	The fitness between participants' views and researcher's representation, findings and reality are congruent (Shenton, 2004; Tobin & Begley, 2004).	<ul style="list-style-type: none"> • Richness of description (Hignett & McDermott, 2015) • Prolonged engagement (Lincoln & Guba, 1985) • Clear explanation on how the analysis was performed (Sundler et al., 2019) • Meaningfulness of the findings and well presented (Kitto et al., 2008) • Accuracy check on the transcriptions and translations (Hignett & McDermott, 2015)
2.	Transferability	How the results or findings of the analysis	<ul style="list-style-type: none"> • Data presentation (Hignett & McDermott, 2015)

No.	Criteria	Description	Strategies to be applied
		are applicable to other or wider situations or populations (Merriam, 1998; Shenton, 2004).	<ul style="list-style-type: none"> • Provide thick description for potential transferability of findings (Hignett & McDermott, 2015; Lincoln & Guba, 1985) • Usefulness and relevance of the findings, understandable and transferable to other research (Sundler et al., 2019)
3.	Dependability	Consistency of findings and could be repeated (Sutton & Austin, 2015).	<ul style="list-style-type: none"> • Traceable and clearly documented research process (Lincoln & Guba, 1985; Tobin & Begley, 2004) • Coding checks, connection to theory, meaningful analysis, peer review (Hignett & McDermott, 2015)
4.	Confirmability	Objectivity in which the findings are clearly derived from the data, not shaped by researcher' interest, motivation, or bias (Sutton & Austin, 2015; Tobin & Begley, 2004).	<ul style="list-style-type: none"> • Audit trail and neutrality (Erlingsson & Brysiewicz, 2013) • Use markers throughout the entire analysis (Koch, 1994) • Presentation of the analysis results to the participants (Walker, 1989)

3.5. Quantitative analysis

3.5.1. Principal Component Analysis (PCA)

In developing a questionnaire, Sharples & Cobb (2015) suggested taking a series of steps to ensure the quality of the questionnaire, with one of the first steps being factor analysis to examine the structure of factors and items included in the questionnaire. Principal Component Analysis (PCA) is one technique of factor extraction in factor analysis and was chosen as the factor extraction technique to the data set of the questionnaire survey in this research. The idea of PCA is to reduce dimensionality of a data set of several variables, to produce a new set of uncorrelated variables or components as they are called in PCA (Abdi & Williams, 2010; Jolliffe, 2004). This objective of PCA was considered suitable for this research, to establish the appropriate structure of factors and corresponding items in the questionnaire.

The usefulness of PCA to examine the structure of factors on the topic of safety has been demonstrated by other studies. Using PCA, Ahmed et al. (2020) explored the key factors on perceptions of risk and decision making

among emergency service personnel. In investigating factors influencing risk perception among construction workers, Chaswa et al. (2020) performed PCA in examining the structure of the used variables. Wang et al. (2019) performed PCA to examine the most impactful factors contributing to unsafe behaviour among coal miners. PCA was also conducted by Priye & Manoj (2020) to understand the pattern of measurement variables in studying perceptions of safety of a public transport passengers. In this research, it was expected that the PCA would be useful to evaluate the structure of factors in the questionnaire, and consider necessary refinements.

3.5.2. Structural Equation Modelling (SEM)

There was a need in this research for an analysis technique which can provide an examination of the relationships among factors influencing perceptions of safety and risk. One analysis technique which can support this is Structural Equation Modelling (SEM), which is a statistical methodology of a confirmatory approach to depict relationships among observed variables, with the basic goal to provide a quantitative test to the researcher's hypothesised theoretical model (Byrne, 2010; Schumacker & Lomax, 2004). In this research, several hypotheses and a respective hypothetical model were developed. By carrying out SEM, it was expected that the relationships among the factors in the developed model could be investigated, as well as testing the proposed hypotheses.

Various studies have demonstrated the usefulness of carrying out SEM in investigating relationships of factors related to perceptions of work safety and risk. SEM analysis performed by Wang et al. (2016) were able to determine that, for construction workers, work characteristics influenced workers' subjective perceptions of safety and risk. By using SEM, Zhao et al. (2021) were able to determine influence of factors of safety management and safety knowledge to risk perceptions of chemical industry workers. Similarly, it was also expected in this research that the SEM analysis would be able to explore the relationships of factors that potentially influence perceptions of safety and risk among the people of Indonesian small food-producing businesses, particularly in Study 3.

3.6. Methodological challenges

There were some challenges related to the methodology of this research. In the qualitative methods that were carried out, there were challenges surrounding the validity and reliability, which in a qualitative approach is termed 'trustworthiness' (Lincoln & Guba, 1985). In this research, the trustworthiness of the qualitative methods and analyses was ensured by applying several criteria as previously explained in this chapter. Additionally, the results and analysis process of the qualitative methods were discussed regularly with the supervisors of this research, to have different supporting points of view. A fellow PhD researcher of Indonesian nationality was also involved to ensure the accuracy of the translations and transcriptions of the interviews.

Another challenge was related to the development of the questionnaires that were used to investigate factors influencing perceptions of safety and risk in Indonesian small food-producing businesses. Although some related questionnaire instruments were available, they were developed in a work setting such as construction works (e.g. Man et al., 2021; Danso et al., 2022) and chemical industry (e.g. Zhao et al., 2021), in which the characteristics are different compared to the observed Indonesian small food-producing businesses in this research. There were considerations whether the available questionnaires would be suitable to be adopted. This is one reason for the importance of Study 1 and Study 2 to have an initial understanding of the observed workplaces and the potential influencing factors to work safety and risk perceptions. Results of Study 1 and Study 2, together with the literature review, were then used to develop the questionnaires that were used in this research.

A challenge was also present regarding the choice of media in conducting each study, particularly related to Covid-19 restrictions at the time of the research. The restrictions presented limitations for the data collection to be conducted directly with the participants, particularly for Study 2, Study 3, and Study 4. While the researcher had the supporting equipment and facilities to carry out the studies remotely, there were considerations regarding prospective participants' accessibility and ability to be involved in remote

interviews and questionnaire surveys. During the data collection, the researcher had regular communications with some participants, to ensure the participants would be able to participate, without any difficulties or objections. Overall, there were no substantial challenges experienced from the remote data collection.

3.7. Chapter 3 summary

The overall methodology and approaches taken in this research have been presented in this Chapter 3, including the rationale for their deployment. In overview, an exploratory approach was attempted in this research, in which a multi-methods approach using qualitative and quantitative methods was carried out across the four studies of this research. A multi-methods approach was considered necessary in this research, to support the achievement of the four objectives in the respective studies. Furthermore, as this research involved human participants, ethical aspects of the research were fully considered and approved by The Ethics Committee of Faculty Engineering of The University of Nottingham. The role of the researcher and challenges surrounding the methodology of this research were also presented in this Chapter 3.

Chapter 4

Study 1: Understanding work and work-related issues in Indonesian small food-producing businesses

4.1. Introduction to Study 1

Work-related issues seem to be prevalent in the workplaces of Indonesian small food-producing businesses. The conditions such as working with various hazards and risks and unavailability of safety equipment in the workplaces of Indonesian small food-producing businesses have been pointed out in some studies, such as Dewi et al. (2020) and Rahayuningsih (2019) in small businesses of *tempe* (soybean cake) and crackers, respectively. Poor work postures also seem to be one commonly found issue in Indonesian small food-producing businesses as described in studies such as A'yunin et al. (2021) and Yuslistyari et al. (2018) in snack home-industries.

Studies which investigated work-related issues in Indonesian small food-producing businesses are mostly conducted using approaches which did not accommodate perspectives of the people involved in the work. This is shown by the majority of utilisation of methods such as work posture assessment (e.g. Maryani et al., 2016), anthropometry analysis (e.g. Silviana et al., 2021), and risks assessment (e.g. Arifin & Wakhid, 2018), in which the approaches and methods used did not investigate the people's perspectives. While these studies were able to describe and identify the work-related issues and risks, it is important to understand the perspectives of the people involved in a work setting which may have a role in their reception and motivation on work safety (Joseph & Arasu, 2023; Schulte et al., 2018).

In starting this research programme, it was necessary to carry out a study to understand work and work-related issues in Indonesian small food-producing businesses, including investigation of the perspectives of the relevant people. Therefore, Study 1 was a qualitative study using observations

and interviews with the people involved, with an objective to understand the work and work-related issues in Indonesian small food-producing businesses. In addition to providing descriptions, Study 1 is expected to contribute in exploring perspectives and opinions of the people in Indonesian small food-producing businesses regarding work conditions and work-related issues in their workplaces. The overview of Study 1 is presented in Figure 4.1.

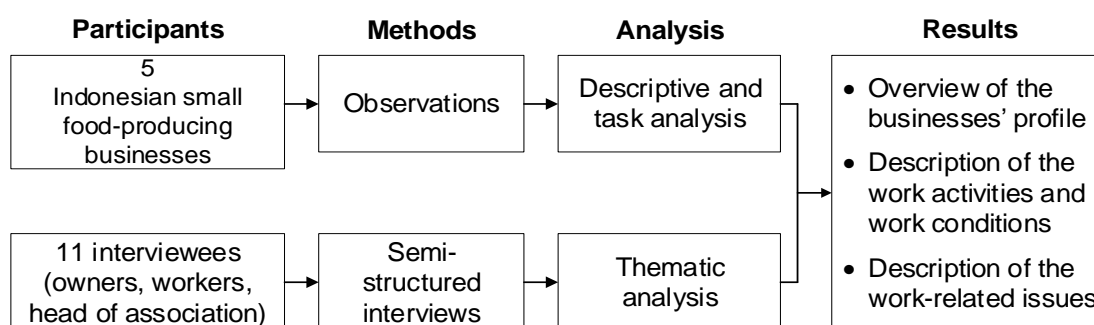


Figure 4.1. Overview of Study 1

4.2. Study 1 method

4.2.1. Observations

4.2.1.1. Observed businesses

Five Indonesian small food-producing businesses located in Malang municipality, East Java province, Indonesia were observed in this Study 1. These five businesses were selected purposively based on the businesses' size which had to be small as in the scope of the overall research, and some considerations on the suitability of the businesses for the research. Meetings with head of associations of the respective businesses took place to explain the study and receive suggestions on the potential businesses that would suit the study. The main considerations in selecting the observed businesses were the manual work characteristics of the tasks in the businesses, and indications of work safety issues as described in related studies such as Irpan et al. (2019) and Silalahi et al. (2018b). Additionally, the researcher's past experiences with some of the businesses and ease of access and communication with the businesses were also taken into consideration when selecting the observed businesses.

As an overview, the five observed businesses are producing three different types of products of *tempe* chips, raw *tempe*, and corn flakes. The researcher made contact and enquiries with the owners of the identified businesses, resulting in involvement of two *tempe* chips businesses, one raw *tempe* business, and two corn flakes businesses. Whilst the businesses produced different types of products, there are similarities in the work-related issues in workplaces and work characteristics, so it is intended that the research findings can be generalised to similar businesses. The general profile of the businesses is shown in Table 4.1.

Table 4.1. Profile of the Study 1 observed businesses

No.	Business	Year started the business	Operating length (years, at the time of study)	Product
1.	Business A	2008	11	<i>Tempe</i> chips
2.	Business B	1999	20	<i>Tempe</i> chips
3.	Business C	1998	21	Raw <i>tempe</i>
4.	Business D	2000	19	Corn flakes
5.	Business E	1995	24	Corn flakes

4.2.1.2. Observations procedure

Before Study 1 started, an ethics application for the observations and interviews was submitted to and approved by The Research Ethics Committee of Faculty of Engineering of The University of Nottingham. An information sheet of the research and a consent form were explained to and signed by the owner of respective business which agreed to participate in the study. The observations that were conducted in Study 1 were direct observations in which the researcher was present in the location, allowing the researcher to capture information such as the sequence of activities and timings (Sharples & Cobb, 2015). To assist the researcher and to ensure the observations would achieve the Study 1 objective, an observation guideline was developed as shown in Table 4.2.

The observations were carried out in the workplaces of the businesses, especially in the production process areas, during the businesses' work hours between 21 October 2019 to 8 November 2019. Each workplace was observed twice in different days, from the beginning to the conclusion of the activities, with the time of observation depends on the respective business'

work hour. An example is from six o'clock in the morning to two o'clock in the afternoon in the raw *tempe* business. The first observations were intended to have an initial required information, while the second ones were to observe whether there is any difference in the activities or work conditions, and to obtain potential additional information. The observations were carried out at a safe distance to avoid being intrusive or creating undesired obstruction or interruption to the workers and their activities, as suggested by Smith (2001). When necessary, the owner of the respective business accompanied the researcher during the observation to provide necessary guidance and information. Drury (1990) also suggested that the researcher who carries out an observation should be in touch with a person who understand the jobs to obtain important information. Some interview questions were also discussed with the owners during the observations, especially questions related to the production process and work arrangement.

Bisantz et al. (2015) suggested to obtain documentations on the observations such as video recording and handwritten notes, as they can be used to analyse the observations. In Study 1 observations, pictures and videos were captured, as they are important to understand the activities and observe the work and safety conditions in the workplaces. A timer device was also used to record the time of the observed tasks. Additionally, necessary notes were taken during the observations to note important observations, such as task assignment of the workers and information on work-related issues and the potential solutions that arose from talks with the owners.

Table 4.2. Study 1 observation guideline

Activity	What to observe	How to observe
Observation of the production process	1. What activities that are being conducted in the production process? How are they arranged?	1. Accompanied by the owner to assist with necessary guidance and information.
	2. What do the workers do to prepare before the production process activities start?	2. Observe from safe distance, no obstruction or interruption to the workers.
	3. How many workers conduct the production process? Which worker perform which activity?	3. Record picture and video of the activities.
	4. What materials are used in the production process?	4. Time recording of the activities. 5. Make notes on the observation as necessary

Activity	What to observe	How to observe
	5. What tools or equipment are used in the activities?	and on the owners' explanation.
	6. Is there any specific guideline or procedure for the worker to do their work?	
	7. What is the output or product from the activities of production process?	
Observation of conditions of the workplace and activities	8. How is the general working condition and environment in which the activities occur (e.g. climate/temperature, lighting)?	
	9. What are the potential issues related to ergonomics and work safety?	
	10. Any potential issues related to the activities of the workers? (e.g. body movement, walking, reaching, hazard or risk occurred)?	
	11. If there are any potential issues, what are the potential solutions?	

4.2.1.3. Analysis

Study 1 observation analysis was focused on two analyses of descriptive analysis and task analysis. Descriptive analysis was carried out to identify and describe the potential work safety and other work-related issues arising during the observed activities, as pointed out by Stack et al. (2016) that observations of tasks and recordings such as pictures and videos can be used to analyse the task procedure and to identify associated work risk factors such as posture, force, and repetition. Task analysis was carried out to understand and describe the activities being performed in the workplaces. Kirwan & Ainsworth (1992) suggested that task analysis using operational sequence diagrams is useful to describe what a worker or team of workers are required to do to achieve a goal in a system. The analysis was carried out based on the materials obtained from Study 1 observations of pictures, videos, time recordings, and notes taken during the observations. The following outputs from the analysis were produced.

1. Descriptive analysis on potential work-related issues in the workplaces. Using the photos, videos, and notes obtained during the observations, work conditions related to work safety and potential work-related issues in the observed workplaces were identified and described. Additionally, potential solutions to the work-related issues were also identified.
2. Task analysis with operations sequence diagrams. Based on the observations in the workplaces, operations sequence diagrams of each of the observed production process were constructed. These displayed the tasks and responsible person, equipment, materials, and time of each performed task. Results of the observations on the work activities and analysis of operation sequence diagrams were then described and summarised.

4.2.2. Semi-structured interviews

4.2.2.1. Interview questions

Semi-structured interviews containing 22 questions were carried out in Study 1, to gather relevant information from the participants related to the objective of Study 1. In a semi-structured interview, the questions are prepared before the interview in a sequence of themes to be covered, but open to change in the sequence and question forms, depending on the interviewees' responses (Kvale, 2007). The interview questions were grouped into five categories as presented in Table 4.3. The questions were related to identification of possible issues regarding the business' organisation, the production process, knowledge and experience on ergonomics, work arrangements, and identification of work-related issues.

Furthermore, the interview questions were developed based on a combination of the needs to obtain specific information in the study and literature review. Some of the questions on business profile and information on the products and workers were adapted from Rusmita (2016). Questions on the organisation of the activities and identification of potential issues were adapted from Stack et al. (2016) and Berlin & Adams (2017). Some questions on work safety and ergonomics survey in SMEs by Siong et al. (2018) were

also adapted, particularly for the questions related to identification of potential issues.

Table 4.3. Study 1 interview questions

No.	Interview questions	Development of question	Target of interviewee
A. Business profile - aimed to understand the general profile of the observed businesses.			
1.	How long has this business been operating?	Based on needs and adapted from Rusmita (2016)	Owners
2.	Can you tell me about the structure of your business?	Based on needs and adapted from Rusmita (2016)	Owners, head of association
3.	Have you come across any problems or difficulties related to structure or organisation of this business? Can you explain more about these?	Based on needs	Owners, workers, head of association
4.	How would you describe the relationships between people who are working in this business?	Based on needs	
B. Production process activities - aimed to understand the production process activities in the observed businesses.			
5.	What product do you produce in this business? What happens to this after you produce this?	Based on needs and adapted from Rusmita (2016)	Owners, head of association
6.	Can you tell me about the materials that you use to produce the products? Where and how to get the materials?	Based on needs	
7.	Do you use any equipment and tools to handle the materials and the product?	Based on needs	Owners, workers
8.	Please explain the production process?	Based on needs	
9.	Do you have any procedures or standards for the work activities?	Based on needs and adapted from Stack et al. (2016)	Owners, workers, head of association
10.	Does the work or process change at different times, for example days of the week, weeks of the year?	Based on needs and adapted from Stack et al. (2016)	
C. Work arrangements - aimed to understand the arrangements of the work and workers in the observed businesses.			
11.	How many workers do you have? How to find the right people to employ? Do they have any specific type of contract?	Based on needs and adapted from Rusmita (2016) and Stack et al. (2016)	Owners, head of association
12.	How do you plan and schedule the work and workers?	Based on needs and adapted from Stack et al. (2016)	Owners, workers, head of association
13.	How is their work time organised?	Based on needs and adapted from Stack et al. (2016)	
14.	Is there any supervision of the work and workers? Can you tell me more about this?	Based on needs	

No.	Interview questions	Development of question	Target of interviewee
15.	Do the workers involved in designing the work activities or problem solving of any problems that may occur?	Based on needs	
D. Knowledge and experience on ergonomics - aimed to explore the people's knowledge and experience on ergonomics.			
16.	Do you have any experience of ergonomics? Can you tell me more about that?	Based on needs	Owners, workers, head of association
17.	Do you think that ergonomics is important to your business? Please explain.	Based on needs	
E. Identification of potential issues - aimed to identify potential existing issues around the works in the observed Indonesian small food-producing businesses.			
18.	Have you come across any problems or difficulties during the production or work activities? Can you explain more about these?	Based on needs	Owners, workers, head of association
19.	Do you think there are any problems with conditions such as heat, cold, vibration, excessive lighting, insufficient lighting during the work? Please explain.	Based on needs and adapted from Stack et al. (2016) and Siong et al. (2018)	
20.	Do you experience any feeling of pain in part(s) of your body or discomfort during the work? Can you tell me more about it?	Based on needs and adapted from Stack et al. (2016)	
21.	Do you think there are any problems around work posture, work method or technique, work production layout, and physical environment? Please explain.	Based on needs and adapted from Stack et al. (2016), Siong et al. (2018), and Berlin & Adams (2017)	
22.	How do you try to solve these problems or difficulties?	Based on needs and adapted from Stack et al. (2016)	

4.2.2.2. Interview participants

Eleven participants were involved as the interviewees, with their profile presented in Table 4.4. The interviewees included every owner and one worker of each observed business, and one head of business association. The owner of each business and head of association were interviewed as they were expected to provide valuable information on all aspects of the business. Each business involved in this research has an association mainly acts as a communication hub based on the product, such as *tempe* chips businesses A and B which are members of an association of *tempe* chips businesses. The association is led by a person called head of association who is trusted by the businesses, to ensure the association is functioning to support the businesses.

One worker from each business was interviewed as they were expected to provide information on the activities that were being performed, and the conditions of the workplace that they were working in.

In addition to their willingness to participate, the interviewed workers were selected based on consideration of their work experience in working in Indonesian small food-producing businesses. This was an attempt to ensure that the workers could give valuable information regarding their activities in the workplaces. Job experience is a worker's amount of time in engaging with their job (Basha & Maiti, 2013), in which a worker is considered experienced varies depending on the job as shown in some studies, from a few months (Lin et al., 2013) to years (Choudhry & Fang, 2008; Fass et al., 2017). In this research, based on the opinions of the people of Indonesian small food-producing businesses, the workers were already working and performing their respective tasks for years. The people also talked about easy and simple characteristics of the jobs without specific skills or knowledge requirement, with which an inexperienced worker would be familiar in several days. Therefore, a minimum work experience in an Indonesian small food-producing business of one year was expected from the involved interviewees.

Table 4.4. Study 1 interviewees profile

No.	Interviewee	Age (years old)	Role	Work length (years, current role)	Work length (years, in food-producing business)
1.	Owner A	52	Owner of Business A	11	18
2.	Owner B	64	Owner of Business B	14	20
3.	Owner C	61	Owner of Business C	21	21
4.	Owner D	55	Owner of Business D	9	19
5.	Owner E	51	Owner of Business E	11	23
6.	Worker A	38	Worker of Business A	8	8
7.	Worker B	30	Worker of Business B	5	5
8.	Worker C	40	Worker of Business C	9	11
9.	Worker D	46	Worker of Business D	7	10

No.	Interviewee	Age (years old)	Role	Work length (years, current role)	Work length (years, in food-producing business)
10.	Worker E	28	Worker of Business E	4	4
11.	Head of association	50	Head of association of <i>tempe</i> chips businesses	4	17

4.2.2.3. Interview procedure

Before every interview, the interviewees were given an explanation of the interview and signed a consent form to indicate their agreement to participate. The interviews with each participant took place in their respective workplaces of the businesses which were in the respective owner's house, at the agreed time with each interviewee. Each interview was recorded with a voice recording device which was in operation during the interview. Time spent for each interview was between 15 to 23 minutes. As presented previously in Table 4.3, there were specific interview questions which were aimed only at specific interviewee groups, such as the question on the length of the businesses which was only asked to the owners.

4.2.2.4. Thematic analysis

All interview recordings with the eleven interviewees were transcribed afterwards for analysis. The transcriptions were performed directly by typing the content from interviews in Microsoft Word files, while listening to the interview recordings. This process was repeated several times to ensure the text transcriptions accurately reflected the interviews. As the interviews were conducted in Bahasa Indonesia (Indonesian language), the interviews were first transcribed into their original form in Bahasa Indonesia which was then translated into English. Additionally, a fellow Indonesian national PhD researcher in the Human Factors Research Group of The University of Nottingham was asked to review the transcriptions and compare them with the interview recordings. This was to ensure the accuracy of the transcriptions and translations.

Thematic analysis was then performed to analyse Study 1 interview results using an inductive approach, in which the identification of codes and themes was driven by what is in the data (Braun & Clarke, 2012). In inductive thematic analysis, the themes are derived from the data and strongly linked to the data, without fitting them into any preconceptions (Braun & Clarke, 2006; Patton, 1990). It was considered that inductive thematic analysis was needed in analysing the semi-structured interviews, rather than a deductive or a hybrid approach, to capture as much information as possible from the interviews to provide understanding and descriptions of the work and work-related issues in the observed businesses. An inductive approach would support this intention, as it would provide broad and more expansive information from the data (Kiger & Varpio, 2020). The thematic analysis was performed by following six steps as suggested by Braun & Clarke (2006) as in Table 4.5.

Table 4.5. Steps of Study 1 thematic analysis

No.	Steps of thematic analysis	Steps taken
1.	Familiarising with the data	<ul style="list-style-type: none"> • Each interview transcription was read thoroughly several times to understand and familiarise with the information contained. • Start to identify and note potential codes by putting colored highlights or comments in the Microsoft Word files of the transcriptions.
2.	Generating initial codes	<ul style="list-style-type: none"> • Codes are the basic segment or element of the raw transcription data, with identifying features of the data to be analysed further (Boyatzis, 1998). • Already started in the previous step, codes were identified by putting colored highlights or comments in the coded texts or parts of the transcriptions, in the Microsoft Word files of the transcriptions. • Generated codes then extracted from the text transcriptions and compiled in separate files, in which Microsoft Excel was used in this study. • During the extraction and compilation of codes, the codes were reviewed and compared with the respective transcriptions several times to ensure they reflect the information on the coded texts.
3.	Searching for themes	<ul style="list-style-type: none"> • Themes are broader than codes, in which interpretive analysis regarding the study starts to occur in search of themes (Boyatzis, 1998) • Generated codes were sorted, reviewed, and collated into several groups based on their

No.	Steps of thematic analysis	Steps taken
		<p>similarity and distinction. This was done by using groups of tables in Microsoft Excel.</p> <ul style="list-style-type: none"> • When necessary, codes or group of codes were compared back with the transcriptions to ensure they reflect the information contained in the texts. • Review and start to label group of codes with potential themes. • Generation of sub-themes to accommodate similarity or difference of relationships between group of codes within the same potential themes. Sub-themes are a level between the codes and themes, basically themes within a theme, which can be useful to give structure of the thematic analysis (Braun & Clarke, 2006).
4.	Reviewing themes	<ul style="list-style-type: none"> • Review of the initially generated potential themes, to ensure the themes represent the contained sub-themes and codes. Or conversely, the codes and sub-themes are fit to belong in certain themes. • Refinements of the group of codes and sub-themes contained in potential themes, by merging or separating group of codes or sub-themes. • Review and compare the codes, sub-themes, and themes to the transcription data as necessary. • Rename the themes and sub-themes as necessary.
5.	Defining and naming themes	<ul style="list-style-type: none"> • Establish the final structure of the thematic analysis, in which three themes with their respective sub-themes and codes were produced in this Study 1, as will be presented in Section 4.3. • Review and finalise the names for the themes and add description for each theme accordingly.
6.	Producing the report	Analyse and report the results of the thematic analysis, in which in this case are this PhD thesis and its potential publication.

4.2.3. Trustworthiness of Study 1 analysis

Several criteria (Section 3.4.5) were taken into consideration to achieve the trustworthiness of the qualitative analysis of Study 1. The strategies that were taken are presented in Table 4.6.

Table 4.6. Strategies to achieve Study 1 analysis trustworthiness

No.	Criteria of trustworthiness	Applied strategies
1.	Credibility	<ul style="list-style-type: none"> • Clear explanation of the observations and interviews analysis process. • Prolonged engagement in the analysis for around eight months in overall. • Inductive thematic analysis on the interview results to allow codes and themes emerge from the data. • Presentation of Study 1 results to the participants to get feedback. • Every interview transcript was reviewed by a fellow Indonesian national PhD researcher to check the accuracy of the transcription and translation.
2.	Transferability	<ul style="list-style-type: none"> • Presentation of interviewees' quotes on the interview results. • Utilisation of Study 1 results for the subsequent studies. • Explanations of potential application of methods and findings to other similar research objects.
3.	Dependability	<ul style="list-style-type: none"> • Codes, sub-themes, and themes of the thematic analysis were reviewed several times. • Every transcript and step of the analysis was documented, and every change was noted. • Documented transcripts and analysis are shared with the PhD supervisors through secured online storages (One Drive and Microsoft Teams). • Generated themes of the thematic analysis were described and connected with existing theories. • The analysis was continuously reviewed by the PhD supervisors.
4.	Confirmability	<ul style="list-style-type: none"> • Every transcript and change made was documented and noted. • Utilisation of noting features on the assisting softwares on the thematic analysis, such as comments and highlight features on Microsoft Word and Microsoft Excel. • Presentation of the results to the participants.

4.3. Study 1 results

4.3.1. General results

The observations and interviews that were conducted in Study 1 resulted in several insights regarding the work and work-related issues in the observed Indonesian small food-producing businesses. In general, it can be understood that the work activities in the workplaces of the observed Indonesian small food-producing businesses were performed in the respective owners' houses, in which the tasks were conducted largely by hand. Several

work-related issues from various sources were also identified, such as exposures of hazards and risks from the materials and work methods. More detailed description of the work activities and work-related issues will be presented throughout this results section.

Furthermore, the thematic analysis performed on the interview results resulted in three themes of business profile, production process, and ergonomics and work safety. Together with the observation results, these interview results are useful in describing the work and work-related issues in the businesses, in addition to describing the general profile of the businesses. As seen in Table 4.7, each theme consists of several sub-themes, in which the sub-themes are formed of several related codes obtained from the interview transcriptions with the interviewees. The codes and examples of the interviewees' accounts will be presented throughout the presentation of the interview results in this section.

Table 4.7. Themes of Study 1 thematic analysis

Themes	Description	Sub-themes
Business profile	The general profile of the businesses of their ownership, organisation, supply chain, and workers.	Ownership
		Organisation and structure
		Supply chain
		Workers
Production process	The characteristics and arrangements of the production process of the observed Indonesian small food-producing businesses.	Characteristics
		Procedures and standards
		Tasks arrangement
		Supervision
Ergonomics and work safety	The conditions of ergonomics and work safety in the observed Indonesian small food-producing businesses.	Work-related issues
		Injuries and unsafe events
		Improvement
		Attitude and knowledge

4.3.2. Business profile

1. Ownership

In terms of ownership, it can be understood that all interviewed Indonesian small food-producing businesses are in individual ownerships. The observed businesses were either started by the current owners or inherited from the previous owners, such as the parents of current owners. Although in individual ownerships, most of the businesses are supported by the family in operating the businesses. These include various types of support, from

helping operational aspects such as handling customers and materials procurement, to shared funds or capital to start the business. All of the interviewed Indonesian small food-producing businesses were experienced long-standing businesses, as they had been operating for more than ten years. Some of the businesses had been operating for twenty years or more. The codes and examples of interviewees' accounts related to ownership are shown in Table 4.8.

Table 4.8. Codes of ownership sub-theme

Theme: Business profile; Sub-theme: Ownership	
Codes	Examples of interviewees' accounts
Individual ownership	<i>"All chips and tempe businesses here are individual proprietorship. So directly owned by the owners, or can be together with the family. But basically it's the owners who own."</i> [Head of association]
Family involvement	<i>"Well, sometimes my family help me on some things like meeting the buying customers."</i> [Owner E]
Family inheritance	<i>"All businesses in this district are owned individually within its family, and mostly inherited the business from their parents, like I do."</i> [Owner B]
Experienced long-standing businesses	<i>"Emm.. I remember my parents started this business because they did not have a job when the economy crisis took place in 1998. So well... it's about 21 years."</i> [Owner C]

2. Organisation and structure

From the interviews, it was further confirmed that the Indonesian food-producing businesses in Study 1 were small in size. Based on the criteria of number of workers and annual revenue regulated in Indonesian Constitution No. 20/2008 (2008) and Statistics Indonesia (2020), the observed businesses fall into the category of small businesses. Additionally, the businesses do not have any particular formal organised business division or structure, such as secretary, supervisor, or marketing. The people involved in all of the interviewed businesses are generally the owners and workers. The owners oversee the whole operation of the administration and production process of the businesses, and the workers perform the production process activities. The interviewees pointed out that the work environment in the businesses is informal, in which there are friendly relationships among the people and the owners are sometimes involved in the production process. Relationships

between owners and workers in all businesses are good, enabling a good work environment. Some owners also mentioned the preference for informal organisation and environment, as they feel more formality is unnecessary for their small size.

There is a business association for different types of products of the business, mainly acting as a communication hub with external parties and mediator among the businesses. Monthly meetings between the association and all corresponding businesses are held to discuss any problems within the businesses. Most of the interviewed businesses felt that relationships with government have not been as mutual as expected. Support for training, equipment, and funding opportunities are offered, but the association and businesses often feel they are unsuitable. Support from academics, particularly university students who conducted some research in the businesses, are also felt to be not beneficial for the businesses. The main issue on research by university students as stated by some interviewees is that there was no clarity or dissemination of the results and follow-up on the research. The codes and examples of interviewee's accounts related to organisation and structure are shown in Table 4.9.

Table 4.9. Codes of organisation and structure sub-theme

Theme: Business profile; Sub-theme: Organisation and structure	
Codes	Examples of interviewees' accounts
Small-sized business	<i>"I think businesses like mine are mostly small and informal..."</i> [Owner E]
No structured organisation	<i>"There is no such divisions like secretary, marketing, finance, etcetera [...] The workers they just... perform the production process, while I handle the administration matters, materials order and purchase, finance, and overall supervision of the production process."</i> [Owner B]
Informal work environment	<i>"We are just like friends... family... well we are still working seriously producing tempe chips, but not any tension... like I as the owners be like boss... no. Jus relaxed as long as the production is working."</i> [Owner A]
Relationships with other parties	<i>"If it's with external people, sometimes people from related government agency come to have discussion about the business. The problem is... with the government as I said, that I and the businesses here feel that there are no... continuity... I mean... follow up."</i> [Head of association]

3. Supply chain

From the interviews, it can be understood that the observed Indonesian small food-producing businesses mainly obtain raw materials locally, from farmers and shops. Specifically for raw soybeans in the raw *tempe* business, they are imported from the United States which have better quality at a more competitive price. The main product selling method of the interviewed food-producing businesses is offline and relies heavily on the customers' word-to-mouth to spread the product's information. The interviewed businesses mostly sell their products at their outlets in the owners' house. They also have several connections with resellers which resell the products by rebranding and repackaging. In addition to selling in the local municipality and region, some of the businesses also deliver small amounts of their products to customers located outside the city or province. The codes and examples of interviewee's accounts related to supply chain are shown in Table 4.10.

Table 4.10. Codes of supply chain sub-theme

Theme: Business profile; Sub-theme: Supply chain	
Codes	Examples of interviewees' accounts
Local and imported raw materials	<i>"Raw tempe is the main material, which we arranged orders with local raw tempe maker [...] Other materials, well, we buy and stock them ourselves from shops or markets."</i> [Owner B]
Offline marketing	<i>"We mainly promote our products traditionally with banner or flyer [...] we do not accustomed to online marketing, so we prefer offline and word-to-mouth marketing."</i> [Owner B]
Outlets and resellers sales	<i>"After production we sell them mainly sold here in our outlet, and some are sold through resellers who come to the outlets in pre-arranged time."</i> [Owner D]
Regional and province scales of sales	<i>"In addition to selling in this outlet, we also sell our product by orders. This is usually for buyers who are far from our outlet. We also sell to other cities or provinces with delivery, based on orders."</i> [Owner D]

4. Workers

The workers recruitment in the observed businesses is centrally organised by the association, where one consideration is to maintain fair competitiveness among the businesses. Although experience is preferred on some activities, generally there are no specific requirements for worker recruitment. In addition to the easy and simple tasks which the interviewees

reported that these do not require any specific skills or knowledge, one focus of the recruitment is to provide jobs in the local communities. This is another reason why there are no specific requirements for worker recruitment. The willingness to work and accepting the amount of salary are the two important considerations to recruit new workers. If necessary, brief training will be given to new workers by the owners when they start working. There is no formal and written work contract with only a trust-based verbal agreement. The codes and examples of interviewee's accounts related to workers are shown in Table 4.11.

Table 4.11. Codes of workers sub-theme

Theme: Business profile; Sub-theme: Workers	
Codes	Examples of interviewees' accounts
No specific requirement	<i>"No there is not... Worker recruitment mainly target local community here, as to... well, one mission... is to empower the community and so that there are job opportunities. So that is why there are no any requirements, just need them to want to work."</i> [Owner B]
Central recruitment and distribution	<i>"It is central through the association, based from the SMEs' inputs. Then based on SMEs' inputs, the association organised the recruitment and number of workers for each SME, to ensure each SME can perform its production process appropriately."</i> [Owner D]
Informal verbal agreement of contract	<i>"No work contract for the workers, only verbal agreement between them and owners. Usually, well it has to be... before new workers agree... agree to their jobs... they talk with their prospective owners about the jobs, tasks, and salary. Should they agree, well then the workers start their job on the agreed start date."</i> [Owner D]
Brief training for new worker	<i>"Unless if, there are new workers who have no or few experience, then they will be trained personally by the owners at the start of their work. This is especially for critical jobs like frying..."</i> [Head of association]

4.3.3. Work activities

4.3.3.1. Overview of the production process

In general, from the observations and interviews, it can be understood that the production processes in the observed Indonesian small food-producing businesses are mainly sequential. Additionally, the interviewees

thought that the production processes consist of simple and manual tasks. Although some activities use semi-automatic machines, the workers are still required to manually handle the materials and inspect the process. Some interviewees likened the tasks to household tasks such as frying and boiling, but in larger scale of production. As the tasks are described as simple and easy, the interviewees mentioned that there was no specific requirement of skills to do the tasks. The interviewees also pointed out that most of the equipment are pre-made and bought from certain shops. The codes and examples of interviewee's accounts related to the characteristics of the production process are shown in Table 4.12.

Table 4.12. Codes of characteristics sub-theme

Theme: Production process; Sub-theme: Characteristics	
Codes	Examples of interviewees' accounts
Mainly sequential process	<i>"It's in order, as I said. First is slicing the raw tempe, frying... well put into the batter first. Then when it's cooked it's left for about half an hour. When it's not hot, then packaged."</i> [Worker B]
Simple and manual tasks	<i>"Well it is easy, just like cooking [...] Then we perform all activities manually by hand, no machinery. Just this stove."</i> [Worker A]
Equipment mostly manual and pre-made bought	<i>"The equipment are mostly manual tools such as bamboo rack, bamboo siever, basket for rinsing... and then stove, bowls, frying pan. We use some machinery like washer and crusher which need electric power, but we still need to put the materials in manually."</i> [Owner C]
Tasks do not require specific skills	<i>"I mean the process is simple, does not need particular skills [...] It is because the jobs are simple, not specific required skills or education."</i> [Owner A]

The codes and examples of interviewee's accounts related to task arrangement are shown in Table 4.13. Although every worker is assigned to a specific task, it can be understood that generally the task assignments in all observed production processes are flexible. A worker can do another task or cooperate with another worker, especially for tasks which not require certain experience. Flexibility is also understood in the work and rest hours, which are not strictly applied. Although all businesses mentioned specific work hours, such as from seven o'clock in the morning to three o'clock in the afternoon, the workers can come later or finish earlier as long as the production target is achieved. The workers also can rest at any time as necessary and can leave

during the work hours if necessary for certain reasons, such as picking up their children from the school. Overtime is possible if required, particularly at certain high demand periods such as public holidays.

Table 4.13. Codes of tasks arrangement sub-theme

Theme: Production process; Sub-theme: Task arrangement	
Codes	Examples of interviewees' accounts
Flexible task assignments	<i>"However, we are flexible in doing our tasks, helping each other. For example if my task is finished already, I could help other worker doing other tasks [...] The work is, each worker has their specific task assigned. But I think that almost all small businesses SMEs like this, the tasks are flexible, and then work together... cooperation among the workers."</i> [Worker D]
Flexible work and rest hour	<i>"Work hour is rather flexible than strict. When the daily production is achieved and no other tasks to be done before the normal work hour ends, then the workers could go home. The workers also can rest at anytime during the work hour, if they feel it is necessary."</i> [Head of association]
High-demand period overtime	<i>"The process or work is the same. Only difference is when demand is higher then the amount of kernels to be worked will also increase. That is usually on public holidays. Well it is quite (challenging) as we the workers could work overtime until five in the afternoon."</i> [Worker E]

4.3.3.2. Description of the production process

1. *Tempe* chips businesses

The observed *tempe* (soybean cake) chips businesses are Business A and Business B, in which a *tempe* chips business typically employs five workers to perform the production process. These two *tempe* chips businesses are small-sized home factories which produce chips snacks made from raw *tempe*, in which the production process areas are located in the respective owners' houses. Examples of the activities in the observed *tempe* chips businesses are presented in Figure 4.2.



Figure 4.2. Examples of activities in *tempe* chips production process (Left to right: slicing, frying, packing)

The work activities observed in the two *tempe* chips businesses are similar, as shown in the operational sequence diagram in Figure 4.3, and the overview of the production process is as follows.

- a. The production process of *tempe* chips consists of activities of slicing, mixing, battering, frying, and packing. All activities are performed manually by the workers, using equipment of knife, chair, bowl, spoon, spatula, stove, frying pan, basket, candle, packaging plastic, and label. The main material is raw *tempe*, with additional material of seasoning, frying oil, and plastic for packaging.
- b. Daily production capacity is processing a maximum 10 kg of raw *tempe*, with daily production output of 56-70 packs *tempe* chips. The daily production cycle is 6-7 process cycles, with each cycle processing 1.5 kg raw *tempe* resulting in 1.2 kg *tempe* chips in 8-10 packs weighing 120-150 gr. The required time to complete each cycle is 60-70 minutes.
- c. The production process of *tempe* chips is generally sequential. Two tasks at the start, which are slicing and mixing, are performed simultaneously by three workers as they do not have a preceding activity.
- d. Only one worker (Worker A) is specifically assigned for the slicing activity. This is due to certain experience required for the slicing task, in which a specific thickness of the sliced raw *tempe* is required.
- e. Workers B and C perform the same tasks throughout the production process, which are mixing, battering, frying, and cooling to ensure the pace of the process to achieve the production target.

- f. Workers D and E come to the work and start packing between three to four hours after the normal work hour has started, or after several batches of *tempe* chips are already cooled and ready to be packed.
- g. Task assignment is flexible rather than strict. An example of this is the involvement of Worker A in the cooling tasks, when Worker A finishes slicing the required amount of raw *tempe* in the daily requirement.

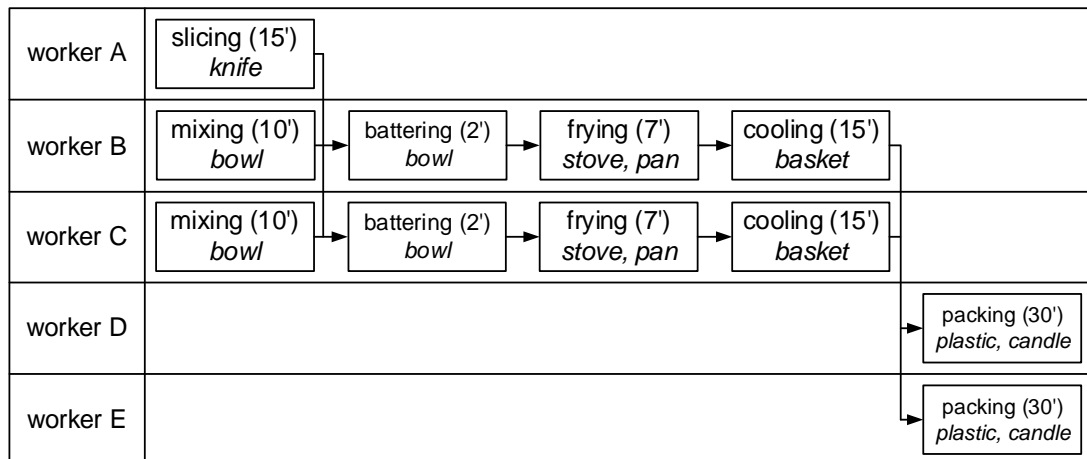


Figure 4.3. Operation sequence diagram of *tempe* chips production process of Business A and Business B (Process cycle of 1.5 kg raw *tempe*, resulting in 1.2 kg *tempe* chips in 8-10 packs weighing 120-150 gr)

2. Raw *tempe* business

The raw *tempe* business of Business C is a small home *tempe* making factory which produces raw *tempe* from soybeans. The main function of this business is to supply raw materials of *tempe* for the *tempe* chips businesses, but also serves personal customers. Business C employs three workers who work in the owner's house, utilising unused rooms or modified parts of the house to accommodate the production process activity. Examples of the activities in the raw *tempe* business are presented in Figure 4.4.



Figure 4.4. Examples of activities in raw *tempe* production process (Left to right: washing, soaking, crushing)

Although some tasks require a longer time due to certain requirements of the process, the production process of raw *tempe* is generally sequential as presented in Figure 4.5, and an overview of the work activities is as follows.

- a. The production process in the raw *tempe* making business involves activities of boiling, rinsing, crushing, washing, soaking, cooling, moulding, and fermentation. All activities are performed manually by the workers, using equipment such as a boiling bath, stirrer, crusher, basket, strainer, soaking bath, cooling rack, and plastic. The main raw materials are raw soybeans and water, with yeast as an additional material for fermentation.
- b. The maximum daily production capacity is 150 kg raw soybeans, with a daily production output of 120-180 kg raw *tempe* in 80-120 single packs weighing 1.5 kg each. The daily production cycle is 2-3 cycles, with each cycle processing 50 kg raw soybeans resulting in 60 kg raw *tempe* in 40 packs weighing 1.5 kg each. The required time to complete each cycle is 370-400 minutes.
- c. The production process of raw *tempe* making is generally sequential. However, an overnight (18 hours) soaking is required to ensure the soybeans are thoroughly cleaned from dirt. To avoid delay, the day's early task (rinsing) is processing yesterday's soaked soybeans. The final operation is fermentation, which lets the raw *tempe* ferment for at least one night to have certain characteristics such as the texture and taste.
- d. Each worker is assigned or responsible for certain tasks, with each worker handling four activities. Worker A is assigned on boiling, rinsing, boiling, and moulding; Worker B on crushing, washing, soaking, and moulding; Worker C on rinsing, boiling, cooling, and moulding.
- e. Task assignment is flexible rather than strict. Examples of this are where Worker A may help Worker B to wash crushed soybeans, and Worker B may help Worker C in cooling the boiled soybeans.
- f. Some tasks are performed by two or more workers, which are boiling and moulding. This is due to two main reasons of time efficiency and to ease difficult or heavy tasks such as lifting and stirring in boiling.

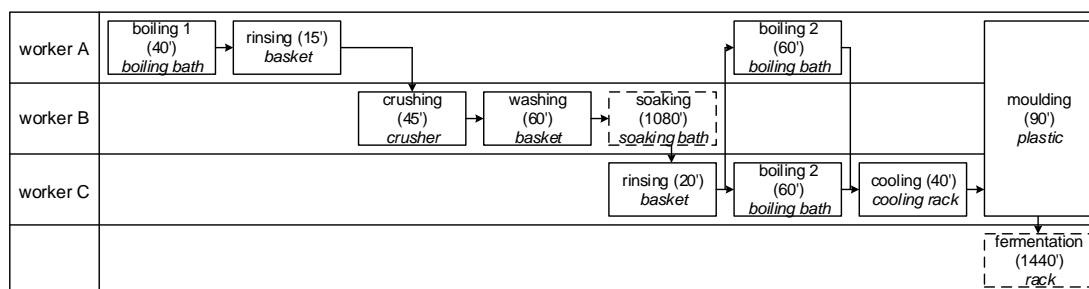


Figure 4.5. Operation sequence diagram of raw *tempe* production process in Business C (Process cycle of 50 kg raw soybeans, resulting in 60 kg *tempe* in 40 packs weighing 1.5 kg each)

3. Corn flakes businesses

Business D and E are small home factories which produce corn flakes, mainly for other businesses to be repacked or rebranded, in which a corn flakes business typically employs six or seven workers. The production processes of the observed corn flakes businesses are utilising the owners' house, mainly the reconstructed backyard. Although using more semi-automatic machines compared to the other previously explained businesses, production activities at the corn flakes businesses are still performed manually. Examples of the activities in the observed corn chips businesses are presented in Figure 4.6.



Figure 4.6. Examples of activities in corn flakes production process (Left to right: crushing area, drying, boiling)

As with the production process of raw *tempe*, some tasks in the corn flakes production process also require longer time due to the requirement of the materials or process. In general, the production process of corn flakes is sequential as presented in Figure 4.7, and the overview of the work activities is as follows.

- a. The production process of corn flakes consists of activities of boiling, washing, soaking, mixing, steaming, cooling, crushing, drying, sieving, frying, and packing. Activities are mostly performed manually by the

workers, using equipment such as washer, crusher, pot, stove, hose, soaking bath, basket, steamer, tarp, bamboo rack, sieve, frying pan, stove, and plastics.

- b. Two activities of washing and crushing are performed with semi-automatic machines, to speed up the operation time due to the high amount of materials. These activities are considered to result in better product outputs if performed with the machines, rather than manually by the workers. Although using semi-automatic machines, these tasks still have to be performed and examined by the workers, to ensure the quality of the resulting processed materials.
- c. The maximum daily production capacity is processing 150 kg corn kernels, with a daily production of 45-90 kg corn chips (45-90 packs). The typical daily production cycle is two process cycles, with each process cycle processing 50 kg corn kernels resulting in 45 kg corn chips in 45 packs weighing 1 kg each. Required time to complete each cycle is 400-420 minutes.
- d. The production process of corn chips is mainly sequential. An overnight (21 hours) soaking is required to ensure the corn is thoroughly cleaned from dirt. A longer operation time is also found in drying, where at least seven hours or more of drying is required, depending on the weather and sun heat. To avoid delay, the early tasks (rinsing and sieving) are processing yesterday's soaked and dried corn.
- e. Each worker is assigned or responsible for certain tasks, with most tasks being performed by two workers. This is due to the task methods and characteristics which require cooperation between workers, and the amount of processed materials.
- f. Task assignment is flexible rather than strict, meaning possible cooperation between workers to perform any tasks. This is found in all activities except frying, because it needs certain methods and standards which can only be done by an experienced worker.

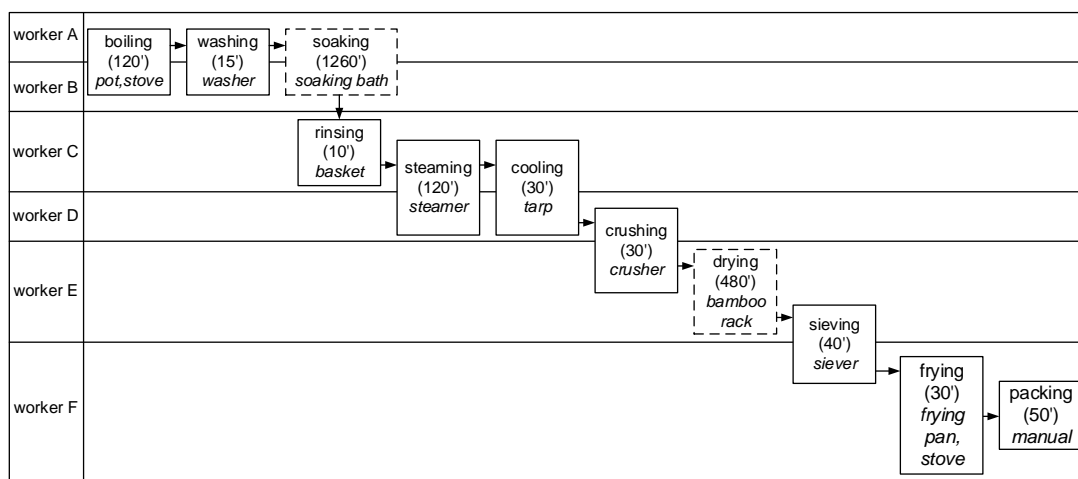


Figure 4.7. Operation sequence diagram of corn flakes production process in Business D and E (Process cycle of 50 kg raw corn, resulting in 45 kg corn chips in 45 packs weighing 1 kg each)

4.3.3.3. Procedures and standards

While there are work procedures or standards, they are not written nor present in the work area. These are explained by the owners to the workers when they start as new employees, especially if they are inexperienced in the tasks. The workers will be familiar with the procedures or standards from routine work, which some interviewees pointed out would be achieved in a few days. The workers also already have years of work experience in doing the production process. As a result of the experienced workers and familiarity, the procedures and standards are done by approximation. An example is the slicing task in the *tempe* chips businesses, in which the thickness of the sliced *tempe* should be between one to two millimetres. However, this was not measured by the slicing workers, which they already know from familiarity. Related to this, therefore, experience is important for certain tasks. The codes and examples of interviewee's accounts related to procedures and standards are shown in Table 4.14.

Table 4.14. Codes of procedures and standards sub-theme

Theme: Production process; Sub-theme: Procedures and standards	
Codes	Examples of interviewees' accounts
Familiarity from years of experience	"There are standards on some process [...] That is from routine experience. For example the softness of the soybeans is felt when stirring... it's stirred, (felt) soft already then that's enough. That is from habit, not measured." [Worker C]
Approximation of procedures and standards	"Well it is just estimated as we are already get used to it. Another example is, for instance... each frying

Theme: Production process; Sub-theme: Procedures and standards	
Codes	Examples of interviewees' accounts
	<i>can not be too long, because it is quick until it cooks. Well that is maximum about five minutes I think, but we are not looking at a clock.</i> [Worker D]
Importance of experience in some tasks	<i>"...but indeed experience or habit is important. Because the timing of the frying has to be accurate. If it is too long it will burn, if it is too fast... it will be less crunchy or crispy."</i> [Owner A]

4.3.3.4. Supervision

It can be understood from the interviews that there is no specific supervisory person in the observed businesses. As a result, there is limited supervision of the workers or the activities, and the owners pointed out that they trust the workers. The limited need for supervision is also because all workers were familiar with their jobs from several years of experience. New workers may be supervised by the owners in their early days on starting their job if necessary. Afterwards, no supervision is given. Some supervision by owners is focused on the quality of the product and the accomplishment of the production target. This is done by the owners before the end of a work day. If the quality of the product is inappropriate or the production target is not achieved yet, the owners then instruct the workers to correct the quality of the product or speed up the production process. The codes and examples of interviewee's accounts related to supervision are shown in Table 4.15.

Table 4.15. Codes of supervision sub-theme

Theme: Production process; Sub-theme: Supervision	
Codes	Examples of interviewees' accounts
No particular and strict supervision	<i>"No, I do not supervise my workers. I believe they are experienced enough. Moreover, the workers here are learning by doing and experience, no such theory or trainings given."</i> [Owner B]
No particular supervisory person	<i>"We in small businesses like this, there is no specific regular supervision by supervisory person or division... no... no such thing as not necessary."</i> [Head of association]
More to product quality and target	<i>"Well sometimes I do have a look, but only to the final product of the tempe. If for example the final tempe product is not in accordance with the specified targets or standards, then I just ask the workers what went wrong. Usually it's just needs to be cleaner."</i> [Owner C]

4.3.4. Ergonomics and work safety

4.3.4.1. Work conditions and work-related issues

The interviewees described the workplaces as not designed specifically for the tasks. As previously presented, the work activities in the owners' houses are performed in domestic rooms, kitchens, backyards, or other parts of the owners' houses. Based on talks with the owners during the observation, the utilisation of the owners' houses is due to the small scale of the production and the simple tasks performed. Additionally, this was considered feasible rather than build a designated production facility which would be costly. It was also understood that, to accommodate the production process, some adjustment or modifications to some of the owners' houses were made. An example is the addition of semi-permanent buildings made with wood and bamboo to accommodate the production process activities in the corn flakes businesses. Additionally, most of the equipment was not designed specifically for the tasks, but was bought ready to use from certain shops.

Furthermore, all interviewees pointed out tiredness and body pain that was experienced by the workers. Prolonged standing or sitting, heavy lifting, and inappropriate work postures or movements are some of the causes for the tiredness and body pain. The interviewees also put forward the inappropriate work environment for the production processes, in which hot working conditions, slippery areas, and dirty workplaces are commonly pointed out by the interviewees. The codes and examples of interviewee's accounts related to work-related issues are shown in Table 4.16.

Table 4.16. Codes of work-related issues sub-theme

Theme: Ergonomics and work safety; Sub-theme: Work-related issues	
Codes	Examples of interviewees' accounts
Workplace and equipment are not designed for the activities	<i>"The work areas and... the equipment placement in this production process are not designed for this work, this is because the production process is performed in the owners' house. If I am not wrong, from the start this house is like this, before this business started."</i> [Worker A]
Tiredness and body pain	<i>"Yes, stiffness on my legs and arms as I said, as I am at least doing this task standing for three hours. So I am taking rest a little bit for several minutes ... other workers also feel like that not comfortable, the difference is while I am standing, he is on long period of sitting."</i> [Worker A]

Theme: Ergonomics and work safety; Sub-theme: Work-related issues	
Codes	Examples of interviewees' accounts
Inappropriate work environment	<i>"My workplace is poorly ventilated and the jobs are hot. This resulted in excessive sweating, that forces the workers to work without clothes on. Environment is obviously hot. Just like you can see it yourself there [...] Slippery and dirty are also common I think in all tempe factory like this."</i> [Owner C]

As the production process areas were not designed specifically for the activities, various potential work-related issues were observed, such as space limitations for work and inappropriate or unsuitable tools. The workers were observed to be working with various hazards and risks from various sources of the environment and materials. Additionally, the workers themselves were performing their tasks with some inappropriate unsafe acts. An overview of the observed potential work-related issues is presented in the following.

1. Space limitations. As the work areas were not designed specifically for the activities, there are some issues related to space limitations. In Business A, the slicing activity is located at the house's front terrace next to a main street which is busy with passing vehicles, exposing the workers to potential hygiene issues and the raw materials to potential contamination and hygiene hazards, respectively. In *tempe* chips businesses of Business A and B, most of the tasks are located at the garage (battering, frying) and living room (packing), with narrow space for movement and equipment placement or storage. Narrow spaces for workers' movements, material handling, and equipment placement were also found in the raw *tempe* production process of Business C. In general, space limitations were seen in all of the observed workplaces, resulting in inappropriate placement of materials and equipment. This could pose potential hazards and risks to the workers and potential product contamination.
2. Inappropriate or unsuitable tools. Most of the equipment used in the observed workplaces are pre-made bought equipment, which are not designed specifically for the tasks. As a result, several workers have difficulties and discomfort in doing their tasks. Examples of this are found on slicing activity in Business A and B, in which the workers have

to use the owner's house living room seat and table to slice the raw *tempe*, as well as using their own knives.

3. Dirty and untidy work areas. Work areas of all of the observed workplaces were mostly dirty and untidy. It was observed that the production equipment was not placed or stored neatly. Additionally, there is no regular or scheduled cleaning for the work areas, which pose high consequences of contamination of materials or injury from frying oil splatter and water and batter spillage.
4. Inappropriate work postures and body movements. In all observed workplaces, there were tasks which involve the workers working with inappropriate body movements and work postures. In raw *tempe* and corn flakes businesses, body twists while stirring boiled materials were observed, as well as squatting to oversee crushing. In raw *tempe* production activities, some workers bent their bodies down to reach the soybean sack, then lift the sack with the support of their legs before pouring the soybeans into the boiling bath. These observed task procedures appeared to be difficult and had potential for injury of the workers. Some tasks such as frying and slicing in *tempe* chips businesses involve prolonged sitting and standing. Furthermore, as mentioned during the observations, the workers have to frequently take several minutes of break between cycles and they experience stiffness on some of their body parts after the work. Examples of tasks involving inappropriate work postures are shown in Figure 4.8.



Figure 4.8. Examples of inappropriate work postures

5. Hazardous work conditions. Hot working conditions were found in all of the observed businesses. In addition to the nature of the hot Indonesian tropical climate and the mostly indoor work areas with inadequate

ventilation, the processes themselves contribute to the hot working conditions. Raw *tempe* making activities in Business C involve utilisation of a large boiling bath with a boiler, which occupies a large space on the production floor. Workers are constantly exposed to heat from the firewood and steam from the boiler. In the corn flakes production processes of Business D and E, although the production processes are located in an open backyard which allows adequate air ventilation, hot working conditions were still observed. This is mainly due to activities which involve boiling, steaming, and frying, which produces hot air and steam. Workers involved in the drying tasks of corn flakes businesses are highly exposed to sun heat, as it is performed outdoors with no roof. The weather was clear at the time of observation, and the worker was visibly sweating excessively and stated that they experience that on a daily basis unless the weather is rainy. Furthermore, uneven and bumpy floors were also found in all of the observed workplaces. Combined with the slippery conditions from the materials, these pose risks such as slips, trips, and falls to the workers. Examples of the work conditions in the observed workplaces are shown in Figure 4.9.



Figure 4.9. Examples of work conditions in the observed workplaces

6. Hazardous tasks from the materials and equipment. Various tasks were observed to be hazardous during the observations, due to either the materials or equipment. Activities at the raw *tempe* making and corn flakes businesses involved large amounts of water, such as for washing, boiling, and soaking, which makes the work area wet and slippery from water spillage and puddles. This is also made worse by inadequate drainage, as there is no specific drainage installation in the

production area. In frying tasks of *tempe* chips businesses which use gas as the source of fire, the gas canister placed close to the stove fire poses a risk of explosion. Another example of a hazardous task is the washing task in the raw *tempe* production process, which involves a chemical solvent to wash the soybeans. This exposes the worker to the risk of illness, and the worker stated that it is common for them to have itchy skin. The semi-automatic machines in corn flakes businesses produce machine smoke and vibrations which could be hazardous to the workers. Furthermore, hazards from equipment were also found in *tempe* chips businesses, specifically in tasks of slicing which used a sharp knife and packing which used a candle to seal the plastic packaging. A summary of the observed work hazards and the identified possible consequences is presented in Table 4.17.

Table 4.17. Observed work hazards in Study 1 observations

Observed hazards	Possible consequences	Locations
Bumpy or uneven floors	Slip, trip, fall	All observed workplaces
Inappropriate work postures and movement	Body pain and tiredness	
Prolonged sitting and standing	Body pain and tiredness	
Hot oil, fire	Body parts blisters	
Slippery floors	Slip, trip, fall	Raw <i>tempe</i> workplace and corn flakes workplaces
Hot steam, hot water	Body parts blisters	
Electricity	Electric shock	
Machine sharp parts	Body parts cuts or grazes	
Machine vibration	Body pain	
Candle fire	Body parts burn, fire at work	<i>Tempe</i> chips workplaces
Knife	Body parts cuts or grazes	
Sun heat exposure	Excessive heat	Corn flakes workplaces
Chemical water exposure	Skin rash or itchiness	Raw <i>tempe</i> workplace

7. Unavailability of safety equipment and procedures. Safety equipment and procedures were not available in the observed workplaces of Indonesian small food-producing businesses. Workers were not wearing or using any safety, protective, or hygiene related equipment,

and there was no designated first aid kit and emergency equipment provided in the work area. Safety caution notices or guidance were also not found in the work areas.

8. Heavy lifting and stirring. Heavy lifting and stirring activities were particularly observed in the production processes of raw *tempe* and corn flakes businesses. A worker involved in a boiling task of Business C was observed to lift at least 25 kg of soybean sacks from the floor to the boiling bath. This lifting activity also involved bending down to reach the sack on the floor and was done several times in a working day. Moreover, the lifting activity was done without any support and bare-footed, in a work environment where the floor is slippery. The boiling tasks in Business C, D, and E involved heavy stirring of boiled soybeans and corn kernels. The stirring was considered heavy as the total stirred materials in the boiling baths could be at least 50 kg of weight. The body twist movements of the workers during the stirring also indicated the difficulty of the stirring task. Examples of observed heavy lifting tasks are show in Figure 4.10.



Figure 4.10. Examples of heavy lifting tasks

9. Unsafe acts. Several unsafe acts were observed during the observations in all of the workplaces. In the workplace of raw *tempe*, some workers were working shirtless due to the hot working conditions. Additionally, as also observed in the workplaces of corn flakes, most of the workers were working bare-footed which could expose them to hazards such as hot materials. However, it can be understood that they were working bare-footed to minimise the risks of slips from the slippery floors. The workers in frying tasks in the workplaces of *tempe* chips and corn flakes were working bare-handed, which could expose them to the

hazard of hot oil splashes. Furthermore, it was observed in all of the workplaces that some workers were smoking and chatting whilst performing their tasks.

Furthermore, it can be understood from the interviews that injuries and unsafe events are occurring in the observed Indonesian small food-producing businesses. However, these are not recorded and the interviewees pointed out that the occurring injuries and unsafe events are minor in severity. Some of the perceived minor injuries are scratches and swelling, while unsafe events such as fall involving workers and incidents of fire are also thought to be minor. The interviewees seemed to be aware of the work hazards and risks in their workplaces, pointing out various sources of the work hazards and risks such as hot materials and sharp tools, and from the tasks themselves such as inappropriate movements. The codes and examples of interviewee's accounts related to injuries and unsafe events are shown in Table 4.18.

Table 4.18. Codes of injuries and unsafe events sub-theme

Theme: Ergonomics and work safety; Sub-theme: Injuries and unsafe events	
Codes	Examples of interviewees' accounts
Occurrence of injuries and unsafe events	<i>"Scratches from knife while slicing, arms or legs stiffness, burnt from hot oil are some that happens to the workers."</i> [Owner B]
Perceived as minor	<i>"...although so far there have not been any major ones. Like almost on fire (the place), workers fell, these were happened."</i> [Worker D]
Awareness to hazards and risks	<i>"Some activities exposing danger risks, if you know what I mean. For instance we use a lot of water in washing. That makes the work area slippery... like that you can see that right... the floor is wet."</i> [Worker E]

4.3.4.2. Attitude and knowledge on ergonomics and work safety

It can be understood from the interviews that ergonomics and work safety are not perceived to be a priority in the observed Indonesian small food-producing businesses. There are indications that the priorities of the businesses are the production and sales, and that work conditions are not being given attention, indicated by the interviewees' statements that they rarely or never think about work conditions or safety. Additionally, some

interviewees also pointed out the difficulty in improving the work conditions, so they accept and would carry on with the current ones. Some interviewees pointed out that the productions and businesses can still run in the current work conditions. Some interviewees also stated that improvement of the work conditions and safety may be unnecessary, and that the current work conditions are fine. Furthermore, the interviewees seemed to have low knowledge and exposure to ergonomics. All interviewees stated that they do not have any experience related to ergonomics and did not understand it, even after the researcher explained a little bit about ergonomics and work conditions. The codes and examples of interviewee's accounts related to attitude and knowledge are shown in Table 4.19.

Table 4.19. Codes of attitude and knowledge sub-theme

Theme: Ergonomics and work safety; Sub-theme: Attitude and knowledge	
Codes	Examples of interviewees' accounts
Less importance	<i>"Because we here just think about the production, achieve the target every day. So if... like working comfortably, never think about it..."</i> [Worker C]
Acceptance to the current work conditions	<i>"That (improvement) may be difficult, so well it's fine just like this. Well then the main thing is us the workers just carrying on doing our tasks in this work area."</i> [Worker B]
Low knowledge and exposure	<i>"Ergonomics? What is that as I think I have just heard it now [...] I do not think I have that experience. Just heard it now..."</i> [Owner D]

4.3.4.3. Potential solutions to work-related issues

Despite the indications of acceptance of the current work conditions and less importance of ergonomics and work safety among the people of the businesses, they seemed to appreciate the need for improvements. Discussions with the owners were also conducted during the observations, to obtain their opinions on potential solutions to deal with the observed work-related issues and to minimise the observed work hazards or other problems. Below are several potential solutions that were identified.

1. Consider air ventilation and water drainage improvement. Better air ventilation and water drainage in the workplaces would provide a better work environment and reduce work hazards for the workers. However,

cost and space limitations are the main challenges for these, as they would require modification or reconstruction of the work area.

2. Increase knowledge on work safety and ergonomics. It can be understood that the interviewees have relatively low knowledge and experiences of work safety and ergonomics. In talks during the observations, some owners mentioned that the people may have more understanding on what should be done or improved in the workplaces, if they have more knowledge about ergonomics and work safety. By increasing the people's knowledge of these, it is expected that people will have more understanding of dealing with the work-related issues.
3. Protective equipment and first aid kit provision. Observation results showed that the workers were not wearing any protective equipment, and the businesses are not providing them either. Designated first aid kit for possible emergencies or injuries was also not in place. Provision of first aid and emergency equipment is regulated in Regulation of Ministry of Manpower and Transmigration No. PER.15/MEN/VIII/2008 (2008). However, it obliges only enterprises with 100 or more workers, or less than 100 with high risk of hazard. The unavailability of first aid and emergency equipment in the observed businesses could be due to the small size and perceptions of easy tasks and minor injuries and unsafe events. However, provision of protective equipment and a first aid kit in the observed businesses can minimise the risk of potential injuries or unsafe events, and provide first aid support if any injuries or unsafe events happen.
4. Improve the overall hygiene and tidiness of work area. It is clear from the observations that the work area conditions at the observed businesses are generally dirty and untidy. In addition to the potential disruption to the activities, this could also pose additional hazards and risks in the activities, such as trips and falls from the untidy equipment and work area. These could be minimized by improving the hygiene and tidiness of the workplaces.
5. Provision of more suitable equipment. It was considered that one source of work hazards and risks could be the unsuitable or

inappropriate equipment that is being used by the workers. This forces the workers to perform inappropriate work postures or movements and heavy lifting or stirring, resulting in complaints of body pain and tiredness. By providing more suitable equipment, it is expected that the work hazards and risks can be minimised, although there may be challenges of cost and limited knowledge about such risks.

When talking about potential improvements or solutions for the work-related issues, the interviewees frequently mentioned cost as the main constraint. The interviewees pointed out that while improvement may be useful, they may be costly and it is better to use the funds to maintain the production and sales. Another potential constraint for improvement to solve the work-related issues is the people's limited understanding of how to improve the workplaces regarding safety and other work-related issues. On the other hand, the interviewees indicated that they are interested to learn about improvement for their workplaces. The codes and examples of interviewee's accounts related to improvements are shown in Table 4.20.

Table 4.20. Codes of improvement sub-theme

Theme: Ergonomics and work safety; Sub-theme: Improvement	
Codes	Examples of interviewees' accounts
Cost consideration	<i>"If what you mean is to have better workplace for the workers, I have no solution in the meantime. It is mainly due to cost consideration..." Well... maybe it can (improve). But cost obviously. [Owner C]</i>
Interested in improvement	<i>"Well I would like to hear if there is any improvement for that," [Worker E]</i>
Limited understanding on improvement	<i>"Well maybe it is necessary to change the work method or equipment, maybe will address it, but we do not know we don't understand." [Owner E]</i>

4.3.5. Summary of Study 1 results

The observations and interviews that were carried out in Study 1 were useful to understand and describe the work and work-related issues in the observed Indonesian small food-producing businesses. Referring to the Study 1 objective, the summary of the results of Study 1 is presented in Table 4.21.

Table 4.21. Summary of Study 1 results

Topic of summary	Results summary
Work activities	<ul style="list-style-type: none"> • Work activities of the production processes are located in the respective owners' houses of the businesses, which are not specifically designed for the activities. • Production processes in the observed Indonesian small food-producing businesses consist of manual activities in generally sequential processes, with manual and pre-made purchased equipment. • Flexibility of task assignment was observed, in which although a worker is specifically assigned to one or more tasks, they can cooperate between each other. • The people of the observed businesses pointed out that the work activities are relatively easy and simple, in which there is no specific requirement for skills to perform the activities. • The workers are familiar with the tasks from years of experience, in which there are certain procedures and standards in the activities based on approximations and habits. • Limited supervision is being carried out on the workers or the activities, and supervision is more focused on the quality of the final production and achievement of the production target.
Work-related issues	<ul style="list-style-type: none"> • Generally, as the production process facilities are not designed specifically for the work activities, various work-related issues related to ergonomics and work safety were observed. • The workers are exposed to various hazards from the materials, equipment, and work methods, and they are working in various hazardous and risky work conditions. Various inappropriate work postures and movements, as well as tasks involving heavy lifting were observed. • Safety equipment and procedures are not available in the observed workplaces. • Injuries and unsafe events are occurring which were perceived as minor by the interviewees. Indications of awareness of the work hazards and risks were also shown by the interviewees. • While indicating interest in improvement regarding ergonomics and work safety, the interviewees pointed out cost and limited understanding of ergonomics issues as some of the challenges for improvement. • While indicating acceptance of the current work conditions, the interviewees pointed out that ergonomics and work safety are not a priority in the businesses.

4.4. Study 1 discussion

Kaewboonchoo et al. (2016) stated that the work environment of SMEs in South East Asia region including Indonesia may not be well-maintained and well-controlled, with potential effects on the health of the workers. This situation was found in Indonesian small food-producing businesses observed in Study 1, where various work-related issues were observed. This includes inappropriate and unsafe work conditions, as well as various exposures of work hazards and risks. In another study involving a similar workplace of *tempe* chips as in this research, Dewi et al. (2020) pointed out conditions such as fire hazards and unavailability of safety equipment and first aid. This was also observed in Study 1, where safety and emergency equipment are not provided in all observed businesses, despite the hazards and risks such as fire. Results of Study 1 also showed other work-related issues such as poor work postures and risks of slips and trips, which was also previously indicated by Rahayuningsih (2019) and Yuslistyari et al. (2018) in some types of Indonesian small food businesses.

One potential aspect that could contribute to the observed work-related issues is the work design. Marhaendra et al. (2022) and Wulandari & Umam (2020) indicated that the work activities of Indonesian small food businesses are mostly located and performed in a workplace which was not specifically designated for the work activities. Most of the work activities in Indonesian small food businesses are performed in the respective owners' houses, hence they are often referred to as home industries. The current research observed similar conditions, in which all observed work activities were located and performed in the corresponding owners' houses, which were not originally designed or prepared for the work activities. Additionally, most of the equipment used to carry out the tasks in the work activities were pre-made equipment bought from certain shops.

Another possible source for the various work-related issues in the observed Indonesian small food-producing business could be the manual tasks that are being performed in the work activities. Walters et al. (2018) pointed out that manual tasks are the main physical risk to health and have the potential to cause work-related problems. In Indonesian small food

businesses, it has been indicated that the work activities consist of manual tasks which pose risks to occupational health as described in some studies such as A'yunin et al (2021) and Siswanto et al. (2021). In the current study, it can be also understood that the work activities in all observed Indonesian small food-producing businesses involve manual tasks. Consequently, the workers are exposed to various potential work-related issues such as body pain and tiredness.

Champoux & Brun (2003) and Vickers et al. (2005) implied that, compared to larger companies, occupational health and safety (OHS) performance is poorer with higher workplace accident rates in SMEs. Ferjencik (2020) also argued that accidents can occur not only in large enterprises but also in SMEs, in which the rates of both fatal and non-fatal accidents associated with the SMEs are higher than large companies (Fabiano et al., 2004; Mendeloff et al., 2007). In the observed Indonesian small food-producing businesses, the interviewees recognised that unsafe events and injuries do occur. However, those are not recorded or monitored which make the determination of the number or rate of the unsafe events and injuries in the observed workplaces difficult.

From the current study, it can be understood that there are indications of acceptance by the people of the current work conditions, where various work-related issues are observed. It has also been discussed that in small businesses, there may be acceptance by the people of the work risks as a result of the culture of work safety, in which risks are accepted as a part of the job (Kines et al., 2013; Walters et al., 2018). Legg et al. (2009) also argued that due to their vulnerability in the labour market, workers in small businesses tend to accept the poorer work conditions. In this current study, the indications of acceptance of the current work conditions are reflected by the interviewees' frequent statements that they are content with the work conditions as the production and business can still run with it.

Furthermore, Hasle & Limborg (2006) argued that issues of safety and health in small enterprises are often pushed aside by the businesses themselves, as they have to cope with other business constraints that are much more critical for their survival. Results from the current study have

confirmed this view, in which there was an indication of less importance on safety in the observed businesses. In the interviews, the people of Indonesian small food-producing businesses often pointed out that they do not think about the potential work-related issues. The priority of the businesses seemed to be sales and quality of product, in addition to dealing more with problems related to raw materials procurement and demand and price fluctuation. These could make the Indonesian small food-producing businesses push work safety and the related issues aside.

4.5. Study 1 conclusion

Understanding of the work and work-related issues in Indonesian small food-producing businesses has been achieved in Study 1. Generally, despite the seemingly easy tasks and relaxed friendly work environment, various work-related issues were observed in the workplaces and activities. There were several observed issues related to hot working conditions, tiredness, body pain from inappropriate work postures and heavy lifting, and exposure of various work hazards and risks. There were also indications of the occurrence of injuries and unsafe events in the workplaces, but they are not recorded. Although the people of the businesses seemed to be aware of the issues relating to work safety in their work activities, they tend to ignore them and accept the current work conditions. The people of the businesses also seemed to have perceptions of minor frequency and severity of the occurring injuries and unsafe events. It was considered necessary to further investigate the people's thoughts on work safety in the next study of the overall research.

Chapter 5

Study 2: Exploring thoughts and opinions on work safety and risk among the people of Indonesian small food-producing businesses

5.1. Introduction to Study 2

In the previous Study 1, it was understood that there are various work safety issues in the observed Indonesian small food-producing businesses. While the people of the businesses seemed to be aware of the work safety issues in their workplaces, less attention seemed to be given by the people to actually addressing these issues. There were indications of ignorance of some aspects of the work conditions, and perceptions of minor severity of outcomes. Following these findings, it was considered that further investigation of the people's thoughts and opinions on work safety and risk was necessary. Study 2 was designed to explore more about how people think about safety and risk, and what safety and risk mean to the people.

The objective of Study 2 was to explore thoughts and opinions on work safety and risk among the people of Indonesian small food-producing businesses. To achieve this objective, in-depth scenario-based interviews were carried out, to collect more detailed information and obtain deeper understanding of the thoughts and opinions on safety and risks among the people of Indonesian small food-producing businesses. Compared to Study 1, in which semi-structured interviews were conducted to understand work and work-related issues, the in-depth scenario-based interviews in Study 2 were focused more explicitly on understanding the people's thoughts and opinions on safety and risks in a defined scenario.

The scenario and interview questions were designed to explore and elicit the people's responses on their thoughts and opinions on work safety and risk in depth. Additionally, a phenomenology approach was deployed to understand the people's experiences and meanings of work safety and risk.

Furthermore, Study 2 involved a wider set of participants, including owners, workers, the head of associations, a government representative, and an expert university staff member who had expertise and experience in work safety and ergonomics. The overview of Study 2 is presented in Figure 5.1.

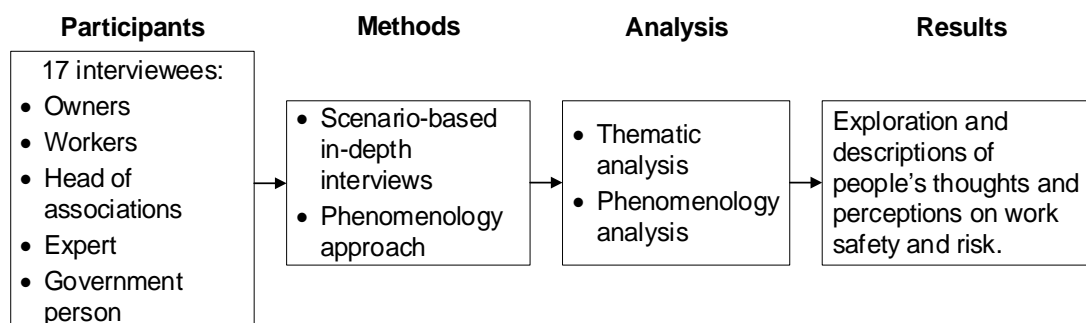


Figure 5.1. Overview of Study 2

5.2. Study 2 method

5.2.1. In-depth scenario-based interviews

5.2.1.1. Development of the scenario






As phenomenology research should focus on trying to access the participants' experiences, feelings, and thoughts (Groenewald, 2004; Wilson, 2015), in-depth scenario-based interviews of Study 2 were designed to explore the participants' thoughts and opinions particularly related to work safety and risk. Rosson & Carroll (2002) explained that scenarios are stories, consisting of one or more actors in a setting or situation, that would enable exploration of reactions, motivations, and intentions. They added that textual narrative of observed workplace practices can be used as scenarios, where the things that people are doing are described or presented as stories. Suri & Marsh (2000) also pointed out the usefulness of combining pictures and texts in using scenarios to stimulate ideas or issues for exploration.





In Study 2, pictures of workplaces showing safety practices and conditions obtained from Study 1 observations were presented to the interviewees. Additionally, narrative texts on safety practices and conditions at workplaces of Indonesian small food-producing businesses based on findings of Study 1 were also presented. However, although Study 1 findings showed poor safety practices and conditions, the narrative text on the Study

2 scenario was formulated using general and neutral descriptions of conditions of safety at the workplaces. This was to avoid critical judgment of the scenario which could bias the interviewees' responses, following suggestions of Moustakas (1994) that a neutral focus on the topic is required in a phenomenology study. Furthermore, during the presentation of the scenario, interviewees were given two short and simple tasks to choose pictures which show good work safety conditions and pictures which show the need for improvements, based on their own opinions. These tasks were aimed to explore their initial thoughts on safety and risks at the workplaces of Indonesian small food-producing businesses.

Other factors from literature related to safety and risk perceptions were also incorporated in the scenario. Hayes et al. (1998), Pandit et al. (2019), and Williamson et al. (1997) looked into safety training, safety policy, and PPE in their research to explore attitudes and perceptions of safety. Factors such as safety rules and procedures, safety communication, safety knowledge, and safety commitment were used by Vinodkumar & Bhasi (2010), Wang et al. (2016), and Williamson et al. (1997) to explore their relationships with safety and risk perceptions. These factors were included in the scenario narratives to elicit and gather responses from the interviewees on these aspects of their thoughts and opinions on work safety and risk. The scenario that was developed in Study 2 interviews is presented in Table 5.1.

Table 5.1. Study 2 scenario

Scenario			
Please see the pictures below.			
			
			

Scenario			
			
<ul style="list-style-type: none"> • These are typical workplaces in small food-producing businesses, which operate in small household scale with individual proprietorship using the owners' house. The work activities are performed manually by the workers, using ready to buy and use equipment. The workers have to work in different circumstances of workplaces, including hot environments, a range of floor conditions, and require various postures and movements and lifting of many different items. • Can you please indicate three pictures that you think show examples of good work safety conditions? Can you please explain the reasons for your selection? • Can you please indicate three pictures that you think show examples where there is need for improvement of work safety conditions? Can you please explain the reasons for your selection? • In an earlier study, some potential ways of reducing and managing the risks in the work were considered, including whether businesses are providing or implementing safety policy, Personal Protective Equipment (PPE), safety training, guidance and procedures and warnings, allocating safety responsibilities in organisations, relationships with external parties (e.g. government, experts/academics) for consultation regarding safety. 			

5.2.1.2. Interviews questions

Following the presentation of the scenario, the interviewees were involved in in-depth interviews, in which the questions were aimed to explore thoughts and opinions on safety and risk. There were some considerations in developing Study 2 interview questions, to ensure the interviews would achieve the objective of the study. As suggested by Boyce & Neale (2006) and Patton (2002), in-depth interviews should involve open-ended questions which would elicit people's opinions and experiences. Related to the phenomenology approach that was carried out in Study 2, Sundler et al. (2019) similarly suggested the use of open questions in a phenomenology study, to enable openness which should guide the entire process of a phenomenological study from data gathering, data analysis, to reporting. Additionally, Moustakas (1994) emphasised that interview questions in a

phenomenology study should be broad questions and abstain from making suppositions to explore the participants' experiences.

Considering the previously mentioned requirements for an in-depth interview and phenomenology study, the Study 2 interview questions were formulated to be open and general questions related to safety and risk in the workplaces of Indonesian small food-producing businesses, to give opportunity for the participants to expand and give details to their responses. There were open and broad questions such as "Can you tell me about a time when an unsafe event occurred?", "What would you do if an unsafe event happens?", and "What kinds of things do you think could go wrong or cause harm in your workplace?", as can be seen in Table 5.2.

Table 5.2. Study 2 interview questions

Interview questions	
For workers and owners	For head of association, government, experts/academics
<ul style="list-style-type: none"> • How would you describe work safety and its importance at your workplace? • Do you feel that you are working safely and your working conditions are safe? Can you explain the reasons for your answer? • What kinds of things do you think could go wrong or cause harm in your workplace? How serious would the consequences be and why? • Can you tell me about a time when an unsafe event occurred? For example an incident or accident resulted in injuries to the workers. What would you do if an unsafe event happens? • Can you tell me about a time when you have been involved in improvements or management of safety within or outside your business? • How would you think work safety could be implemented differently in your workplace? What would be the challenges or barriers? 	<ul style="list-style-type: none"> • How would you describe work safety and its importance at these workplaces? • Do you think that the workers are working safely and their working condition is safe? Can you explain the reasons for your answer? • What kinds of things do you think could go wrong or cause harm in these workplaces? How serious would the consequences be and why? • Can you tell me about a time when an unsafe event happened in these types of workplaces? For example an incident or accident resulted in injuries to the workers. What would you do if you are informed or heard of an event related to safety happens in these workplaces? • Can you tell me about a time when you or your organisation were involved in safety management or improvements with these businesses? • How would you think work safety could be implemented differently in these workplaces? What would be the challenges or barriers?
Follow-up questions	
<ul style="list-style-type: none"> • Can you elaborate a little more on that? • Can you give me examples on that? 	

Interview questions	
For workers and owners	For head of association, government, experts/academics
Ending and clarifying	
<ul style="list-style-type: none"> • Summary of the interview • Is there something you would like to add or clarify? • Is there something we forgot to talk about? • Acknowledgement 	

5.2.2. Participants

The Study 2 interviewees were selected purposively, ensuring that for this phenomenology study, the data were collected through in-depth interviews from individuals who have experienced the phenomenon as suggested by Creswell (2013). All Study 1 interviewees were involved in Study 2 interviews to further investigate their thoughts and opinions on work safety and risk in more detail and depth, with additional interviewees to have broader responses from people with experience in work in Indonesian small food-producing businesses. Two owners, two workers, and one head of association from each type of product were interviewed in Study 2. Workers and owners were involved as they are the main focus of the study and they are directly involved in the activities in the workplaces, and can provide the essential information around safety and risk in Indonesian small food-producing businesses. The head of associations oversee the general organisational and operational aspect of the businesses. Additionally, to gather opinions and thoughts on safety and risk through relevant external viewpoints, an expert and a government person were also interviewed.

The profile of the interviewees is presented in Table 5.3. The owners, workers, and head of associations have vast experience of working in Indonesian small food-producing businesses, ranging from 5 to 23 years. The expert was an academic staff member at a university whose expertise and research experience are in the topic of work safety and ergonomics, and has field experience of working and consultation on the field of health and safety in various industries. The government person was from a government agency in the municipality which deals with workers' well-being and productivity, including small businesses. As can be seen in Table 5.3, the expert and government person have 18 and 22 years of work experiences in their current

role, respectively. It was expected that they would be able to provide useful information and perspectives on work safety and risk in Indonesian small food-producing businesses.

Table 5.3. Profile of Study 2 interviewees

No.	Interviewee	Age (years old)	Work experience (years)	Business/organisation	Operating length (years)
1.	Owner A	53	19	A (<i>tempe</i> chips)	12
2.	Worker A	39	9		
3.	Owner B	65	21	B (<i>tempe</i> chips)	21
4.	Worker B	31	6		
5.	Owner C	62	22	C (raw <i>tempe</i>)	22
6.	Worker C	41	12		
7.	Owner D	58	23	D (raw <i>tempe</i>)	23
8.	Worker D	43	21		
9.	Owner E	56	20	E (corn flakes)	20
10.	Worker E	47	11		
11.	Owner F	52	24	F (corn flakes)	25
12.	Worker F	29	5		
13.	Head of association 1	51	18	Association of <i>tempe</i> chips businesses	
14.	Head of association 2	45	13	Association of raw <i>tempe</i> businesses	
15.	Head of association 3	48	14	Association of corn flakes businesses	
16.	Government person	42	18	Government agency	
17.	Expert	56	22	University academic staff	

5.2.3. Interview procedures

Study 2 data collection of in-depth scenario-based interviews were conducted remotely by phone calls during February-March 2021, due to Covid-19 situation at the time of Study 2 limiting travel and conduct face-to-face interviews with the interviewees. The researcher was located in Nottingham, United Kingdom, while the interviewees were located in Indonesia. Ethics approval of the study was provided by the Ethics Committee of Faculty of Engineering, University of Nottingham, before the study commenced. Before each interview, the prospective interviewees were given access to online Microsoft Forms prepared by the researcher, including information about the study, such as the objectives, procedure, what happens after the interview, and data storage and utilisation. After agreeing to participate, they filled in a consent form.

The interviews contained two parts to present the scenario and ask interview questions, in which a PDF version of the scenario (Table 5.1) was sent to the interviewees by email prior to the interviews. During the first part of presenting the scenario, the interviewees were looking at the scenario and listening to the reading of the scenario details by the researcher. Firstly, as instructed at the beginning of the scenario, the researcher asked the interviewees to look through the pictures that were being shown. The researcher then asked the interviewees to read through the scenario, whilst the researcher was also speaking through the scenario to guide the interviewees. This was to ensure that the interviewees understood the scenario. Tasks to select pictures based on the interviewees' opinions on the safety conditions were also conducted during the presentation of the scenario. After presentation of the scenario, the interviews were then continued with the further questions to the interviewees (Table 5.2). All interviews, including the choices made by the interviewees on the tasks to choose pictures, were recorded by a separate recording device which was in operation during each interview. The average time spent for Study 2 interviews was 40 minutes.

5.2.4. Analysis

5.2.4.1. Thematic and phenomenology analysis

Each recorded interview with the 17 interviewees was then transcribed for analysis. Direct transcription was performed by typing the interviewees' accounts on a document processing software (Microsoft Word) while listening to the interview records. This process was repeated and reviewed several times to ensure the text transcriptions represent the interviews accordingly. As the interviews were conducted in Bahasa Indonesia (Indonesian language), all interviews were firstly transcribed in Bahasa Indonesia. After transcriptions in Bahasa Indonesia for all interviews were obtained, they were translated into English. Additionally, to ensure the accuracy of the transcriptions and translations, a fellow Indonesian national PhD researcher in the Human Factors Research Group of The University of Nottingham was asked to review the transcriptions and compare them with the interview recordings.

Inductive thematic analysis was performed on the interview transcripts, as thematic analysis would be suitable with the phenomenology approach to understand and interpret meanings and experiences of the participants (Kiger & Varpio, 2020; Smith & Osborn, 2015; Sundler et al., 2019). Inductive thematic analysis, in which codes and themes are derived and emerge from the interviewees' accounts (Fereday & Muir-Cochrane, 2006; Varpio et al., 2020), was chosen as phenomenology study must allow the data to emerge to capture rich description of phenomena and their setting (Bentz & Shapiro, 1998; Kensit, 2000). Sundler (2019) also emphasised that thematic analysis in phenomenology should be inductive, beginning with a search for meaning and aim to try to understand the complexity of meanings in the data.

Furthermore, to ensure the thematic analysis was carried out appropriately, six steps of thematic analysis as suggested by Braun & Clarke (2006) were applied. Additionally, as the approach of phenomenology was applied in this study, the thematic analysis was combined with steps of phenomenology analysis as suggested by Giorgi (1997), Giorgi (2012), and Giorgi et al (2017). The description of the steps taken in the Study 2 analysis is presented in Table 5.4.

Table 5.4. Steps of Study 2 thematic and phenomenology analysis

No.	Steps of thematic analysis (Braun & Clarke, 2006)	Descriptions and steps taken	Steps of phenomenology analysis (Giorgi, 1997, 2012; Giorgi et al., 2017)
1.	Familiarising with the data	<p>Description: Thorough readings of each interview transcript several times to be familiarised with, and to ensure clear understanding of the contained information.</p> <p>Steps taken:</p> <ul style="list-style-type: none"> • Each produced transcription was read thoroughly several times for familiarisation. This was to ensure clear understanding of the information contained in the transcriptions. • Start to identify and note potential meaning units that can be generated from the interview transcriptions, by using the comments feature in the Microsoft Word files of the transcriptions. 	Reading of the data

No.	Steps of thematic analysis (Braun & Clarke, 2006)	Descriptions and steps taken	Steps of phenomenology analysis (Giorgi, 1997, 2012; Giorgi et al., 2017)
2.	-	<p>Description: To apply a phenomenology approach, before the generation of codes, the researcher firstly interpreted the meaning of interviewees' accounts and conceptualised them to the studied topic of safety and risks. This was performed by reflecting the interviewees' words into the forms of meaning units. A meaning unit is a description signifying a certain meaning contained in parts of the text, still in the language of the participants, which is relevant to the study to be analysed further (Giorgi, 1997, 2012; Giorgi et al., 2017).</p> <p>Steps taken:</p> <ul style="list-style-type: none"> • Generation of the meaning units was carried out by re-reading of the transcriptions, and dividing the transcriptions into parts every time a transition in meanings in the transcriptions is experienced. This was carried out and reviewed several times to ensure the meaning units reflect the interviewees' accounts. An example of generation of a meaning unit is, from an interviewee account of: <i>"If it is severe injuries then none. If it's the minor ones, a little bit of like grazes, that is common"</i> [Worker B], a meaning unit was generated as follows: <i>"While stating that there has never been a severe injury, Worker B points out that minor injuries are common."</i> • The generated meaning units with their corresponding interviewees' accounts were then collated and grouped in Microsoft Excel files. Every extracted meaning unit and its interviewees' account was coded to enable traceability and help the researcher when necessary in reviewing the thematic analysis. 	<p>Generates meaning units</p>

No.	Steps of thematic analysis (Braun & Clarke, 2006)	Descriptions and steps taken	Steps of phenomenology analysis (Giorgi, 1997, 2012; Giorgi et al., 2017)
3.	Generating initial codes	<p>Description: Transforming the generated meaning units into relevant codes.</p> <p>Steps taken:</p> <ul style="list-style-type: none"> • Codes were started to be identified and generated based on the generated meaning units, accompanied by the corresponding interviewees' accounts. The codes are identification of the most interesting element of the meaning units derived from the interviewees' quotes. • Code searching was carried out several times as required by thematic analysis, while ensuring that the codes represent the meaning units of interviewees' accounts, specifically related to the studied topic of safety and risks. 	Transforming the meaning units
4.	Searching for themes	<p>Description: Collation of codes into group of themes and sub-themes, based on comparison of their similarities and differences.</p> <p>Steps taken:</p> <ul style="list-style-type: none"> • In this phase, the generated codes from the previous step were examined for their broader meanings. All generated codes were compared between each other based on their similarities and differences, which then enabled collation into several groups to identify potential themes. • Sub-themes were generated to have clearer differences and relationships between the generated codes, and to have more detailed results. Initial labels of potential names were also given to the initially searched sub-themes and themes. • This step was done several times by continuously comparing the generated potential themes with the corresponding codes, meaning units, and interviewees' accounts. This was to ensure that the final structure of meaning units, codes, and sub-themes accurately represent their corresponding themes. 	Organisation of the transformed data
5.	Reviewing themes	Description: Repeated reviews and refinements of the generated themes,	Review the transformed data

No.	Steps of thematic analysis (Braun & Clarke, 2006)	Descriptions and steps taken	Steps of phenomenology analysis (Giorgi, 1997, 2012; Giorgi et al., 2017)
		<p>ensuring relevance and coherence of the respective sub-themes and codes.</p> <p>Steps taken:</p> <ul style="list-style-type: none"> • All generated potential themes with their respective sub-themes, codes, and meaning units were reviewed several times in this phase. This was to ensure that every theme and sub-theme has relevant and adequate meaning units and codes, and conversely, the meaning units and codes themselves coherently represent their respective sub-theme and theme. • Review of distinction and commonality of the grouped meaning units and codes was also performed, to ensure they are adequately distinct or common to represent a sub-theme or theme and to avoid overlapping. • This step of reviewing themes was performed several times to achieve the most appropriate results. This included addition, combination, modification, and removal of the meaning units, codes, sub-themes, or themes. 	
6.	Defining and naming themes	<p>Description: Establishing the final structure of themes, and describing each theme to have clear description and insights on what is explained by the themes.</p> <p>Steps taken:</p> <ul style="list-style-type: none"> • This phase was performed after the structure of the themes and their corresponding sub-themes, codes, and meaning units was finalised. • The names for all themes were formulated and given definitions to describe and provide insight on the results. 	Establish and describe the structure of the phenomenon
7.	Producing the report	<p>Description: Analysing and discussing the results of the analysis, while writing reports of the analysis, which in this case are this PhD thesis and potential publication.</p> <p>Steps taken: The results of the thematic analysis were then analysed and reported in this PhD thesis, with a view to potential journal or conference publications.</p>	-

5.2.4.2. Trustworthiness of the analysis

Several strategies were taken in the Study 2 qualitative analysis to ensure its trustworthiness (Section 3.4.5), as presented in Table 5.5.

Table 5.5. Strategies to achieve Study 2 analysis trustworthiness

No.	Criteria of trustworthiness	Applied strategies
1.	Credibility	<ul style="list-style-type: none"> • Clear explanation of the thematic and phenomenology analysis process. • Prolonged engagement in the analysis for around seven months in overall. • Inductive thematic analysis to allow codes and themes to emerge from the data. • Phenomenology approach to add the interviewee's meanings and experiences. • Presentation of results to the participants. • Every interview transcript was reviewed by a fellow Indonesian national PhD for accuracy check of the transcription and translation.
2.	Transferability	<ul style="list-style-type: none"> • Presentation of interviewees' quotes and meaning units. • Utilisation of Study 2 results for the next Study 3 • Explanation of potential application of methods and findings to other similar research objects.
3.	Dependability	<ul style="list-style-type: none"> • Meaning units, codes, sub-themes, and themes were reviewed several times. • Every transcript and step of the analysis was documented and every change was noted. • Documented data and analysis are shared with the PhD supervisors through secured online storages (One Drive and Microsoft Teams). • Generated themes were described and connected with existing theories. • Analysis was continuously reviewed by the PhD supervisors.
4.	Confirmability	<ul style="list-style-type: none"> • Every transcript and change made were documented. • Utilisation of noting features on the assisting software on the thematic analysis, such as comments and highlight features on Microsoft Word and Microsoft Excel. • Presentation of the results to the participants.
5.	Reflexivity	<ul style="list-style-type: none"> • Every possible emerging meaning unit, code, sub-theme and theme was questioned for its suitability to the data, by comparing to the extracted interviewees' accounts. This was still performed, even after the considered final themes and sub-themes were established. • The process and results of the analysis were periodically discussed with the supervisors of this PhD research, to have suggestions from other people's perspectives.

5.3. Study 2 results

Five themes emerged from the Study 2 thematic analysis, as can be seen in Table 5.6. The thematic analysis combined with phenomenology analysis was useful to generate themes related to the people's thoughts and opinions on work safety and risk, based on their meanings and experiences from the interview transcriptions. Generally, all interviewees contributed to valuable information or description of their knowledge and experiences around work safety and risk at their workplaces. Description of the themes and their respective sub-themes is presented in Table 5.6. The meaning units, codes, and examples of the corresponding interviewees' accounts will be presented throughout the next sub-sections of explanation of each theme.

Table 5.6. Themes of Study 2 thematic analysis

Themes	Description	Sub-themes
Safety management	The implementation of safety management aspects in the Indonesian small food-producing businesses.	Rules and procedures on work safety
		Safety equipment
		Communication on safety
		Commitment on safety
Risk perception	The people's thoughts and opinions related to work risks in the workplaces of Indonesian small food-producing businesses.	Perceived frequency and probability
		Perceived severity
		Awareness to the unsafe work conditions
Safety perception	The people's thoughts and opinions related to safety in the workplaces of Indonesian small food-producing businesses.	Safety judgments
		Safe feeling and acceptance
Safety knowledge	Participants' understanding and learning on work safety.	Understanding of safety
		Learning on safety
Safety motivation	The participants' thoughts and opinions around their motivation on safety.	Importance of work safety
		Ignorance to safety
		Improvement on safety

5.3.1. Responses to picture selection

As previously explained (Section 5.2.1.1), short tasks to choose pictures showing good work safety conditions and needing improvement were given to the interviewees during the presentation of the scenario. Most of the interviewees indicated the difficulty to choose pictures with good work safety conditions. Some interviewees indicated pictures showing good work safety conditions, however, they often followed with statements that the actual

conditions may be worse than they look in the pictures. Furthermore, when asked to choose pictures which need improvement on work safety, generally all interviewees responded that there is a need to improve the work conditions shown in all of the pictures.

All interviewees generally stated that the shown pictures were not showing good work safety conditions. When talking about the work conditions of both the workplaces pictures in the interview scenario and in their actual workplaces, the interviewees mentioned the various hazards and exposure to risks. The interviewees gave examples of various sources of hazards such as the knife and fire wood logs, and their respective risks such as cut and fire at the workplaces. Furthermore, the interviewees also seemed to be aware of the inappropriate work conditions such as hot working conditions, poor work postures, and heavy liftings. Examples of interviewees' responses on talks around the tasks in scenario are presented in Table 5.7.

Table 5.7. Examples of responses on scenario tasks

Tasks	Examples of interviewees accounts
To choose pictures showing good work safety conditions	<p><i>"It's difficult... emm... So if I am told to choose the good ones, which the work safety is good, well I can't, none."</i> [Worker E]</p> <p><i>"...if it's good, looks like these are not that good. Because I can see that there are some things that are not good in all (of the pictures)... dirty, messy, hot [...] Emm... it's difficult. Because I think all of the pictures showing (something) that is unsafe."</i> [Owner B]</p>
To choose pictures needing improvements on work safety	<p><i>"Well that will be all of them (laughs), that can be... what can I say... improved or fixed to be safer, right? Yes, all of them. An example is back to tempe, which pictures that was... this F and G. That for example if there are a way for us to lift the sacks comfortably."</i> [Worker C]</p> <p><i>"Yes, all of them. It's all of them (laughs) [...] Hot, how to... well maybe still hot, but so that it's not too hot [...] Also maybe there are tools or other ways so not lifting like these picture H or G."</i> [Government person]</p>

5.3.2. Safety management

In general, it can be understood that safety management is not being implemented in the involved Indonesian small food-producing businesses.

This was reflected by several aspects related to safety management that emerged in the thematic analysis, in which the related codes, meaning units, and interviewees' accounts are presented in Table 5.8. Rules and procedures related to work safety are not being implemented in the involved businesses. Rules and procedures in the businesses are more about what is involved in carrying out the tasks in the production procedures, and these are not strictly or formally implemented either. The interviewees, particularly the owners and workers, pointed out that the procedures in the production processes are more based on familiarity and experience.

The people of the businesses pointed out that rules or procedures related to safety may be unnecessary, as the tasks are easy. They also thought that rules or procedures on work safety would be complicated and interfere with the activities. The interviewed government person similarly implied that rules or procedures on safety may be unsuitable for the small size of the businesses and cannot be enforced as they may complicate the activities. Similarly, safety equipment and PPE are not utilised nor provided in the businesses. The interviewees frequently pointed out that PPE such as gloves is troublesome to wear and would make the workers uncomfortable in carrying out the tasks. Furthermore, while the people seemed to appreciate the importance of safety equipment and PPE, they frequently refer to the easy tasks and low frequency of accidents as the reasons of their unavailability and non-utilisation.

There is limited communication on work safety. When talking about whether there has been any discussion on work safety in the businesses, the people of the businesses pointed out that any kind of talks are more about the production. This is also indicated by a head of association, in which communication in the association is more about the workers and production. The limited communication on work safety is also understood in terms of relationships with external parties. While the people of the businesses stated that there are relationships with external parties such as a relevant government agency or university student or lecturer, they were never about work safety. Talks about production, marketing, and sales are the most common topics with external parties. Furthermore, the businesses seemed to

be not committed to work safety. The owners, workers, and head of associations frequently emphasised that the priorities of the businesses are the production and sales. This is also emphasised by the interviewed expert, that there is a possibility that safety is not well implemented or even ignored in small businesses in Indonesia.

Table 5.8. Sub-themes, codes, and meaning units of safety management theme

Theme: Safety management			
Sub-themes	Codes	Examples of meaning units	Examples of interviewees accounts
Rules and procedures on work safety	Non-implementation of rules and procedures related to work safety	Owner B is unsure to talk about work safety procedure, as there is no such thing as that in her workplace.	<i>"Well I don't know about that, as this our business don't have that."</i> [Owner B]
	Unnecessity and unsuitability of rules and procedures on work safety	HoA3 points out that work safety such as safety procedures is not implemented in the workplaces, and indicates the unnecessary due to the small size of the businesses.	<i>"But there is not any, not like we are strictly, and discipline to be safe. Use safety equipment, then emergency equipment... nothing like that. Well as we are small businesses, so it feels not necessary."</i> [HoA3]
Safety equipment	Non-utilisation and troublesome effects of PPE	While pointing out that PPE is not being used in the workplace, Owner A gives example of the non-utilisation of gloves due to troublesome effects and familiarity with working bare-handed.	<i>"We also do not use PPE at all [...] for instance using gloves as earlier. (We) tried, didn't feel right, well then we are not using it. We are accustomed with bare-handed."</i> [Owner A]
	Unavailability of safety equipment	While indicating a fire hazard, HoA2 points out that there is no equipment to deal with the potential consequence and also unavailability of other safety equipment, due to the safe thoughts and commonality of	<i>"And then like fire... I mean... we don't have specific safety equipment... for example fire hydrant, what other safety tools. Because we think it's safe. And I think that is normal for small business like us to not have safety equipment."</i> [HoA2]

Theme: Safety management			
Sub-themes	Codes	Examples of meaning units	Examples of interviewees accounts
		unavailability of safety equipment.	
	Safety equipment and PPE are important but not necessary	While thinks that it may be better to have safety equipment, Worker B thinks that it may not be necessary due to the low frequency of unsafe event.	<i>“Well though maybe it’s better to have, but as there is no fire happens so far, so maybe not necessary.”</i> [Worker B]
Communication on safety	No talks on work safety	Points out that safety is never talked about in the workplace, and what is being talked about is the production.	<i>“No, we never talk about safety in our work... just what is the daily production target, then start working [...] the owner is the same as the workers, never talk about safety.”</i> [Worker E]
	Non-involvement of external parties on work safety	Owner A points out that involvement of government and academics are never about work conditions or safety, and more about marketing and sales.	<i>“With agency or student or lecturer, it always about marketing and sales. That’s it, nothing other... never talk about work condition or work health safety.”</i> [Owner A]
	No communication and report mechanism on work safety	Points out that there has never been any communication or talk about work safety with the small businesses, and talks were about other topics than safety such as marketing.	<i>“There is no mechanism for communication about K3 (work safety) either. I mean... we had every other time we meet the SMEs, that we never talk about K3, work safety. Maybe just funding, marketing, what are their problems, but never about work safety.”</i> [Government person]
Commitment on safety	Not committed to work safety	HoA3 points out that as the priorities of the businesses are the production and sales, commitment	<i>“So as long as those our two priorities are fine, well I think that no need for a commitment to work safer.”</i> [HoA3]

Theme: Safety management			
Sub-themes	Codes	Examples of meaning units	Examples of interviewees accounts
		to work safety is not necessary.	
	Non-implementation of safety management	While pointing out that there has never been any improvement or management about work safety, HoA2 points out that what is being managed is the production and marketing.	<i>“No... never... What managed is just production and marketing. Also obviously the tempe product, so the tempe is good. Never if that work safety.” [HoA2]</i>
	Priority of the job and sales over safety	Despite the injuries and tiredness, Worker B points out the daily routine and priority of working to achieve the production target.	<i>“What we know is come to work, finish the production target done. If (we have) stiffness tired, a bit of blisters, grazes just leave them just rest at home.” [Worker B]</i>

5.3.3. Risk perception

The interviewed owners, workers, and head of associations frequently mentioned and emphasised the low frequency and probability of unsafe events and injuries in the workplaces. Even though they pointed out that unsafe events and injuries do occur, they do not occur often, particularly for the major or severe ones. On the other hand, the interviewees indicated that minor injuries and unsafe events such as hot oil or hot water splashes occur more frequently. The interviewees also implied that the easy characteristics of the tasks make the frequency and possibility of unsafe events and injuries low.

Furthermore, the interviewees perceived that the severity of injuries was low, when referring to injuries such as grazes and blisters. Unsafe events such as slips and falls were also perceived as minor in severity, as they did not lead to major consequences which the interviewees referred to as hospitalisation or death. Additionally, although it has never happened, some interviewees thought that there is always the possibility of more severe consequences of unsafe events. The people of the businesses seemed to be aware of the unsafe conditions in their workplaces, indicated by awareness of

the hazards, risks, and the potential consequences. The codes, meaning units, and interviewees' accounts of the theme of risk perception are presented in Table 5.9.

Table 5.9. Sub-themes, codes, and meaning units of risk perception theme

Theme: Risk perception			
Sub-themes	Codes	Examples of meaning units	Examples of interviewees accounts
Perceived frequency and probability	Perceived low frequency of unsafe events and injuries	While giving examples of injuries and unsafe event that are experienced by the workers, Worker F points out that they rarely happen.	<i>"...well, my friend's skin was like burnt some days ago... but I think that is rarely happen, the frequency of happening. I myself have had a swollen arm as the basket slipped from my arm, but that's some months ago already."</i> [Worker F]
	Occurrence of unsafe events and injuries	Worker D gives an example of an unsafe event in the past, which hurt the person involved.	<i>"There was a time, but it wasn't me, someone was slipped which was not good... until sprained and hurt to walk."</i> [Worker D]
	Perceived low possibility of unsafe event and injuries	Owner E pointing out the small size of the businesses in the area in which the possibility of accident is low in small-sized businesses.	<i>"All corn chips producers around here are small household businesses, not big factories. So the possibility is low for accidents dangers I think."</i> [Owner E]
	Influence of tasks characteristics	Owner A feels that the possibility of major accidents and injury is low due to the easy tasks.	<i>"...but I feel like for easy tasks like this there is small possibility of accident. I meant major hurt accident, about the small possibility..."</i> [Owner A]
Perceived severity	Perceived minor injuries	Points out that while he is frequently exposed to risk and injury, they are minor and can be treated with minor personal treatment.	<i>"Well I mean still there is, myself for instance... almost every day (I got) blisters, slips too. But it's just a little bit. It's fine by like rinse it with water and massage."</i> [Worker D]
	Perceived low severity of unsafe events	Despite the seemingly rather severe unsafe event which happened in the past, Worker E points out that the person involved was fine with just minor injuries.	<i>"...the one that lifting the corn basket. Lift two people together, slipped and fell. We were shocked. Quite bad the fall... what to say... like heavy fall (imitate sound of fall). Well again fortunately it was fine. The person just had headache and swollen."</i> [Worker E]

Theme: Risk perception			
Sub-themes	Codes	Examples of meaning units	Examples of interviewees accounts
	Possibility of more severe consequences of unsafe events	While stating that a past unsafe event of fire was not severe, Owner F points out that it could have led to severe consequences for the person involved.	<i>"...not long ago, well though not so severe, the frying area was in blaze, the fire was too big... fortunately it went off straight after watered. Well it's quite (serious)... may as well resulted in serious or severe. For instance, hopefully not, until death. Or send to a hospital."</i> [Owner F]
Awareness of the unsafe work conditions	Awareness of work hazards	Worker A emphasises the hazards from material and equipment in a frying task.	<i>"As earlier... there is danger of exposed to hot oil on this frying one... oh and close to gas canister too... you would see that I am like that too."</i> [Worker A]
	Awareness of the risk and potential consequences	Owner D further gives another example of heavy lifting hazard and the risk.	<i>"Well maybe... what else... oo lifting of soybean sack. That is heavy about twenty five kilos. Could fall or sprain if not strong enough."</i> [Owner D]
	Awareness of the inappropriate work conditions	Despite the easy and simple tasks, Owner A identifies and emphasises that there are hazards and risks from various sources to which workers can be exposed.	<i>"Although the works seem easy simple right, as I said. But if you see the production place of our work, you can see yourself from our work method, tools, can expose the workers to... well as I said earlier, tired, stiffness, and others. And then it's hot too, isn't it... what can I say... the temperature. Especially when it's dry season, it will be very hot."</i> [Owner A]

5.3.4. Safety perception

The codes, meaning units, and interviewees' accounts of the theme of safety perception are presented in Table 5.10. Generally, the people of the businesses seemed to perceive the workplaces and activities of Indonesian small food-producing businesses as not safe. This is reflected from the interviewees who frequently mentioned the hazards and risks both in the workplaces and the activities. Additionally, the interviewees also frequently pointed out the commonality or normality of the unsafe work conditions, which

may also be the case with other similar types of businesses. In addition to the common occurrence of perceived minor unsafe events and injuries such as slips and grazes, the interviewees also implied that work conditions such as being hot and dirty will also be commonly found in small businesses.

Furthermore, the interviewees thought that work safety is difficult to implement in their workplaces. This is particularly mentioned by the people of the businesses who have past work experiences in bigger factories, in which they compared the different practices and cultures, and difficulty for implementation in their current workplaces of small businesses. The interviewed government person and expert were also in agreement, by mentioning the potential challenging implementation of work safety in small businesses, due to different culture and characteristics compared to bigger businesses.

It can also be understood from the interviews, that there are feelings of safety among the people of the businesses, despite the unsafe work conditions of their workplaces. The two main possible influences for the feeling of safety are the routine and perceptions of easy tasks, as frequently pointed out by the interviewees. The interviewed people of the businesses have vast working experiences in Indonesian small food-producing businesses of several years. These long experiences of carrying out the tasks, combined with the perceived easy tasks and perceived low frequency and minor severity of unsafe events and injuries, could contribute to the feeling of safety of the people, despite their awareness of the work hazards and risks.

Furthermore, there are also indications of acceptance of the current work conditions among the people of the businesses. Similar to the feeling of safety, being accustomed to the tasks from years of routine and the easiness of the tasks could contribute to the people's acceptance of the work conditions, despite the hazards and risks. Additionally, cost and limited knowledge of work safety could also influence the people to accept and carry on with the current work conditions.

Table 5.10. Sub-themes, codes, and meaning units of safety perception theme

Theme: Safety perception			
Sub-themes	Codes	Examples of meaning units	Examples of interviewees accounts
Safety judgments	Thinks that the workplaces and activities are not safe	Worker F thinks that the tasks in his workplace are not safe and that the people are working with hazards.	<i>"Well... I would say that our work activities are not safe. We work with some dangerous things."</i> [Worker F]
	Commonality of unsafe conditions	Points out that dangerous, uncomfortable, and hot work conditions of are commonly found in small businesses	<i>"I mean, this conditions like... let's say dangerous, not comfortable, work in hot conditions... I think that's commonly found in small business...."</i> [Owner C]
	Work safety may be difficult and different in the workplaces	Expert points out that, although there is a different scale and difference in complexity compared with bigger factories, work safety should still be implemented and taken into attention in small businesses.	<i>"...but it should be applicable though not as complex as in big businesses. In big factories that I have ever known, culture, there is equipment inspection almost everyday, work methods is evaluated too. Well it doesn't have to be like that in SME, but at least there should be inspection mechanism regarding work safety."</i> [Expert]
Safe feeling and acceptance	Feeling of safety in the jobs	Worker E emphasises the feeling of safety by giving an example of a hazardous task and the consequences, but points out that does not make him think that his job is not safe.	<i>"It feels safe... again, feeling of safe [...] Myself for example, I do drying right. Everyday after work I do massage at home. As I lift the corn racks. One lift maybe just one kilo, but repeatedly. That's quite stiffed. But I don't think about that everyday I go to work. Well that probably shows safe feeling, right, although actually not safe."</i> [Worker E]
	Feeling of safety from routine and perceived easy tasks	Points out that the people may think that the work is safe because of being accustomed to the job from years of working.	<i>"Well... it's like... emm... I think because we have been (working) like this for years and have accustomed already to our works, maybe we think that our work is safe."</i> [Worker C]

Theme: Safety perception			
Sub-themes	Codes	Examples of meaning units	Examples of interviewees accounts
	Acceptance of the unsafe conditions	While pointing out the unsafe hazardous workplace, Owner B emphasises acceptance to the current work safety condition of the workplace.	<i>"Yes, maybe it's not safe, not comfortable, there are hazards. But then again, that's we have and what we can."</i> [Owner B]

5.3.5. Safety knowledge

When asked about what is work safety for them, the people of the businesses were mostly unsure how to describe it. Some interviewees pointed out that they do not know about work safety, and some others tried to describe it briefly in their own words. In addition to their inability to describe work safety, the people of the businesses also seemed to have limited understanding of work safety. This is reflected by their incomprehension on some topics related to work safety, such as safety equipment, safety management, and what to do in an unsafe event. Similarly, there were also indications of limited understanding of work safety improvements among the people of the Indonesian small food-producing businesses. While they seemed to be aware of the unsafe work conditions and the need for improvement, the interviewees frequently stated that they do not know what to do and how to do it. The people's seemingly limited knowledge on work safety is also evident to the interviewed expert, who pointed out that there is a possibility of low knowledge of work safety in people of small businesses.

From the interviews, it can be understood that the owners, workers, and heads of association of the businesses have never had experience of learning or training on work safety. They pointed out that both in and outside their formal education, they were never taught or learned about work safety. Additionally, when there was training from government or academics, they were always about another topic than work safety such as marketing and product quality. On the other hand, despite the limited exposure on learning or training about work safety, some interviewees indicated interest to learn

about it. They mentioned that they are interested to at least know more about work safety.

However, the interviewees doubted the necessity and benefit of training related to work safety. While they questioned the benefit of work safety, some interviewees doubted the necessity of work safety training as the tasks are easy and the businesses are fine with the current conditions. The interviewed government person also pointed out that small businesses need other training than work safety. As their priority seems to be money or income, the government person thought that they may need training related to marketing and sales more than work safety. The codes, meaning units, and interviewees' accounts of the theme of safety knowledge are presented in Table 5.11.

Table 5.11. Sub-themes, codes, and meaning units of safety knowledge theme

Theme: Safety knowledge			
Sub-themes	Codes	Examples of meaning units	Examples of interviewees accounts
Understanding on work safety	Inability to describe work safety	While stating that she does not know what work safety is, Owner B is unsure and attempted to describe work safety in her own words as preventing somebody being hurt.	<i>"I even don't know what that is (laughs) Emm... what can I say... as long as work safe, nobody is hurt... it's like that maybe. Is that correct? (laughs)"</i> [Owner B]
	Limited understanding on work safety	Owner F points out that while the people are working with caution, they do not know what work safety is.	<i>"Well we work with what we have like this. Don't want hurt, injury... but don't know either what is, what is working safely like."</i> [Owner F]
	Limited understanding of work safety improvement	While pointing out that the workplace can be improved on work safety, Owner C indicates the low understanding to be able to do that.	<i>"Yes, there has to be something that can be improved, but then again we don't know how...."</i> [Owner C]
Work safety learning	Never learned or had training on safety	Owner F points out that he does not have experience of learning about work safety, either in or outside formal education, and that his formal	<i>"I have never been taught of that theoretically (laughs) I am just an SD (Sekolah Dasar/elementary school) graduate, my</i>

Theme: Safety knowledge			
Sub-themes	Codes	Examples of meaning units	Examples of interviewees accounts
		education level is only at elementary level.	<i>formal education is like other people. Nothing about work safety. Never taught either outside school (laughs).</i> [Owner F]
	Interest to learn about work safety	While he has never learned about safety, Worker D is interested to learn about work safety.	<i>"Well (I am) interested, as so far I have not aware or learn about it. Well just want to know what are those."</i> [Worker D]
	Unsure of the benefit and necessity of safety training	Emphasises that the people would appreciate training more if it is beneficial, otherwise unnecessary if it is more about theory.	<i>" Well... if there is a benefit for us then we're fine with that (laughs)... that's right, isn't it? If it's the same just theory, then no need. If there is no benefit for us then, no need it's alright."</i> [Owner D]

5.3.6. Safety motivation

The codes, meaning units, and interviewees' accounts of the theme of safety motivation are presented in Table 5.12. Generally, the interviewees thought that work safety is important in Indonesian small food-producing businesses. The interviewees emphasised that work safety is important in their workplaces to prevent unsafe and unwanted things such as accidents or injuries to the workers. However, despite emphasising the importance of work safety, most of the interviewed people of Indonesian small food-producing businesses stressed the non-necessity to implement work safety in their workplaces. They frequently argued that the easy tasks, low frequency of accidents, and the thoughts that work safety is complicated make work safety unnecessary for their workplaces.

Additionally, the interviewees seemed reluctant to value work safety as they are unsure of the benefits of work safety. Most interviewees doubted the benefit if they implement work safety or work safer, and particularly questioned the idea that work safety will provide better work conditions for the workers

and financial benefit. Owners and workers in particular, pointed out the rare occurrence of accidents and perceived minor injuries, in which they have the thoughts that their work conditions are fine as a consequence. The interviewed government person similarly put forward the difficulty of implementing work safety in these businesses, mainly due to their focus on production and sales.

From the interviews, there were indications of the people's ignorance towards work safety. The interviewed owners and workers frequently stated that they never think about work safety, and that what they think about is just the production. Being accustomed to the activities from routine and the easy tasks seem to be the main reasons that make people not thinking about work safety. The interviewed expert and government person also commented on the potential influence of the seemingly easy characteristics of tasks and the people's low knowledge and lack of understanding of work safety. Furthermore, the low importance and potential negligence of work safety was also reflected by no evaluation or any follow up on issues related to work safety. Although past unsafe events such as a fall involving a worker and a fire in the workplaces were talked briefly at the time of occurrence, nothing was done afterwards as a follow up or evaluation.

The people of the businesses seemed to have low motivation for work safety, indicated by their unwillingness to try to make changes on practices of work safety in their workplaces. Whilst there was some interest of the people to learn about work safety (Section 5.3.5), some interviewees pointed out the potential reluctance of the people to change their work in regard to work safety. Many seemed to believe that improvement regarding work safety is needed in the workplaces and various things that can be improved were mentioned, such as the work environment and equipment. However, the people of the businesses frequently put forward two challenges for the improvement of work safety of cost and familiarity of the tasks. As a result, despite having several ideas on work safety improvement, the people of the businesses stressed that nothing can be done regarding work safety in their workplaces.

Table 5.12. Sub-themes, codes, and meaning units of safety motivation theme

Theme: Safety motivation			
Sub-themes	Codes	Examples of meaning units	Examples of interviewees accounts
Importance of work safety	Thinks that work safety is important	Points out that work safety is important for his workplace to prevent any accidents or injuries.	<i>“Important, very important... as if there is accident, injuries, those will not be good.”</i> [Head of association 1]
	Unnecessary to implement work safety	Points out that things related to implementation of work safety are not necessary and that the people do not care about it.	<i>“...so complicated things of K3 like SOP, PPE are not necessary... people here don’t care.”</i> [Worker E]
	Unsure of the benefit of work safety	While pointing out the potential effect of poor sales, HoA 3 questions the financial benefit of implementing work safety.	<i>“Yes... if sales is not good the business can close... if work safe, well... can’t make money come, can it? (laughs)”</i> [HoA 3]
Ignorance of safety	Not thinking about work safety	While pointing out that the people are not thinking about work safety, Worker C emphasises that the people just work and that the priority is the job.	<i>“As earlier like I said. We don’t think about what work safety is. Basically just work [...] what I know is just work. Not thinking don’t know whether the work is safe or not.”</i> [Worker C]
	No follow up on safety issues	Even though an unsafe event was talked about when it happened, there was no further follow up and they carried on working as normal.	<i>“Well after that happened, well just... just for a little bit... you know... oh what was that... ooo too heavy... ooo it should be like this... maybe just like that then carry on working. Forgotten the next day just work as normal.”</i> [Head of association 2]
	Unwillingness to work safely	While indicating interest to learn about work safety, Worker F doubts the people’s willingness to work safety and the applicability.	<i>“Yes... well I want to know, it’s okay if there is like work safety training. But for instance... for instance then I am like being arranged this and that to work safely, then that what’s maybe I... and my friends... maybe don’t want that or difficult.”</i> [Worker F]

Theme: Safety motivation			
Sub-themes	Codes	Examples of meaning units	Examples of interviewees accounts
Improvement on safety	Thinks that improvement in work safety is needed in the workplaces	Expert emphasises that all of the tasks and workplaces need an improvement regarding the work safety to an extent.	<i>"I mean, in my opinion, if talking the ones that need work safety improvement, I feel that all of workplaces are necessary [...] The point is I think that all of these workplaces can be improved on their K3 (work safety) aspect."</i> [Expert]
	Challenge of familiarity and cost to safety improvement	Owner A emphasises that while the people are aware of the unsafe conditions, there are challenges of routine and cost to improve work safety conditions.	<i>"We think about cost if we are going to improve [...] I think maybe the workers' routine, if it's about challenge... I mean, as I already said, we know that we work not safely and with unsafe conditions. But we are accustomed to work like this. [Owner A]"</i>
	Have ideas but nothing can be done on work safety	While indicating potentially safer equipment which could prevent the worker getting splashed by hot oil as in the current condition, Owner B points out that the people carry on working with the current conditions and indicates that nothing can be done regarding the work and safety conditions.	<i>"For instance, this is just for an example... there is a tempe frying tool which is enclosed, the oil is inside like enclosed tube, so the person will not be splashed by hot oil [...] but that's what we have, nothing we can do [...] we work with what we have, that's what I mean, so there is nothing we can do." [Owner B]"</i>

5.3.7. Summary of Study 2 interview results

Thoughts and opinions on work safety among the people relevant to the Indonesian small food-producing businesses have been analysed by generating themes from thematic analysis. A summary of Study 2 interview results is presented in Table 5.13.

Table 5.13. Summary of Study 2 interview results

Themes	Summary of interview results
Safety management	<ul style="list-style-type: none"> • Safety is not being managed in the workplaces, reflected by non-implementation of aspects related to safety management such as rules and procedures and safety equipment, which are thought to be not necessary and troublesome by the people of the businesses. • There were indications of low commitment to work safety among the people of the businesses, in which the job and sales are prioritised over work safety. • While there are opinions that safety management may be difficult for the Indonesian small food-producing businesses due to different culture, priorities, and work characteristics compared to larger businesses, work safety should still be implemented and managed through a different, less complex approach.
Risk perception	<ul style="list-style-type: none"> • The interviewed people of the Indonesian small food-producing businesses are generally aware of many work hazards and the inappropriate work conditions, as well as the risks and the potential consequences. These were reflected in their ability to identify and give examples of various work hazards and risks in the workplaces. • Although unsafe events and injuries are occurring in the workplaces, these are perceived as low in possibility, frequency, and severity by the people of the businesses. However, some interviewees pointed out that more severe consequences from the possible unsafe events are possible. • The perceived easy characteristics of the tasks is often pointed out as the possible influence on the risk perceptions of the people.
Safety perception	<ul style="list-style-type: none"> • Generally, the interviewees stated that the workplaces and activities in Indonesian small food-producing businesses are unsafe, which are thought to be common in similar types of small businesses. • There are indications of acceptance of the current work conditions by the people of the Indonesian small food-producing businesses, in which there is a feeling of safety among the people due to routine and perceived easy tasks.
Safety knowledge	<ul style="list-style-type: none"> • The people of Indonesian small food-producing businesses seemed to have a relatively low level of knowledge and understanding of work safety, in which they do not have experience of learning or training about work safety. • While there are interests to learn about work safety, there are doubts by the people of Indonesian small food-producing businesses about the benefit and necessity. • While the people of Indonesian small food-producing businesses may need training or learning on other topics than safety, they should still be given and have adequate access to learning on work safety.
Safety motivation	<ul style="list-style-type: none"> • While the interviewees thought that work safety is important for the businesses, there are doubts on the benefit and necessity to implement work safety.

Themes	Summary of interview results
	<ul style="list-style-type: none"> • There are indications of ignorance and unwillingness to improve work safety among the people of Indonesian small food-producing businesses. • While improvement of work safety is thought to be needed, there are considerations on the benefit and challenges for the businesses to implement work safety. However, work safety should still be considered and improved in the workplaces of the businesses, for the long-term benefit for the workers.

5.4. Study 2 discussion

It can be understood from the Study 2 interviews that the owners, workers, and heads of associations of the Indonesian small food-producing business were aware of the work hazards and risks at their workplaces. They were able to give examples of work hazards and their risks, as well as the possible consequences, both on the photographs in the interview scenario and at their workplaces. This finding contradicts arguments by Joseph & Arasu (2023) and Lansdown et al. (2007) that there is lack of ability to recognise risk among the community and workforce in small businesses and developing countries. This contradiction indicates that awareness and perceptions of safety and risk may be different across different work settings, which may be influenced by the different types of risk (Gierlach et al., 2010; Reisinger & Mavondo, 2005).

Despite the awareness of the unsafe work conditions, the people of the businesses may have acceptance and the feeling of safety in their jobs, as they often mentioned during the interviews. This confirms a suggestion of the tendency to accept and normalise hazards in workplaces of small businesses as implied by Gardner et al. (1999). Familiarity with the work activities was often mentioned by the interviewees as one potential influence on their feeling of safety and acceptance of the work conditions. As explored in Study 2, the work characteristics of Indonesian small food-producing businesses in which the people have been working for many years could be one possible reason for the safe feeling of the workers.

Another thing which was often put forward by Study 2 interviewees to have an influence on their feeling of safety and acceptance of the work conditions, as well as on their risk perception, was the easy tasks. Wang et al. (2016) and Rundmo (1997) have commented on how the characteristics of the tasks or the work influence the perceptions of risk and safety. Rasmussen (1997) and Leveson (2004) also suggested that perceptions on risk of injury or accident can be influenced by factors such as the work environment and the tasks of the workers. The people of the businesses frequently pointed out that their tasks are in the characteristics of easy and simple, which influence their perceptions such as the low possibility of unsafe events or injuries.

When talking about risk in their workplaces, the people of the businesses often mentioned frequency and probability of occurrence of unsafe events and injuries. They referred to frequency as how often unsafe events and injuries happen in their workplaces in the past, and probability as the likelihood for them to happen in the future. The Study 2 interviewees frequently emphasised and perceived that the frequency and probability of unsafe events and injuries in their workplaces were low. This finding contradicts arguments that SMEs' workers suffer more injuries than workers of larger businesses (Micheli & Cagno, 2010; Sørensen et al., 2007), but it is worth noting that underreporting of injuries and illness is possibly high in small businesses (Legg et al., 2015). Additionally, the severity of past unsafe events and injuries are also perceived as low or minor by the interviewees. This adds to the argument by Micheli & Cagno (2010), that there may be low occurrences of injuries and accidents in the SMEs which may lower the risk perception among the people.

From the interviews, it was found that safety is not being implemented nor managed in the observed Indonesian small food-producing businesses. Ferjencik (2020) pointed out that in managing or controlling risk, commitment to safety is one fundamental aspect of safety management. There are indications that the people of the observed Indonesian small food-producing businesses are not committed to work safety, which could contribute to the absence of safety management in the

businesses. Additionally, the absence of safety management may be related to the relatively low safety knowledge among the people, as they stated that they never have any kind of learning about work safety. These add to findings by Savkovic et al. (2019) that there may be lack of commitment and knowledge on work safety in SMEs.

Nowrouzi et al. (2016) implied that in Occupational Health and Safety Management Systems (OHSMS), employees should recognise unsafe conditions and communicate them for effective management. In the current study, although the people seemed to be aware of the unsafe work conditions with hazards and risk exposure, there was a perception that it is not necessary to give more attention to work safety. Work safety is rarely thought or talked about and some interviewees emphasised that it is never considered. Work safety does not seem to be a priority for the businesses, and the interviewees frequently stated that the priorities of the businesses are only the production and sales. Nunes et al. (2006) also found that the focus of SMEs is more on sales, and that there is a possibility that safety matters are ranked below production (Kongtip et al., 2008).

From the Study 2 results, it is evident that the emerging themes and sub-themes from the thematic analysis potentially have relationships between each other. It was discussed that the characteristics such as easy tasks and familiarity, and people's knowledge of safety, may have influences on people's perceptions of safety and risk. The potential influence of work characteristics on perceptions of safety and risk has been indicated in some studies such as Wang et al. (2016) and Rundmo (1997). Safety knowledge has also been argued to have relationships with perceptions of safety and risk (Chaswa et al., 2020; Korkmaz & Park, 2018). Based on the potential relationships or influences among the factors that explored in Study 2, it was considered necessary to investigate their relationships in the next Study 3.

5.5. Study 2 conclusion

Thoughts and opinions on work safety and risk among the people of Indonesian small food-producing businesses, reflected by the emerging themes, have been explored in Study 2. While the workplaces and activities of the observed Indonesian small food-producing businesses are generally perceived as unsafe, there are indications of acceptance and feelings of safety in the work conditions. The people in the observed businesses seemed to be aware of the work hazards and risks in their workplaces, with perceptions of low frequency and minor severity of unsafe events and injuries. There seems to be potential relationships among the emerged themes from the analysis, which will be investigated in the next Study 3.

Chapter 6

Study 3: Factors influencing perceptions of work safety and risk in Indonesian small food-producing businesses

6.1. Introduction to Study 3

In the previous Study 2, it can be understood that the people of Indonesian small food-producing businesses perceived the work conditions and work activities in their workplaces as unsafe. While unsafe events and injuries are occurring and there is awareness by the people of the work hazards and risks, they feel safe because of job routine or familiarity and the perceived easy tasks. Furthermore, the people of the businesses generally perceived the probability of the risks in their workplaces as low. Additionally, although the severity of past unsafe events was perceived as low, some interviewees pointed out that more severe consequences of work risks at their workplaces is possible.

It was also indicated in the previous Study 2 that the perceptions of safety and risk of the people of Indonesian small food-producing businesses were potentially influenced by factors such as safety knowledge and work characteristics. Despite the indications, there has not been an attempt to investigate influences toward perceptions of safety and risk in Indonesian small food-producing businesses as far as the researcher is aware to date. Therefore, it was considered necessary and important to investigate influences among factors related to perceptions of work safety and risk among the people of Indonesian small food-producing businesses.

Study 3 was a quantitative study using questionnaires, aimed to investigate and describe the relationships between the factors that influence perceptions of safety and risk among people of Indonesian small food-producing businesses. The study was divided into two stages. In the first stage, a questionnaire was developed based on the identification of potential

influencing factors and administered with an initial sample of respondents. Using Principal Component Analysis (PCA), the structure of factors was refined and the questionnaire was revised and administered with a larger sample of participants in the second stage of the study. Structural Equation Modeling (SEM) was then used to explore the influences among the factors. The overview of Study 3 is presented in Figure 6.1.

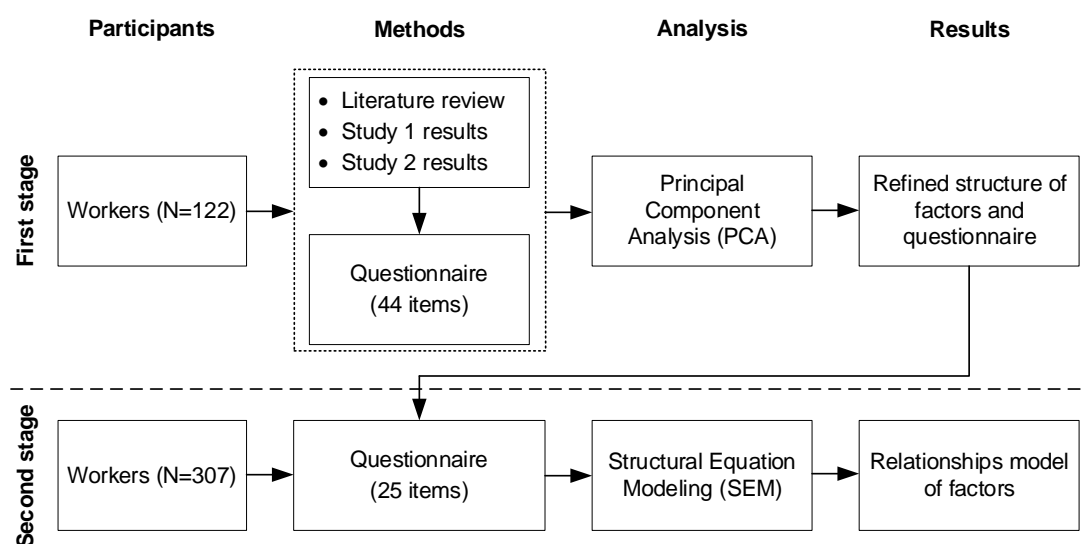


Figure 6.1. Overview of Study 3

6.2. Study 3 first stage

6.2.1. Method

6.2.1.1. First stage questionnaire

1. Identification of potential influencing factors

In investigating relationships among factors related to perceptions of safety and risk, there are some approaches that can be applied to develop a questionnaire. Application of literature review to develop a questionnaire was demonstrated by Hayes et al. (1998), who developed the Work Safety Scale (WSS) to measure perceptions of workplace safety. Adaptation of existing questionnaires from other studies to construct another survey questionnaire was demonstrated by Vinodkumar & Bhasi (2010). Additionally, some studies combined qualitative interviews and literature reviews to identify factors and construct a questionnaire to investigate influencing factors to subjective perception of safety and risk (Wang et al., 2016) and to quantify risk perception

(Man et al., 2019). In this research, the approach of combining qualitative interviews and literature reviews as demonstrated by Wang et al. (2016) and Man et al. (2019) was carried out.

The first step in developing the Study 3 first stage questionnaire was identification of factors which potentially influence safety perception and risk perception in Indonesian small food-producing businesses. This was done based on results of the previous Study 1 and Study 2, and also a literature review. Studies such as Korkmaz & Park (2018) and Atombo et al. (2017) have indicated that safety perception may be influenced by other factors such as knowledge and demographic factors. Perceptions toward risk can also be influenced by various factors from personal characteristics to external influences such as the work environment (Leveson, 2004; Rasmussen, 1997). In Study 2 of this research, it was understood that the characteristics of the jobs of the interviewees such as familiarity or routine could contribute to their perception of safety of their workplaces. Additionally, based on Study 2 results, risk perception of people of Indonesian small food-producing businesses can be influenced by other factors such as the frequency and consequences of accidents, their knowledge of safety, and work characteristics.

Several studies have shown relationships between safety management and workers' safety perception or risk perception. Griffin & Neal (2000) explained that the employees' safety perceptions among Australian manufacturing and mining organisation employees was strongly influenced by factors related to safety management such as safety communication, safety equipment, and safety training. Rundmo (1997) found that offshore oil installations employees' risk perception is influenced by safety commitment. Zhao et al. (2021) explored that, in Chinese chemical industry workers, safety leadership (including safety policy and other factors) influenced the perception of risk severity and probability. Vu et al. (2022) also found the influence of workplace safety management practices (such as commitment and rules and procedures) on perceived risk among Vietnamese workers related to the Covid-19 pandemic.

Safety knowledge is another factor that potentially influences safety and risk perception. A direct impact of safety knowledge on perception of risk severity was found by Zhao et al. (2021) in their study on chemical industry workers in China. Positive effects of the workers' knowledge on their risk perceptions of various hazards at their workplaces were investigated among construction workers in Malawi (Chaswa et al., 2020). They pointed out that increasing knowledge around safety would also increase the workers' risk perception on work hazards at their workplaces. Safety training, which predicted safety knowledge (Vinodkumar & Bhasi, 2010), is found to have an insignificant impact on safety perception among construction industry workers in The Republic of Korea (Korkmaz & Park, 2018). They argued that carrying out safety training would not change the workers' awareness and perceptions of safety at their workplaces.

The potential influence of work characteristics (e.g. easy tasks) on safety and risk perceptions was evident in studies 1 and 2 of this thesis and also considered in other studies in the literature. Wang et al. (2016) identified a significant association of work characteristics on workers' subjective perception of safety and risk in their study among construction workers, in which they argued that how workers perceived safety and risk of their jobs would depend on the characteristics of the jobs. Rundmo (1997) found a strong effect of physical working conditions on perceived risk among offshore oil installation workers. Workers would have higher perceived risk, if they are exposed more to conditions such as noise, vibration, and heat. Rundmo (1997) further explained that the status of safety and contingency measures such as inspection, safety instruction, and safety equipment, had a direct effect on risk perception.

Based on the review of literature and combined with results of the previous Study 2 and Study 1, five factors were identified and included in Study 3 first stage. Descriptions of the factors that were included in Study 3 first stage are presented in Table 6.1.

Table 6.1. Description of possible factors influencing safety and risk perceptions

No.	Possible factors	Descriptions of context in this study
1.	Safety management	How variables related to safety, i.e. safety commitment, safety communication, safety rules and procedures, are being implemented in the businesses.
2.	Safety knowledge	The workers' knowledge and understanding on safety.
3.	Work characteristics	Characteristics of work activities that are being conducted in the observed Indonesian small food-producing businesses.
4.	Risk perception	The workers' perceptions of frequency, probability, and potential consequences of work risks at their workplaces.
5.	Safety perception	The workers' perceptions of the current safety conditions of their workplaces and how safe are their workplaces.

2. Questionnaire items development

A questionnaire containing statements (items) based on the identified potential influencing factors was developed for the first stage of Study 3. Several statements were developed for each factor drawing on findings from Study 1 and 2. Examples of these statements are “I have adequate understanding on work safety” and “I have received sufficient training related to safety”, which were included in factors of safety knowledge. Another example relating to safety rules and procedures which included a statement “It is important to have rules and procedures related to safety for the jobs in my workplaces”, as the workers in Study 2 were unsure of the necessity and importance of safety rules and procedures. All statements on the factor of work characteristics were derived from findings from studies 1 and 2, to reflect the work characteristics of Indonesia small food-producing businesses.

Statements for other factors were adapted from other related studies such as Vinodkumar & Bhasi (2010), Della et al. (2020), Hayes et al. (1998), Neal et al. (2000), Williamson et al. (1997), Cheyne & Cox (2000), Cheyne (1998), Hon et al. (Hon et al., 2014), Kath et al. (2010), Varonen & Mattila (2000), and Oah et al. (2018). Some statements from the previously mentioned studies were directly adopted while some others are modified to ensure their suitability to the profile of the businesses. For example, the term of “management” used in questionnaires from the mentioned literatures was

reworded to “owner” or “workplace”, as the businesses that were involved did not have formal and structured management or organisation. An example of the questionnaire item is the statement “Safety is given high priority by the management” (Vinodkumar & Bhasi, 2010), was modified to “Safety is given priority in my workplace”. An example of a directly adopted statement was “My workplace is safe” (Hayes et al., 1998), on the factor of safety perception. Overall, 44 items were included in the questionnaire, covering the five factors. The statements included in the first stage questionnaire and details of their sources are presented in Table 6.2.

Table 6.2. Study 3 first stage questionnaire items

Factors	Topics	No.	Items of statements	Sources
1. Safety management (SM)	Safety commitment			
	Priority of safety	1)	Safety is given priority in my workplace	(Vinodkumar & Bhasi, 2010)
	Importance of safety	2)	In my workplace, safety is considered to be equally important as production and profits	(Cheyne & Cox, 2000; Vinodkumar & Bhasi, 2010; Williamson et al., 1997)
	Interest in safety matters	3)	In my workplace, the owner is interested in safety matters of the workers	(Cheyne & Cox, 2000; Vinodkumar & Bhasi, 2010)
	Commitment to health and safety	4)	All people who work in my workplace are committed to health and safety	(Hon et al., 2014)
	Provision of safety equipment	5)	In my workplace, sufficient safety equipment is provided for the workers	(Vinodkumar & Bhasi, 2010)
	Safety communication			
	Encouragement of open safety communication	6)	Open communication about safety is encouraged in my workplace	(Della et al., 2020; Kath et al., 2010)
	Reporting of unsafe conditions	7)	In my workplace, unsafe conditions are reported	(Della et al., 2020)
	Reporting of unsafe events	8)	In my workplace, unsafe events are reported	(Hon et al., 2014)
	Value in discussing safety	9)	In my workplace, it is worth discussing safety matters with the owner	(Varonen & Mattila, 2000)
	Safety rules and procedures			
	Availability of safety rules and procedures	10)	Rules and procedures related to safety are in place at my workplace	Study 1 results, Study 2 results

Factors	Topics	No.	Items of statements	Sources	
	Importance of safety rules and procedures	11)	It is important to have rules and procedures related to safety for the jobs in my workplaces	Study 2 results	
	Enforcement of safe procedures	12)	Safe procedures are enforced in my workplace	Study 2 results, (Vinodkumar & Bhasi, 2010)	
2.Safety knowledge (SK)	Safety understanding				
	Level of safety understanding	13)	I have adequate understanding of work safety	Study 2 results	
	Importance of safety knowledge	14)	It is important to have knowledge of safety to do my jobs in my workplace	Study 2 results	
	Knowledge to perform the job safely	15)	I know how to perform my job safely	(Neal et al., 2000; Vinodkumar & Bhasi, 2010)	
	Knowledge to maintain or improve safety	16)	I know how to maintain or improve safety of my workplace	(Neal et al., 2000; Vinodkumar & Bhasi, 2010)	
	Safety training				
	Experience in safety training	17)	I have received sufficient training related to safety	Study 2 results	
	Exposure to safety training	18)	I have been shown how to work safely	(Cheyne et al., 1998)	
	Need of safety training	19)	I think my workplace would benefits from training on safety	Study 2 results	
	Availability of safety training	20)	There is adequate safety training in my workplace	(Williamson et al., 1997)	
	3.Work characteristics (WC)	Difficulty of the jobs	21)	Jobs in my workplace are difficult	Study 1 results, Study 2 results
		Complexity of the jobs	22)	Jobs in my workplace are complicated	Study 1 results, Study 2 results
Requirement of skills and experience for the jobs		23)	Jobs in my workplace require certain skills	Study 2 results	
		24)	Jobs in my workplace require certain experience	Study 2 results	
Workload of the jobs		25)	The workload of the jobs in my workplace is high	Study 1 results, Study 2 results	
Jobs assignment		26)	Jobs in my workplace are clearly assigned	Study 1 results, Study 2 results	

Factors	Topics	No.	Items of statements	Sources
	Jobs supervision	27)	Jobs in workplace are being supervised by the owner	Study 1 results, Study 2 results
4.Risk perception (RP)	Perception of hazards and riskiness of the workplace	28)	My workplace is risky	(Hayes et al., 1998)
		29)	My workplace is hazardous	(Hayes et al., 1998)
	Awareness of hazards in the jobs	30)	I know what are the hazards associated with my jobs	(Vinodkumar & Bhasi, 2010)
	Awareness on risk in the jobs	31)	I know the risks of my jobs	Study 2 results
	Perception of ability to avoid risk	32)	I cannot avoid taking risks in my job	(Williamson et al., 1997)
	Perception of possibility of unsafe events	33)	The possibility of unsafe events in my workplace is high	Study 2 results
	Perception of frequency of unsafe events	34)	Unsafe events occur frequently in my workplace	Study 2 results
	Awareness of potential consequences of risk	35)	I know the potential consequences of the risk in my job	Study 2 results
	Perception of severity of risk	36)	The consequences of risks of my jobs would be severe	Study 2 results
5.Safety perception (SP)	Perception of safety of the workplace	37)	My workplace is safe	(Hayes et al., 1998)
		38)	My workplace is dangerous	(Hayes et al., 1998)
		39)	Everybody works safely in my workplace	(Williamson et al., 1997)
	Perception of ability to improve safety	40)	I can't do anything to improve safety in my workplace	(Williamson et al., 1997)
	Influence of job familiarity and routine on perception of safety	41)	I feel safe because of job familiarity and routine	Study 2 results
	Perception of the likelihood of an accident	42)	It is unlikely that an accident will happen to me	(Varonen & Mattila, 2000)
	Perception of the likelihood of being hurt or injured	43)	In the normal course of my job, I do not encounter any dangerous situations	(Williamson et al., 1997)
		44)	I could get hurt or injured easily in my job	(Hayes et al., 1998; Oah et al., 2018)

3. Questionnaire design

Two alternatives of questionnaire design were considered for the design of the first stage questionnaire; random order and presenting questions in groups for each factor. While Davis & Venkatesh (1996) suggested that grouped questions may have better quality in the measures, Budd (1987) and Goodhue (1998) suggested that items for all constructs should be in random order where no items of the same construct are adjacent. They argued that grouping questions may result in artificially inflated reliability, in which reliability may be higher as people may be drawn to consistent responses in related grouped questions (Budd, 1987; Goodhue, 1998). Goodhue (1998) also implied that a person will tend to adjust their answers on questions, if several questions on the same construct are adjacent.

In designing the Study 3 first stage questionnaire, the potential for influence is evident in the statements “My workplace is hazardous” and “My workplace is risky” if they are adjacent in the survey, and also statements between “My workplace is safe” and “My workplace is dangerous”. Goodhue (1998) argued that while people may answer early questions independently, they would make adjustments for the remaining questions. The order of questions may also have a carry-over effect, in which subsequent questions can be influenced by their preceding questions and may contribute to an unrepeatability survey (Earthy et al., 1997; Schuman & Presser, 1981; Tourangeau & Rasinski, 1988). To minimise the possibility of unreliable responses from the participants, the order of items of statements in the first stage questionnaire was randomised.

In another consideration for question order, the section on participant profile was asked at the end of the questionnaire, after the responses to the multiple statements. According to Coverse & Presser (1986) and Oppenheim (1992), questions on the respondents' demographics such as education and age, should be at the end of a questionnaire. This is to anticipate the effect of negative feelings from collection of personal information towards the responses to the questions, and to prevent boredom and avoid less engagement from the participants (Converse & Presser, 1986; Oppenheim, 1992; Rattray & Jones, 2007). Additionally, a Likert scale was used in the

questionnaire for the respondents to give responses to. Likert scale, as developed by Likert (1932), is a five or seven point scale for an individual to express their agreement or disagreement on a particular statement. In both Study 3 first stage and second stage questionnaires, a 5-point Likert scale was used of (1)=strongly disagree to (5)=strongly agree.

Before data collection, the questionnaire was reviewed by some experts, to ensure accuracy, appropriateness, and expression. Firstly, the questionnaire was reviewed by the supervisors of this PhD research, who have knowledge and experience in human factors and safety research. Furthermore, an academic who has experience in safety research and involved in Indonesian small food-producing businesses was involved in reviewing the Bahasa Indonesia (Indonesian language) version of the questionnaire. One head of a business association who has knowledge and experience of the works in the Indonesian small food-producing businesses was also involved in reviewing the Bahasa Indonesia version of the questionnaire. The questionnaire that was used in Study 3 first stage is presented in Table 6.3.

Table 6.3. Study 3 first stage questionnaire

Section 1: Questionnaire statements						
Instructions:						
1. You will be presented with a list of statements related to safety perception and risks perception in Indonesian small food-producing businesses.						
2. Please read each statement carefully.						
3. Please respond to each statement by rating your level of agreement on the scale.						
4. The scales indicate how would you agree for each statement, from (1)=strongly disagree, (2)=disagree, (3)=neutral, (4)=agree, to (5)=strongly agree.						
5. You can review and change your answers at any time before submitting your answer, but you will not be able to make changes after submission.						
No.	Statements	Scale				
		1 (strongly disagree)	2 (disagree)	3 (neutral)	4 (agree)	5 (strongly agree)
1.	It is important to have rules and procedures related to safety for the jobs in my workplace					
2.	Safety is given priority in my workplace					
3.	Jobs in my workplace require certain experience					
4.	I could get hurt or injured easily in my job					
5.	In my workplace, it is worth discussing safety matters with the owner					

6.	In my workplace, the owner is interested in safety matters of the workers					
7.	Jobs in my workplace are clearly assigned					
8.	My workplace is dangerous					
9.	I think my workplace would benefit from training on safety					
10.	I know the potential consequences of the risks in my job					
11.	Jobs in my workplace are supervised by a senior person					
12.	I have adequate understanding of work safety					
13.	Unsafe events occur frequently in my workplace					
14.	I feel safe because of job familiarity and routine					
15.	Jobs in my workplace are complicated					
16.	I know what are the hazards associated with my jobs					
17.	In my workplace, sufficient safety equipment is provided for the workers					
18.	My workplace is risky					
19.	It is unlikely that an accident will happen to me					
20.	Rules and procedures related to safety are in place at my workplace					
21.	In my workplace, unsafe events are reported					
22.	Safe procedures are enforced in my workplace					
23.	The consequences of risks of my jobs would be severe					
24.	I can't do anything to improve safety in my workplace					
25.	All people who work in my workplace are committed to health and safety					
26.	Jobs in my workplace require certain skills					
27.	It is important to have knowledge of safety to do my jobs in my workplace					
28.	I have been shown how to work safely					

29.	The workload of the jobs in my workplace is high					
30.	Jobs in my workplace are difficult					
31.	In my workplace, unsafe conditions are reported					
32.	I know how to perform my job safely					
33.	Open communication about safety is encouraged in my workplace					
34.	I know how to maintain or improve safety of my workplace					
35.	I cannot avoid taking risks in my job					
36.	In the normal course of my job, I do not encounter any dangerous situations					
37.	There is adequate safety training in my workplace					
38.	My workplace is hazardous					
39.	In my workplace, safety is considered to be equally important as production and profits					
40.	My workplace is safe					
41.	The possibility of unsafe events in my workplace is high					
42.	Everybody works safely in my workplace					
43.	I have received sufficient training related to safety					
44.	I know the risks of my jobs					
Section 2: Participant's profile						
Age (years old):						
Gender:						
Last formal education:						
Work length (years, current work):						
Work length (years, in small food-producing businesses):						
Type of product:						
Job/task:						
Contacts (email/mobile):						

6.2.1.2. Procedures and participants

Ethics approval for the study was provided by The Ethics Committee of Faculty of Engineering of The University of Nottingham before it started. Due to Covid-19-related restrictions at the time of the study, the questionnaire survey was conducted online. The online participant information sheet, consent form, and questionnaire were prepared using Microsoft Forms

through the researcher's University of Nottingham account. Responses from the participants were automatically stored in the researcher's Microsoft Forms account, with shared access with the PhD supervisors. The number of responses collected was monitored to ensure it achieved the expected number. Data collection for this first stage took place within a six week period.

The targeted participants of Study 3 first stage were the workers of Indonesian small food-producing businesses. This is because the workers are the people who perform the work activities in the Indonesian small food-producing businesses, in which the influences on their perceptions of work safety and risk were expected to be investigated. Contacts were made with people of Indonesian small food-producing businesses who were involved in Study 1 and Study 2, informing them about Study 3 and asking their help to share the information about participant recruitment. Participants from studies 1 and 2 had previously consented to storage of their contact details to be informed about future studies. A flyer containing information on the first stage recruitment was also prepared and sent to the contacted people.

It was expected that a minimum number of 100 participants would be involved based on requirements for the use of PCA in the analysis to examine the structure of factors and the included items in the questionnaire. Ferguson & Cox (1993) commented on the sample size to ensure stable factor structures in factor analysis, where an exact minimum number of participants between 100 to 200 can be used (Gorsuch, 1983; Kline, 1986; Nunnally, 1978). Therefore, the number of participants for the first stage of this Study 3 was expected to be at least 100 participants.

6.2.1.3. Analysis

1. Descriptive statistics and validity and reliability

In order to have general information on the dataset, descriptive statistics of the dataset were examined, including the means, standard deviations, and correlations among the variables. The validity and reliability of the questionnaire items were also examined. For the validity of the questionnaire items, this was provided by the PCA conducted in the Study 3 first stage, as the process of factor analysis such as PCA would concurrently

verify the validity of the items included in the analysis (Tabachnick & Fidell, 2001; Taherdoost, 2016). A loading value of an item of at least 0.4 and no cross-loadings among the items would indicate validity of the questionnaire items (Ferguson & Cox, 1993; Velicer et al., 1982), which will be explained in more detail in the next section explaining the PCA process.

Reliability of a research instrument can be observed with its Cronbach alpha value, which provides internal consistency measures of a test or scale falling between 0 (no reliability) to 1 (perfect reliability) (Mohajan, 2017; Tavakol & Dennick, 2011). Various criteria to interpret Cronbach alpha values have been suggested by different authors, with Tavakol & Dennick (2011) emphasising that reports suggested acceptable Cronbach alpha values ranging from 0.70 to 0.95. Both descriptive statistics and PCA process of Study 3 first stage were performed using IBM SPSS Statistics 28.

2. Principal Component Analysis (PCA)

Principal Component Analysis (PCA) was used to analyse the dataset, to examine the structure of factors and items included in the questionnaire, by reducing the number of variables into a smaller number of components (Norris & Lecavalier, 2010; Tabachnick & Fidell, 2001). Following guidance on the Exploratory Factor Analysis (EFA) process by Ferguson & Cox (1993), Williams et al. (2010), and Ponnamp et al. (2014), three general stages in performing the PCA were carried out in Study 3 as presented in Figure 6.2 and will be explained in the following.

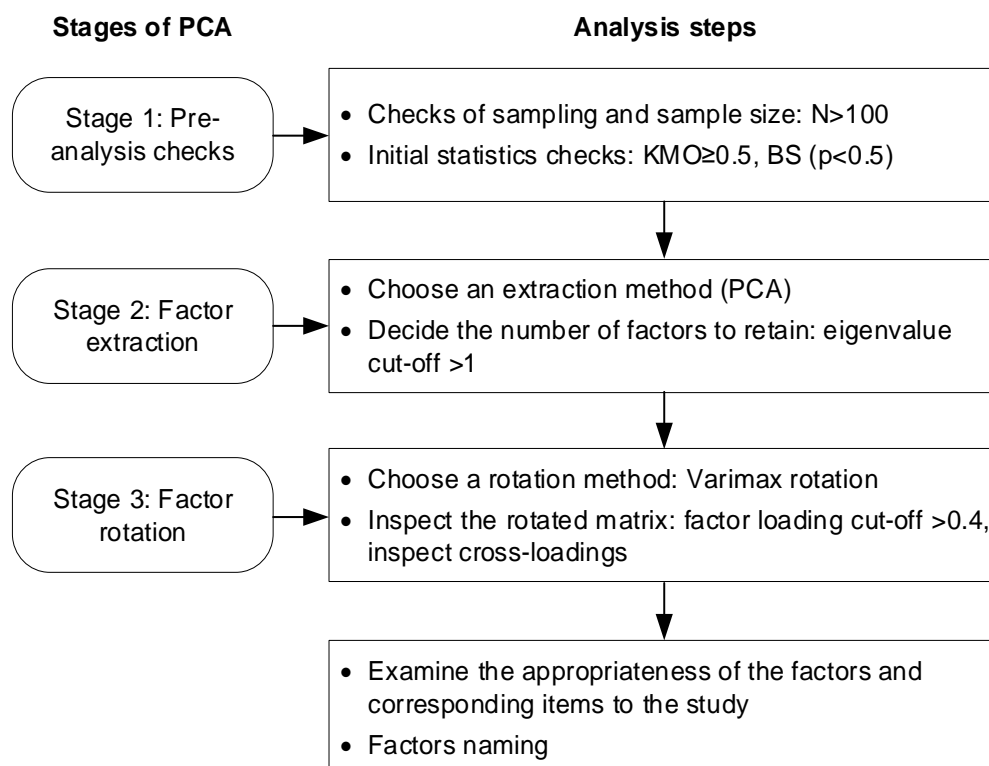


Figure 6.2. Steps of Principal Component Analysis (PCA)

a. Stage 1: Pre-analysis checks

Sampling and sample size. As suggested in Ferguson & Cox (1993), the minimum number of participants in a factors analysis should be between 100 to 200. The number of responses obtained in Study 3 first stage was 122, which was considered an adequate sample size for the PCA.

Initial statistical checks. Ferguson & Cox (1993) and Dziuban & Shirkey (1974) suggested that the Kaiser-Meyer-Olkin (KMO) test of sampling adequacy and Bartlett test of sphericity (BS) should be examined. A minimum KMO value of 0.5 is required, to indicate that variables can be accounted for by smaller sets of factors, and that reliable and distinct factors can be produced. Moreover, a significant test statistic on BS ($p < 0.5$) indicates patterned or discoverable relationships in the data (Dziuban & Shirkey, 1974; Ponnampalnam et al., 2014).

b. Stage 2: Factor extraction

Extraction method. PCA was chosen as the factor extraction technique in analysing the dataset, as it should be the first step in factor

analysis to reduce the data before it can be followed up with other factor analysis techniques (Ferguson & Cox, 1993; Ponnampalnam et al., 2014; Tabachnick & Fidell, 2001). The main objective of PCA is to transform a data set into a new set of variables called the principal components (Jolliffe, 2004), which was considered suitable for the objective of Study 3.

Number of factors to retain. In deciding the number of factors to retain, two techniques were considered. The first technique was to use the scree plot as proposed by Cattell (1966), which is a graph of the factors (X-axis) against their eigenvalue (Y-axis). A point of inflexion is then determined on the graph, which is the point where the slope of plot line changes drastically. The researcher then should retain the number of factors to the left of the point of inflexion (Cattell, 1966; Field, 2009). Although the scree plot technique is useful, it may be problematic as there may be more than one point of inflexion or break (Ferguson & Cox, 1993). Another technique to decide the number of factors to retain is the Kaiser 1 (K1) rule, which was used in this first stage of this study. Using the K1 rule, the number of factors to retain was based on the eigenvalues, in which all factors with eigenvalues greater than 1 is retained (Ferguson & Cox, 1993; Kaiser, 1960).

c. Stage 3: Factor rotation

Rotation method. Resulting extracted factors from the PCA process were then rotated to a simple structure, in which each variable has high loading on one factor and small or zero on the other factors (Ferguson & Cox, 1993). The Varimax rotation method was chosen for this study, as it is the best rotational procedure by aiming to maximise the variance of the squared loadings across factors (Ferguson & Cox, 1993).

Inspecting the rotated matrix. The structure of the factors resulting in the rotated component matrix from the PCA was then inspected and deciding the acceptable loading to define factors, in which factor saturation is critical (Ferguson & Cox, 1993). It is recommended that a loading of 0.4 is set rather than 0.3 to increase factor saturation (Velicer et al., 1982), which was used in this study. Cross loadings, in which an item loads on two or more factors, were also examined. Ferguson & Cox (1993) suggested removal of an item when it

loads on more than one factor with small difference of loading (0.2 or smaller), but can remain if the difference is larger than 0.2. As the PCA resulted in several cross loadings which consequently resulted in removal of some items, the process of factor extraction and rotation was performed in total four times, as suggested by Ferguson & Cox (1993) to re-run the process when items are removed.

6.2.2. Results

6.2.2.1. Participants

The profile of participants is presented in Table 6.4. 128 responses were obtained in the first stage questionnaire. Six responses were excluded from the analysis as they were considered inappropriate. This was due to several reasons of completion time far below the average (1 response), the participant did not complete the consent form (2 responses), and invalid responses (3 responses). Examples of the invalid responses were answers of “not working”, work experience of “0 years”, and answers of “test” to the questions in profile or demographic section. Therefore, a total 122 responses were included as the dataset for the analysis.

Table 6.4. Profile of Study 3 first stage participants

No.	Profile	No. of participants (N=122)	Percentage
1.	Age (years old)		
	50 or older	19	15.6%
	40-49	37	30.3%
	30-39	48	39.3%
	20-29	18	14.8%
2.	Gender		
	Male	93	76.2%
	Female	29	23.8%
3.	Last formal education		
	<i>Sekolah Dasar</i> (Elementary School) or equivalent	61	50.0%
	<i>Sekolah Menengah Pertama</i> (Junior High School) or equivalent	22	18.0%
	<i>Sekolah Menengah Atas</i> (Senior High School) or equivalent	39	32.0%
4.	Work length (years, current)		
	10 or more	66	54.1%
	5-9	47	38.5%
	Less than 5	9	7.4%

No.	Profile	No. of participants (N=122)	Percentage
5.	Work experience (years, in small food-producing businesses)		
	10 or more	42	34.4%
	5-9	59	48.4%
	Less than 5	21	17.2%
6.	Product of the businesses		
	<i>Tempe</i> chips	57	46.7%
	Raw <i>tempe</i>	34	27.9%
	Corn flakes	31	25.4%

The participants represent three different types of products of Indonesian small food-producing businesses. As in Study 1 and Study 2, the participants are workers of *tempe* chips, raw *tempe*, and corn flakes small businesses. Workers of *tempe* chips businesses are higher (46.7%) than the other two types of products, as the location of the study of Malang municipality, East Java province, Indonesia is one of the nation's industrial centres of *tempe* chips businesses. Consequently, the number of businesses and workers of *tempe* chips are higher than the other two types of products. The sample consists of more male workers (76.2%) than female workers (23.8%), in which the age of the workers is mostly 30-39 years old (39.3%) and 40-49 years old (30.3%), with the oldest participant being 59 years old and the youngest participant being 20 years old.

The respondents mostly have a relatively low level of formal education of elementary school or equivalent (50%). They are experienced, with most of them having work experience in Indonesian small food-producing businesses between 5-9 years (48.4%). The longest work experience in the observed Indonesian small food-producing businesses is 26 years, while the lowest is 2 years. One third of the workers have been working in their current businesses for more than ten years (34.4%). The longest work length in current business is 26 years, with the lowest length is 1 year.

6.2.2.2. Descriptive statistics and validity and reliability

Descriptive statistics for the means, standard deviations, and correlations among the factors are presented in Table 6.5. Mean values of all factors are below the rating of 3 (neutral), ranging from 1.89 which was found

on Safety Knowledge (SK), to 2.42 which was found was on Safety Perception (SP). All variables have significant correlations with each other, in which the lowest correlation was between SP and SK (0.466). On the other hand, the correlation between SP and Work Characteristics (WC) was the highest with a correlation coefficient of 0.827.

Table 6.5. Descriptive statistics of Study 3 first stage factors

No.	Factors	Mean	SD	SM	SK	WC	RP	SP
1.	Safety Management (SM)	2.23	0.80	-	-	-	-	-
2.	Safety Knowledge (SK)	1.89	0.65	.605**	-	-	-	-
3.	Work Characteristics (WC)	2.28	0.75	.816**	.598**	-	-	-
4.	Risk Perception (RP)	2.12	0.74	.563**	.665**	.718**	-	-
5.	Safety Perception (SP)	2.42	0.84	.743**	.466**	.827**	.664**	-

**Correlation is significant at the 0.01 level (2-tailed)

SD: Standard deviation

A mean rating of 2.23 on the factor for safety management is consistent with previous Study 2 findings that safety management is inadequately implemented in the observed Indonesian small food-producing businesses. This is reflected in the mean rating of item SM5 with 2.07, indicating an insufficient provision of safety equipment in the workplaces. The mean rating of 2.19 on SM12 indicates that the activities in the workplaces are generally performed without any safety rules or procedures. Additionally, the people of the businesses were unsure whether safety-related rules or procedures are important and necessary, which reflected in the mean rating of 2.18 (SM11). Furthermore, the mean ratings on items related to safety communication (SM6, SM7, SM8, SM9) also indicate that safety communication is generally low in the workplaces. The people of the businesses do not give priority or interest to safety in their workplaces as indicated the ratings of 2.10 and 2.04 on SM1 and SM3, respectively.

The factor of safety knowledge has a mean rating of 1.89, in which only one item (SK3) has a mean rating above 2. In general, these indicate a low level of knowledge or understanding of safety among the participants, and a low level of learning or training of safety in the businesses. Training or learning related to safety in the workplaces seem inadequate, as reflected in the mean ratings of 1.68 and 1.98 on SK5 and SK8, respectively. The respondents

seemed to be unsure of the benefit of safety training should they have one, reflected in the mean rating of 1.75 on SK7. The rating of 1.80 on SK2 adds to this, indicating that the participants think that it is not important to have knowledge on safety to do the jobs in their workplaces.

The mean rating of 2.28 on the work characteristics factor reflects the work characteristics of the observed Indonesian small food-producing businesses, which seemed to be simple and easy tasks and performed in a rather informal work environment. Mean ratings of 2.39, 2.44, and 2.35 on WC1, WC2, and WC3, respectively, indicate that the jobs in the businesses are not difficult, not complicated, and do not require specific skills. The jobs in the observed workplaces are not clearly assigned as indicated by the rating of 2.15 on WC6. WC7 about job supervision has the rating of 2.05, which reflects the low supervision to the jobs.

The factor of risk perception has a mean rating of 2.12 as presented in Table 6.5. There are three items with mean ratings lower than 2, which are RP1, RP2, and RP8, indicating people's perceptions that their workplaces are not risky, not hazardous, and they do not know the potential consequences of the risks. Mean ratings related to possibility and frequency of unsafe events of RP6 and RP7 of 2.34 and 2.05, respectively, were indicated by the participants. These indicate that the participants thought that unsafe events rarely happen in their workplaces. Furthermore, one questionnaire item on risk perception factor of RP5, is a negatively worded question with a mean rating of 2.54. This would mean that the participants thought that they could avoid taking risks in their jobs.

The mean rating of the factor of safety perception is 2.42 as presented previously in Table 6.5. All questionnaire items in the factor of safety perception are below the median scale of 3, ranging from 2.17 to 2.89. Some questionnaire items in safety perception were negatively worded, i.e. SP4, SP6, and SP7, which requires a different interpretation to the ratings. A mean rating of 2.37 on SP4 indicates that the participants feel that they can do something to improve safety in their workplaces. For SP6, the mean rating of 2.20 indicates that the workers think that it is likely that an accident will happen

to them. As for the mean rating of 2.89 in SP7, it could indicate that the workers encounter dangerous situations in their activities.

The descriptive statistics of Study 3 first stage questionnaire items are presented in Table 6.6. Based on the Cronbach alpha value of 0.950, the reliability of the questionnaire was verified. All factors used in the questionnaire are also reliable, shown by acceptable Cronbach alpha values of 0.885 (SM), 0.805 (SK), 0.744 (WC), 0.834 (RP), and 0.834 (SP). As for the validity of the questionnaire items, as previously explained, this will be examined through the PCA process based on the loadings of the items and occurrence of cross-loadings. It will be presented in the next section of the results of the PCA that several cross-loadings were present, which led to refinements of the structure of factors and items.

Table 6.6. Descriptive statistics of Study 3 first stage items

No.	Factor	Items	Mean	Standard deviation	Pearson item-total correlation coefficient	Cronbach alpha value
1.	Questionnaire					0.950
2.	Safety Management (SM)	Safety commitment				0.885
		1) Safety is given priority in my workplace	2.10	1.15	.627**	
		2) In my workplace, safety is considered to be equally important as production and profits	2.61	1.17	.579**	
		3) In my workplace, the owner is interested in safety matters of the workers	2.04	1.22	.591**	
		4) All people who work in my workplace are committed to health and safety	2.25	1.17	.670**	
		5) In my workplace, sufficient safety equipment is provided for the workers	2.07	1.19	.573**	
		Safety communication				
		6) Open communication about safety is encouraged in my workplace	2.27	1.15	.637**	
		7) In my workplace, unsafe conditions are reported	2.30	1.26	.530**	
		8) In my workplace, unsafe events are reported	2.35	1.27	.695**	
		9) In my workplace, it is worth discussing safety matters with the owner	2.10	1.23	.513**	
		Safety rules and procedures				
	10) Rules and procedures related to safety are in place at my workplace	2.28	1.21	.677**		
	11) It is important to have rules and procedures related to safety for the jobs in my workplaces	2.18	1.24	.611**		
	12) Safe procedures are enforced in my workplace	2.19	1.13	.458**		
3.	Safety Knowledge (SK)	Safety understanding				0.805
		1) I have adequate understanding of work safety	1.71	0.87	.434**	
		2) It is important to have knowledge of safety to do my jobs in my workplace	1.80	0.91	.520**	
		3) I know how to perform my job safely	2.61	1.26	.661**	
		4) I know how to maintain or improve safety of my workplace	1.71	0.85	.476**	
		Safety training				
		5) I have received sufficient training related to safety	1.68	0.93	.425**	
		6) I have been shown how to work safely	1.90	1.07	.478**	
	7) I think my workplace would benefit from training on safety	1.75	0.90	.491**		
	8) There is adequate safety training in my workplace	1.98	1.09	.429**		

No.	Factor	Items	Mean	Standard deviation	Pearson item-total correlation coefficient	Cronbach alpha value
4.	Work Characteristics (WC)	1) Jobs in my workplace are difficult	2.39	1.20	.598**	0.744
		2) Jobs in my workplace are complicated	2.44	1.24	.587**	
		3) Jobs in my workplace require certain skills	2.35	1.20	.605**	
		4) Jobs in my workplace require certain experience	2.22	1.19	.638**	
		5) The workload of the jobs in my workplace is high	2.32	1.23	.529**	
		6) Jobs in my workplace are clearly assigned	2.15	1.13	.545**	
		7) Jobs in my workplace are supervised by a senior person	2.05	1.15	.556**	
5.	Risk Perception (RP)	1) My workplace is risky	1.88	1.04	.482**	0.834
		2) My workplace is hazardous	1.99	1.13	.507**	
		3) I know what are the hazards associated with my jobs	2.06	1.13	.633**	
		4) I know the risks of my jobs	2.20	1.21	.468**	
		5) I cannot avoid taking risks in my job	2.54	1.20	.689**	
		6) The possibility of unsafe events in my workplace is high	2.34	1.24	.537**	
		7) Unsafe events occur frequently in my workplace	2.05	1.07	.418**	
		8) I know the potential consequences of the risks in my job	1.76	0.98	.522**	
		9) The consequences of risks of my jobs would be severe	2.24	1.08	.620**	
6.	Safety Perception (SP)	1) My workplace is safe	2.28	1.22	.500**	0.834
		2) My workplace is dangerous	2.40	1.33	.675**	
		3) Everybody works safely in my workplace	2.53	1.14	.612**	
		4) I can't do anything to improve safety in my workplace	2.37	1.29	.618**	
		5) I feel safe because of job familiarity and routine	2.50	1.29	.639**	
		6) It is unlikely that an accident will happen to me	2.20	1.15	.596**	
		7) In the normal course of my job, I do not encounter any dangerous situations	2.89	1.31	.559**	
		8) I could get hurt or injured easily in my job	2.17	1.07	.540**	

** Correlation is significant at the 0.01 level (2-tailed).

6.2.2.3. Principal Component Analysis (PCA)

1. The overall PCA process

The first step of the PCA was checks of Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity (BS), to check the appropriateness of the data. As can be seen in Table 6.7, results of the KMO and BS test performed to Study 3 first stage data showed a KMO value of 0.856 and significant BS ($p < 0.5$), which indicated that the data is appropriate for PCA. The KMO value indicated that distinct factors can be expected to be produced from the dataset. Significant BS also indicated that discoverable relationships can be expected from the dataset.

Table 6.7. KMO and Bartlett's Test results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.856
Bartlett's Test of Sphericity	Approx. Chi-Square	4523.190
	df	946
	Sig.	.000

The next step is factor extraction, in which factors with eigenvalues higher than one were retained. The SPSS outputs of eigenvalues, scree plot, and component matrix are presented in Appendix 6.1. There were six components with eigenvalues higher than one, which consequently resulted in six extracted components. The component matrix was then subsequently rotated to produce a rotated component matrix as presented in Table 6.8. A loading value of 0.4 was set during the PCA process to increase the saturation of produced matrix.

Table 6.8. Rotated Component Matrix (first-run PCA)

Rotated Component Matrix ^a						
Items	Component					
	1	2	3	4	5	6
SM3	0.850					
SM11	0.845					
SM5	0.774					
SM1	0.735					
SK8	0.693					
SM10	0.664	0.421				
SM4	0.644					
SM7	0.621					
WC4	0.593	0.505				
SM6	0.592					
SM8	0.579	0.523				

Rotated Component Matrix ^a						
Items	Component					
	1	2	3	4	5	6
SM2	0.575					
RP2		0.761				
RP3		0.696				
RP9		0.657				
WC7		0.632			0.427	
RP7		0.629				
WC2	0.486	0.621				
SP1		0.595				
RP6		0.594				
SP7		0.585				
WC6		0.561			0.558	
RP4		0.479	0.421	0.407		
SK4			0.844			
RP8			0.796			
SK2			0.783			
SK6			0.771			
SK7			0.757			
SK1			0.751			
RP1			0.702		0.407	
SK5			0.616			-0.504
WC5				0.794		
WC3				0.723		
WC1	0.440			0.679		
SP3				0.670		
SK3		0.475		0.537		
RP5		0.431		0.467		
SM9		0.449			0.729	
SM12					0.726	
SP5	0.415				0.608	
SP6	0.412			0.407	0.591	
SP2	0.465				0.535	
SP4	0.433				0.495	
SP8				0.402		0.556
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. ^a						
a. Rotation converged in 29 iterations.						

The results of initial factor extraction of the PCA show that several cross loadings were present, in which some variables loaded onto more than one component. A summary of the cross loadings is presented in Table 6.9.

Table 6.9. Cross loadings of items (first-run PCA)

Component	Items	Cross loadings
1	Safety management (10 items) Safety knowledge (1 item) Work characteristics (1 item)	3 items (SM10, WC4, SM8) cross loading onto component 2

Component	Items	Cross loadings
2	Risk perception (6 items) Work characteristics (3 items) Safety perception (2 items)	2 items (WC7, WC6) cross loading onto component 5 1 item (WC2) cross loading onto component 1 1 item (RP4) cross loading onto component 3 and 4
3	Safety knowledge (6 items) Risk perception (2 items)	1 item (RP1) cross loading onto component 5 1 item (SK5) cross loading onto component 6
4	Work characteristics (3 items) Safety perception (1 item) Risk perception (1 item) Safety knowledge (1 item)	2 items (SK3, RP5) cross loading onto component 2 1 item (WC1) cross loading onto component 1
5	Safety perception (4 items) Safety management (2 items)	3 items (SP5, SP2, SP4) cross loading onto component 1 1 item (SM9) cross loading into component 2 1 item (SP6) cross loading onto component 1 and 4
6	Safety perception (1 item)	1 item (SP8) cross loading onto component 4

Cross loading items with loading differences of 0.2 or smaller were removed, and the PCA was re-run without these items. In total, the PCA process was run four times with 17 items removed throughout the four runs of PCA, due to small differences in cross loadings. Although cross loadings were still present on one item (WC1) in the fourth-run PCA, the loading differences were over 0.2 so the item was not removed. Therefore, the PCA process was finalised in the fourth-run. The final rotated component matrix is presented in Table 6.10, with SPSS outputs of the fourth run of the PCA presented in Appendix 6.2. The final rotated component matrix contained 27 items grouped into five components.

Table 6.10. Rotated Component Matrix (fourth and final run of the PCA)

Rotated Component Matrix ^a					
Items	Component				
	1	2	3	4	5
SM3	0.863				
SM11	0.837				
SM5	0.768				
SM1	0.736				
SM10	0.715				
SM2	0.662				
SM4	0.641				
SM6	0.627				

Rotated Component Matrix ^a					
Items	Component				
	1	2	3	4	5
SM7	0.622				
SK4		0.842			
RP8		0.800			
SK2		0.800			
SK6		0.788			
SK7		0.761			
SK1		0.747			
RP2			0.763		
SP1			0.706		
RP6			0.661		
SP7			0.652		
RP3			0.650		
RP9			0.578		
RP7			0.562		
WC3				0.807	
WC5				0.805	
WC1	0.405			0.746	
SM12					0.854
SM9					0.817
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.					
a. Rotation converged in 8 iterations.					

2. Items and factor removal and retention

The components and their items were examined to establish the final resulting factors. Initial review from the final produced rotated component matrix indicated that the five produced components were consistent with the five identified and formulated factors for the original questionnaire, as shown in Table 6.11. However, further examination and considerations were necessary to ensure the appropriateness of the final factors to be included in the second stage the study, as explained in the following.

Table 6.11. Comparison of initially formulated factors and PCA results

Initially formulated			PCA results		
No.	Factor	No. of items	No.	Factor/component	No. of items
1.	Safety Management	12	1.	Factor/component 1	9 (9 items from SM)
2.	Safety Knowledge	8	2.	Factor/component 2	6 (5 items from SK, 1 item from RP)
3.	Work Characteristics	7	3.	Factor/component 3	7 (5 items from RP, 2 items from SP)
4.	Risk Perception	9	4.	Factor/component 4	3 (3 items from WC)
5.	Safety Perception	8	5.	Factor/component 5	2 (2 items from SM)
Total no. of items		44	Total no. of items		27

Firstly, the structure of the produced factors or components from the performed PCA was examined. Table 6.10 and Table 6.11 show that there were only two items in component 5. Generally, a factor with fewer than three items is undesirable as it may be weak and unstable (Costello & Osborne, 2005; Ponnam et al., 2014). Therefore, it was decided that two items in component 5 “Safe procedures are enforced in my workplace” (SM12) and “In my workplace, it is worth discussing safety matters with the owner” (SM9) were removed, and as a consequence component 5 was also removed. To verify the validity and reliability of the final factors and items, further validity and reliability checks were performed on the components and items, as can be seen in Table 6.12. All items are valid and all components, which subsequently will become factors or variables, are reliable. Therefore, no items were removed from the validity and reliability checks.

Table 6.12. Post-PCA validity and reliability checks

No.	Components	Items	Factor loadings	Pearson item-total correlation coefficient	Cronbach alpha value
1.	Component 1	SM3	0.863	.672**	0.915
		SM11	0.837	.678**	
		SM5	0.768	.650**	
		SM1	0.736	.693**	
		SM10	0.715	.618**	
		SM2	0.662	.602**	
		SM4	0.641	.729**	
		SM6	0.627	.592**	
		SM7	0.622	.646**	
2.	Component 2	SK4	0.842	.560**	0.902
		RP8	0.800	.597**	
		SK2	0.800	.601**	
		SK6	0.788	.566**	
		SK7	0.761	.541**	
		SK1	0.747	.495**	
3.	Component 3	RP2	0.763	.489**	0.847
		SP1	0.706	.493**	
		RP6	0.661	.524**	
		SP7	0.652	.508**	
		RP3	0.650	.575**	
		RP9	0.578	.577**	
		RP7	0.562	.496**	
4.	Component 4	WC3	0.807	.624**	0.873
		WC5	0.805	.584**	
		WC1	0.746	.643**	

** . Correlation is significant at the 0.01 level (2-tailed).

As the two items SM12 and SM9 were removed based on examination of components structures, 19 items were removed in total as presented in Table 6.13. Therefore, 25 out of 44 initial questionnaire items were retained for the second stage of the study.

Table 6.13. Removed items based on PCA results

No.	Items removed	Source of removal
1.	Jobs in my workplace require certain experience (WC4)	First-run PCA
2.	In my workplace, unsafe events are reported (SM8)	
3.	Jobs in my workplace are complicated (WC2)	
4.	Jobs in my workplace are clearly assigned (WC6)	
5.	I know the risks of my jobs (RP4)	
6.	I know how to perform my job safely (SK3)	
7.	I cannot avoid taking risks in my job (RP5)	
8.	I feel safe because of job familiarity and routine (SP5)	
9.	It is unlikely that an accident will happen to me (SP6)	
10.	My workplace is dangerous (SP2)	
11.	I can't do anything to improve safety in my workplace (SP4)	
12.	I could get hurt or injured easily in my job (SP8)	Second-run PCA
13.	There is adequate safety training in my workplace (SK8)	
14.	My workplace is risky (RP1)	
15.	Everybody works safely in my workplace (SP3)	
16.	I have received sufficient training related to safety (SK5)	Third-run PCA
17.	Jobs in my workplace are supervised by a senior person (WC7)	
18.	Safe procedures are enforced in my workplace (SM12)	
19.	In my workplace, it is worth discussing safety matters with the owner (SM9)	Examination of components structures

3. Factors naming and reformulation

In naming and reformulating the factors that would be used in the second stage study, items on each component were compared with the initially formulated factors as presented in Table 6.14. In addition to the different number of factors, it can be seen that some items from different initially formulated factors were grouped into the same component or factor on the PCA results. This raised important considerations about factor naming.

Table 6.14. Comparison of initially formulated and retained factors

Initially formulated			PCA results		
No.	Factor	No. of items	No.	Factor/Component	No. of items
1.	Safety Management	12	1.	Safety Management	9 (9 items from SM)
2.	Safety Knowledge	8	2.	Safety Knowledge	6 (5 items from SK, 1 item from RP)

Initially formulated			PCA results		
No.	Factor	No. of items	No.	Factor/Component	No. of items
3.	Work Characteristics	7	3.	Work Characteristics	3 (3 items from WC)
4.	Risk Perception	9	4.	Perception on Safety and Risk	7 (5 items from RP, 2 items from SP)
5.	Safety Perception	8			
Total no. of items		44	Total no. of items		25

- 1) **Component 1 (9 SM items).** The remaining nine from the initial twelve items of safety management were retained in the same component. Therefore, for the following Study 3 second stage, component 1 retained the name “Safety Management”.
- 2) **Component 2 (5 SK items, 1 RP item).** One item from risk perception “I know the potential consequences of the risks in my job” (RP8) was grouped in the same component with five other items from safety knowledge. As the item is still related to knowledge around safety and risk, component 2 retained the name “Safety Knowledge”.
- 3) **Component 3 (3 WC items).** The remaining three items of work characteristics were grouped in the same component. Therefore, component 3 name of “Work Characteristics” was retained.
- 4) **Component 4 (5 RP items, 2 SP items).** Some items on factors of risk perception and safety perception might be considered to be similar by the respondents. This may indicate that one factor contributes to the grouped items of risk perception and safety perception in the same component. Therefore, component 4 was named “Perceptions of Safety and Risk” to reflect the items related to risk perception and safety perception.

The remaining 25 items from the PCA results were then reformulated into the four factors as extracted through the PCA, as presented in Table 6.15. These factors and items were then included in the second stage questionnaire.

Table 6.15. Reformulated factors and items for Study 3 second stage

No.	Factors	Items of statements
1.	Safety Management (SM)	1) Safety is given priority in my workplace (SM1) 2) In my workplace, safety is considered to be equally important as production and profits (SM2) 3) In my workplace, the owner is interested in safety matters of the workers (SM3) 4) All people who work in my workplace are committed to health and safety (SM4) 5) In my workplace, sufficient safety equipment is provided for the workers (SM5) 6) Open communication about safety is encouraged in my workplace (SM6) 7) In my workplace, unsafe conditions are reported (SM7) 8) Rules and procedures related to safety are in place at my workplace (SM8) 9) It is important to have rules and procedures related to safety for the jobs in my workplaces (SM9)
2.	Safety Knowledge (SK)	1) I have adequate understanding of work safety (SK1) 2) It is important to have knowledge of safety to do my jobs in my workplace (SK2) 3) I know how to maintain or improve safety of my workplace (SK3) 4) I know the potential consequences of the risks in my job (SK4) 5) I have been shown how to work safely (SK5) 6) I think my workplace would benefit from training on safety (SK6)
3.	Work Characteristics (WC)	1) Jobs in my workplace are difficult (WC1) 2) Jobs in my workplace require certain skills (WC2) 3) The workload of the jobs in my workplace is high (WC3)
4.	Perceptions of Safety and Risk (PSR)	1) My workplace is hazardous (PSR1) 2) I know what are the hazards associated with my jobs (PSR2) 3) The possibility of unsafe events in my workplace is high (PSR3) 4) Unsafe events occur frequently in my workplace (PSR4) 5) The consequences of risks of my jobs would be severe (PSR5) 6) My workplace is safe (PSR6) 7) In the normal course of my job, I do not encounter any dangerous situations (PSR7)

6.3. Study 3 second stage

6.3.1. Method

6.3.1.1. Second stage questionnaire

The questionnaire for the second stage of the study is presented in Table 6.16. For the same reasons as in the first stage questionnaire design, the questionnaire statements were presented in random order.

Table 6.16. Study 3 second stage questionnaire

Section 1: Questionnaire statements						
Instructions:						
1. You will be presented a list of statements related to safety perception and risks perception in Indonesian small food-producing businesses.						
2. Please read each statement carefully.						
3. Please respond to each statement by rating your level of agreement on the scale.						
4. The scales indicate how would you agree for each statement, from (1)=strongly disagree, (2)=disagree, (3)=neutral, (4)=agree, to (5)=strongly agree.						
5. You can review and change your answers at any time before submitting your answer, but you will not be able to make changes after submission.						
No.	Statements	Scale				
		1 (strongly disagree)	2 (disagree)	3 (neutral)	4 (agree)	5 (strongly agree)
1.	It is important to have rules and procedures related to safety for the jobs in my workplaces					
2.	I know what are the hazards associated with my jobs					
3.	Jobs in my workplace are difficult					
4.	Safety is given priority in my workplace					
5.	I think my workplace would benefit from training on safety					
6.	My workplace is safe					
7.	In my workplace, sufficient safety equipment is provided for the workers					
8.	I have adequate understanding of work safety					
9.	Rules and procedures related to safety are in place at my workplace					
10.	The consequences of risks of my jobs would be severe					
11.	I know how to maintain or improve safety of my workplace					
12.	Open communication about safety is encouraged in my workplace					
13.	In the normal course of my job, I do not encounter any dangerous situations					
14.	The workload of the jobs in my workplace is high					

15.	All people who work in my workplace are committed to health and safety					
16.	It is important to have knowledge of safety to do my jobs in my workplace					
17.	Unsafe events occur frequently in my workplace					
18.	In my workplace, unsafe conditions are reported					
19.	I know the potential consequences of the risks in my job					
20.	Jobs in my workplace require certain skills					
21.	My workplace is hazardous					
22.	In my workplace, safety is considered to be equally important as production and profits					
23.	I have been shown how to work safely					
24.	The possibility of unsafe events in my workplace is high					
25.	In my workplace, the owner is interested in safety matters of the workers					

Section 2: Participant's profile

Age (years old):
 Gender:
 Last formal education:
 Work length (years, current work):
 Work length (years, in small food-producing businesses):
 Type of product:
 Job/task:
 Contacts (email/mobile):

6.3.1.2. Procedures and participants

The same procedure was used to administer the online quantitative survey study using the refined questionnaire, with a new and larger sample of respondents. The survey included information for participant, consent forms, and the questionnaire, which were prepared in Microsoft Forms through the researcher's University of Nottingham account. Renewal of ethics approval for Study 3 second stage was received from The Ethics Committee of Faculty of Engineering of The University of Nottingham. Responses from the participants were automatically stored in the researcher's Microsoft Forms account, with shared access with the PhD supervisors. The number of responses collected was monitored to ensure it achieved the expected number. Data collection for this second stage took place within a period of five weeks.

The expected participants were once again the workers of Indonesian small food-producing businesses. Recruitment for Study 3 second stage participants was also done in a similar way, in which contacts were made to the people of Indonesian small food-producing businesses who were involved in the previous studies of this research. In the contacts, the people were informed about the study and asked for their help to share the information about the participant recruitment. A flyer containing information on the study recruitment was also prepared and sent to the contacted people to be shared to potential participants.

A minimum number of participants to be achieved was considered, taking account of the SEM analysis for this part of the study. The ratio of number participants to number of statements was used in determining the number of participants, in which there are various suggestions on the ratio. Some of the suggestions are a ratio between 3 to 6 (Cattell, 1978), minimum ratio of 5 (Gorsuch, 1983), and ratio of at least 10 (Everitt, 1975; Nunnally, 1978). As the number of questionnaire items for second stage study is 25, the number of participants was expected to be at least 250, achieving the ratio recommended by Everitt (1975) and Nunnally (1978). The intention was to have at least 300 participants for the second stage of Study 3, to anticipate undesirable responses from the participants, such as invalid responses. Additionally, by aiming for a minimum 300 respondents, this would also exceed the good category of adequate sample size in factor analysis of a minimum of 300 as suggested by Comrey & Lee (1992).

6.3.1.3. Analysis

1. Descriptive statistics and validity and reliability

Descriptive statistics for the second stage study (i.e. means, standard deviations, and correlations) and reliability checks based on Cronbach's alpha values were performed using IBM SPSS Statistics 28. Validity checks in the second stage study included convergent validity and discriminant validity, examined together with the SEM analysis which will be explained in the next section explaining the SEM process.

2. Structural Equation Modeling (SEM)

Following guides provided by Schumacker & Lomax (2004) and Anderson & Gerbing (1988), the SEM analysis in this research was performed with steps as in Figure 6.3.

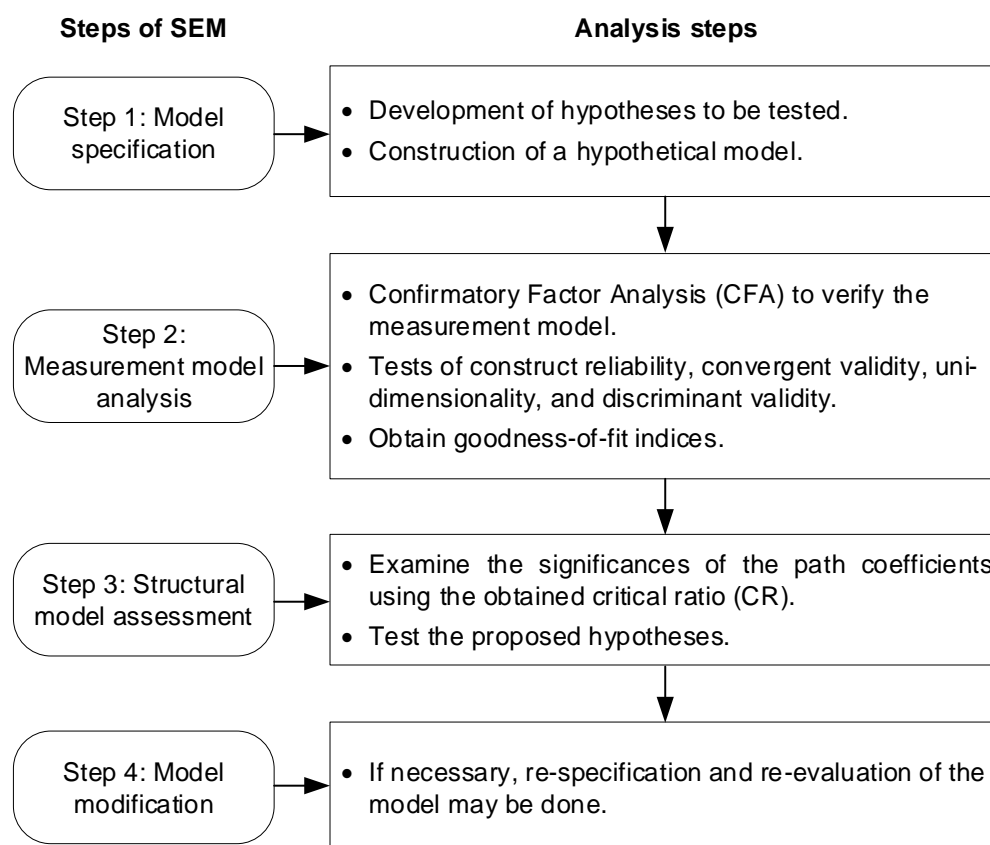


Figure 6.3. Steps of Structural Equation Modeling (SEM)

a. Model specification

A model that was expected to be analysed with SEM was formulated, along with the corresponding hypotheses that will be tested. Schumacker & Lomax (2004) suggested that the model which will be assessed with SEM itself may be specified by using available relevant research, theory, and information. In this study, the model and hypotheses formulation were based on literature review, Study 1 results, and Study 2 results, and the formulated hypothetical model is shown in Figure 6.4.

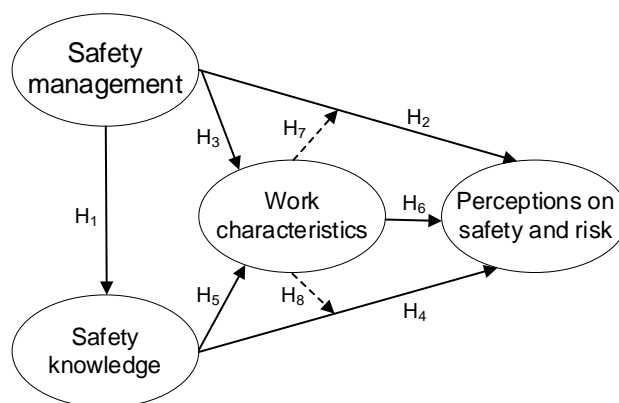


Figure 6.4. Hypothetical model of Study 3 second stage

Safety management and its factors such as management commitment, safety communication, and safety rules and procedures, have been found to have correlation with safety knowledge (Lu et al., 2020; Vinodkumar & Bhasi, 2010). Based on results of the previous Study 2, it can be understood that currently, safety management is rather not implemented in the observed Indonesian small food-producing businesses. It was also understood that the people have a relatively low knowledge of work safety. It was considered that, in the observed Indonesian small food-producing businesses, the low level of implementation of safety management in the businesses could influence the knowledge or understanding of the people on work safety. Therefore, it was hypothesised that in Indonesian small food-producing businesses, safety management positively influences safety knowledge (**H₁**).

Factors of safety management such as safety commitment, safety policy, and rules and procedures have also been found to have influences on employees' risk perception (Rundmo, 1997; Vu et al., 2022; Zhao et al., 2021). Park et al. (2022) also argued that employees' perceptions of safety and risk can be influenced by safety management in the workplace. In the observed Indonesian small food-producing businesses, while safety is not being managed, the people perceived their workplaces as unsafe but with low risk. The absence of safety management could contribute to the workers' perceptions of low risk to the risks at their workplaces, in which in this Study 3 it was hypothesised that safety management in Indonesian small food-producing businesses positively influences the workers' perceptions of safety and risk (**H₂**).

Furthermore, from the previous Study 1 and Study 2, it was understood that the people perceived the work characteristics of the observed businesses as being consisted of easy and light tasks which do not require certain skills. When talking about potential different implementations of work safety, the interviewees frequently pointed out their reluctance to implement work safety by performing aspects related to safety management such as rules, procedures, and commitment. They thought that management or implementation of work safety would complicate and interfere with the work activities. Therefore, it was hypothesised that safety management positively influences work characteristics in Indonesian small food-producing businesses (**H₃**), in which implementation of safety management may contribute to the more difficult activities with higher workload and require certain skills. Thus, three hypotheses relating to safety management were proposed as shown below.

H₁: Safety management positively influences safety knowledge

H₂: Safety management positively influences perceptions of safety and risk

H₃: Safety management positively influences work characteristics

Safety knowledge has been found to have impacts on workers' risk perceptions (Chaswa et al., 2020; Zhao et al., 2021). Similarly, predictors of safety knowledge such as safety training could also have impact on the workers' safety perceptions (Korkmaz & Park, 2018). It was hypothesised that safety knowledge of the people of Indonesian small food-producing businesses could have positive influence on their perceptions of safety and risk (**H₄**). The people's knowledge of safety is considerably low, which could influence their perceptions of low risk at their workplaces.

Furthermore, from previous Study 2 results, it was understood that in general, the people of Indonesian small food-producing businesses have relatively low knowledge of safety. This was indicated by their doubts over their general and short explanations of their understanding of safety, and they do not have experience of training or other forms of learning about safety. Some interviewees also stated that they were unsure of the need or

importance of more knowledge on safety, because they thought that their work might not need certain knowledge of safety and that it will not be beneficial. Therefore, in this Study 3, it was also hypothesised that safety knowledge positively influences work characteristics (**H5**). Two hypotheses relating to safety knowledge were formulated as shown below.

H4: Safety knowledge positively influences perceptions of safety and risk

H5: Safety knowledge positively influences work characteristics

Some studies have shown the association between work characteristics and workers' perceptions of safety and risk (Oah et al., 2018; Rundmo, 1997; Wang et al., 2016). As explored in Study 2, generally the people of Indonesian small food-producing businesses perceived that their workplaces were unsafe. They pointed out that the frequency and probability of accident or injury were low, and that resulting consequences of past unsafe events were low in severity. Their perceptions of safety and risk at their workplaces may be related to the characteristics of their work. This was indicated by some of their statements that their relatively simple and easy jobs, as well as familiarity and routine, may make them feel safe although they were aware of the unsafe conditions. It was hypothesised that the work characteristics of the Indonesian small food-producing businesses negatively influence the workers' risk perception (**H6**).

The easy and simple characteristics of the workers' tasks as they emphasised could influence their perception of low risk at their workplaces. In addition to its hypothesised influence on perceptions of work safety and risk, work characteristics was also hypothesised to be a mediating factor of influences of both safety management and safety knowledge to perceptions of work safety and risk. In the previous Study 2 interviews, the people of the observed Indonesian small food-producing businesses indicated the unnecessary of implementing work safety, due to the easy tasks and perceived low risk of unsafe events and injuries. Similarly, some interviewees also questioned the benefit of increasing safety knowledge, as their work tasks are simple and they experienced no major issues on work safety so far. These indicate potential influences of work characteristics, in which work

characteristics is hypothesised to be mediating safety management (**H₇**) and safety knowledge (**H₈**) in influencing perceptions of work safety and risk. Three hypotheses relating to work characteristics were proposed as shown below.

H₆: Work characteristics negatively influence perceptions of safety and risk

H₇: Work characteristics mediate the influence of safety management on perceptions on safety and risk

H₈: Work characteristics mediate the influence of safety knowledge on perceptions on safety and risk

b. Measurement model analysis (Confirmatory Factor Analysis (CFA))

The first step of the SEM analysis was measurement model analysis, which involves CFA. CFA was performed to assess and test whether the measurement model meets several satisfactory criteria, using IBM SPSS AMOS 28. Tests performed on the measurement model were regarding its uni-dimensionality, reliability, convergent validity, and discriminant validity as explained in the following.

- 1) Construct reliability assesses the extent of how consistent a variable or set of variables measure what they intend to measure (Straub et al., 2004). Construct reliability can be assessed by examining values of composite reliability and Cronbach's alpha of the measurement model, where a threshold value of 0.7 is considered acceptable (Nunnally & Bernstein, 1994). Cronbach's alpha values were obtained using IBM SPSS Statistics 28, and composite reliability values were obtained using the following formula (Raykov, 1997), where λ is the standardised factor loading for item i as obtained from AMOS, and ϵ is the respective error variance for item i .

$$CR = \frac{(\sum \lambda_i)^2}{(\sum \lambda_i)^2 + (\sum \epsilon_i)}$$

- 2) Convergent validity is the degree to which multiple measures of constructs that should be related are in fact related (Gefen et al., 2000).

At the same time, satisfactory convergent validity will ensure unidimensionality of constructs with multiple items (Bollen, 1989). Average Variance Extracted (AVE) can be used to assess convergent validity, in which an AVE value of greater than 0.5 will provide evidence of convergent validity, as the corresponding latent variable explains more than half of the variance in the belonging indicators (Bagozzi & Yi, 1988). The AVE values were obtained using the following formula (Fornell & Larcker, 1981b), where λ represents the standardised factor loading as obtained from AMOS, and i is the number of items.

$$AVE = \frac{\sum_{i=1}^n \lambda_i^2}{n}$$

- 3) Discriminant validity is the extent to which a construct is truly distinct from other constructs (Hair et al., 2010). Discriminant validity was examined by using the Heterotrait-Monotrait (HTMT) ratio as suggested by Henseler et al. (2015), which is a ratio measure of the average of correlations of indicators across two variables (heterotrait correlations), relative to the geometric mean of the correlations of indicators within the same variable (monotrait correlations). The obtained HTMT ratio values were then examined, in which discriminant validity is achieved when HTMT ratio values of all variables are lower than 0.9, as recommended by Henseler et al. (2015). The HTMT ratio values were calculated using the following equation (Henseler et al., 2015; Rönkkö & Cho, 2022), where $HTMT_{ij}$ is the HTMT ratio value between variables i and j , $\bar{\sigma}_{ij}$ denotes the average of correlations between indicators of variables i and j , while $\bar{\sigma}_i$ and $\bar{\sigma}_j$ denote the average of correlations of indicators within the same construct. The correlation coefficients obtained from the output of IBM SPSS AMOS were used in calculating the HTMT ratios.

$$HTMT_{ij} = \frac{\bar{\sigma}_{ij}}{\sqrt{\bar{\sigma}_i \times \bar{\sigma}_j}}$$

In addition to the above tests, an examination of several criteria of goodness of fit of the model was also carried out, to assess the fitness of the model and the dataset. As Weston & Gore (2006) suggested, a model's fit to the data must be evaluated to determine whether the associations among variables in the model adequately reflect the data. Several criteria of model fit were used to examine the fitness of the model, as can be seen in Table 6.17.

Table 6.17. Goodness of fit criteria of Study 3 measurement model

No.	Goodness of fit	Criteria	Reference
1.	χ^2/df	≤ 3	(Byrne, 2001)
2.	GFI (Goodness of Fit Index)	≥ 0.90	(Byrne, 2001)
3.	CFI (Comparative Fit Index)	≥ 0.90	(Byrne, 2001)
4.	NFI (Normed Fit Index)	≥ 0.90	(Byrne, 2001)
5.	TLI (Tucker Lewis Index)	≥ 0.90	(Byrne, 1994)
6.	RMSEA (Root-mean-square error of approximation)	< 0.05	(Schumacker & Lomax, 2004)

c. Structural model assessment

After the CFA process to test the reliability, validity, and goodness of fit of the measurement model, the second step was examination of statistical relationships of the structural model. This step also confirms whether the proposed hypotheses as explained previously are supported or not. Assessment of the statistical relationships of the structural model was carried out by examining the critical ratio (CR) or t-values obtained from the model estimation run with the AMOS software. Hair et al. (1998) stated that CR is a t-value obtained, in which CR values exceeding 1.96 (0.05 significance level) or 2.56 (0.01 significance level) are showing significant values and would support the proposed hypothesis.

d. Model modification

As will be explained throughout the next section of the results of SEM analysis, while the model seems to have good and strong fit to the data, there was a consideration related to the discriminant validity of the model. Bollen (1989) and Fornell & Larcker (1981a) pointed out that discriminant validity is crucial in analysis of latent variables such as SEM, in which Farrell (2010) implied that there may be uncertainty regarding the results of hypothetical

model without it. Therefore, the model was subsequently modified (explained in Section 6.3.2.3).

6.3.2. Results

6.3.2.1. Participants

A total of 318 responses to the questionnaire were obtained. With similar reasons to data removal in the first stage, eleven responses were excluded from the analysis of this second stage study because of invalid responses. In total, the number of responses that were included for Study 3 second stage dataset for the analysis was 307. The profile of the participants is presented in Table 6.18. In overview, the profile of these participants is similar to those in the first stage. The age of participants is dominated by the workers with the age of 30-39 (45%) and 40-49 (32.2%), and the oldest participant was 58 years old while the youngest was 20 years old.

Most of the participants have their last formal education level of elementary school or equivalent (58%), with more numbers of male workers (60.3%) than female workers (39.7%). A majority of the participants have ten or more years of experience in working in Indonesian small food-producing businesses (56.4%), with almost half of them working in their respective current small food-producing businesses for 5 to 9 years (47.9%). The representation of the three different types of products in is more balanced compared to the first stage, in which the workers are working in the businesses of *tempe* chips (36.8%), raw *tempe* (30%), and corn flakes (33.2%).

Table 6.18. Profile of Study 3 second stage participants

No.	Profile	No. of respondents (N=307)	Percentage
1.	Age (years old)		
	50 or older	31	10.1%
	40-49	99	32.2%
	30-39	138	45.0%
	20-29	39	12.7%
2.	Gender		
	Male	185	60.3%
	Female	122	39.7%
3.	Last formal education		

No.	Profile	No. of respondents (N=307)	Percentage
	<i>Sekolah Dasar</i> (Elementary School) or equivalent	178	58.0%
	<i>Sekolah Menengah Pertama</i> (Junior High School) or equivalent	40	13.0%
	<i>Sekolah Menengah Atas</i> (Senior High School) or equivalent	85	27.7%
	Diploma or equivalent	3	1.0%
	<i>Sarjana</i> (Bachelor) or equivalent	1	0.3%
4.	Work length (years, current)		
	10 or more	105	34.2%
	5-9	147	47.9%
	Less than 5	55	17.9%
5.	Work experience (years, in small food-producing businesses)		
	10 or more	173	56.4%
	5-9	105	34.2%
	Less than 5	29	9.4%
6.	Product of the businesses		
	<i>Tempe</i> chips	113	36.8%
	Raw <i>tempe</i>	92	30.0%
	Corn flakes	102	33.2%

6.3.2.2. Descriptive statistics and validity and reliability

Means, standard deviations, and correlations among the factors are presented in Table 6.19. Means of all factors are below the rating of 3 (neutral), ranging from 2.39 which was found on Safety Knowledge (SK), to 2.46 which was found on Perceptions on Safety and Risk (PSR). All factors have significant correlations with each other, in which the highest correlation is between Safety Management (SM) and SK (0.833). The lowest correlation is between Work Characteristics (WC) and PSR with a correlation coefficient of 0.745.

Table 6.19. Descriptive statistics of Study 3 second stage factors

No.	Factors	Mean	SD	SM	SK	WC	PSR
1.	Safety Management (SM)	2.40	0.98	-	-	-	-
2.	Safety Knowledge (SK)	2.39	1.00	0.833**	-	-	-
3.	Work Characteristics (WC)	2.40	1.06	0.774**	0.785**	-	-
4.	Perceptions of Safety and Risk (PSR)	2.46	0.97	0.769**	0.770**	0.745**	-

** Correlation is significant at the 0.01 level (2-tailed)

SD: Standard deviation

The means of all questionnaire items are below the median rating of 3 (neutral), indicating disagreement from the participants to all questionnaire items in general. For the SM factor, the rating of 2.29 on SM1 suggests that safety is not being given priority in the workplaces of Indonesian small food-producing businesses. The rating of 2.50 on SM9 indicates that the workers of Indonesian small food-producing business do not think that safety rules and procedures are important for their workplaces. For the SK factor, the rating of 2.34 on SK1 indicates a low knowledge or understanding of work safety among the workers. This is also reflected in the rating of 2.34 on SK5, suggesting that the workers are not given or do not have experience of learning or training about safety. Additionally, the mean of SK6 is 2.44, indicating that the participants are unsure of the benefit of safety training.

Regarding the factor of WC, the participants indicated that the jobs in Indonesian small food-producing business are not difficult, from the mean of 2.35 (WC1). The mean of WC2 of 2.40 indicates that the jobs do not require specific or particular skills, and the mean of WC3 of 2.45 suggests that generally the workload of the jobs is light. For the factor of PSR, the mean of PSR1 of 2.41 indicates that the workplaces are not thought to be hazardous. The mean rating of PSR6 of 2.48 is contradictory, suggesting that the workplaces are unsafe. This could reflect the workers' inability to identify hazards or negligence to hazards, or a low level of safety knowledge. Relatively low mean ratings were also found in items related to the possibility, frequency, and severity of risks (PSR3, PSR4, PSR5). These indicate that unsafe events or accidents rarely happen and that the severity would be low in general.

The descriptive statistics of Study 3 second stage questionnaire items are presented in Table 6.20. The questionnaire is reliable based on a Cronbach alpha value of 0.961. All factors used in the questionnaire are also reliable, shown by acceptable Cronbach alpha values of 0.915 (SM), 0.886 (SK), 0.789 (WC), and 0.877 (PSR). Validity checks based on the SEM analysis will be presented in the next section explaining the SEM results. It will be presented that there was an issue relating to discriminant validity, which led to the necessity to modify the model and structure of factors and items.

Table 6.20. Descriptive statistics of Study 3 second stage items

No.	Factors	Items	Mean	Standard deviation	Pearson item-total correlation coefficient	Cronbach alpha value
1.	Questionnaire					0.961
2.	Safety Management (SM)	Safety is given priority in my workplace (SM1)	2.29	1.18	0.691**	0.915
		In my workplace, safety is considered to be equally important as production and profits (SM2)	2.37	1.29	0.740**	
		In my workplace, the owner is interested in safety matters of the workers (SM3)	2.35	1.26	0.757**	
		All people who work in my workplace are committed to health and safety (SM4)	2.40	1.29	0.741**	
		In my workplace, sufficient safety equipment is provided for the workers (SM5)	2.41	1.30	0.719**	
		Open communication about safety is encouraged in my workplace (SM6)	2.38	1.24	0.720**	
		In my workplace, unsafe conditions are reported (SM7)	2.44	1.29	0.735**	
		Rules and procedures related to safety are in place at my workplace (SM8)	2.46	1.29	0.727**	
		It is important to have rules and procedures related to safety for the jobs in my workplaces (SM9)	2.50	1.29	0.732**	
3.	Safety Knowledge (SK)	I have adequate understanding of work safety (SK1)	2.39	1.26	0.735**	0.886
		It is important to have knowledge of safety to do my jobs in my workplace (SK2)	2.42	1.28	0.739**	
		I know how to maintain or improve safety of my workplace (SK3)	2.41	1.18	0.724**	
		I know the potential consequences of the risks in my job (SK4)	2.34	1.22	0.715**	
		I have been shown how to work safely (SK5)	2.34	1.31	0.762**	
		I think my workplace would benefit from training on safety (SK6)	2.44	1.28	0.753**	
4.	Work Characteristics	Jobs in my workplace are difficult (WC1)	2.35	1.24	0.724**	0.789
		Jobs in my workplace require certain skills (WC2)	2.40	1.32	0.745**	
		The workload of the jobs in my workplace is high (WC3)	2.45	1.22	0.715**	
5.	Perception on Safety and Risk	My workplace is hazardous (PSR1)	2.41	1.27	0.717**	0.877
		I know what are the hazards associated with my jobs (PSR2)	2.49	1.30	0.686**	
		The possibility of unsafe events in my workplace is high (PSR3)	2.47	1.30	0.737**	
		Unsafe events occur frequently in my workplace (PSR4)	2.43	1.30	0.721**	
		The consequences of risks of my jobs would be severe (PSR5)	2.45	1.26	0.688**	
		My workplace is safe (PSR6)	2.48	1.27	0.726**	
		In the normal course of my job, I do not encounter any dangerous situations (PSR7)	2.48	1.24	0.517**	

** Correlation is significant at the 0.01 level (2-tailed).

6.3.2.3. Structural Equation Modeling (SEM)

1. Measurement model analysis (CFA)

The SEM analysis of the second stage study started with a measurement model analysis which involved CFA. The objective of this step was to evaluate the suitability of the model, by examining the model's construct reliability, convergent validity, discriminant validity, and goodness-of-fit. Based on the developed hypothetical model as in Figure 6.4 and using second stage study dataset, a measurement model was obtained using IBM SPSS AMOS software as in Figure 6.5.

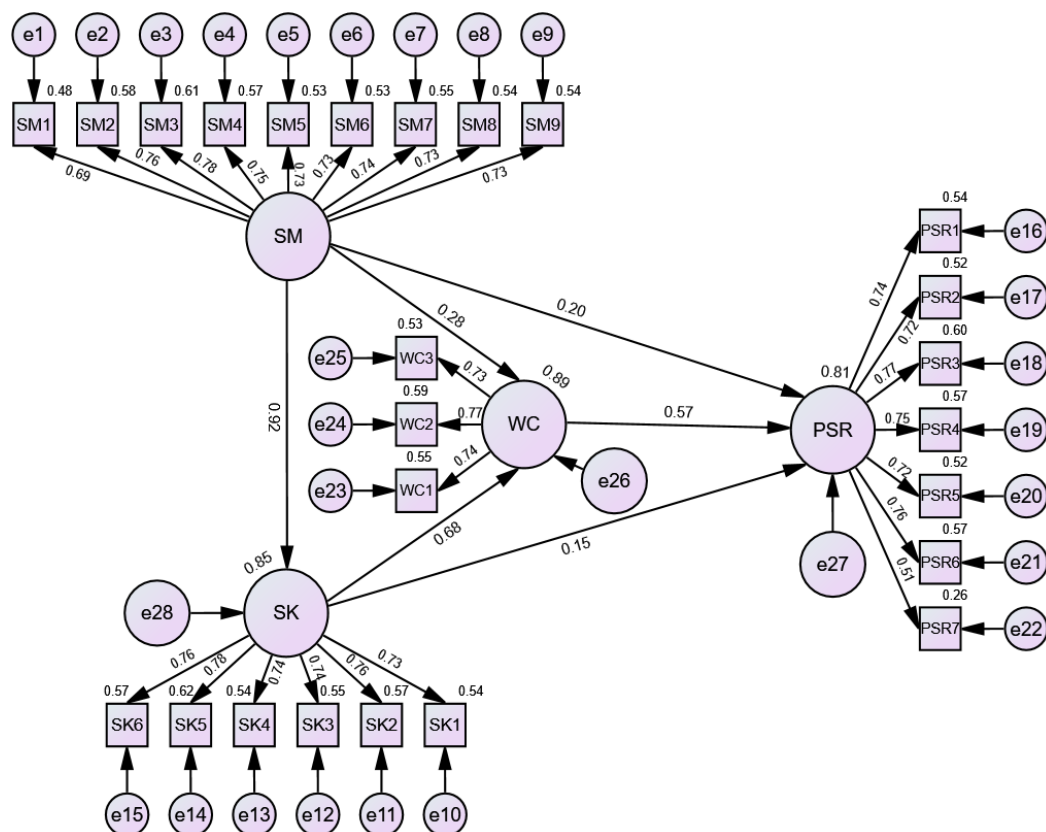


Figure 6.5. Study 3 second stage measurement model (AMOS output)
(SM: Safety Management, SK: Safety Knowledge, WC: Work Characteristics,
PSR: Perception of Safety and Risk)

In the model in Figure 6.5, the directional arrows between factors such as from SM to SK and from WC to PSR, indicate the standardised estimates of regression weights. For example, the regression estimate from SM to SK is 0.92, in which if SM goes up by 1, SK would go up by 0.92. The reflective directional arrows from factors to their reflective items or indicators are

loadings, which indicate the correlation between the item and the factor and how well the items represent the related factors. The loadings of items to their respective factors are in the range from 0.51 (PSR7) to 0.78 (SM3). The lowest loading 0.51 on indicator of PSR7 indicates that indicator PSR7 has the least correlation to its factor of PSR, while loading of SM3 (0.78) has the highest correlation to its factor of SM.

The values above the indicators are their respective estimates of squared multiple correlation, reflecting how much of an indicator's variance is accounted for by its respective factor. The lowest value of squared multiple correlation among the indicators is 0.26 (PSR7), which means that 26% of PSR7 variance is accounted for by the factor PSR and the remaining 74% of its variance is accounted for by its unique error factor e22. The highest value of squared multiple correlation among the indicators is 0.62 (SK5), which means that 62% of SK5 variance is accounted for by the factor SK and the remaining 38% of its variance is accounted for by its unique error factor e14. Errors (e1 to e28) represent estimations of unexplained variances which the indicators or factors are supposed to measure (Appendix 6.3). The lowest value of error is 0.092 (e26), while the highest is 1.125 (e22). Factors of SK, WC, and PSR are the three dependent factors in the model, which have squared multiple correlations values (R^2) on them. Based on these R^2 values, as an example, it is estimated that the predictors of PSR explain 81% of its variance.

The results of the CFA performed on the measurement model are presented in Table 6.21. The construct reliability of the measurement model was assessed by examining the composite reliability and Cronbach's alpha values of each factor. The values of composite reliability for all factors ranged from 0.790 to 0.916, and the Cronbach's alpha values ranged from 0.789 to 0.915. Therefore, the construct reliability of the model is verified, as all composite reliability and Cronbach alpha values were greater than 0.7, as suggested by Nunnally & Bernstein (1994). To assess the model's convergent validity, AVE calculation for all constructs resulted in AVE values ranged from 0.513 to 0.565. As these AVE values are higher than the recommended value of 0.5 (Bagozzi & Yi, 1988), convergent validity of the model is verified.

Table 6.21. CFA results of Study 3 measurement model

Factor	Indicator	Loading	Estimate	S.E.	C.R.	Composite reliability	Cronbach's alpha	AVE
SM	SM1	0.691	1.000	-	-	0.916	0.915	0.547
	SM2	0.761	1.203	0.096	12.496			
	SM3	0.780	1.204	0.094	12.787			
	SM4	0.752	1.186	0.096	12.350			
	SM5	0.728	1.157	0.097	11.977			
	SM6	0.730	1.104	0.092	12.021			
	SM7	0.742	1.166	0.096	12.206			
	SM8	0.734	1.158	0.096	12.077			
	SM9	0.734	1.158	0.096	12.072			
SK	SK1	0.733	1.000	-	-	0.886	0.886	0.565
	SK2	0.757	1.046	0.079	13.221			
	SK3	0.740	0.943	0.073	12.907			
	SK4	0.736	0.968	0.076	12.824			
	SK5	0.785	1.112	0.081	13.736			
	SK6	0.757	1.050	0.079	13.214			
WC	WC1	0.739	1.000	-	-	0.790	0.789	0.556
	WC2	0.769	1.102	0.083	13.329			
	WC3	0.729	0.968	0.077	12.608			
PSR	PSR1	0.738	1.000	-	-	0.879	0.877	0.513
	PSR2	0.723	1.003	0.080	12.526			
	PSR3	0.775	1.071	0.079	13.487			
	PSR4	0.754	1.040	0.079	13.110			
	PSR5	0.720	0.967	0.078	12.468			
	PSR6	0.758	1.028	0.078	13.185			
	PSR7	0.513	0.675	0.077	8.736			

In assessing the discriminant validity of Study 3 measurement model, HTMT ratio values of all factors in the model were calculated. Calculation of HTMT values were done using correlation coefficients among all indicators obtained from AMOS (Appendix 6.4), using the HTMT ratio equation (Section 6.3.1.3). Table 6.22 shows that discriminant validity of the measurement model is partially achieved, as not all HTMT ratio values for all factors are lower than 0.9, as suggested by Henseler et al. (2015). Subsequent modification of this model is explained later.

Table 6.22. HTMT ratio of Study 3 second stage factors

Factors	SM	SK	WC	PSR
SM	1	-	-	-
SK	0.923	1	-	-
WC	0.907	0.938	1	-
PSR	0.856	0.870	0.893	1

Several criteria to assess the model goodness-of-fit were examined. The goodness-of-fit criteria obtained for the model are presented in Table 6.23, and the AMOS output is presented in Appendix 6.5. All goodness-of-fit criteria of the measurement model of this are satisfactory, indicating that this fits well with the dataset.

Table 6.23. Goodness of fit criteria for the model

No.	Goodness of fit	Criteria	Results
1.	χ^2/df	≤ 3	1.577
2.	GFI (Goodness of Fit Index)	≥ 0.90	0.902
3.	CFI (Comparative Fit Index)	≥ 0.90	0.966
4.	NFI (Normed Fit Index)	≥ 0.90	0.914
5.	TLI (Tucker Lewis Index)	≥ 0.90	0.963
6.	RMSEA (Root-mean-square error of approximation)	< 0.05	0.043

2. Structural model analysis

Structural and statistical relationships among the factors were then examined. The relationships among the factors are presented in Table 6.24.

Table 6.24. Results of the SEM analysis

Factors relationships	Standardised factor loadings	Standard error (SE)	Critical ratio (CR)	P
SM \rightarrow SK (H_1)	0.923	0.091	11.434	***
SM \rightarrow PSR (H_2)	0.196	0.178	1.269	0.205 (ns)
SM \rightarrow WC (H_3)	0.280	0.174	1.799	0.072 (ns)
SK \rightarrow PSR (H_4)	0.149	0.243	0.625	0.532 (ns)
SK \rightarrow WC (H_5)	0.679	0.162	4.170	***
WC \rightarrow PSR (H_6)	0.574	0.256	2.297	0.022**
SM \rightarrow WC \rightarrow PSR (H_7)*	0.185	0.204	-	0.116**
SK \rightarrow WC \rightarrow PSR (H_8)*	0.396	0.496	-	0.022**

*** $P < 0.001$, ** $P < 0.05$, *indirect relationships, ns: not significant

The resulting structural model is shown in Figure 6.6. While SM has a significant influence on SK with 0.923 estimated regression weight (H_1), SM does not significantly influence either PSR (H_2) or WC (H_3). SK does not significantly influence PSR (H_4), but SK does have a significant influence on WC (H_5) with 0.670 regression weight. The factors WC is found to have significant influence on PSR (H_6) with 0.574 estimated regression weight. Therefore, it can be understood from the SEM analysis that H_1 , H_5 , and H_6 are supported, while the other hypotheses are not supported.

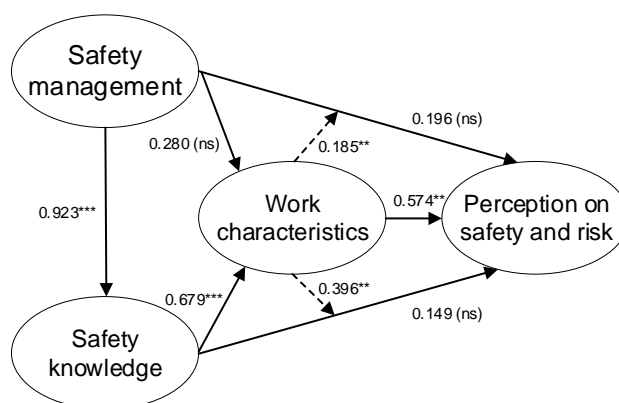


Figure 6.6. Study 3 second stage structural model
 (**P < 0.05, ***P < 0.001, ns: not significant)

3. Model modification

a. Assessing discriminant validity

Although the goodness-of-fit indices indicate that this is a good model and the hypotheses were able to be tested, it was necessary to consider modifications of the model. This was because of the partially achieved discriminant validity. Bollen (1989) and Fornell & Larcker (1981a) emphasised that establishment of discriminant validity is crucial in latent variable analysis. Farrell (2010) pointed out that uncertainty surrounding the results of a structural analysis may exist if there is an unresolved issue on discriminant validity. Farrell (2010) suggested examining item cross-loadings as an initial step in attempting to solve the nonachievement of discriminant validity. Therefore, PCA using the second stage dataset was performed to examine any possible cross-loadings. The result of the first-run of the PCA is presented in Table 6.25.

Table 6.25. Rotated Component Matrix of Study 2 second stage dataset
 (first-run PCA)

Rotated Component Matrix ^a				
Items	Component			
	1	2	3	4
SM3	.692			
SM2	.691			
SM5	.657			
SM4	.648			
SM6	.646			
SM7	.625			
SM1	.616			
SM8	.537	.426		

Rotated Component Matrix ^a				
Items	Component			
	1	2	3	4
SM9	.511	.473		
SK2		.680		
SK5		.667		
SK3		.662		
SK4		.654		
WC1		.637		
SK6		.618		
SK1	.465	.514		
WC2		.456	.440	
PSR2			.729	
PSR3			.711	
PSR4			.682	
PSR5			.646	
PSR1			.593	
PSR6			.556	.511
WC3			.437	
PSR7				.837
Extraction Method: Principal Component Analysis.				
Rotation Method: Varimax with Kaiser Normalization.				
a. Rotation converged in 7 iterations.				

As can be seen in Table 6.25, some cross-loadings were found from the PCA. The cross-loading items were then removed and subsequent PCA was performed without the removed items. In total, the PCA was ran three times, with the final result of the PCA is presented in Table 6.26.

Table 6.26. Rotated Component Matrix of Study 2 second stage dataset (third final run PCA)

Rotated Component Matrix ^a				
Items	Component			
	1	2	3	4
SM2	.707			
SM3	.698			
SM5	.685			
SM4	.663			
SM6	.660			
SM7	.622			
SM1	.621			
SK3		.686		
SK2		.674		
SK4		.672		
SK5		.668		
WC1		.651		
SK6		.627		
PSR2			.734	

Rotated Component Matrix ^a				
Items	Component			
	1	2	3	4
PSR3			.729	
PSR4			.707	
PSR5			.651	
PSR1			.597	
PSR7				.896
Extraction Method: Principal Component Analysis.				
Rotation Method: Varimax with Kaiser Normalization.				
a. Rotation converged in 7 iterations.				

Examination of the structure of the factors or components of the final PCA result was then carried out, to ensure that the items are in the appropriate corresponding factor. Item WC1 is grouped together with items related to safety knowledge, though item WC1 is not related with safety knowledge. Therefore, item WC1 was removed and not included in further analysis. Furthermore, item PSR7 was then re-grouped in factor or component 3 with other items related to perceptions on work safety and risk, as a factor should not contain only one item. The final structure of items and factors included in further analysis is presented in Table 6.27.

Table 6.27. Reformulated factors and items of Study 3 second stage

No.	Factors	Items of statements
1.	Safety Management (SM)	1) Safety is given priority in my workplace (SM1)
		2) In my workplace, safety is considered to be equally important as production and profits (SM2)
		3) In my workplace, the owner is interested in safety matters of the workers (SM3)
		4) All people who work in my workplace are committed to health and safety (SM4)
		5) In my workplace, sufficient safety equipment is provided for the workers (SM5)
		6) Open communication about safety is encouraged in my workplace (SM6)
		7) In my workplace, unsafe conditions are reported (SM7)
2.	Safety Knowledge (SK)	1) It is important to have knowledge of safety to do my jobs in my workplace (SK1)
		2) I know how to maintain or improve safety of my workplace (SK2)
		3) I know the potential consequences of the risks in my job (SK3)
		4) I have been shown how to work safely (SK4)

No.	Factors	Items of statements
		5) I think my workplace would benefit from training on safety (SK5)
3.	Perception on Safety and Risk (PSR)	1) My workplace is hazardous (PSR1)
		2) I know what are the hazards associated with my jobs (PSR2)
		3) The possibility of unsafe events in my workplace is high (PSR3)
		4) Unsafe events occur frequently in my workplace (PSR4)
		5) The consequences of risks of my jobs would be severe (PSR5)
		6) In the normal course of my job, I do not encounter any dangerous situations (PSR6)

The factor structure and corresponding items were refined as part of this analysis. The PCA analysis resulted in removal of the factor of Work Characteristics (WC), which consequently resulted to the modification of the model as in Figure 6.7.

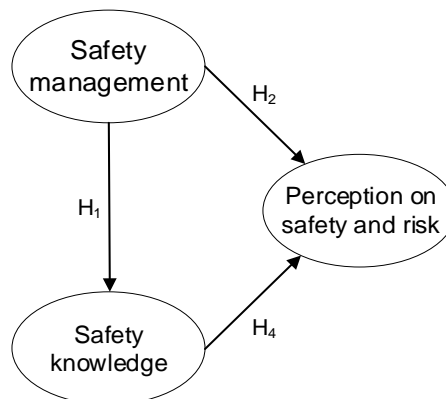


Figure 6.7. Study 3 modified hypothetical model

b. Measurement model analysis on the modified model

After the structure of factors and items and the model were reformulated, the measurement model was also reanalysed as can be seen in Figure 6.8.

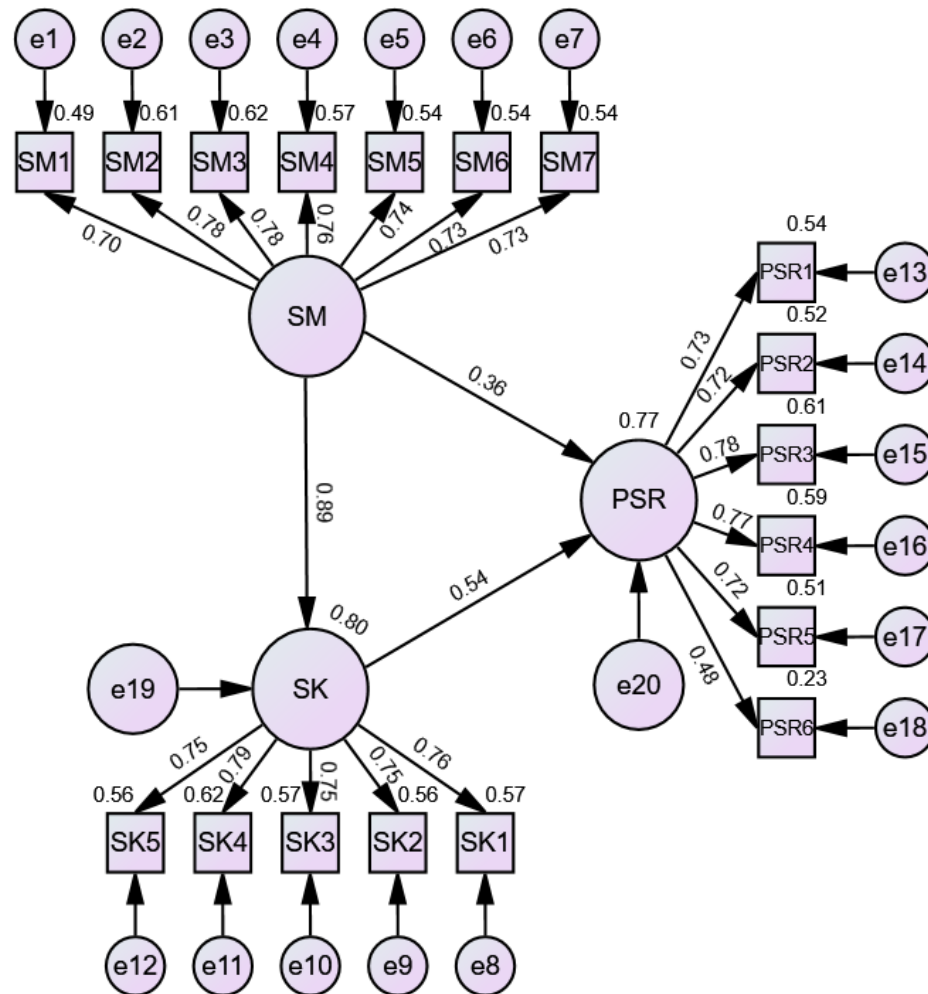


Figure 6.8. Study 3 modified measurement model (AMOS output)

Results of the CFA performed on the modified measurement model are presented in Table 6.28. Firstly, the construct reliability of the measurement model was assessed by examining the composite reliability and Cronbach's alpha values of each factor. The values of composite reliability for all factors ranged from 0.855 to 0.898. Moreover, the Cronbach's alpha values of all factors ranged from 0.851 to 0.898. Therefore, the construct reliability of the model is verified, as all composite reliability and Cronbach alpha values were greater than 0.7, as suggested by Nunnally & Bernstein (1994). Furthermore, to assess the model's convergent validity, AVE calculation for all constructs resulted in AVE values ranging from 0.501 to 0.577. As these AVE values are higher than the recommended value of 0.5 (Bagozzi & Yi, 1988), convergent validity of the model is verified.

Table 6.28. CFA results of Study 3 modified measurement model

Factor	Indicator	Loading	Estimate	S.E.	C.R.	Composite reliability	Cronbach's alpha	AVE
SM	SM1	0.703	1.000	-	-	0.898	0.898	0.558
	SM2	0.779	1.201	0.094	12.869			
	SM3	0.784	1.190	0.092	12.952			
	SM4	0.757	1.174	0.094	12.521			
	SM5	0.737	1.152	0.094	11.203			
	SM6	0.732	1.088	0.090	12.123			
	SM7	0.733	1.132	0.093	12.139			
SK	SK1	0.757	1.000	-	-	0.872	0.871	0.577
	SK2	0.747	0.911	0.069	13.284			
	SK3	0.754	0.950	0.071	13.427			
	SK4	0.786	1.065	0.076	14.060			
	SK5	0.752	0.998	0.075	13.371			
PSR	PSR1	0.732	1.000	-	-	0.855	0.851	0.501
	PSR2	0.723	1.003	0.083	12.252			
	PSR3	0.781	1.071	0.082	13.259			
	PSR4	0.769	1.040	0.082	13.062			
	PSR5	0.716	0.967	0.080	12.125			
	PSR6	0.485	1.028	0.079	8.125			

In assessing the discriminant validity of the modified measurement model, HTMT ratio values of all factors in the model were calculated. Calculation of HTMT values were done using correlation coefficients among all indicators obtained from AMOS (Appendix 6.6), and using the HTMT ratio equation (Section 6.3.1.3). As evident in Table 6.29, discriminant validity of Study 3 modified measurement model is achieved, as all HTMT ratio values for all factors are lower than 0.9, as suggested by Henseler et al. (2015).

Table 6.29. HTMT ratio of Study 3 second stage modified factors

Factors	SM	SK	PSR
SM	1	-	-
SK	0.893	1	-
PSR	0.844	0.863	1

The goodness-of-fit criteria obtained for the model of this Study 3 are presented in Table 6.30, and the AMOS output is presented in Appendix 6.7. All goodness-of-fit criteria of reformulated measurement model of this Study 3 are satisfactory, indicating that the measurement model fits well with the dataset.

Table 6.30. Goodness of fit criteria for the modified model

No.	Goodness of fit	Criteria	Results
1.	χ^2/df	≤ 3	1.308
2.	GFI (Goodness of Fit Index)	≥ 0.90	0.942
3.	CFI (Comparative Fit Index)	≥ 0.90	0.987
4.	NFI (Normed Fit Index)	≥ 0.90	0.946
5.	TLI (Tucker Lewis Index)	≥ 0.90	0.985
6.	RMSEA (Root-mean-square error of approximation)	< 0.05	0.032

c. Structural model analysis on the modified model

The structural and statistical relationships among the factors in the modified measurement model (Figure 6.8) were then examined. The relationships among the factors are presented in Table 6.31.

Table 6.31. SEM analysis results of the modified model

Factors relationships	Standardised factor loadings	Standard error (SE)	Critical ratio (CR)	P
SM \rightarrow SK (H_1)	0.893	0.090	11.512	***
SM \rightarrow PSR (H_2)	0.360	0.142	2.830	0.005***
SK \rightarrow PSR (H_4)	0.539	0.127	4.110	***

***P < 0.001

The resulting structural model is shown in Figure 6.9. SM has significant influence on SK with 0.893 regression weight, indicating that H_1 is supported. Similarly, SM also significantly influences PSR with 0.360 regression weight, which means that H_2 is supported. The H_4 hypothesis is also supported, indicated by significant influence of SK on PSR with 0.539 regression weight.

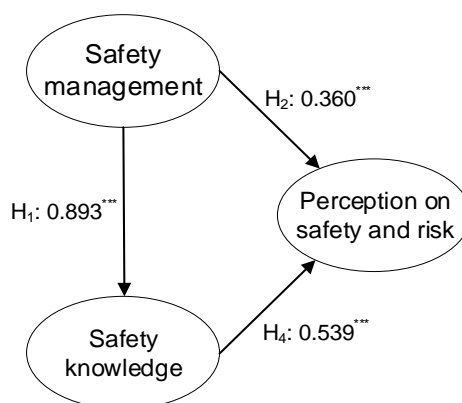


Figure 6.9. Study 3 modified structural hypothetical model
(***P < 0.001)

6.4. Study 3 discussion

The results of Study 3 questionnaire survey were useful to understand workers' perceptions of work safety and risk in Indonesian small food-producing businesses. From the survey, it can be understood that all factors have mean ratings below the median scale of 3. The mean rating of 2.40 on the factor of safety management generally indicates that the workers perceived low practices of safety management in their workplaces. Some studies have implied that in small businesses, there is often low and inadequate activities of management of work safety (Champoux & Brun, 2003; Gardner et al., 1999; Unnikrishnan et al., 2015). It was also understood in the previous Study 2 that safety management is not being implemented in the observed Indonesian small food-producing businesses

It has been argued that knowledge about work health and safety among people working in small businesses is poor (Cunningham et al., 2014; Olsen et al., 2010; Walters et al., 2018). In the Study 3 questionnaire survey results, safety knowledge had a mean rating of 2.39, indicating a low level of safety knowledge among the workers in Indonesian small food-producing businesses. This reflects the results of the previous Study 1 and Study 2, where the interviewees indicated that they have a low understanding of work safety. The factor of work characteristics had a mean rating of 2.40, reflecting results of previous studies that the workers perceived their work tasks as easy, with relatively low workload, and do not require certain skills. Moreover, Gardner et al. (1999) and Micheli & Cagno (2010) have commented that there may be lower perceptions around risk in the SMEs, due to the lower occurrence of injuries and accidents. This is also possibly the case in the observed Indonesian small food-producing businesses, where a mean rating of 2.46 was observed in the factor of perceptions of work safety and risk.

From the SEM analysis of Study 3, the influences among the factors were able to be understood. Firstly, there is a significant and positive influence of safety management towards safety knowledge in the observed Indonesian small food-producing businesses. In other studies by Lu et al. (2020) and Vinodkumar & Bhasi (2010), safety management through its factors such as commitment, leadership, rules and procedures, and employee involvement

was found to influence safety knowledge. Neal & Griffin (2004) also emphasised that factors related to safety management such as leadership could influence safety knowledge. In the observed Indonesian small food-producing businesses, based on the significant positive influence, changes or improvements on the businesses' safety management could improve the workers' safety knowledge.

In the SEM analysis, there was a significant and positive influence of safety management on perceptions of safety and risk. This means that, in the observed Indonesian small food-producing businesses, changes or different safety management would prompt increases in people's perceptions of safety and risk. The finding that safety management significantly influences workers' perceptions of work safety and risk in the observed Indonesian small food-producing businesses add to findings of some studies which found strong relationships between safety management and safety and risk perceptions (Park et al., 2022; Rundmo, 1997; Vu et al., 2022; Zhao et al., 2021). It was understood in the previous Study 2 that safety is rather not being managed nor implemented in the observed businesses, and was evident in the relatively low rating on the factor of safety management in the Study 3 questionnaire survey. The low level of safety management could contribute to the participants' generally low perceptions of safety and risk in their workplaces, as indicated by the low ratings on factor of perceptions of work safety and risk.

Another influence explored in Study 3 was that, in the observed Indonesian small food-producing businesses, safety knowledge has a significant and positive influence on perceptions of work safety and risk. The relationship or impact of safety knowledge on perceptions of safety and risk was also pointed out by Park et al. (2022), Chaswa et al. (2020), and Zhao et al. (2021). The people's relatively low knowledge of safety could contribute to their perceptions that their workplaces are rather less risky and hazardous as indicated by the low ratings on the factor of perceptions of work safety and risk. Increasing knowledge of safety among the people of Indonesian small food-producing businesses would make them perceive safety and risk differently.

As presented in the results, the final relationship model in Study 3 was a modified version of the initially formulated model, due to considerations regarding discriminant validity. The main modification was the removal of the factor of work characteristics, which consequently removed some of the initially formulated hypotheses. Some studies have shown the potential relationships of work characteristics in factors related to safety, such as Wang et al. (2016) who found that work characteristics is significantly associated with subjective perception of risk. Rundmo (1997) found that the work characteristic of physical working conditions had a strong effect on the workers' perceived risk. Neal & Griffin (2004) also argued that work design is associated with safety knowledge. Therefore, aspects of work characteristics in the initially formulated model could be interesting for further study, as the influence of work characteristics remains pertinent in the observed Indonesian small food-producing businesses, as emphasised in the preceding Study 1 and Study 2.

6.5. Study 3 conclusion

Based on Study 3 questionnaire survey results, the workers' have low perceptions on both practices of safety management in their workplaces and knowledge of safety. It can also be understood that the workers' generally have perceptions that their work tasks are easy and not involving heavy workload and certain skills. The questionnaire survey results also indicate generally low perceptions of safety and risk among the workers on their workplaces. Furthermore, significant and positive influences of both safety management and safety knowledge on perceptions of work safety and risk in the observed Indonesian small food-producing businesses were explored in Study 3. Additionally, safety management also has a significant and positive influence on safety knowledge. Although work characteristics was eventually excluded as a factor in the final model due to discriminant validity considerations, it may still relevant to be observed in potential future studies.

Chapter 7

Study 4: Feedback and recommendations for work safety in Indonesian small food-producing businesses

7.1. Introduction to Study 4

In the previous three studies, the current conditions of work safety and people's perceptions of work safety and risk in Indonesian small food-producing businesses were explored. In Study 1, through observations and interviews, it was understood that generally the workplaces of the observed Indonesian small food-producing businesses are unsafe with various work hazards and risks. Additionally, while the people of the businesses appreciated that their workplaces are unsafe, there were indications of the feeling of safety from years of routine in performing the jobs and from the jobs' easy and simple characteristics.

Study 2 was a qualitative study using in-depth interviews and a phenomenology approach, to investigate the people's thoughts and opinions on work safety and risk. Findings from this study confirmed that, although the people perceived their workplaces as generally unsafe, they believed there were low risks. Furthermore, it was understood that people's perceptions of work safety and risk could be influenced by other factors such as safety knowledge and work characteristics. In quantitative Study 3 using questionnaires, the relationships among the factors were investigated. Based on the SEM analysis, it was confirmed that there were significant influences among the factors of safety management, safety knowledge, and perceptions of work safety and risk.

These findings were brought forward to this final Study 4, with one objective was to obtain feedback on the findings from the people of Indonesian small food-producing businesses. Study 4 was a qualitative study using a focus group involving owners, workers, and associations of Indonesian small

food-producing businesses, as well as a government person and an expert of university academic staff. Their feedback on findings of the current condition and issues on work safety (Study 1), the people' perceptions of work safety and risk (Study 2), and the factors influencing perceptions of work safety and risk (Study 3) were explored. Additionally, challenges and potential recommendations for work safety in the Indonesian small food-producing businesses were explored. The overview of Study 4 is presented in Figure 7.1.

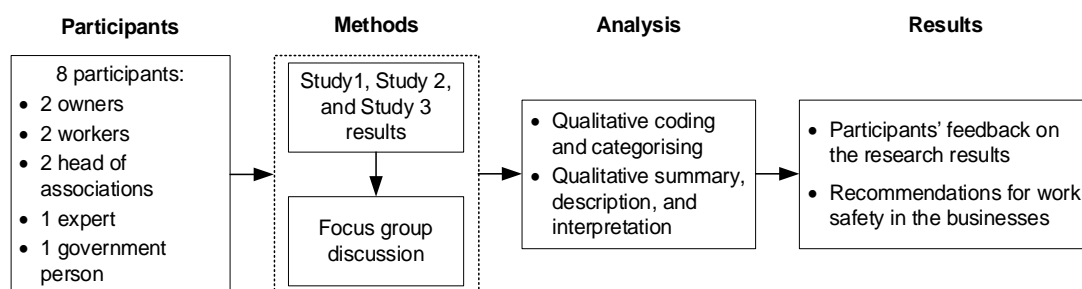


Figure 7.1. Overview of Study 4

7.2. Study 4 method

7.2.1. Focus group materials and procedures

The results from Study 1, Study 2, and Study 3 of this research were presented and discussed in the Study 4 focus group, using a Power Point presentation prepared by the researcher. The focus group was divided into two topics of presentation and discussion as shown in Table 7.1. Additionally, the materials for the focus group were prepared in Bahasa Indonesia (Indonesian language) as the participants were Indonesian nationals.

Table 7.1. Overview of Study 4 focus group contents

No.	Topic	Contents of the focus group
1.	Feedback on results on the preceding studies	<ul style="list-style-type: none"> • Study 1 results. General results of Study 1 observations and interviews were presented to the participants. This included some pictures showing the work activities and work conditions in the observed Indonesian small food-producing businesses, and key points of the interview results around work-related issues. • Study 2 results. The main results of the interviews around perceptions on work safety and risk were presented. • Study 3 results. The initial model of Study 3 was presented and explained, to have the participants' opinions on the potential relationships and influences among the observed factors.

No.	Topic	Contents of the focus group
		<ul style="list-style-type: none"> • Discussion on the results of Study 1, Study 2, and Study 3.
2.	Challenges and recommendations for work safety	<ul style="list-style-type: none"> • Challenges and potential recommendations for work safety in Indonesian small food-producing businesses were presented and discussed. This was achieved by presenting challenges and potential solutions as identified from Study 1 and Study 2. • The participants were also involved in tasks to identify and give their opinions on the challenges and potential recommendations for work safety in Indonesian small food-producing businesses. • Discussion on the challenges and potential recommendations for work safety

The focus group in Study 4 was designed to encourage the participants' involvement and discussion, as interactions and sharing of opinions and experiences should happen in a focus group (Berland et al., 2008; Krueger & Casey, 2000). A focus group, as emphasised by Vaughn et al. (1996), contains two core elements of a moderator who sets the focus group with prepared guide or questions, and the goal is to elicit feelings, attitudes, and perceptions of the participants on the selected topic. In Study 4, all participants were involved in the focus group through discussions by giving their opinions on the topics, in which they interacted between each other by exchanging and complementing each other's opinions. In addition to presenting the focus group materials, the researcher in the Study 4 focus group also led and moderated the focus group to ensure discussion and interactions between participants, so that the focus group would achieve the study objective.

The focus group was started with an introduction from the researcher. In the opening section, the researcher explained the objective and procedures of the focus group, and the overview of the research to the participants. The focus group then proceeded to presentation of the first topic of results of the three previous studies, followed by a discussion session. Afterwards, a second topic on challenges and ideas for recommendations for work safety in the businesses was presented by the researcher and followed by another discussion session. In the discussion sessions, the researcher guided the discussion by using several prompts of questions or instructions. The researcher also gave opportunity for questions at several points during the

presentation. The overall materials and procedures of the Study 4 focus group are presented in Table 7.2, with the overview presented in Figure 7.2.

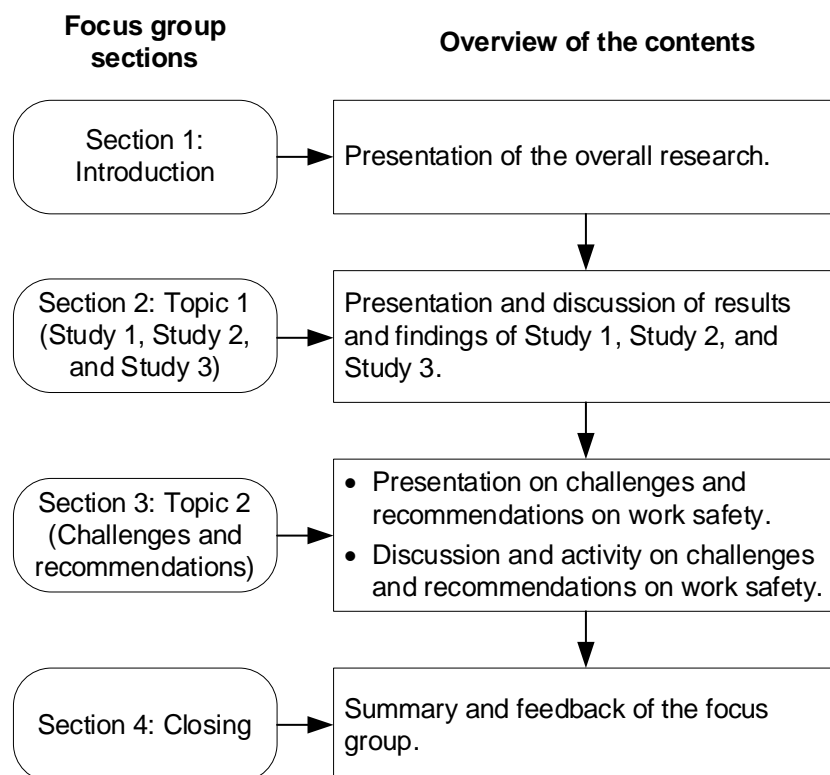


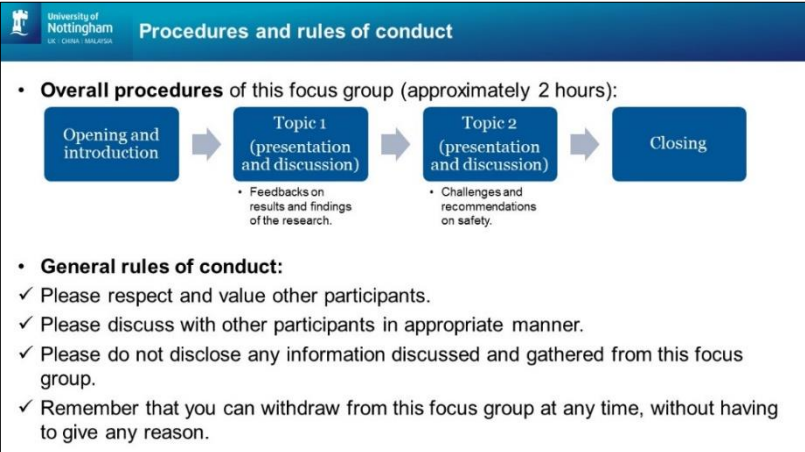
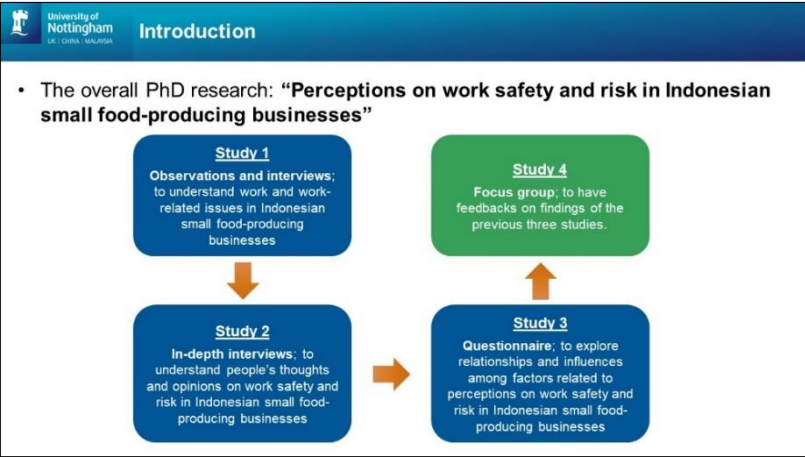



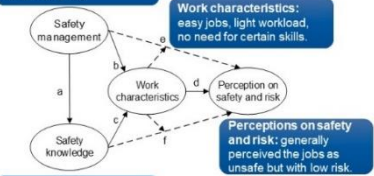
Figure 7.2. Overview of Study 4 focus group contents

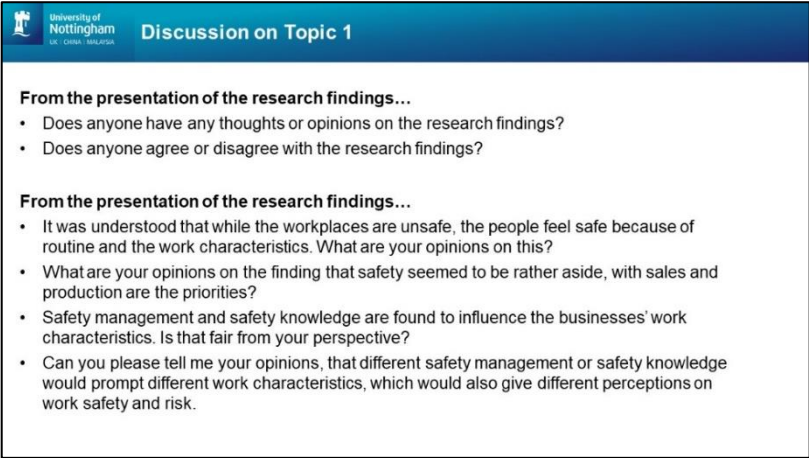
An ethics application for Study 4 was approved by The Ethics Committee of Faculty of Engineering of The University of Nottingham. Considering Covid-19 related restrictions at the time of Study 4, the focus group was carried out online in Microsoft Teams meeting, using the researcher's Microsoft Teams account provided by The University of Nottingham. To recruit the Study 4 focus group participants, contacts were made with prospective participants using contact details obtained in previous studies, in which all participants had consented to be contacted for future studies. Information of the study and a consent form were prepared online with Microsoft Forms through the researcher's University account. The focus group took place in Microsoft Teams on 1 January 2023 for two and a half hours. The focus group was recorded and stored securely in the researcher's University account shared with the supervisors. Examples of screenshots of the focus group meeting are shown in Appendix 7.1.


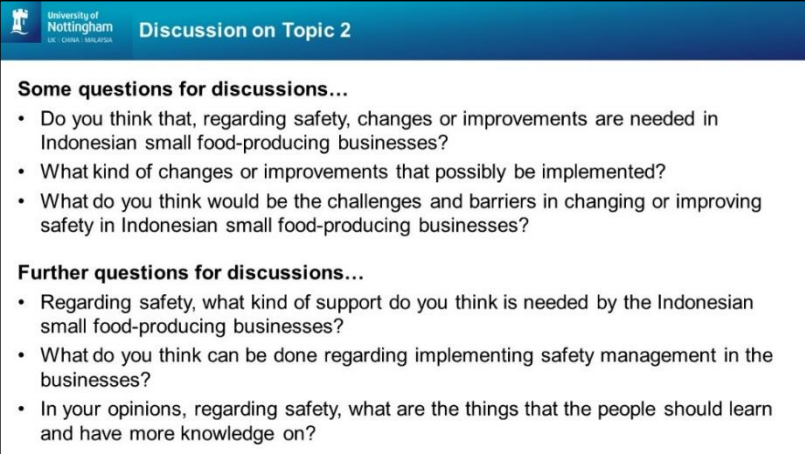
Table 7.2. Materials and procedures of Study 4 focus group

Step no.	Topic	Personnel	Materials	Time estimation
1.	<p>Opening:</p> <ul style="list-style-type: none"> - Confirmation of consent to participate - Objective of the study - Expectation of the focus group - Procedure and rules of conduct of the focus group 	<p>Researcher: presenter</p> <p>Participants: listener</p>	<p>PowerPoint slides:</p>  	5 minutes

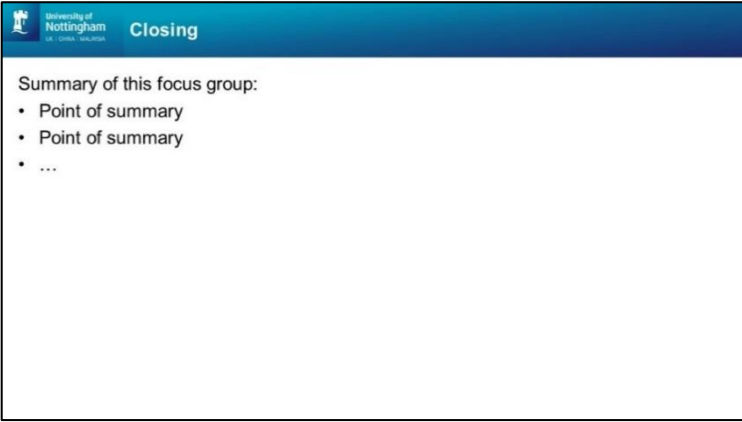
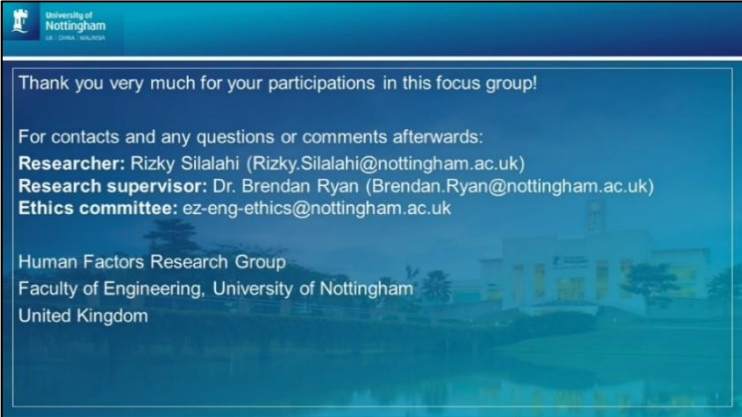
Step no.	Topic	Personnel	Materials	Time estimation
			 <p>Procedures and rules of conduct</p> <ul style="list-style-type: none"> Overall procedures of this focus group (approximately 2 hours): <pre> graph LR A[Opening and introduction] --> B[Topic 1 (presentation and discussion)] B --> C[Topic 2 (presentation and discussion)] C --> D[Closing] </pre> <ul style="list-style-type: none"> • General rules of conduct: <ul style="list-style-type: none"> ✓ Please respect and value other participants. ✓ Please discuss with other participants in appropriate manner. ✓ Please do not disclose any information discussed and gathered from this focus group. ✓ Remember that you can withdraw from this focus group at any time, without having to give any reason. 	
2.	Introduction: Explanation of the overall PhD research	<p>Researcher: presenter</p> <p>Participants: listener</p>	<p>PowerPoint slide:</p>  <p>Introduction</p> <ul style="list-style-type: none"> The overall PhD research: “Perceptions on work safety and risk in Indonesian small food-producing businesses” <pre> graph TD S1[Study 1: Observations and interviews; to understand work and work-related issues in Indonesian small food-producing businesses] --> S2[Study 2: In-depth interviews; to understand people's thoughts and opinions on work safety and risk in Indonesian small food-producing businesses] S2 --> S3[Study 3: Questionnaire; to explore relationships and influences among factors related to perceptions on work safety and risk in Indonesian small food-producing businesses] S3 --> S4[Study 4: Focus group; to have feedbacks on findings of the previous three studies.] </pre>	5 minutes

Step no.	Topic	Personnel	Materials	Time estimation
3.	<p>Topic 1: Presentation of the research results and findings</p>	<p>Researcher: presenter</p> <p>Participants: listener</p>	<p>PowerPoint slides:</p> <div> <p>Topic 1: Research findings (Study 1 and Study 2)</p> <div> <p>Observations of various work hazards and risks in the workplaces</p>  </div> <div> <p>Issues around work safety and ergonomics</p> <ul style="list-style-type: none"> • Accidents/incidents and injuries (minor) happen but not recorded. • Work hazards from environment, equipment, work method • Aware but less attention to safety conditions • Limited knowledge and experience • The workplaces are not designed for the jobs • Willing to improve, but challenges of cost and limited understanding </div> <div> <p>Perceptions on work safety and risk perceptions</p> <ul style="list-style-type: none"> • Thinks that the work conditions and activities are unsafe • Aware of the unsafe work, but feel safe from years of routine • Thinks that the simple and easy work make the workplace and the jobs feel safe • Safety is important and should work safer • Awareness to work hazards, risks, and the potential consequences • Accidents/incidents and injuries rarely happen and minor </div> </div> <div> <p>Topic 1: Research findings (Study 3)</p> <div> <p>Safety management: generally not implemented, rather not exist.</p> </div> <div> <p>Work characteristics: easy jobs, light workload, no need for certain skills.</p> </div> <div>  </div> <div> <p>Safety knowledge: low level of safety knowledge</p> </div> <div> <p>Influences between the factors</p> </div> <div> <p>What are your thoughts on these?</p> </div> <div> <ul style="list-style-type: none"> • If safety management changes (e.g. safety is prioritised, there is a person who manage/responsible to safety, safety equipment is enforced), it would change safety knowledge and work characteristics. • Different safety management and/or safety knowledge (e.g. safety training) would prompt different characteristics. • Different work characteristics (e.g. if the work is more difficult, with higher workload) would give different perceptions on work safety and risk • Different safety management and/or safety knowledge would prompt different characteristics, which would also give different perceptions on work safety and risk. </div> </div>	15 minutes

Step no.	Topic	Personnel	Materials	Time estimation
4.	Discussion 1: Discussion and feedback on Topic 1	<p>Researcher: moderator</p> <p>Participants: participate in interaction and discussion</p>	<p>PowerPoint slide:</p>  <p>From the presentation of the research findings...</p> <ul style="list-style-type: none"> • Does anyone have any thoughts or opinions on the research findings? • Does anyone agree or disagree with the research findings? <p>From the presentation of the research findings...</p> <ul style="list-style-type: none"> • It was understood that while the workplaces are unsafe, the people feel safe because of routine and the work characteristics. What are your opinions on this? • What are your opinions on the finding that safety seemed to be rather aside, with sales and production are the priorities? • Safety management and safety knowledge are found to influence the businesses' work characteristics. Is that fair from your perspective? • Can you please tell me your opinions, that different safety management or safety knowledge would prompt different work characteristics, which would also give different perceptions on work safety and risk. <p>Question prompts:</p> <ul style="list-style-type: none"> • Can you elaborate a little more on that? • Can you give examples on that? • Anyone has any addition to his/her statements? • Do you all agree with his/her statements? • What about from your perspective as [role]? 	30 minutes

Step no.	Topic	Personnel	Materials	Time estimation
5.	Topic 2: Challenges and recommendation for safety in Indonesian small food-producing businesses	Researcher: presenter Participants: listener	PowerPoint slide: 	5 minutes
6.	Discussion 2: - Discussion and feedback on Topic 2 - Activities for the participants	Researcher: moderator Participants: participate in interaction and discussion	PowerPoint slide: 	30 minutes

Step no.	Topic	Personnel	Materials	Time estimation						
			<div> <p>University of Nottingham Discussion on Topic 2 (continued) - Activities</p> <p>A few simple tasks...</p> <ul style="list-style-type: none"> • Are there any more issues or challenges that you would like to identify? • How would you rank these issues/challenges based on their urgency? • Are there any more potential recommendations that you would like to propose? • How would you rank these potential recommendations based on their importance? <table border="1"> <thead> <tr> <th>Some issues</th> <th>Some potential recommendations</th> <th>Some challenges</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> • Accidents/incidents and injuries (minor) happen but not recorded. • Work hazards from environment, equipment, work method • Aware but less attention to safety conditions • Limited knowledge and experience • The workplaces are not designed for the jobs • Willing to improve, but challenges of cost and limited understanding • ...? • ...? </td> <td> <ul style="list-style-type: none"> • Low-cost changes/improvement on the workplaces (e.g. safer equipment, modification of the places) • Access to training on safety to the people • Access to support from related party (e.g. government, academia) • Initiate safety management from the basics and simple facets. • ...? • ...? </td> <td> <ul style="list-style-type: none"> • Cost • Work habit/routine • Attention/support from related party (e.g. government, academia) • Knowledge • ...? • ...? </td> </tr> </tbody> </table> <p>Questions prompts:</p> <ul style="list-style-type: none"> • Can you elaborate a little more on that? • Can you give examples on that? • Anyone has any addition to his/her statements? • Do you all agree with his/her statements? • What about from your perspective as [role]? </div>	Some issues	Some potential recommendations	Some challenges	<ul style="list-style-type: none"> • Accidents/incidents and injuries (minor) happen but not recorded. • Work hazards from environment, equipment, work method • Aware but less attention to safety conditions • Limited knowledge and experience • The workplaces are not designed for the jobs • Willing to improve, but challenges of cost and limited understanding • ...? • ...? 	<ul style="list-style-type: none"> • Low-cost changes/improvement on the workplaces (e.g. safer equipment, modification of the places) • Access to training on safety to the people • Access to support from related party (e.g. government, academia) • Initiate safety management from the basics and simple facets. • ...? • ...? 	<ul style="list-style-type: none"> • Cost • Work habit/routine • Attention/support from related party (e.g. government, academia) • Knowledge • ...? • ...? 	
Some issues	Some potential recommendations	Some challenges								
<ul style="list-style-type: none"> • Accidents/incidents and injuries (minor) happen but not recorded. • Work hazards from environment, equipment, work method • Aware but less attention to safety conditions • Limited knowledge and experience • The workplaces are not designed for the jobs • Willing to improve, but challenges of cost and limited understanding • ...? • ...? 	<ul style="list-style-type: none"> • Low-cost changes/improvement on the workplaces (e.g. safer equipment, modification of the places) • Access to training on safety to the people • Access to support from related party (e.g. government, academia) • Initiate safety management from the basics and simple facets. • ...? • ...? 	<ul style="list-style-type: none"> • Cost • Work habit/routine • Attention/support from related party (e.g. government, academia) • Knowledge • ...? • ...? 								

Step no.	Topic	Personnel	Materials	Time estimation
7.	<p>Closing:</p> <ul style="list-style-type: none"> - Summary of the focus group - Feedback on the focus group - Conclusion 	<p>Researcher: presenter and moderator</p> <p>Participants: listener, participate in interaction and discussion</p>	<p>PowerPoint slides:</p>  <p>Questions prompts:</p> <ul style="list-style-type: none"> • Is there something you would like to add or clarify? • Is there something we forgot to talk about? • Acknowledgement 	15 minutes

7.2.2. Participants

Selection of the participants was purposive. Participants were drawn from people who were involved in or related to work safety in Indonesian small food-producing businesses and had been involved in previous studies in the PhD programme. A target of eight people of different roles who were relevant to the Indonesian small food-producing businesses was set as an appropriate number for the focus group discussion, as suggested by Wilkinson (2011) and Bloor et al. (2001) that between six to eight people is needed for a focus group. Details of the participants in the focus group are given in Table 7.3.

Table 7.3. Participants of Study 4 focus group

No.	Role	Number of participants
1.	Owner	2
2.	Worker	2
3.	Association	2
4.	Expert	1
5.	Government person	1
Total number of participants		8

7.2.3. Analysis

A transcription of the discussion of the focus group was obtained from the recording. The transcription was performed by typing the interviewees' accounts on a document processing software (Microsoft Word) while listening to the recording. This process was repeated and reviewed several times to ensure that the text transcription represented the content of the focus group. As the focus group was conducted in Bahasa Indonesia (Indonesian language), the focus group was firstly transcribed in Bahasa Indonesia which was then translated into English. Qualitative analysis was then carried out in analysing the focus group results as described in Table 7.4. To ensure the accuracy of the transcription and translation, a fellow Indonesian national PhD researcher in the Human Factors Research Group of The University of Nottingham was asked to review the transcription and compare it with the focus group recording.

Table 7.4. Study 4 analysis steps

No.	Analysis steps	Description	Steps taken
1.	Familiarisation with the data	<ul style="list-style-type: none"> • Listening to the focus group recording several times. • Producing a transcript of the focus group and reviewing it several times by comparing with the focus group recording. 	<ul style="list-style-type: none"> • An initial transcript of the focus group was produced, by typing the participants' accounts in Microsoft Word while listening to the focus group recording. • The transcript was reviewed several times and finalised by re-listening and comparing to the focus group recording. • The focus group transcript was read several times while starting to identify potential codes and making notes or comments in the participants' accounts.
2.	Coding	Identifying and noting ideas or concepts arising from the transcript.	<ul style="list-style-type: none"> • Codes were identified throughout the focus group transcript, noting the potential codes using the comments feature in the Microsoft Word file of the transcription. • Identified codes were transferred to Microsoft Excel to be organised. • Identified codes were reviewed several times and finalised by comparing with the focus group transcript.
3.	Categorising	Establishing categories or groups based on the identified codes.	<ul style="list-style-type: none"> • The identified codes were grouped in several categories based on the similarities and differences. • The produced categories were then reviewed several times to ensure the codes represent the respective categories accordingly. • Based on the study objective, two categories of feedback on the previous studies and challenges and potential recommendations for work safety were produced.
4.	Describing and summarising	Describing and interpreting the findings with supporting data of the participants' accounts, and summarising the results.	<ul style="list-style-type: none"> • The results of the qualitative analysis were then presented, described, and summarised as in the next Section 7.3. • Presentation of examples of the participants' interview quotes to describe the results.

As in the qualitative analysis of the previous Study 1 and Study 2, several criteria were considered to achieve trustworthiness of the Study 4 analysis. The steps taken to achieve the trustworthiness are presented in Table 7.5.

Table 7.5. Trustworthiness criteria of Study 4 analysis

No.	Criteria of trustworthiness	Applied strategies
1.	Credibility	<ul style="list-style-type: none"> • Clear explanation of the focus group analysis process. • Prolonged engagement in the analysis for around four months in overall. • The focus group transcript and meeting recording were reviewed by a fellow Indonesian national PhD for accuracy check of the transcription and translation.
2.	Transferability	<ul style="list-style-type: none"> • Presentation of the participants' accounts in the focus group results. • Discussion and explanation of potential application of methods and findings to other similar research objects. • Involvement of different roles of participants in the focus group.
3.	Dependability	<ul style="list-style-type: none"> • The analysis process of coding, categorising, and describing and summarising were reviewed several times. • Every step of the analysis was documented and every change was noted. • Documented data and analysis are shared with the PhD supervisors through secured online storages (One Drive and Microsoft Teams). • Results of the analysis were described and connected with existing theories. • Analysis was continuously reviewed by the PhD supervisors.
4.	Confirmability	<ul style="list-style-type: none"> • Every step of the analysis was documented and every change was noted. • Utilisation of noting features on the assisting softwares on the analysis, such as comments and highlight features on Microsoft Word and Microsoft Excel. • The focus group was summarised and asked for participants' feedback at the closing section of the focus group.

7.3. Study 4 results

From the qualitative analysis, there were several areas of agreement in the general discussion and these were extracted and grouped into several categories as in Table 7.6.

Table 7.6. Categories of Study 4 qualitative analysis results

No.	Categories	Sub-categories
1.	Feedback on the research results	1) Agreement on the observed work-related issues and emphasis on its non-urgency
		2) Emphasis on the acceptance of the current work safety conditions
		3) Opinions on the potential influences among factors related to perceptions of work safety and risk
		4) Emphasis on the low priority on work safety and further indication on the ignorance of work safety
2.	Challenges and recommendations on work safety	1) Emphasis on challenges of cost and habits
		2) Emphasis of the potential difficulty and troublesome nature of work safety
		3) Agreement to start with improvement on knowledge and learning on work safety
		4) Agreement on lack of urgency and unnecessary of change or improvement on work safety

7.3.1. Participants' feedback on the research results

When discussing the results of Study 1, the participants were generally in agreement that there were several work-related issues in their workplaces. The participants frequently pointed out their hazardous and risky workplaces, which made them doubt that their workplaces were safe. The participants were in agreement that there were several identified work-related issues, but emphasised that the work-related issues in their workplaces were not urgent or necessary to be followed up or solved. When asked to rank the urgency of the identified issues, the participants were not inclined to rank them. This was because they thought that the issues related to work safety were not urgent and not to be solved, by arguing that they were actually not problems. Examples of discussion on Study 1 results in the focus group are shown below.

*“Oh yes that is right Sir... if stiffness is almost every day, knife grazes is sometime... that is right Sir (**Worker 1**).”*

*“That is correct, it is correct what you said. And then dangers from environment, tools, those are correct too (**Owner 1**).”*

*“This kind of workplace is common. Dirty, if it is said to be safe well... there is... (**Government**) In reality is not safe actually Sir (**Owner 2**) Well it is difficult indeed Sir... ee what I mean by difficult is... as earlier as already said, if it is said to be safe well there are dangers... (**Worker 2**).”*

*“...none which is more urgent, and actually not a problem too, those are not problems for us actually. Well although well how to say, well those conditions are true (**Association 1**) Yes correct Sir. Still these issues are true, but if it is the urgency, in my opinion, it feels not urgent (laughs) (**Owner 2**).”*

From the results of Study 2, there were indications of acceptance of the current unsafe work conditions among the people of the observed workplaces. This was further emphasised by the focus group participants. The participants frequently pointed out and discussed familiarity and routine with the activities and the easy tasks as reasons for them to accept the unsafe conditions. Additionally, there are perceptions of low frequency and minor severity of unsafe events and injuries as also previously explored in Study 2, which seem to influence acceptance of the current work conditions.

There were also emphases on the feeling of safety among the people of the businesses and that nothing should be done regarding the work safety conditions of the workplaces. Similar with the results of the previous Study 2, the perceived easy tasks and familiarity with the activities were frequently mentioned as possible reasons for the feeling of being safe. In general, the discussion around acceptance of the current work conditions led to agreement among the participants that there are no significant issues related to safety in their workplaces, and that they are happy to carry on working with the current work conditions. Below are extracts of the discussion on Study 2 findings.

*“...it is true that there hazards maybe. Well like in the pictures and texts of the research as earlier in the slides. [...] Well but as we have accustomed to, maybe well the works is just like this... well that just stay as it is right (**Association 2**) Yes Sir as injuries accidents are rare too Sir... (**Owner 2**) Yes, even if there is well just what... grazes, stiffness just like that (**Worker 2**) That is it, well then so... well then just*

make if safe Sir even though not safe (laughs) [...] Why bother... (Owner 2)."

"Ee so ee I also agree with the others Sir. Ee as earlier ee think that simple and easy work make it feel safe Sir (Owner 2) Yes that is right correct (Worker 1) [...] Maybe there are unsafe things, such as for example like, like frying right Sir, frying... then liftings as in the pictures on your slide right. But as that is... well just like that Sir. Basically we work then done, a little bit of grazes and injuries are used to that. (Owner 2) The other day I also exposed to hot water, well just a little bit of blisters that is fine (laughs) (Worker 1)."

"Well that is maybe... like relaxed environment, household tasks... makes the feeling of safe (Expert) Feeling of afraid... ee there is no feeling of not safe at all (Owner 1) That is right, nothing about that at all (Worker 2) But still well... although we know that there are dangers [...] Basically just be careful... but relaxed not like wary (Owner 1)."

During the presentation and discussion on the results of the previous Study 3, the focus group participants acknowledged the potential influences among the observed factors. One common point was about the potential influence of safety management on work characteristics. The participants were in agreement that improvement or implementation of safety management would make the activities complicated and troublesome. The potential influence of safety knowledge on perceptions of work safety and risk was also discussed by the participants. There were opinions from the participants that if the people were more knowledgeable about safety, they may perceive the workplaces as more unsafe and riskier. Similarly, the participants also seemed to agree that implementing safety management may make the people have more unsafe and risky perceptions about their workplaces. Examples of discussion on Study 3 results are shown below.

"Well that could be Sir, yes Sir is it... well so far we do not understand ee like what is safe, maybe what is work safe like... if we learn well maybe our thoughts change. Maybe become afraid or how maybe Sir (Association 2) Ee actually yes than could be (Owner 2)."

"...I agree with that Sir. For example if our works are heavier, more difficult... but it... what is it... managed right... then we know how is the safe work... well then maybe our thoughts or perceptions can change too Sir (Worker 1)."

"Well... maybe just we will just become more knowledgeable right Sir. Oo this is how work safely is, we need to be like this, but well ee... (Association 2) [...] ...that maybe difficult (Association 2) [...] Maybe

become troublesome as earlier (Owner 1) Well more like will become more complicated. But what to say ee... troublesome, more to slowing it down. As we have to be like this and that, because that is not safe, have to be like this and that, this is not good, so it should be like this and that. That will be complicated like that (laughs) (Association 1)."

"It should change shouldn't it [...] Because for example knowledge right, become more knowledgeable... well earlier was said so the people know like ooo that is not safe (Expert) Yes Sir, there may be influences right Sir [...] For example we are told that actually safe work is like this and that, it should be like this, in our place is actually not safe... well maybe what can I say... our perception will change in the end (Association 1)."

As explored in the previous Study 2, the participants of Study 4 focus group also emphasised the low priority of work safety in the workplaces. When the discussion about that took place, the participants acknowledged that the priority of the businesses is the sales and the work of production process, and that work safety is not being prioritised. The people of the Indonesian small food-producing businesses often argued that the production process and sales are fine, despite the various hazards and risks in their workplaces.

Furthermore, it was further confirmed from the focus group that there are indications of ignorance to work safety among the people of the Indonesian small food-producing businesses. The participants often pointed out that the people never think about work safety, and that work safety is not being talked about in the businesses. One participant suggested that work safety is important for their workplaces, but it is not in the thoughts of the people. There was also discussion in which the participants pointed out the seemingly perceived easy and simple tasks which make the people not think about work safety. The extracts below show examples of discussion around the priority of work safety in the businesses.

"That is what I mean Sir... maybe they [the participants] know but not... emm what to say... if it said to not care maybe care actually... (Expert) Well no Sir... no, do not care either actually Sir (laughs) [...] Well not thinking is the same as do not care right Sir (laughs) (Owner 2)."

"Well yes the activities are just like that too right? (Worker 2) (laughs) yes just slicing, frying, boiling (laughs) (Association 2) I am the same

though different like me in corn... so it is just the same Sir, just liftings, boilings... so never think about work safe as earlier Sir (Worker 1)."

"Yes correct... never not even think [about it] (laughs) (Association 2) What is thought about is as earlier. We the workers come, then produce, well then afterwards go home, the owners handle the sales (Worker 1) Well if it is not being thought about... how can be care or paid attention right. Isn't it? (Association 1)."

"So why we from government or agency is like... what to say... minimum support or programme related to work safety in small businesses. Well maybe it is important... (Government) No, it is not important (Association 2) Yes Sir, not thinking at all about that work safe [...] Well still, well still be careful... if there is someone hurt well like treat or help (Worker 2) But never being thought about right, as the work is just like this (Association 2) No, never (Worker 2) The important things are just production and sales right Sir (Association 2)."

7.3.2. Challenges and recommendations for work safety

In Study 2, it was understood that the people of the observed Indonesian small food-producing businesses indicated two main challenges to work safety, which were cost and familiarity of the tasks. Similarly, when discussion about challenges related to work safety took place in the Study 4 focus group, cost and habits were two challenges emphasised by the participants. In the task to rank the challenges, while the participants did not have anything to add to the identified challenges, they also seemed to be in agreement that the first two challenges are habits to their activities and cost.

When discussions on challenges for work safety took place in the focus group, the participants frequently emphasised that work safety is difficult to implement or improve in Indonesian small food-producing businesses. Some participants thought that any kind of possible improvements in work safety in their workplaces would be costly. The participants gave examples of possible but costly improvements such as workplace modifications and changes of equipment. Additionally, some participants argued that the difficulty to implement work safety is also because the priority of the businesses is the production and sales for the businesses to survive, and that work safety is not important.

Furthermore, some participants pointed out that the difficulty to implement or improve work safety is due to the habits of the activities, which they thought to be difficult to change if work safety is added to the activities. There was also a discussion where the participants argued that even if there is knowledge of safety among the people and support from related parties, work safety would still be difficult due to the people's habits and routine to the current activities and work conditions. The participants seemed to be in agreement that work safety is troublesome. They frequently pointed out that dealing with or implementing work safety would complicate the activities, which make them reluctant to change. As also indicated in the previous Study 2, some focus group participants further indicated reluctance to implement aspects of work safety such as rules and procedures, due to the potential problems. Examples of discussion extracts on challenges and difficulties of work safety in the businesses are shown below.

“And then well... it is obvious, if we change equipment, an obvious issue is cost (Owner 2) That is expensive (Owner 1) Yes obviously (Association 1) Ee place modification is very expensive too isn't it (Worker 2) Well clearly, if we talk about cost (Owner 2) Well then doesn't make it safer either does it (Association 1) Yes not really (Owner 2) No no (Worker 2).”

“So my opinion is, like this, habits is the first challenge, ee the main one maybe the term. As it is difficult right, what is it, obviously to change habits. And even more so we have been like this for years Sir, so how to, to change it (Owner 2) Right and no problem either right Sir (Worker 1) Yes that is correct (Owner 2) That is correct. So everyday is like this come, then work go home. Feels just safe, no big injury or accident. Well then why change (Owner 1).”

“So it is like this... for example in your workplaces there are like rules, and then safe work method, has to be followed. And then has to wear safety equipment. Owners also has to monitor how is the work safety, is the work... will the works then change, gentlemen? (Expert) Well Sir, is it not more complicated? (Association 1) Yes Sir, that is troublesome [...] I have to look after [the safety], then maybe warn if there is... inappropriateness right... (Owner 1) [...] Ee maybe can be safer yes... but maybe we need to learn... because that will add to the complicatedness of the work, more complicated (Association 1).”

The participants' seemed to agree that improvement of work safety in the businesses should start with improving the people's knowledge and learning about work safety. Some participants seemed to be aware that current conditions of work safety in the businesses, such as absence of safety management and unavailability of safety equipment, may be a consequence of the low knowledge which should be addressed first. When asked to rank the identified potential recommendations, the participants agreed that the priority should be access to safety learning such as training. There was discussion that access to safety training and support from government and academics are equally important. This is because the participants thought that resources need to be provided for the businesses to be able to learn about work safety.

Despite the participants' agreement that knowledge or learning on work safety should be improved, they still doubted the necessity of learning or gaining knowledge on work safety and questioned the benefits of improvements on work safety. There was discussion in which the participants emphasised that nothing is needed to be improved or changed regarding work safety. The participants frequently reiterated that the priority of the businesses is production and sales. Furthermore, the participants also emphasised that any training should fill the businesses' needs, and that training on work safety was not felt necessary at the moment. That is in addition to the participants' thoughts that training on work safety is rather unnecessary due to the perceived minor unsafe events and injuries. Examples of discussion around these are shown below.

*"The easiest way as starting point maybe training, socialisation about work safety maybe those first (**Government**) Well yes maybe those are possible... but just the easy ones, not too difficult (**Association 1**) That is right Sir, correct. Ee maybe we can be taught first, ee maybe it is better if firstly we can be taught. As now we don't know what... ee what to say... our situation, our current knowledge don't know what safety is, what is safety (**Owner 2**)."*

*"Emm... if it is ranked Sir, these recommendations, emm which one is the most important maybe? (**Researcher**) Well access to training, in my opinion (**Association 2**) Yes right correct (**Owner 1**) That is for the starting point maybe Sir (**Government**) I agree, that's good, I agree (**Expert**) Try to gather the people of the SMEs... we give information,*

socialisation, then later how about the practice (**Government**) Ee I agree Sir, well basically maybe training first maybe Sir (**Owner 2**) I agree too Sir (**Worker 1**) The same Sir, maybe we can like be taught first (**Worker 2**).”

“...for example, just an example. Ee if there is a training on safe work right, how is it. I feel that the need for that is not much (**Association 1**) Even no need for that (**Worker 1**) That is right, so well, better for the other (**Association 1**) Well what I think is, I think there is no need for that (**Worker 1**) No need for any training such as that Sir. As long as the production is fine then sell just like that (**Worker 2**).”

“But sometimes we have a look, what is the need, if we need something then the training should be on what we need. I think it should be like that (**Association 1**) Yes Sir (**Association 2**) So if work safety well... well looks like that is not necessary, because well issues on safety is just like that (laughs) (**Association 1**) [...] ...because so far is enough. Like accident which... major right, that is none of that [...] basically just be careful, like so far is enough, accident injuries which like... major feels like never happen (**Association 2**).”

Another point of discussion in the focus group on recommendations for work safety is that change or improvement on work safety seemed to be the least urgent recommendation. The participants argued that even if there were changes to the activities such as different equipment and modification, there would be no differences to the conditions of safety in the workplaces. The participants also pointed out that, before making improvements to work safety, the people need to be firstly informed about work safety, highlighting earlier points about the priority to improve learning or knowledge on work safety.

“In my opinion, I prefer change and improvement to be the last Sir (**Owner 2**) Well that is right as the earlier Sir, we don't feel that there is anything that need to be improved or changed (**Association 1**) Right that's correct, true (**Owner 2**) Well just work as normal, it is safe [...] So ee change, improvement is the last if it is truly necessary (**Worker 2**).”

“...process and equipment are like that. Cannot be changed (**Owner 1**) Even if that is changed... from the safety, in my opinion well, in my opinion right... that will be the same... (**Owner 2**) Yes that is right. For example, well... a tool for... what is the example ee... (**Association 1**) Let's say change to like automatic... I don't know ee from whether safe or not. The change is, it feels more to what to say... well just the production is faster (**Owner 2**).”

“Yes that's right... well willingness is we want it, maybe there is benefit we will become knowledgeable. But if that does not affect our

production significantly... even more if does not affect our sales to more... (Owner 1) That is right Sir, basically... does that have an effect... (Association 1) Right if there is no effect well then there is no need to change (Owner 1) Ee yes Sir as earlier, what is it called... our priority which we think about. Again, that will be sales and production Sir (Owner 2)."

7.3.3. Summary of the focus group results

Feedback was collected from the people related to Indonesian small food-producing businesses on findings from the previous three studies of this research. The challenges and potential recommendations for work safety in Indonesian small food-producing businesses were also discussed. A summary of the results of Study 4 is presented in Table 7.7.

Table 7.7. Summary of Study 4 focus group results

Feedback on the study findings	Challenges and recommendations for work safety
<ol style="list-style-type: none"> 1. While the participants seemed to agree with the observed work-related and safety issues in their workplaces, they emphasised that the issues are not major or in urgent need to be solved. This is mainly because the issues are not affecting the overall business and work activities, and issues on the sales and production are more important to be considered. 2. In agreement with findings of Study 2, there are indications of acceptance of the people of the Indonesian small food-producing businesses to the current work and safety conditions. The easy tasks, familiarities and habits, and perceived minor severity and low frequency of unsafe events may contribute to the feeling of safety among the people. 3. The participants acknowledged the potential influences of factors related to perceptions of work safety and risk as explored in the previous Study 3. The participants agreed that if there are changes in safety management in the businesses and safety knowledge among the people, their perceptions on work safety and risks may change too. Additionally, different safety management and safety knowledge 	<ol style="list-style-type: none"> 1. The participants identified and agreed that habits in completing the activities and cost are the two main challenges to implement or improve work safety. The people's years of routine in performing the activities is a challenge which makes any effort to implement or improve work safety difficult. Additionally, any kind of attempt to improve work safety in the workplaces is thought to be costly. 2. The participants emphasised that work safety is difficult to be implemented in the businesses. Habits to the activities, added with the lower importance of work safety compared to the production and sales, make it difficult to implement work safety. The participants also emphasised the potential complication involved in work safety, which make the people reluctant to implement it. 3. The Study 4 participants agreed that people's knowledge should be the priority, and steps should be taken to leverage the people's knowledge on work safety first to improve work safety in Indonesian small food-producing businesses.

Feedback on the study findings	Challenges and recommendations for work safety
<p>could also contribute to different work characteristics.</p> <p>4. Similar to the results of Study 2, the participants emphasised the low priority and ignorance of work safety in the businesses. The people of the Indonesian small food-producing businesses argued that the production processes can still run well despite the hazards and risks in the workplaces. Furthermore, due to the easy tasks, work safety is not being taken into consideration by the people of the businesses.</p>	<p>It was discussed that the people's relatively low knowledge of work safety is one possible main source of the work and safety related issues in the workplaces. However, there are doubts that learning or training on work safety is necessary or important.</p> <p>4. It was discussed that change or improvement to work safety is the least important recommendation to do in the businesses. Additionally, the people of the businesses questioned the necessity to improve work safety due to doubts over the benefits.</p>

7.4. Study 4 discussion

Representatives of the people of Indonesian small food-producing businesses in the focus group generally acknowledged and were in agreement with the results of the previous three studies of this research. In this research, it was observed that the workplaces of Indonesian small food-producing businesses are unsafe with various work-related issues, which were also indicated in other studies such as Rahayuningsih (2019) and Irpan et al. (2019). The participants responded that the findings from observations and interviews of various work-related issues such as hazardous and risky work conditions, as well as occurring injuries and unsafe events, are accurate representations of the current work safety conditions.

Findings around people's thoughts and perceptions on work safety and risk were also discussed and recognised by the participants. The people of the businesses agreed that while they were aware of the unsafe work conditions of their workplaces, there were feelings of safety and acceptance. Legg et al. (2015) and Gardner et al. (1999) have previously argued that there is a tendency of workers in small businesses to accept and normalise hazardous and poor work conditions. Moreover, the people of the businesses also agreed with the seemingly low perceptions of frequency and severity of the occurring unsafe events and injuries. This is similar to opinions by Cagno

et al. (2011) and Gardner et al. (1999) that there may be lower risk perceptions in SMEs. Additionally, the focus group participants also acknowledged the potential factors influencing their perceptions of safety and risk in the relationships model that were presented.

Cost has been identified as one main barrier for work safety improvement in small businesses (Esterhuyzen, 2019; Vickers et al., 2005). In the focus group, cost was also identified as one of the challenges to improve or implement work safety. The participants frequently emphasised that any kind of improvement in work safety would be costly. Another identified main challenge for work safety in Indonesian small food-producing businesses was the people's habits in completing the work activities in the current conditions. In other studies, workers' habits were identified as a potential challenge in complying with safety operating procedures and utilisation of PPE (Cagno et al., 2014; Top et al., 2016). Similarly, it was discussed in the focus group that there is high potential of reluctance to practice work safety in the work activities of the observed Indonesian small food-producing businesses, due to the people's habits from years of routines in performing the tasks. The participants emphasised that any potential change to the work activities as a consequence of work safety practice would be difficult.

It was discussed in the focus group, that any recommendations for work safety should start with improving the people's knowledge on work safety. The participants pointed out the current low knowledge of work safety should be improved first before going into any practice of improvement on work safety. Similarly, as emphasised by Esterhuyzen (2019), the relevant people should have sufficient knowledge of work safety to apply and direct OHS in small businesses. Ferjencik (2020) stated that in supporting implementation of work safety in SMEs, basic safety management which suits the goals and knowledge of SMEs can be formulated. It was also discussed in the focus group that despite the difficulty, there should be an attempt to implement safety management in the businesses, though this needs to be a different and simpler approach compared to those in larger businesses. However, the participants were in agreement that any change or practice regarding implementation of work safety is a low priority and is not a necessity.

Despite the small size of the businesses, OHS is still an important part of business management practices, and should not be regarded as unnecessary or neglected by small businesses (Esterhuyzen, 2019). This was also pointed out by the academic expert in the focus group, to which the people of the businesses argued by questioning and doubting the benefit of work safety. It has also been indicated in other studies, that there may be doubts among the SMEs over the real benefit or improvement by improving health and safety, and may be perceived to be less useful unless they are demonstrated in practice (Bonafede et al., 2016; Griffin et al., 2005; Lansdown et al., 2007). The people of the Indonesian small food-producing businesses further emphasised that the issues around safety were not affecting the overall business process and work activities negatively.

7.5. Study 4 conclusion

Feedback on the results of the three previous studies was collected from a sample of people related to the Indonesian small food-producing businesses. Generally, the participants were in agreement with the results of the observed issues related to work safety in the workplaces. Additionally, the participants acknowledged that work safety is not a priority for the businesses, in which production and sales are of higher priority. The people's perceptions of work safety and risk were also discussed, where the people of the businesses recognised the indications of acceptance of the current work safety conditions, partly due to perceived minor severity and low frequency of unsafe events. It was discussed that work safety is difficult to implement in Indonesian small food-producing businesses, due to the potential complexity arising from changes. Habits involved in completing the activities and cost are two main challenges to implementing work safety. It was also understood that, instead of thinking about what can be changed or improved regarding work safety in the workplaces, the participants emphasised that the people's knowledge or learning on work safety should be addressed beforehand.

Chapter 8

General discussion and conclusions

8.1. Introduction to Chapter 8

This chapter starts with a review of the research aim and objectives, in which achievements of the research objectives and overview of the research findings and discussion are presented. The findings of the research will then be discussed, drawing from the main findings of the four studies which have been presented throughout this thesis. Furthermore, the contributions of knowledge and practical recommendations of the research will be discussed. Reflections on the methodology and approach taken in this research will also be discussed, as well as limitations of the research. Additionally, recommendations for future research that could be developed from this research will also be discussed. Finally, this thesis will conclude with concluding statements of the research.

8.2. Review of the research aim and objectives

The overarching aim of this research was to investigate perceptions of work safety and risk in Indonesian small food-producing businesses. The research aim was supported by four research objectives, with a summary of the main findings presented in Table 8.1. In overview, drawing from the four studies, the findings of this research can be divided into four main findings related to work and work-related issues (Study 1), people's perceptions of work safety and risk (Study 2), factors influencing perceptions of safety and risk (Study 3), and recommendations for work safety in Indonesian small food-producing businesses (Study 4). Accordingly, the discussion of the research findings in the next section will be presented in four sub-sections, respective to the four studies and main findings.

Table 8.1. Summary of the research findings

Research objectives	Study	Methods and analyses	Main findings
Objective 1: To understand work and work-related issues in Indonesian small food-producing businesses	Study 1	<ul style="list-style-type: none"> • Observations • Semi-structured interviews • Descriptive analysis • Thematic analysis 	<ul style="list-style-type: none"> • Some main characteristics of the work activities are performed in locations which are not designated for the work activities, conducted largely manually by hand, and flexible task arrangements. • Various work-related issues were observed in the workplaces, in which the workers are working with various hazards and risks in poor working conditions, with low level of safety management.
Objective 2: To explore thoughts and opinions on work safety and risks among the people of Indonesian small food-producing businesses	Study 2	<ul style="list-style-type: none"> • In-depth scenario-based interviews • Phenomenology approach • Thematic and phenomenology analysis 	<ul style="list-style-type: none"> • Perceptions among the people of Indonesian small food-producing businesses that their workplaces and activities are unsafe, while there are indications of feeling of safety and acceptance. • Awareness of the people in the hazardous and risky workplaces and activities, with perceptions of low frequency and minor severity of unsafe events and injuries.
Objective 3: To investigate factors influencing perceptions of work safety and risk among the people of Indonesian small food-producing businesses	Study 3	<ul style="list-style-type: none"> • Questionnaires • Principal Component Analysis (PCA) • Structural Equation Modeling (SEM) 	<ul style="list-style-type: none"> • Significant and positive influence of safety management on safety knowledge. • Both safety management and safety knowledge have significant and positive influences on perceptions of safety and risk.
Objective 4: To obtain feedback on the research findings and explore recommendations relating to work safety in Indonesian small food-producing businesses	Study 4	<ul style="list-style-type: none"> • Focus group • Qualitative analysis 	<ul style="list-style-type: none"> • Acknowledgment of the findings of the research such as unsafe work conditions with various hazards and risks, low importance of work safety, and the influences among the factors related to their perceptions of safety and risk. • Cost and habits are the two main challenges for implementation and improvement on work safety in the workplaces. • It was suggested that the people's knowledge of work safety should be addressed first, before any attempt to change or improve work safety in the workplaces, which was thought to be the least concern.

Overall, it was observed that the conditions of workplaces and work activities of Indonesian small food-producing businesses were unsafe with various hazards and risks with potential consequences. The people of the businesses seemed to be aware of the unsafe work conditions, and perceived that their workplaces and work activities were unsafe. There are also general perceptions among the people that the risks in their workplaces are low in probability and severity. It can also be understood that their perceptions of work safety and risks are influenced by the low levels of safety management and knowledge, and there is an indication of the potential influence from work characteristics. Additionally, cost considerations and other priorities of the businesses such as production and sales may also contribute to the people's perceptions of work safety and risk.

Furthermore, there were indications of acceptance of the current work conditions with the feeling of safety among the people of the businesses, due to factors such as rare occurrence of injuries and unsafe events, and familiarity with the tasks. In dealing with potential improvements for work safety in the observed Indonesian small food-producing businesses, improving the people's safety knowledge and low-cost improvement are recommended. However, it is worth noting that the people of the businesses indicated that any changes or improvements related to work safety in their workplaces were not urgent. Therefore, future studies to further establish the needs and what can be done regarding work safety in Indonesian small food-producing businesses are also recommended, particularly by considering a participatory approach and socio-technical aspects. The overview of the key findings and recommendations of this research is presented in Figure 8.1 and discussed in the following sections.

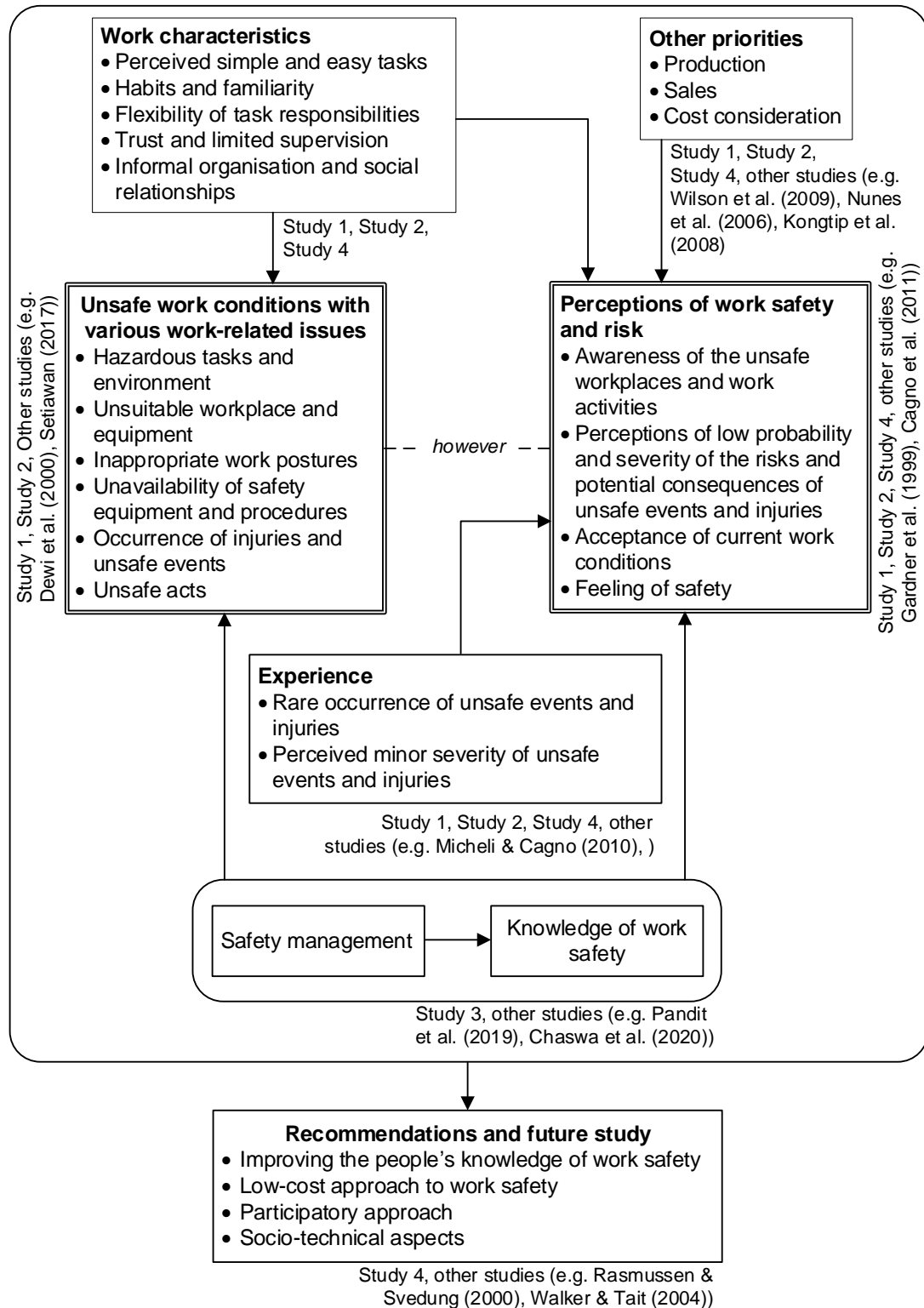


Figure 8.1. Overview of the key findings and recommendations of this research

8.3. Discussion on the findings of the research

8.3.1. Work and work-related issues in Indonesian small food-producing businesses

1. Characteristics of the work

One similarity among the observed Indonesian small food-producing businesses is that the workplaces were not designed specifically for the work activities, and this could contribute to the observed poor work conditions with various work-related issues. All work activities observed in this research were conducted in the owners' houses in which most equipment was not specifically designed for the tasks. This finding supports the explanation by Alferts & Morgan (2015) that informal workers, as in the observed businesses in this research, mostly work in unusual places such as roadsides and homes. On the other hand, design of work activity such as the tasks and equipment are important to prevent injuries and reduce risks such as work postures and forces (Bush, 2012; Houghton et al., 2015). In other research involving Indonesian small food-producing businesses, it has also been suggested that improvement in the design such as layout and equipment can reduce risks of accidents and musculoskeletal problems (Dewi et al., 2020; Setyowati et al., 2017).

The work activities in the observed Indonesian small food-producing businesses were largely conducted manually by hand. The work activities involved manual tasks such as lifting heavy sacks, stirring heavy loads of materials, and slicing with a knife. Although some semi-automatic machines were used, the tasks still need to be carried out manually by the workers. This is similar to explanations by Silalahi et al. (2018b) and Delti et al. (2018) that the production processes of Indonesian small food businesses mainly consist of manual tasks. These could lead to several work-related issues with risks such as grazes, cuts, and body pain as observed, and it has also been commonly agreed that manual tasks and material handling contribute to higher physical workload and higher risks of injuries (Ratnasingam et al., 2011; Sogaard & Sjogaard, 2015).

Another characteristic of the observed work activities is the sequential work process with flexible task responsibilities. As explored in Study 1, each worker in the observed work activities was generally responsible for at least one task, and the workers could do another task or cooperate if required. From the interviews with the businesses' owners and workers, it can be understood that this is particularly when there is a need to accelerate the production process to achieve the production target. Although this depends on the type of work, task flexibility in work management of smaller businesses has been suggested, where the people have casual relations and sometimes fill in each other's roles (Eakin, 1992; Eakin & MacEachen, 1998; Walters et al., 2018). Furthermore, there is no specific supervision performed on the work activities, as a specific supervisory person is not available. The Study 1 interviewees pointed out that supervision is not necessary due to employing experienced workers, and supervision is applied more to the achievement of meeting production targets and product quality.

2. Work-related issues

As explored in Study 1, there are various work-related issues in the observed Indonesian small food-producing businesses. Several risky work conditions were found in all observed workplaces, such as risks of burnt body parts, risks of slips and falls, and risks of body pain or musculoskeletal problems. These risks come from various hazards such as exposure to heat and fire, unsuitable equipment, heavy load of materials, and poor work postures. These conditions confirm the explanation by Kortum et al. (2011), that there are common issues such as musculoskeletal problems and forceful tasks in the workforces of developing countries such as in the South East Asian region. Kaewbonchoo et al. (2016) also found prevalence of poor work postures and hot working environments in Indonesian SMEs. Among Indonesian small food businesses, it has also been implied that hot work environments are common, in addition to exposure of risks of slips and falls and injuries, as well as exposure to dangerous tools (Rahayuningsih, 2019; Ushada & Okayama, 2018).

Hasle et al. (2011) and Olsen (2010) pointed out that safety management in SMEs is more likely to be given by oral practices rather than written. Study 2 of this research suggests that work safety is not being managed in the observed Indonesian small food-producing businesses. Evidence of safety management was not observed in the workplaces and it was also emphasised by the interviewees that safety is not being managed in the businesses. It was also evident that no particular person had a responsibility to deal with safety. The personnel in the businesses were working in an informal environment without specific responsibility or delegation regarding work safety. The informal working environment may contribute to the low level or absence of safety management in the observed businesses, as emphasised by Hasle & Limborg (2006) that a formal structure for safety is difficult to implement and sustain in small businesses, mainly due to their informal cultures.

The low level of safety management in the observed businesses is reflected by the unavailability of safety procedures and safety equipment (e.g. PPE, emergency procedure and equipment). Study 1 showed that the focus of the work methods or procedures is predominantly on completion of the tasks. These findings support an argument by Hasle et al. (2009) that the unavailability of safety procedures or policies is often found in small enterprises. Furthermore, although the people seemed to be aware of unsafe work conditions as explored in Study 2, there was a perception that it is not necessary to give more attention to work safety. Work safety is rarely thought or talked about and some interviewees emphasised that it is never considered. This low level of communication on work safety further reflect the low level of safety management in the observed businesses, as implied by Nowrouzi et al. (2016) that an effective safety management would be reflected by adequate communications about safety among the employees.

The people of small enterprises often have relatively low knowledge around practices of work safety and healthy physical work environment (Hasle & Limborg, 2006; Olsen et al., 2010). Similarly, it was established in this research that the people of Indonesian small food-producing businesses have low knowledge of work safety and ergonomics (e.g. they were unable to

adequately describe work safety and ergonomics in the Study 1 and Study 2 interviews). Additionally, Ansori et al. (2019) explained that most workers in small enterprises in Indonesia have low levels of formal education. The people of the observed businesses typically have a formal education level of elementary school, in which there is no specific learning about ergonomics or work safety. These may contribute to the observed poor work and safety conditions, as limited knowledge of safety in smaller businesses may lead to low understanding of risk and less preventive systems to address work-related issues (Hasle et al., 2011; Whysall et al., 2006).

8.3.2. Perceptions of work safety and risk in Indonesian small food-producing businesses

1. Contradictions in the perceptions of work safety and risk

In the Study 1 and Study 2 interviews, it was understood that unsafe events and injuries do occur in the observed Indonesian small food-producing businesses, but the people generally perceived them as low in frequency and severity. There were statements in Study 2 interviews that the occurrence of unsafe events and injuries are rare, and consequences such as cut grazes and body part stiffness are normal. The interviewees also noted that the people involved in an unsafe event or experienced an injury were still able to continue working. These findings confirm the explanations by Micheli & Cagno (2010) and Hasle et al. (2009), that there are low perceptions towards risk in SMEs. Champoux & Brun (2003) also argued that the low frequency of adverse events in small businesses, which was also implied by the people of the businesses in this research, may influence the people's risk perceptions.

Evidence from previous research indicates a tendency among people in SMEs to believe that their work activities are not dangerous (Hasle et al., 2009; Olsen et al., 2010). In this research however, as indicated in Study 1 and confirmed in Study 2 and Study 4, the people of Indonesian small food-producing businesses generally recognised that their workplaces and activities were not safe. On the other hand, despite their awareness of the unsafe work conditions, it was revealed that the people accepted the working situations and there was a feeling of safety. Despite the various unsafe work

conditions, the people of the businesses pointed out that they do not have any unsafe feelings when working in their workplaces. These findings support the argument by Gardner et al. (1999) that there is a tendency to accept and normalise hazards in the workplaces of small businesses.

There are some possible reasons for this apparent contradiction of people's perceptions of unsafe work conditions but seeming to accept it and have the feeling of safety. In Study 2, it was discussed that the easy tasks in the work activities and familiarity with the tasks from experiences may have a role, in which the people of the businesses frequently emphasised their years of routine of performing the tasks. Adding this to the people's perceptions of low frequency of unsafe events and injuries as explored in Study 1 and Study 2, could be one potential reason for their feeling of safety and acceptance of the current work conditions. This is similar to the explanation by Jarvis & Tint (2009) that workers may consider that their work is not hazardous as they have been working for years without anything bad happening.

Another possible reason is the work culture and relationships in the workplaces. It has been argued that social characteristics such as informal workplace relationships in small businesses may make the workers accept riskier work conditions (Eakin & MacEachen, 1998; Lansdown et al., 2007; MacEachen et al., 2010). As explored particularly in Study 1, the relationships between people in the observed Indonesian small food-producing businesses are informal, reflected by the absence of formal organisation and informal verbal work contracts. There were also discussions that the owners trust the workers, and that their relationships are like friends or family. These may make the people of the businesses give little attention to work-related issues and downplay the hazards and risks, in addition to the low priority and importance of work safety.

Eakin (1992) argued that, even though there may be awareness towards hazards, people in small workplaces may still have low perceptions that the hazards can cause problem to health and safety. This is also indicated in this research that whilst the people of the businesses seemed to be aware of the unsafe work conditions, they have low perceptions of risk. This may be because the people do not see the hazards and risks in their workplaces as

problems, as indicated in Study 2 and Study 4. The people of the businesses often stated that the businesses' priorities of production and sales are fine, even with the hazardous and risky work conditions. The people's acceptance and feeling of safety as previously discussed may also contribute to this, making the people perceive risk as low although they are aware of the unsafe conditions.

2. Low priority of safety

As previously mentioned, there were shared thoughts and opinions among the people of the observed businesses, that work safety is not a priority. Low importance was attached to work safety, and production and sales are the businesses' two main priorities. Consequently, as indicated in Study 1 and confirmed in Study 2 and Study 4, the participants thought that any potential improvement on work safety is not urgent to be implemented. Others have also found that there may be reservations about the benefit of implementing work safety systems in small enterprises (Lansdown et al., 2007; Santos et al., 2013). The people of the businesses frequently pointed out that they were content with the work conditions as the production and business can still run with it. This eventually contributes to consensus among the participants of the Study 4 focus group, that changes or improvements on work safety are the least concern in addressing work-related issues in the businesses.

The people of the businesses often mentioned that achieving production targets is their main objective. Hashemian & Triantis (2023) pointed out that the pressure of production for an organisation to survive usually results in valuing production over safety. Indications of valuing production over safety were also found in the observed Indonesian small food-producing businesses. There were statements from the people of the businesses that they never think about safety, as long as production targets were achieved. Additionally, achievement of production in the observed businesses is important to gain the expected sales and profit, which is another main goal of the businesses to survive as emphasised by the businesses' owners. The

workers similarly mentioned that sales were important, so that their employment was safe and they can maintain a salary.

It has been argued that a profitability-focused organisation may result in more cost-efficiency of the process to achieve the production targets, leading to production pressure and sacrificing safety (Kontogiannis & Malakis, 2019; Sterman, 2015). Prioritisation of production efficiency over work safety conditions may also be the case in the observed Indonesian small food-producing businesses. It has previously been discussed that due to cost considerations, the businesses are using the owners' houses for production instead of having a designated production facility, and most of the equipment was not designed specifically for the tasks. These could contribute to various work-related issues as has been previously discussed, whereby the people accept and have the feeling of safety although they recognised and were aware of the unsafe conditions. Hollnagel (2017) described this as trade-offs between production and safety, which poses potential failures regarding safety.

In a production system where production and profit are the focus, an unsafe event which does not immediately lead to any harm is typically seen as acceptable (Dekker, 2017). This is similar with findings of this research, where there is acceptance and feelings of safety among the people of the businesses, despite the unsafe work conditions and occurrence of unsafe events. However, it has been pointed out that adverse events such as major accidents usually develop slowly and cumulatively from minor events, and it has been warned that normalisation or acceptance of minor events is one potential contributing factor (Rasmussen, 1997). Therefore, it is important that in Indonesian small food-producing businesses, potential problems in production processes that may lead to unwanted safety events are recognised to identify possible improvement and reduce the work risks, as suggested by Hashemian & Triantis (2023).

8.3.3. Factors influencing perceptions of work safety and risk in Indonesian small food-producing businesses

It was found in Study 3 that, in the observed Indonesian small food-producing businesses, safety management has a positive significant influence on the workers' perceptions of work safety and risk. It has been widely considered that safety management and its related aspects such as commitment, rules and procedures, and equipment influence employees' perceptions of safety and risk (Chan et al., 2021; Pandit et al., 2019; Vinodkumar & Bhasi, 2010). These aspects were also incorporated in the factor of safety management in Study 3, in which their ratings in the questionnaire survey were low, indicating low safety management. This was also explained by Study 2 interviewees that safety was not being managed nor implemented in the observed Indonesian small food-producing businesses.

It has been discussed that aspects related to safety management are not implemented in the observed Indonesian small food-producing businesses. This is reflected by some understandings such as unavailability of rules and procedures related to safety, unavailability of safety equipment, and the low commitment and priority towards work safety. These low levels of implementation of safety management could contribute to the workers' generally low perceptions of safety and risk in their workplaces, as indicated by the low ratings on the factor of perceptions on work safety and risk. As explained in studies such as Pandit et al. (2019) and Rundmo (1997), safety management aspects such as commitment and provision of safety equipment positively influence workers' perceptions about risk and safety in the corresponding workplaces.

Safety knowledge was also found to have positive significant influence on perceptions of work safety and risk in the observed Indonesian small food-producing businesses. Some studies such as Chaswa et al. (2020) and Zhao et al. (2021) have previously found positive effects of safety knowledge on workers' perceptions around safety and risk. From the Study 3 results, the workers' low safety knowledge is reflected from the low mean rating of factor of safety knowledge. The Study 1 and Study 2 interviewees also implied that

they have low understanding, as well as limited experience and access for learning about safety and ergonomics. These could contribute to the workers' generally low perceptions of work safety and risk, as knowledge on safety may contribute to workers' perceived risk (Liu & Hammitt, 1999).

The Study 3 results show evidence of the factors that can potentially influence perceptions of work safety and risk in the observed Indonesian small food-producing businesses. It can be predicted that, from the significant positive influences, changes or differences in safety management and safety knowledge would give different perceptions of work safety and risk. In the Study 4 focus group, the participants acknowledged that changing the practice of safety management and having different knowledge about safety may result in different perceptions of safety and risk. These potential influences were previously pointed out by Pandit et al. (2019) that developing aspects related to safety management such as commitment on safety may lead to higher perceptions of safety and risk, and by Zhao et al. (2021) that increases in knowledge of safety may increase perception of risk.

It has been argued that more exposure about knowledge of safety and risk surrounding their jobs would elicit higher risk perceptions among the workers (Kawahara et al., 2018; Zhao et al., 2021). In the Study 4 focus group, the people of the businesses implied that their current low risk perceptions, feeling of safety, and acceptance may be because they have low safety knowledge and the absence of safety management. The people of the businesses implied that they may perceive their workplaces and activities as more unsafe or riskier, should they understand work safety more or if there is a practice of safety management in their workplaces. There were also opinions that they may not be as accepting and not feel as safe with their current work conditions, compared to their current acceptance and feeling of safety. It was also discussed that, in turn, they may give more attention to work safety and put more consideration on the necessary improvements.

Furthermore, although the factor of work characteristics was excluded in the final model of Study 3, the Study 4 focus group participants acknowledged its potential relationships with other factors in the model. It was discussed that if safety is implemented differently in the workplace and there

is a higher level of safety knowledge among the people, the work characteristics of the businesses may also be different. The participants pointed out that focusing on work safety would complicate the work activities, which was also argued by Cunningham & Sinclair (2015) that occupational health and safety may be perceived as too complicated in small businesses. An example given in the discussion was the potential for tasks to become more complicated if the workers should follow safety procedures or rules and wear PPE. In turn, the potential changes in work activities in the workplace could increase the people's perceptions of safety and risk, as perceptions of safety and risk may depend on characteristics of the tasks and work environment (Leveson, 2011; Wang et al., 2016).

8.3.4. Challenges and recommendations for work safety in Indonesian small food-producing businesses

1. Challenges surrounding work safety

This research showed that there are some challenges to improve work safety in Indonesian small food-producing businesses, with cost being identified as a challenge in Study 4. There were perceptions among the people of the businesses that any kind of follow-up or improvement towards issues related to safety would be costly, and this makes them reluctant to make changes. The challenge of cost was also pointed out by Vassie & Cox (1998) as a potential factor that could prevent SMEs participating in occupational health and safety. The people of the businesses mentioned that production and workers' salary have already accounted for much of the spending cost of the businesses. Additionally, the academic expert and government person also agreed that cost is the main challenge for improving work safety in the businesses. In the earlier interviews of Study 1 and Study 2, cost was also frequently pointed out by the interviewees as one main consideration for improvement to solve the work-related issues in the workplaces.

The participants of Indonesian small food-producing businesses also emphasised the challenge of habits to implement work safety. They pointed out that any potential changes to their activities regarding safety would be difficult, as they have been accustomed to the current activities from years of

routine. Whysall et al. (2006) commented that changing habits regarding safe work is difficult, which was also mentioned by Study 2 and Study 4 participants as most of the workers have been working for years. In addressing the barrier of habits, Whysall et al. (2006) implied that a different setting of work regarding safety could be initiated. However, this may be difficult in the observed Indonesian small food-producing businesses. In addition to cost considerations, there were some interview statements from the people of the businesses that they were unsure and unwilling to change the work activities.

Furthermore, the relatively low knowledge of work safety among the people of Indonesian small food-producing businesses is a consideration. In addition to the people's relatively low level of formal education in which there was no learning about work safety and ergonomics, they also have no exposure to work-based training on the topic of work safety. These could make the people of the businesses have limited understanding on improving their workplaces' safety. Hasle et al. (2011) pointed out that limited knowledge is a constraint that could explain the problems around risky work environments in small firms. Similarly, Whysall et al. (2006) also implied that knowledge is an issue when attempting to implement interventions to address work-related issues. Additionally, the low priority of safety in the businesses also poses a challenge, where people were unsure that improvements on the safety of their workplaces is necessary as previously discussed.

2. Recommendations for work safety

In the Study 4 focus group, it was discussed and recommended that knowledge of work safety should firstly be addressed before taking any steps to improve work safety in the businesses. The participants argued that any attempt to improve work safety in their businesses would be meaningless and not sustainable, if the people do not have adequate knowledge of work safety. As previously discussed, the people of the observed Indonesian small food-producing businesses generally have low levels of knowledge of work safety and risk. Adequate knowledge is required to apply work safety in small businesses (Esterhuyzen, 2019), therefore, it is considered important to

improve the knowledge of safety among the people of Indonesian small food-producing businesses.

By improving the knowledge of safety among the people of Indonesian small food-producing businesses, it can be expected that further work to improve work safety in the businesses can be done. Cohen & Colligan (1998) implied that improving workers' knowledge around safety such as through training can increase their knowledge of work hazards and safety, which could then allow adoption of safe work practices to improve safety for protection. Additionally, safety training can simultaneously improve safety knowledge and behavior (Burke et al., 2011). Improving safety knowledge of the people of Indonesian small food-producing businesses such as through safety training could improve their awareness and importance of safe working conditions. This would then be able to raise their attention and priority to improve their working conditions, and their behavior regarding safety in their workplaces.

Furthermore, although it was not discussed in more detail, there was a suggestion from the academic expert involved in this research that work safety improvements in Indonesian small food-producing businesses may be initiated with low-cost and basic simple approaches. Hasle et al. (2012) also implied that, as small enterprises have limited financial resources, interventions related to work safety and the overall work environment should not further burden small enterprises with additional cost. Although further work is needed to define the low-cost alternatives to improve work safety in Indonesian small food-producing businesses, relevant parties such as government or researchers should consider this when dealing with work safety in the businesses. Any recommendations should be financially feasible and not burdening to the businesses.

3. Socio-technical aspects and participatory approach

It can be understood particularly from the Study 4 focus group, that there is a need for relevant stakeholders to support and work together to improve work safety in Indonesian small food-producing businesses. As previously mentioned, the people of Indonesian small food-producing businesses put forward that they need support particularly from related

governmental bodies and academics, to deal with work safety in their businesses. The academic expert and government person also resonated that the businesses cannot deal with improving work safety themselves. This is also implied by Kines et al. (2013) that changes or improvement to safety in small enterprises could be achieved by integrated interventions of everyone in the businesses. They explained that all personnel from workers to top management can be involved in meetings, workshops, and interviews regarding improvement in the workplace.

Rasmussen & Svedung (2000) discussed a socio-technical system in risk management of integration of multiple level decision-making for effective OSH interventions, from the top level of government or regulators to the bottom level of the company staff and the work system itself. This may be relevant for Indonesian small food-producing businesses, for various actors such as researchers and government to work together with the businesses to improve work safety in the workplace, to further identify their needs and establish what can be done regarding work safety in their workplace. In doing so, a participatory approach can be taken which would incorporate multiple perspectives in system design to plan and control work activities in a workplace (Detienne, 2006; Nagamachi & Tanaka, 1995; Wilson, 1995).

It is suggested that a participatory approach may be conducted to improve work safety in Indonesian small food-producing businesses. Related to safety knowledge, Itani (2011) implied that while experts may have more knowledge on theories and methods of work improvement, the people of small businesses have a better understanding of their actual working conditions. Itani (2011) also suggested that experts and authorities should inform small businesses people that the main roles of work improvements lie in the people of the workplaces themselves. A participatory approach would be useful to establish a suitable programme to improve safety knowledge of the people of Indonesian small food-producing businesses. Similarly, any attempt to implement low-cost safety improvements in Indonesian small food-producing businesses can be done with a participatory approach. The people of the businesses should be involved by identifying their needs and capabilities, to

ensure that the proposed improvement of safety is low-cost and not burdening as previously discussed.

8.4. Contributions of the research

This research has a number of contributions to theoretical knowledge and practical recommendations. An overview of the contributions is presented in Table 8.2 and will be discussed in this section.

Table 8.2. Overview of contributions of the research

Area of contributions	Contributions of the research
Theoretical knowledge	1. Greater understanding of work activities and work-related issues in Indonesian small food-producing businesses. This research contributes to describing the work and work-related issues in Indonesian small food-producing businesses, including the perspectives of the people involved in the work activities.
	2. Exploring perceptions of work safety and risk among the people of Indonesian small food-producing businesses, which have not been previously explored. It was found that while the people of the businesses thought that their workplaces and activities were unsafe and they were aware of the hazards and risks, there is acceptance and feeling of safety with low risk perceptions.
	3. Exploring factors influencing perceptions of work safety and risk in Indonesian small food-producing businesses, which have not been previously investigated. It can be understood that perceptions of work safety and risk among people of the businesses are significantly influenced by safety management and safety knowledge.
	4. Development of a questionnaire instrument on perceptions of work safety and risk in Indonesian small food-producing businesses. This research contributes by developing a questionnaire which is expected to be suitable for the Indonesian small food-producing businesses and similar work settings, by considering their characteristics.
	5. Demonstrating applicability and usefulness of qualitative exploratory approaches to investigate work and safety and the related issues in Indonesian small food-producing businesses. This research contributes by demonstrating a qualitative exploratory approach which is useful to understand work safety in Indonesian small food-producing businesses.
Practical recommendations	6. Providing recommendations to improve knowledge of safety for Indonesian small food-producing businesses. It was considered that the first step to improve work safety in the businesses is by improving

Area of contributions	Contributions of the research
	people's knowledge of work safety. Development of a programme through a participatory approach such as training or workshops is recommended.
	7. Providing recommendations for low-cost safety management for Indonesian small food-producing businesses. Initiating low-cost management of safety in the businesses could improve the workplaces' safety conditions. The businesses should be involved in a participatory approach to develop the low-cost management and improvement regarding work safety.

8.4.1. Contributions to theoretical knowledge

1. Understanding of work activities and work-related issues

The first contribution of this research is that it provides greater understanding of work activities and work-related issues in Indonesian small food-producing businesses, by including the perspectives of relevant people. While some studies have presented descriptions of work activities and work-related issues in some types of Indonesian small food-producing businesses such as Dewi et al. (2020), Rahayuningsih (2019), and Delti et al. (2018), it was considered that comprehensive descriptions which include perspectives of relevant people was still lacking. It is important to understand the perspectives of the people when studying work-related issues to have appropriate necessary action that may be taken (Joseph & Arasu, 2023; Schulte et al., 2018; Walters et al., 2018), which this research contributes.

One characteristic that was understood in the observed Indonesian small food-producing businesses is that the work activities were conducted in the owners' houses. This is similar to suggestions that the workplace of small businesses is often located in an unusual place such as roadsides and homes (Alfers & Rogan, 2015; Wulandari & Umam, 2020). In the observed Indonesian small food-producing businesses, this research adds that this is due to considerations of cost and the simple and easy tasks, which made the owners decide that a designated place was not necessary. Another characteristic is the manual tasks with flexible task assignments. While this adds to previous description of manual tasks in Indonesian small food-producing businesses such as in A'yunin et al (2021) and Siswanto et al. (2021), this research also

identified that there is a flexible task assignment in which the workers can cooperate or do another task when required.

Various work-related issues in Indonesian small food-producing businesses explored in Study 1, generally confirms that there is a hazardous work environment in small businesses (Sørensen et al., 2007). The findings are also relevant with indications of several work-related issues in Indonesian small food-producing businesses such as poor work postures (Yuslistyari & Setianah, 2018), hot work environment (Ushada & Okayama, 2018), and fire hazards without availability of safety equipment (Dewi et al., 2020). Additionally, this research explored people's perspectives of low attention and importance given to work-related issues, and there is acceptance of the unsafe conditions. These add to the arguments that there is a lack of attention and priority given to work safety, and a tendency to accept and normalise hazards in small businesses (Champoux & Brun, 2003; Gardner et al., 1999).

Furthermore, one important issue observed in the Indonesian small food-producing businesses is the low implementation of safety management. It has been previously argued that in small businesses, there may be inactivity or low level of management of work safety (Champoux & Brun, 2003; Gardner et al., 1999). In the observed Indonesian small food-producing businesses in this research, it can be understood that several aspects of safety management are low or non-existent in the businesses. This is reflected by several findings from the research studies such as the unavailability of safety-related personnel, lack of communication of safety, unavailability of safety procedures and rules, and unavailability of safety equipment.

2. Exploration of perceptions of work safety and risk

Secondly, this research contributes by exploring and providing descriptions of perceptions of work safety and risk among the people of Indonesian small food-producing businesses. Although studies investigating perceptions of safety and risk are widely available, they mostly involved different work settings compared to Indonesian small food-producing businesses, such as among construction workers (e.g. Han et al., 2019; Ulubeyli et al., 2014) and mining workers (e.g. Griffin & Neal, 2000; Soejadi,

2017). To the best of the researcher's knowledge, no study previously explored perceptions of work safety and risk in Indonesian small food-producing businesses or similar work setting, which this research provides.

It has been argued that there is a tendency among people in the SMEs to believe that their work activities are not dangerous (Hasle et al., 2009; Olsen et al., 2010). In contrast, it was found in this research that the people of the observed Indonesian small food-producing businesses did perceive that their workplaces were not safe. However, it is worth noting that the arguments by Hasle et al. (2009) and Olsen et al. (2010) were based on different work settings compared to this research, such as construction and metal industries. This indicates that workers' perceptions of safety may be different across different work settings. Despite the perceptions that their workplaces were not safe, the workers reported a feeling of safety and acceptance to the unsafe work conditions in the observed Indonesian small food-producing businesses. This finding supports the suggestion by Gardner et al. (1999), that there is a tendency to accept and normalise hazards in the workplaces of small businesses.

Furthermore, the people of the observed Indonesian small food-producing businesses seemed to be aware of the hazards and risks in their workplaces, including the potential consequences. This finding contradicts arguments by Joseph & Arasu (2023) & Lansdown et al. (2007) that there is lack of awareness and ability to recognise risk among the workforce of small businesses and developing countries. Additionally, it can be understood that there were low risk perceptions among the people, in which they perceived the frequency and severity of unsafe events and injuries as low. This adds to the arguments by Micheli & Cagno (2010), that there may be lower risk perception among the people of SMEs, due to the possibility of low occurrence of injuries and accidents. Among the people of Indonesian small food-producing businesses as in this research, their familiarity and experiences of the work activities, feeling of safety, and acceptance may contribute to their low perceptions of risk.

It has been implied that most work environments, conditions, and standards of workplaces in developing countries need to be improved

(Chopra, 2009; Kortum et al., 2011). Similarly, there has been some suggestions for urgent improvements regarding work safety and ergonomics in some Indonesian small food-producing businesses (Maryani et al., 2016; Rahayuningsih, 2019; Yuslistyari & Setianah, 2018). There seemed to be a different case in the observed Indonesian small food-producing businesses. In Study 4 of this research, the people of the businesses emphasised that changes or improvements on work safety is the least concern and the least thing to do in the businesses. The people of owners, workers, and heads of associations frequently emphasised that although several issues were observed, they were not major problems to be concerned about. They put forward that their priorities of production and sales could still be achieved, despite the various work-related issues.

3. Exploration of factors influencing perceptions of safety and risk

The third contribution of this research is the exploration of factors influencing perceptions of work safety and risk in Indonesian small food-producing businesses. As previously discussed, there are many published studies on perceptions of safety and risk, and also a considerable number of studies investigating influencing factors on perceptions of work safety and risk. However, most of the studies are in different work settings compared to Indonesian small food-producing businesses, such as construction sectors (e.g. Chaswa et al., 2020; Pandit et al., 2019), mining industries (e.g. Griffin & Neal, 2000), and chemical industry (e.g. Zhao et al., 2021). In terms of the size and scale, these industries are arguably bigger than the observed Indonesian small food-producing businesses in this research, and may also have different characteristics in their work and safety.

There may be differences such as lower levels or inactivity of activities of work safety management in small businesses (Champoux & Brun, 2003; Gardner et al., 1999). In this research, this is reflected by the low implementation of safety management such as the absence of personnel responsible for work safety, unavailability of safety and emergency procedures, and low provision of safety equipment as observed in the

Indonesian small food-producing businesses involved in this research. These differences around characteristics of work safety between bigger and smaller businesses could explain potentially different influences on perceptions of work safety and risk. A study to explore factors influencing perceptions of safety and risk in Indonesian small food-producing businesses was absent from the literature, which is provided by this research.

It was found that, in the observed Indonesian small food-producing businesses, both safety management and safety knowledge have significant positive influences on perceptions of work safety and risk. Positive and significant influence of safety management on safety knowledge was also found. Although found in different work settings, this research adds to the existing arguments that perceptions of safety and risk can be influenced by factors such as safety management (Vu et al., 2022) and safety knowledge (Chaswa et al., 2020; Zhao et al., 2021). Findings of this research present factors influencing perceptions of work safety and risk, particularly in relation to typical work settings as in Indonesian small food-producing businesses which was previously unavailable. Additionally, although excluded in the final model due to inadequate discriminant validity, work characteristics may have effects around perceptions of work safety and risk. This may be considered in future potential research.

4. Development of a questionnaire

The fourth contribution to knowledge of this research is the development of a questionnaire instrument on perceptions of work safety and risk for Indonesian small food-producing businesses or similar work settings. Currently, several questionnaires to investigate perceptions of safety and risk in a workplace are available such as provided by Williamson et al. (1997), Hayes et al. (1998), and Cheyne & Cox (2000). However, these questionnaires were developed for work settings with different characteristics from Indonesian small food-producing businesses, such as offshore oil and gas organisations and manufacturing industries. An example of the difference is that the Indonesian small food-producing businesses involved in this research do not have formal and structured management or organisation. This

resulted in adapting the terms “management” to “owner” or “workplace” in the Study 3 questionnaires.

Furthermore, perceptions of safety and risk can be influenced by different factors (e.g. the work environment, tasks, organisational factors, and social factors), and differences in the existence of hazards and occurrences of accidents (Han et al., 2019; Harclerode et al., 2016; Leveson, 2004; Rasmussen, 1997). It has been argued in this thesis, that there are particular characteristics of the work and work-related issues in the observed Indonesian small food-producing businesses. These characteristics include informal organisations and relationships, less sophisticated work methods and equipment, and flexibility of task responsibilities. This research contributes by providing a questionnaire which has been developed considering the characteristics of Indonesian small food-producing businesses. The questionnaire is expected to be suitable to investigate perceptions of safety and risk in Indonesian small food-producing businesses and other similar work settings.

5. Demonstrating applicability and usefulness of a qualitative exploratory approach

Another contribution of this research is demonstrating the applicability and usefulness of a qualitative approach in understanding and investigating work, work-related issues, and perceptions of work safety and risk in Indonesian small food-producing businesses. Studies in the human factors and work safety discipline in Indonesian small food-producing businesses have mostly been conducted using observational and technical aspects, such as work posture analysis (e.g. Yuslistyari & Setianah, 2018), anthropometry analysis (e.g. Silviana et al., 2021), and risk assessment (e.g. Arifin & Wakhid, 2018; Irpan et al., 2019). While the methods used in previous studies were useful to identify and describe work hazards and risk, they did not accommodate the perspectives of relevant people. On the other hand, perspectives and inputs of relevant people such as workers are important in studying safety in a work setting (Joseph & Arasu, 2023; Schulte et al., 2018).

This research demonstrated that an exploratory approach using qualitative data collection techniques and analyses can be useful to understand some aspects surrounding work safety. This is particularly in the case in work settings similar to Indonesian small food-producing businesses, in which the application of such an approach is still limited. In Study 1, the usefulness of observations and semi-structured interviews to understand work and work-related issues was demonstrated. The observations and semi-structured interviews complemented each other to provide understanding and descriptions of the work and work-related issues in the observed workplaces, including the point of views of owners, workers, and heads of associations.

Some studies conducted in different work settings and environments compared to Indonesian small food-producing businesses explored in this research have shown that a phenomenological approach can reveal people's experiences around safety. For example, Mehri et al. (2019) pointed out that, taxi drivers in Iran are experiencing pressure from traffic chaos in their work, in addition to pressures of economic and social prestige. In their phenomenology study among nurses, Jeong & Kang (2021) explored the fundamental structure of nurses' safety such as personal protection systems and risk factors. To date however, to the best of the researcher's knowledge, an in-depth qualitative study related to safety and risk perceptions in Indonesian small food-producing businesses or other similar work setting was not previously available.

In Study 2 of this research, it was demonstrated that utilisation of in-depth scenario-based interviews is useful in exploring thoughts and opinions on work safety and risks in the context of Indonesian small food-producing businesses. In the preceding Study 1 which used semi-structured interviews, people's initial thoughts on the seemingly unsafe work conditions were explored. In the following Study 2, the application of a phenomenology approach added more depth to the results, by exploring the people's experiences and understanding of work safety and risks at their workplaces. It was explored that, while the people have the same thoughts that the work safety is relatively poorly implemented in their workplaces and that safety is important, there are doubts over the urgency and benefit of improving

practices of work safety in this context. Similarly, while people appreciated the work hazards and risks in their workplaces, they have feelings of safety and acceptance of the work conditions.

Focus groups have been widely applied in various studies related to work safety or other topics related to human factors and safety, such as in Xu et al. (2023) and Berland et al. (2008). However, it has not been widely applied in the type of work setting as in Indonesian small food-producing businesses, in which the benefit was demonstrated in Study 4 of this research. By conducting a focus group comprising representatives of different roles related to the industry, the challenges and recommendations relating to work safety in Indonesian small food-producing businesses were able to be explored. This method also enabled gathering of feedback on the findings of this research. It is recommended that a qualitative exploratory approach can be applied more in understanding or investigating human factors and work safety discipline in Indonesian small food-producing businesses.

8.4.2. Contributions on practical recommendations

The first practical recommendation that can be made from this research is to improve the knowledge of safety among the people of Indonesian small food-producing businesses. In any potential attempt to improve the knowledge of safety in the businesses, relevant stakeholders such as the government or academics, and the businesses themselves should work together. This has previously been suggested by Landstad et al. (2022), that small businesses need support from relevant people such as government in educating small businesses about health and safety. Rasmussen & Svedung (2000) also pointed out that relevant parties from many levels such as regulators, safety officers, and managers should motivate and educate workers so that their work safety can be improved. It can be recommended that a programme to improve knowledge of work safety such as training of simple or basic work safety can be developed, by considering the understandability and suitability for the businesses.

Secondly, a low-cost approach to improve work safety in Indonesian small food-producing businesses should be considered. Although further work

may be necessary to establish the suitable improvement of safety in the workplaces, any interventions related to work safety need to be low in cost as suggested by Hasle et al. (2012). Promoting practices of safety management can be considered to address the low level of safety management in the observed Indonesian small food-producing businesses. Ferjencik (2020) and Walker & Tait (2004) suggested that in supporting implementation of work safety in SMEs, a basic and simple safety management which suits the goals and knowledge of SMEs can be formulated. This may be considered for Indonesian small food-producing businesses, by promoting practices of safety management such as safety procedures, safety equipment, and safety rules, while considering the suitability and feasibility for the businesses.

In potential follow-up on the practical recommendations, it is important to consider taking a participatory approach and including socio-technical aspects. This is to ensure that the recommendations would be suitable and support the improvement of work safety in Indonesian small food-producing businesses. Itani (2011) has shown that a participatory approach and activity would be useful in improving work conditions and safety in small and informal workplaces. In potential attempts to develop a programme to improve safety knowledge or implement low-cost safety improvement in Indonesian small food-producing businesses, relevant stakeholders should involve and work together with the people of the businesses in a participatory approach to develop a suitable programme, to ensure that it would suit their needs.

In applying the recommended participatory approach, some steps may be taken with the people involved in the operation of the businesses (e.g. owners and workers), who should be the focus of the programme. Firstly, they need to be given the opportunity to communicate about what do they need and want, particularly related to improving their knowledge of work safety and the potential low-cost implementation of work safety as previously discussed. This may be done by a study involving trainings or workshops. The aim of this first step should be establishing a plan of actions to be taken where, if possible, sharing of best practices of safety in similar businesses may be discussed. Afterwards, practical stage should follow where the plan of actions is implemented. Participation of the people in this stage is essential, as well as

gathering their opinions about the implementation, rather than giving them instructions.

It is also important to consider the challenges of cost and habits. The improvements need to be ensured to be not costly, and slowly introduced within a considerable time frame. The next step may involve evaluation of the implementation where, again, the participation of the people of the businesses is important. They need to be given the opportunity to express their opinions on the implementation, and participate in evaluating the implementation, using a workshop or focus group. Additionally, these participatory steps should include a socio-technical approach where relevant actors need to be involved and actively participate in the programme. For example, relevant academics or experts may be involved to support with relevant knowledge, and relevant governmental bodies should be involved to support with regulatory aspects. This is to ensure that the improvements would be appropriate and sustainable.

8.5. Reflections on the methodology

Throughout the research, several methods of both qualitative and quantitative data collection and analyses were applied. The utilisation of several qualitative and quantitative methods was due to the four different objectives of the overall research, in which each needed to be addressed with different approaches. Generally, the methods applied in this research were useful in achieving the objectives. Reflections on the methodological approach are presented in the following sections.

8.5.1. Understanding work and work-related issues in

Indonesian small food-producing businesses (Study 1)

Direct observations were conducted in Study 1, to understand the work and identify work-related issues in the observed Indonesian small food-producing businesses. By conducting direct observations, the researcher was able to directly observe the work activities that were being performed in the workplaces. Pictures, videos, time recordings, and notes that were taken during the observations were useful to analyse the observation results. The descriptive analysis was useful to describe the work conditions and potential

work-related issues such as hot environment, unavailability of safety equipment, and poor work postures. Additionally, task analysis with operation sequence diagrams was also conducted, which was useful to describe the sequence and task assignment in the production processes.

Observations are a commonly used technique in the human factors discipline, and these are important to gain insights into work activities (Bisantz et al., 2015). However, observations have not been widely applied in studies involving Indonesian small food-producing businesses. Observations are briefly mentioned and explained as a background to conduct studies on topics such as equipment design (A'yunin et al., 2021), layout design (Dewi et al., 2020), and risk assessment (Rahayuningsih, 2019) in some Indonesian small food-producing businesses. However, a study which conducted observations to comprehensively describe the work activities and identify work-related issues in an Indonesian small food-producing business was not previously available. In Study 1 of this research, it was demonstrated that together with the interviews, observations are useful to describe work activities and identify work-related issues in Indonesian small food-producing businesses.

In addition to observations, semi-structured interviews with owners, workers, and the head of the association of Indonesian small food-producing businesses were also conducted in Study 1. Thematic analysis was used to analyse the interview results, which was useful in extracting important information from the interviews. The results of the interviews added to the observations results, by providing people's perspectives of the work and work-related issues. Several observation results were confirmed in the interviews, such as the various inappropriate work conditions and work-related issues, and unavailability of safety equipment and procedures which were pointed out by the interviewees. Additionally, the interviews revealed other useful information such as practices of standards and procedures based on familiarity rather than following a strict and formal guideline, and the level of knowledge of the people on ergonomics and work safety.

The interviews in Study 1 support suggestions that research in understanding work in developing countries and small businesses, particularly around work safety, should recognise the perspectives or point of views of the

people and workers (Joseph & Arasu, 2023; Walters et al., 2018). Although some previous studies on ergonomics and work safety in Indonesian small food-producing businesses mentioned the utilisation of interviews such as Rahayuningsih (2019) and Arifin & Wakhid (2018), the methods, analysis, and results of the interviews were not clearly described. The semi-structured interviews conducted in Study 1 demonstrated the usefulness of interviews to obtain information from relevant people on work and work-related issues in Indonesian small food-producing businesses.

Considerations should also be given to the number of questions in the interviews. Study 1 combined 22 questions and, while this was necessary at the time of the study to obtain various information needed in the study, briefer interview questions while maintaining the objective may be considered in future research. The participants of this study also had relatively low level of formal education, and had difficulty in understanding some terms such as 'ergonomics' and 'organisation structure'. In potential future research involving similar participant characteristics, it may be important to consider participants' understanding of the interview questions, by providing brief explanations of terms when necessary or using alternative terms or questions.

8.5.2. Exploring thoughts and opinions on work safety and risk (Study 2)

Previously in the literature review and research methodology chapters, it was noted that depending on the aim of the study, several approaches of methodology can be taken to studying perceptions of safety and risk in a work setting. Research which is focused on investigating people's perceptions of safety and risk in a work setting typically used questionnaire surveys (e.g. Han et al., 2019; Ulubeyli et al., 2014) or interviews (e.g. Andersen et al., 2015; Luria & Yagil, 2010). Furthermore, in investigating factors influencing perceptions of safety and risk, researchers typically conducted a questionnaire survey which was then followed by a method to analyse the relationships such as SEM (e.g. Wang et al., 2016), system dynamics (e.g. Zhao et al., 2021), or linear regression (e.g. Xia et al., 2017). In this research, the two approaches were applied to explore people's thoughts and opinions on safety and risk

(Study 2) and to investigate factors influencing perceptions of safety and risk (Study 3).

In Study 2, a qualitative study of in-depth scenario-based interviews and a phenomenology approach was useful to obtain people's thoughts and opinions on work safety and risk in depth. The interviews were then analysed with a combination of thematic analysis and phenomenology analysis, which were useful to understand meanings and experiences of safety and risk in Indonesian small food-producing businesses. Investigation of perceptions or thoughts and opinions among the people of Indonesian small food-producing businesses was limited. Thus, the in-depth scenario-based interviews and phenomenology approach in Study 2 was necessary to provide understanding of perceptions of safety and risk in Indonesian small food-producing businesses. Additionally, the Study 2 interviews involved a scenario describing work conditions and work-related issues based on the Study 1 results, with short tasks for the interviewees to choose pictures showing good work safety conditions and showing the needs for improvements. The scenario and tasks were useful for stimulating people's thoughts and opinions on safety and risk as intended. By presenting these at the start of the interviews, there were initial responses from the interviewees about the safety conditions of the workplaces, such as opinions that the work conditions are unsafe. These were further explored in the subsequent interview questions.

Regarding the participants of Study 2, the interviews involved the same interviewees from the preceding Study 1. This was intended to have a deeper investigation regarding their thoughts and perceptions of safety and risk in Indonesian small food-producing businesses, as suggested by Morse et al. (2002) that an involvement of the same participants in a follow-up interview would add depth in the analysis. This was useful in Study 2 to have a deeper exploration of the participants' experience and opinions on safety and risk in their workplaces, following-up their initial responses in the preceding Study 1 interviews. Furthermore, the Study 2 interviews were conducted through phone calls due to Covid-19 restrictions at the time of study. Generally, the phone call interviews went well and were able to support the study objective to explore thoughts and opinions on safety and risk in Indonesian small food-

producing businesses. The interviewees were able to adequately respond to the interview questions and gave a variety of relevant information. However, challenges such as connection issues and clarity of the instructions or questions during the interviews should be anticipated in future research.

8.5.3. Investigating factors influencing perceptions of work safety and risk (Study 3)

Study 2 was followed by a quantitative Study 3 with questionnaires, to investigate factors influencing perceptions of work safety and risk. The questionnaire used in Study 3 was developed based on the results of Study 1 and Study 2, as well as the literature review, adopting the approach demonstrated by Wang et al. (2016) and Man et al. (2019) in combining interviews and literature reviews to develop a questionnaire. This approach was useful in developing the questionnaire regarding perceptions of work safety and risk specific for Indonesian small food-producing businesses which was previously not available. The Principal Component Analysis (PCA) performed on the Study 3 first stage dataset was useful in establishing the structure of the included factors and items. In the second stage of Study 3, the Structural Equation Modeling (SEM) analysis was useful to show the influences between the factors.

In the Study 3 results, there was an issue of insufficient discriminant validity in the initial hypothetical model. The most common cause for insufficient discriminant validity is that an indicator is related to more than one factor (cross-loadings), in which Exploratory Factor Analysis (EFA) is suggested as the first step to resolve it (Farrell, 2010; Rönkkö & Cho, 2022). If discriminant validity issues persist after EFA, if possible, the indicator can be combined into the other factor. If this still does not resolve the discriminant validity issue, additional data may be collected to see if the issue is related to the sample size. In this research, all alternatives were considered in resolving the discriminant validity issue. Further EFA with the PCA technique was carried out, resulting in removal of some items of indicators due to cross-loadings, which consequently led to removal of the factor of work characteristics. Regrouping of indicators was also considered, but this was

unsuitable due to the different facets of indicators in Study 3 which cannot be combined. Collection of additional data was considered difficult due to the timeline of the overall PhD programme. Therefore, the model was modified without the factor of work characteristics.

The exclusion of the factor of work characteristics from the final model was rather disappointing. This is because its inclusion would have added more explanations on the findings of the research, as perceptions of safety and risk may be related to the characteristics of the work (Leveson, 2011; Wang et al., 2016). In the Study 4 of this research, the potential relationships of work characteristics with the other factors in the observed Indonesian small food-producing businesses were confirmed in the focus group discussion. There were discussions about the potential influence of work characteristics on the people's perceptions of safety and risk, as well as the potential influences of safety management and safety knowledge on work characteristics. However, as work characteristics was not included in the final model, the potential relationships with other factors were not able to be fully explained by the model.

Another reflection regarding the methods of Study 3 is relating to the use of negatively worded questions in the questionnaire. These negatively worded questions were adopted from other studies, such as 'I can't avoid taking risks in my job' and 'I can't do anything to improve safety in workplace', which were directly adopted from Williamson et al. (1997). There are suggestions to reverse the scoring of the negatively worded questions, to ensure the correct representation of the direction of the questions (Sharples & Cobb, 2015). However, this was not done in the Study 3 of this research, as some issues arose in the statistical analysis when the scores of the negatively worded questions were reversed. An example is the negative Cronbach's alpha value to indicate the reliability of the factor, which led to uncertainties whether the next steps of the analysis would be affected by the issues.

Due to the issues and uncertainties when reversing the scores of the negatively worded questions, therefore, the scoring of the negatively worded questions in this research was not reversed. Sharples & Cobb (2015) also implied that, if there is a doubt about the statistical analysis regarding the

direction of the questions, the original scoring may be retained. The use of negatively worded questions in a survey about perceptions of safety and risk without reversing the scores have also been shown in some studies, such as Vinodkumar & Bhasi (2009) and Korkmaz & Park (2018). However, as forewarned by McCorry et al. (2013) and Roszkowski & Soven (2010), this case requires careful interpretation of the results, such as when describing the mean of the factor of risk perception which contained some negatively worded questions. In this research, this was anticipated by interpreting the scores of the negatively worded items relative to their respective scores, rather than describing them as low or high.

There was another consideration whether the use of negatively worded questions in Study 3 might have posed potential issues in the subsequent analysis of PCA and SEM. As pointed out by Roszkowski & Soven (2010), the presence of negatively worded items may create potential issues related to reliability and factor structure. Relatedly, Brown (2006) explained that in a factor analysis such as the PCA and SEM as in this research, although reversing the scores of negatively worded items may result in different correlation coefficients, it has less influence on the structure of factors. Therefore, the use of PCA in Study 3 was still expected to be able to achieve the aim to establish the structure of the factors and items. The PCA might actually have reduced the potential issues, as most of the negatively worded questions were removed during the PCA process. There was only one negatively worded question left from the PCA and included the subsequent SEM analysis, which should have minimised the potential effect of the negatively worded questions.

Overall, due to the presence of negatively worded items, the results of the Study 3 questionnaire survey and the subsequent analysis of PCA and SEM need to be carefully interpreted. A reflection may be considered regarding the process when developing the Study 3 questionnaire. The use of questionnaire items in the same direction (e.g. all questions in positive directions) should have been considered when developing the questionnaire, rather than directly adopted and mixed the positively and negatively worded questions. This is also implied by Lietz (2010), that a negatively worded

question should be rephrased into a positive wording when constructing a questionnaire. The use and scoring of the negatively worded questions may be reviewed in future research, to minimise the potential effects on the analysis.

Furthermore, the questionnaire surveys in Study 3 were conducted online. While this offered flexibility of access, there was a challenge to obtain the desired number of participants for the study sample. This was addressed by periodic monitoring of the number of responses, and requested support from the contacts of people of the Indonesian small food-producing businesses to recruit more participants. Another consideration regarding the online questionnaire surveys is the potential effect of unequal probability of participants selection, where it may only reach literate people who have internet access to complete the questionnaire (Eysenbach & Wyatt, 2002; Haddad et al., 2022). To minimise this potential effect, the researcher did not have a specific intention to only recruit participants who have online or internet access. During the participant recruitment, the focus was to achieve the intended number of participants, without restricting the recruitment for people who have internet access. Based on the participants' profile of the online questionnaire surveys, it can be understood that their profile such as age, education level, and work experience were diverse. This indicates that the participants were not restricted to any particular criteria such as internet accessibility.

8.5.4. Feedback on the research findings and recommendations for work safety (Study 4)

Study 4 was the final study of the research using a focus group discussion, with the main objective to obtain feedback on the findings of the research from people relevant to Indonesian small food-producing businesses. Additionally, the focus group was also intended to discuss challenges and recommendations relating to work safety in Indonesian small food-producing businesses. Overall, the focus group in Study 4 was useful for gathering feedback on the research findings and exploring challenges and recommendations on safety, by presenting and discussing the research

findings in Indonesian small food-producing businesses. Interactions between the participants occurred in the focus group which enriched the information gathered. The tasks to identify challenges and recommendations were interactive and useful to gather the participants' opinions. The qualitative analysis including describing and summarising the focus group was also useful to present the results.

Workers are often overlooked in thinking about safety while their inputs are important for work safety programmes, and can be involved in discussions on safety and risk in their workplaces (Joseph & Arasu, 2023; Schulte et al., 2018). It has also been pointed out that involvement of people relevant to small businesses is necessary for implementation of OSH, as resources on OSH are limited in small businesses (Itani, 2011; Vinberg et al., 2016). The Study 4 focus group involved multi-stakeholder participants from internal (e.g. owners and workers) and external (e.g. government person) people relevant to the observed Indonesian small food-producing businesses. This provided different perspectives from various roles which may have different opinions. An example is while the owners thought that safety management is not necessary for their workplaces, the university academic staff implied that it is still important, although may be implemented in a simpler and low-cost approach. Overall, the multi-stakeholder approach involving various roles in this research was useful to increase the scope and adequacy of the analysis and findings of the respective studies, as suggested by Morse et al. (2002). This type of study involving a group of people relevant to Indonesian small food-producing businesses to discuss about work safety in their workplaces has not been done before. It was demonstrated in Study 4 that the focus group method is useful in discussing safety in small business such as the Indonesian small food-producing businesses.

Another consideration is the inclusion of workers and owners in the same focus group discussion, in which it may have a silencing or restraining effect due to the different status of roles in the businesses (e.g. lower status (worker) and higher status (owner)) (Bloor et al., 2001; Krueger & Casey, 2000). This was not observed in this research, where the workers seemed to be actively participated and honest in their responses, and seemed not

affected by their lower roles. There were some instances where the workers put forward a critical discussion, such as their doubts over the benefit of safety training, which the owners supported that safety training may indeed not be beneficial for the businesses. Conversely, there were statements from the owners such as that safety equipment is not necessary, on which the workers agreed and added the reason of troublesome effect on their task. Therefore, it may be argued that the inclusion of workers, owners, and other roles in the same focus group did not restrain any participant in giving their opinions. This has been implied previously by Hoyland et al. (2014) & Kaczorowski et al. (2020), that involving higher management in a focus group may give benefit of obtaining different perspectives or perceptions in the discussed topic.

The Study 4 focus group was conducted online, which was considered useful in offering flexibility of access and participation from the participants. Although a few connection issues were experienced, the researcher dealt with the issue by repeating the affected parts of the discussion. In practice, there were a few times where the focus group participants were silent, particularly when discussing findings regarding the relationships model in Study 3. This may be due to the participants' limited understanding on the topic together with the amount of detail in the presentation. This was dealt with by repeating the presentation at a slower pace, and allowing time for the participants to indicate their understanding.

8.6. Limitations of the research

In general, at the time the research was conducted, the chosen methods and analyses were suitable and supported the achievement of the research aim and objectives. The methods and analyses taken were able to obtain the expected results and findings as have been presented in this thesis. However, it is considered that there are several limitations on the overall PhD research, which will be presented in the following.

1. Coverage of the research objects

As presented throughout this thesis, this research covered three types of products of Indonesian small food-producing businesses of *tempe* chips,

raw *tempe*, and corn flakes. It is expected that the findings of this research can be generalised among these three types of businesses, and also in other similar types of businesses. However, some cautions may be considered when generalising the findings of this research. It has been suggested that Indonesian small food-producing businesses have common characteristics such as manual tasks, informal work environment and organisation, and utilisation of owners' house as the workplaces. It is worth noting that there are other Indonesian small food-producing businesses which produce other types of products, different to the ones involved in this research.

Additionally, there are many similar types of Indonesian small food-producing businesses but different in size than those observed in this research, either smaller (micro) or bigger (medium or big). In practice, without initial observations in the corresponding businesses, the difference in size is sometimes not clear which should be taken into account. The difference in types of products and size may also lead to differences such as in the equipment and materials. Consequently, there may be different practices and perceptions of work safety and risks such as different work hazards and risk in the workplaces. These potential differences should be considered when generalising the results of this research.

2. Interview questions and content

The interview questions and content, particularly in qualitative Study 1, Study 2, and Study 4, were designed to achieve the study objectives and consider the participants' characteristics. Whilst these were considered suitable at the time that the studies took place, some limitations may be considered. The first limitation regarding the qualitative data collection is the length of the interview materials. In the Study 1 interviews, there were 22 questions which was considered necessary at the stage of the research to obtain several information from the participants. However, this posed a challenge related to the focus of the interviews. This potential effect was minimised by only asking relevant questions for particular participants.

In the Study 2 scenario, the narrative text was useful to start the interview and gave the participants an overview of the interview, but posed a

challenge of participants' disengagement with the interview due to the length of the text. This was anticipated by the two short tasks in the scenario, which helped to ensure engagement from the interviewees. In the Study 4 focus group presentation, although it was necessary to have feedback on the research findings, the content in some parts of the study findings were considered too long. This was anticipated by the researcher by breaking the content into separate parts for discussion with the participants to maintain engagement.

Furthermore, in all qualitative interviews in this research, there were some terms which may have been difficult to be understood by the interviewees such as 'ergonomics', 'organisation structure', and 'influences of factors'. Overall, a briefer interview with fewer questions and content while maintaining the objectives of the study may be considered in potential future research. Additionally, in the Study 4 focus group, the researcher also acted as moderator to oversee and guide the flow of the focus group. While the focus group generally went well and was able to achieve the expected results, an independent moderator may be considered in potential future research. The presence of moderator may be useful, so that the researcher can focus more on gathering and exploring more information.

3. Remote data collection

As presented throughout the thesis, the data collection of Study 2 (phone call interviews), Study 3 (online questionnaire surveys), and Study 4 (online focus group meeting) were carried out remotely. Generally, all remote data collections were able to collect the expected data, but there were some challenges. In the phone call interviews and online focus group, a few connection issues were experienced. Additionally, as the interviews and focus group were conducted remotely, the researcher was not able to observe the participants' reactions during the interviews such as gestures and facial expressions. These may be relevant to be observed during interviews with humans, as it can add to the meaning of participants' responses. Face-to-face interviews and focus groups may be considered for future research, to be able to directly understand the participants' responses, and to minimise

communication issues. Furthermore, although the Study 3 online questionnaire surveys eventually were able to obtain the expected sample size, there were periods when the response rates were slow. This was anticipated with periodical contact with some people of the businesses, to help achieve the expected number of responses. Additionally, the researcher was not able to accompany the participants of the questionnaire surveys for any possible enquiry, such as clarifications on the questionnaire items that may be raised by the participants.

4. Trustworthiness of the qualitative data and analysis

As explained, there were attempts to ensure validity and reliability of the qualitative data and analysis of this research, collectively referred to as trustworthiness. Several criteria to achieve trustworthiness were taken, however, limitations regarding verification and validation of the qualitative data and analysis with the participants may be considered. In this research, the summary of the research findings was presented to the participants in the Study 4 focus group. Although that was not intended to specifically validate the findings and analysis of the research, particularly the qualitative approaches, several agreements on the research findings reflect trustworthiness of the qualitative data and analysis. In future potential research involving qualitative data analysis, the participants may be involved in particular verification or validation of the data, analysis processes, and the results produced from the analysis.

5. Insufficient discriminant validity

As previously explained in Chapter 6 and the methodology reflections section, there was an issue of insufficient discriminant validity in the Study 3 model. The insufficient discriminant validity was addressed with necessary steps as explained previously, with some limitations that may be considered. Although the sample size of Study 3 fulfilled the requirement for PCA and SEM, considerations on sample size for potential future studies related to Study 3 may be necessary. It can be argued that a larger sample size in

following up Study 3 may yield different results, particularly related to the cross-loadings of questionnaire items and discriminant validity of the model.

Furthermore, the structure of the factors and corresponding items may be examined, as it could be related to cross-loadings between the items which may contribute to the insufficient discriminant validity of the Study 3 model. A particular attention may be given to the removal of the factor of work characteristics, on which it had a lower number of items compared to the other factors with only three items. This indicates a possibility of an issue due to the lower number of indicators, as a low number of items in a factor could contribute to an unstable model. Initially, before the model was modified, there were seven items in the factor of work characteristics. In future study, these items related to the factors of work characteristics may be reviewed and revised, as an attempt to include more items for the factor of work characteristics which may improve the discriminant validity of the model.

6. Wordings of the questionnaire items

As previously discussed in the methodology reflections section, particularly relating to Study 3, the findings of this research should be carefully interpreted due to the presence of negatively worded questions. The results relating to the negatively worded questions have been carefully interpreted, and the resulting structure of factors was still expected to be correctly analysed as negatively worded questions have less effect on the structure of factors, as discussed previously. However, the development of the questionnaire relating to the use of negatively worded questions may be reviewed. As mentioned in the methodology reflections section, the use of questionnaire items in the same direction should have been considered, rather than directly adopting questionnaire items from other studies. Additionally, there were attempts to ensure the understandability of Study 3 questionnaire items for the participants, by questionnaire review from the research supervisor, an expert, and a head of association of the businesses. However, the issue of cross-loadings may be related to the wordings of the questionnaire. Overall, review of the wordings of the questionnaire items may be necessary in future research.

8.7. Recommendations for future research

A number of recommendations for future research based on this research can be provided as follows.

1. *Relationships model development.* Future research investigating factors influencing perceptions of work safety and risk with a different model may be conducted. In this research, the factor of work characteristics was initially included in the model, but excluded in the final model due to insufficient discriminant validity. The factor of work characteristics may be included in future research, considering necessary refinements on the questionnaire items and structure of the factors. As in the aim, this research focused on exploring and investigating the influences toward perceptions of work safety and risk. Some literature suggest that perceptions of safety and risk may influence other factors such as safety motivation, safety attitude, and safety behaviour. A study on influences of perceptions of safety and risk toward other factors would be interesting, and would provide more explanations on conditions of work safety in Indonesian small food-producing businesses.
2. *Refinements of the questionnaire and structure of factors.* A questionnaire specific to the Indonesian small food-producing businesses to investigate the people's perceptions of work safety and risk was developed in this study. However, there was an issue of discriminant validity which may relate to the structure of factors in the questionnaire. A future study with a specific objective to refine and redevelop the questionnaire would be useful to establish an instrument to investigate perceptions of work safety and risk in Indonesian small food-producing businesses or similar work settings. In refining and redeveloping the questionnaire as discussed previously in the methodology reflections and research limitations sections, the structure of indicators and factors, as well as the wordings of questionnaire items can be examined and re-developed.
3. *Research on socio-technical aspects.* This research has attempted to understand work safety and risk mainly through the lens of the internal

actors of Indonesian small food-producing businesses, which are the owners, workers, and associations. Although a government person and an expert of university academic staff were involved, the focus of their involvement was to bring them into the scope of the businesses to have their opinions on the work safety. There were insights such as a potential programme to improve work safety in Indonesian small food-producing businesses. In potential future research, a study focusing on socio-technical aspects relating to work safety in Indonesian small food-producing businesses may be conducted, to provide a clearer picture related to socio-technical aspects of work safety for Indonesian small food-producing businesses.

4. *A participatory approach study.* As previously discussed, there is a need to further identify the needs and establish practical improvements or implementations of work safety in the observed Indonesian small food-producing businesses. In a future attempt to achieve this, a participatory study may be conducted where several levels of actors relevant to work safety in Indonesian small food-producing businesses should be involved and work together on work safety in the businesses. This includes actors from government, consultants, researchers or academics, to parties who are directly involved in the operation of the businesses such as the workers, associations, and owners. A series of participatory studies relating to work safety in the businesses may be conducted as discussed in recommendations section, from establishing a plan of actions, implementing the plan, to evaluating the implementation. During the series of studies, it is essential to maintain a participatory approach, where the people who directly involved in the operations of the businesses should be the focus of the programme.
5. *Larger sample size.* As presented in the research limitations section, there was a consideration regarding the sample size of this research, particularly in Study 3. The sample size of this research may contribute to the insufficient discriminant validity of the Study 3 model. A potential attempt in the future to refine the questionnaire or relationships model, can be conducted by a survey involving a higher number of participants.

It is possible that a larger sample size would obtain additional explanations on the measurement of perceptions of work safety and risk in Indonesian small food-producing businesses or similar work setting, as well as on the relationships between influencing factors.

6. *Involvement of other similar work settings.* It may be interesting to conduct similar future research involving other similar work settings compared to the Indonesian small food-producing businesses as in this research. Research investigating perceptions of work safety and risk in Indonesian small food-producing businesses or similar work settings is still limited. As mentioned in the research limitations, although the findings of this research can be generalised with caution, there are some considerations. These are related to potentially different characteristics in businesses with different types and size compared to this research. Similar research involving similar work settings would be interesting to compare the results and findings.

8.8. Concluding statements

The research presented in this thesis has addressed a number of gaps in research and knowledge, contributing to knowledge particularly relating to perceptions of work safety in Indonesian small food-producing businesses. Generally, whilst there are perceptions among the people of Indonesian small food-producing businesses that their workplaces and work activities are unsafe, there is an acceptance and feeling of safety on their current work conditions. It can be understood that the characteristics of easy tasks, familiarity in the work activities, and informal organisation and relationships may contribute to the people's perceptions of work safety and risk. Additionally, the production, sales, and cost are of higher priority than work safety, which may also contribute to people's perceptions of work safety and risk.

Findings of this research show the positive and significant influences of both safety management and safety knowledge on perceptions of safety and risk. Additionally, a positive and significant influence of safety management on safety knowledge was also explored. Moreover, findings of this research

suggest that the people of the businesses' habits towards the work activities and cost are the two main challenges to improve or implement work safety. It can also be understood that any attempt to improve work safety in the Indonesian small food-producing businesses should start with leveraging the people's knowledge of safety. Additionally, the people of the businesses implied that changing or improving work safety is the least concern. A future study with a participatory approach including socio-technical aspects may be considered, to further identify the needs and establish practices to improve work safety in Indonesian small food-producing businesses.

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Appendices

Appendix 3.1. Ethics approvals of the studies of the PhD research

1. Ethics approval of Study 1

2018-19 academic year only

Ethics Committee Reviewer Decision

This form must be completed by each reviewer. Each application will be reviewed by two members of the ethics committee. Reviews may be completed electronically and sent to the Faculty ethics administrator (Donna Astill-Shipman) from a University of Nottingham email address, or may be completed in paper form and delivered to the APM Hub

Applicant full nameRizky Salalahi.....

Reviewed by:

NameDE13.....

Signature (paper based only)

Date17/10/2019.....

- Approval awarded - no changes required
- Approval awarded - subject to required changes (see comments below)
- Approval pending - further information & resubmission required (see comments)
- Approval declined – reasons given below

Comments:

Looks good.

One thing to change is the consent form. It is good practice to give each statement its own 'initial box' so that the participants can consent to parts of the form and not others. It also helps to make you more happy that they have read each statement, rather than just signing the bottom.

Please note:

1. The approval only covers the participants and trials specified on the form and further approval must be requested for any repetition or extension to the investigation.
2. The approval covers the ethical requirements for the techniques and procedures described in the protocol but does not replace a safety or risk assessment.
3. Approval is not intended to convey any judgement on the quality of the research, experimental design or techniques.
4. Normally, all queries raised by reviewers should be addressed. In the case of conflicting or incomplete views, the ethics committee chair will review the comments and relay these to the applicant via email. All email correspondence related to the application must be copied to the Faculty research ethics administrator.

Any problems which arise during the course of the investigation must be reported to the Faculty Research Ethics Committee

2. Ethics approval of Study 2

Ethics Committee Reviewer Decision

This form must be completed by each reviewer. Each application will be reviewed by two members of the ethics committee. Reviews may be completed electronically and sent to the Faculty ethics administrator from a University of Nottingham email address, or may be completed in paper form and delivered to the Faculty of Engineering Research Office.

Applicant full name Rizky Salalahi

Reviewed by:

Name S11

Signature (paper based only)

Date 12/01/2021

- Approval awarded - no changes required
- Approval awarded - subject to required changes (see comments below)
- Approval pending - further information & resubmission required (see comments)
- Approval declined – reasons given below

Comments:

Please note:

1. The approval only covers the participants and trials specified on the form and further approval must be requested for any repetition or extension to the investigation.
2. The approval covers the ethical requirements for the techniques and procedures described in the protocol but does not replace a safety or risk assessment.
3. Approval is not intended to convey any judgement on the quality of the research, experimental design or techniques.
4. Normally, all queries raised by reviewers should be addressed. In the case of conflicting or incomplete views, the ethics committee chair will review the comments and relay these to the applicant via email. All email correspondence related to the application must be copied to the Faculty research ethics administrator.

Any problems which arise during the course of the investigation must be reported to the Faculty Research Ethics Committee

Ethics Committee Reviewer Decision

This form must be completed by each reviewer. Each application will be reviewed by two members of the ethics committee. Reviews may be completed electronically and sent to the Faculty ethics administrator from a University of Nottingham email address, or may be completed in paper form and delivered to the Faculty of Engineering Research Office.

Applicant full name Rizky Salalahi - Resubmission

Reviewed by:

Name G20

Signature (paper based only)

Date 15/01/2021

- Approval awarded - no changes required
- Approval awarded - subject to required changes (see comments below)
- Approval pending - further information & resubmission required (see comments)
- Approval declined – reasons given below

Comments:

Please note:

1. The approval only covers the participants and trials specified on the form and further approval must be requested for any repetition or extension to the investigation.
2. The approval covers the ethical requirements for the techniques and procedures described in the protocol but does not replace a safety or risk assessment.
3. Approval is not intended to convey any judgement on the quality of the research, experimental design or techniques.
4. Normally, all queries raised by reviewers should be addressed. In the case of conflicting or incomplete views, the ethics committee chair will review the comments and relay these to the applicant via email. All email correspondence related to the application must be copied to the Faculty research ethics administrator.

Any problems which arise during the course of the investigation must be reported to the Faculty Research Ethics Committee

3. Ethics approval of Study 3

Ethics Committee Reviewer Decision

This form must be completed by each reviewer. Each application will be reviewed by two members of the ethics committee. Reviews may be completed electronically and sent to the Faculty ethics administrator from a University of Nottingham email address, or may be completed in paper form and delivered to the Faculty of Engineering Research Office.

Applicant full name Rizky Silalahi

Reviewed by:

Name C08

Signature (paper based only)

Date 08/02/22

- Approval awarded - no changes required
- Approval awarded - subject to required changes (see comments below)
- Approval pending - further information & resubmission required (see comments)
- Approval declined – reasons given below

Comments:

My only suggestion for improvement is to be a little clearer in the participant information that the responses to the survey will not be shared with employers and will only be used (anonymously) for the purposes of the research. This will give participants confidence to answer honestly

Please note:

1. The approval only covers the participants and trials specified on the form and further approval must be requested for any repetition or extension to the investigation.
2. The approval covers the ethical requirements for the techniques and procedures described in the protocol but does not replace a safety or risk assessment.
3. Approval is not intended to convey any judgement on the quality of the research, experimental design or techniques.
4. Normally, all queries raised by reviewers should be addressed. In the case of conflicting or incomplete views, the ethics committee chair will review the comments and relay these to the applicant via email. All email correspondence related to the application must be copied to the Faculty research ethics administrator.

Any problems which arise during the course of the investigation must be reported to the Faculty Research Ethics Committee

Ethics Committee Reviewer Decision

This form must be completed by each reviewer. Each application will be reviewed by two members of the ethics committee. Reviews may be completed electronically and sent to the Faculty ethics administrator from a University of Nottingham email address, or may be completed in paper form and delivered to the Faculty of Engineering Research Office.

Applicant full name Rizky Silalahi

Reviewed by:

Name G20

Signature (paper based only)

Date 11/02/2022

- Approval awarded - no changes required
- Approval awarded - subject to required changes (see comments below)
- Approval pending - further information & resubmission required (see comments)
- Approval declined – reasons given below

Comments:

Please note:

1. The approval only covers the participants and trials specified on the form and further approval must be requested for any repetition or extension to the investigation.
2. The approval covers the ethical requirements for the techniques and procedures described in the protocol but does not replace a safety or risk assessment.
3. Approval is not intended to convey any judgement on the quality of the research, experimental design or techniques.
4. Normally, all queries raised by reviewers should be addressed. In the case of conflicting or incomplete views, the ethics committee chair will review the comments and relay these to the applicant via email. All email correspondence related to the application must be copied to the Faculty research ethics administrator.

Any problems which arise during the course of the investigation must be reported to the Faculty Research Ethics Committee

4. Ethics approval of Study 4

Ethics Committee Reviewer Decision

This form must be completed by each reviewer. Each application will be reviewed by two members of the ethics committee. Reviews may be completed electronically and sent to the Faculty ethics administrator (Donna Astill-Shipman) from a University of Nottingham email address, or may be completed in paper form and delivered to the APM Hub

Applicant full name ...Rizky Silalahi.....

Reviewed by:

Name M08

Signature (paper based only)

Date ...02/12/22

- Approval awarded - no changes required
- Approval awarded - subject to required changes (see comments below)
- Approval pending - further information & resubmission required (see comments)
- Approval declined – reasons given below

Comments:

Please note:

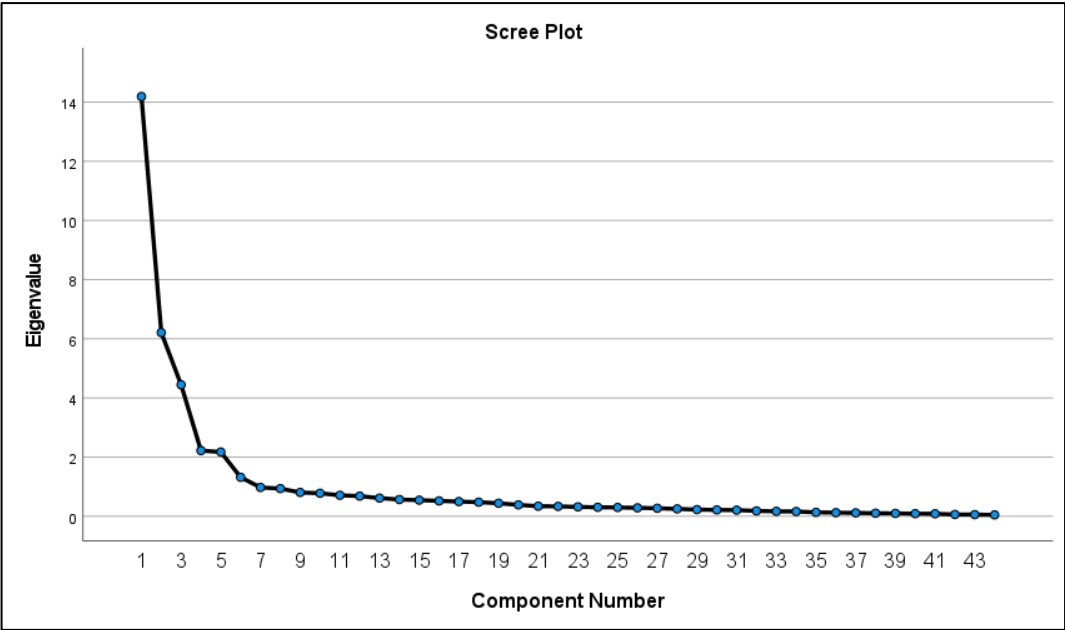
1. The approval only covers the participants and trials specified on the form and further approval must be requested for any repetition or extension to the investigation.
2. The approval covers the ethical requirements for the techniques and procedures described in the protocol but does not replace a safety or risk assessment.
3. Approval is not intended to convey any judgement on the quality of the research, experimental design or techniques.
4. Normally, all queries raised by reviewers should be addressed. In the case of conflicting or incomplete views, the ethics committee chair will review the comments and relay these to the applicant via email. All email correspondence related to the application must be copied to the Faculty research ethics administrator.

Any problems which arise during the course of the investigation must be reported to the Faculty Research Ethics Committee

Appendix 6.1. SPSS output of the first-run PCA

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	14.191	32.251	32.251	14.191	32.251	32.251	7.956	18.082	18.082
2	6.211	14.115	46.366	6.211	14.115	46.366	6.548	14.882	32.963
3	4.446	10.105	56.472	4.446	10.105	56.472	6.226	14.151	47.114
4	2.222	5.050	61.521	2.222	5.050	61.521	4.250	9.659	56.774
5	2.173	4.939	66.460	2.173	4.939	66.460	4.005	9.102	65.876
6	1.319	2.998	69.458	1.319	2.998	69.458	1.576	3.582	69.458
7	.976	2.217	71.675						
8	.937	2.130	73.805						
9	.806	1.833	75.638						
10	.779	1.771	77.409						
11	.711	1.616	79.024						
12	.683	1.552	80.577						
13	.615	1.399	81.975						
14	.567	1.288	83.264						
15	.546	1.242	84.506						
16	.521	1.185	85.690						
17	.497	1.131	86.821						
18	.478	1.087	87.908						
19	.441	1.003	88.911						
20	.387	.879	89.789						
21	.342	.777	90.566						
22	.335	.762	91.329						
23	.318	.723	92.051						
24	.305	.693	92.745						
25	.299	.680	93.425						
26	.286	.651	94.076						
27	.272	.618	94.693						
28	.251	.570	95.264						
29	.227	.515	95.779						
30	.216	.492	96.271						
31	.209	.475	96.745						
32	.183	.416	97.161						
33	.168	.381	97.542						
34	.162	.369	97.911						
35	.134	.305	98.217						
36	.123	.280	98.496						
37	.117	.265	98.761						
38	.105	.238	98.999						
39	.098	.223	99.221						
40	.090	.204	99.426						
41	.086	.196	99.621						
42	.061	.139	99.760						
43	.057	.130	99.891						
44	.048	.109	100.000						

Extraction Method: Principal Component Analysis.



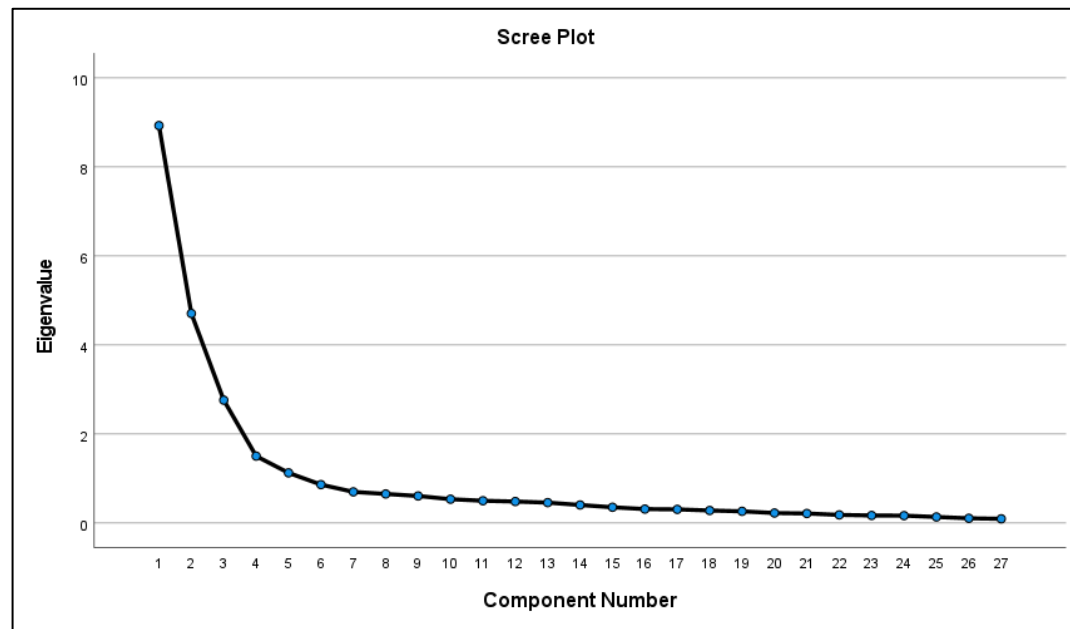
Component Matrix^a

	Component					
	1	2	3	4	5	6
SM8	.700					
RP5	.691					
SM10	.686					
SM4	.683					
SP2	.680					
SK3	.663					
SM6	.647					
SM1	.644	-.445				
WC4	.642		-.466			
SP5	.639					
SM11	.630	-.522				
SP4	.622		-.420			
RP3	.619	.545				
RP9	.612	.462				
WC3	.612			.435		
SM3	.610	-.512				
SP3	.607				.463	
WC1	.605	-.409				
SP6	.602			.404		
SM5	.589	-.490				
SM2	.587					
WC2	.586					
SP7	.553					
SP8	.548			.403		
SM7	.541	-.474				
WC5	.533	-.434				
RP6	.532					

WC6	.530	.510				
RP7		.649				
WC7	.543	.588				
SM9	.495	.578				
RP4	.446	.537			.417	
SM12	.441	.527				
RP2	.490	.494				
SP1	.482	.486				
SK8	.439	-.483				.406
SK4	.472		.639			
SK2	.517		.551			
SK6	.470		.544			
SK1	.427		.538			
RP8	.519		.535			
SK7	.487		.531			
RP1	.479		.486			
SK5	.417					.456
Extraction Method: Principal Component Analysis.						
a. 6 components extracted.						

Appendix 6.2. SPSS output of the fourth-run (final) PCA

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.928	33.065	33.065	8.928	33.065	33.065	5.507	20.398	20.398
2	4.706	17.428	50.493	4.706	17.428	50.493	4.842	17.933	38.331
3	2.758	10.217	60.710	2.758	10.217	60.710	3.741	13.855	52.186
4	1.502	5.562	66.271	1.502	5.562	66.271	2.811	10.412	62.598
5	1.125	4.168	70.439	1.125	4.168	70.439	2.117	7.841	70.439
6	0.861	3.189	73.628						
7	0.698	2.586	76.214						
8	0.652	2.413	78.628						
9	0.606	2.244	80.872						
10	0.534	1.977	82.848						
11	0.499	1.847	84.695						
12	0.481	1.782	86.477						
13	0.457	1.692	88.169						
14	0.404	1.495	89.664						
15	0.352	1.305	90.969						
16	0.311	1.153	92.122						
17	0.305	1.130	93.252						
18	0.280	1.036	94.288						
19	0.261	0.967	95.255						
20	0.223	0.827	96.081						
21	0.213	0.788	96.869						
22	0.181	0.670	97.538						
23	0.168	0.622	98.160						
24	0.164	0.608	98.768						
25	0.135	0.498	99.266						
26	0.105	0.389	99.655						
27	0.093	0.345	100.000						



Component Matrix ^a					
	Component				
	1	2	3	4	5
SM4	.734				
SM1	.700	-.436			
SM11	.678	-.515			
SM3	.666	-.497			
SM5	.650	-.485			
SK2	.639		-.455		
WC1	.636			.430	
RP8	.635		-.422		
SM7	.627	-.479			
WC3	.624			.489	
SK4	.604		-.544		
SM10	.603		.460		
SK6	.592		-.446		
RP9	.586	.484			
SK7	.582		-.452		
SM2	.575				
SM6	.572				
WC5	.566	-.423		.536	
SK1	.532		-.472		
RP7		.685			
SM9		.619			.488
RP3	.575	.596			
RP2	.444	.541			
SP1	.442	.511			
SP7	.465		.552		
RP6	.473		.532		
SM12		.556			.611
Extraction Method: Principal Component Analysis.					
a. 5 components extracted.					

Appendix 6.3. Variances of errors in Study 3 model (AMOS output)

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
SM	.667	.099	6.759	***	par_28
e28	.126	.028	4.517	***	par_29
e26	.092	.034	2.731	.006	par_30
e27	.168	.034	4.887	***	par_31
e1	.732	.063	11.636	***	par_32
e2	.701	.062	11.258	***	par_33
e3	.622	.056	11.112	***	par_34
e4	.722	.064	11.321	***	par_35
e5	.794	.069	11.464	***	par_36
e6	.712	.062	11.448	***	par_37
e7	.739	.065	11.380	***	par_38
e8	.767	.067	11.428	***	par_39
e9	.768	.067	11.430	***	par_40
e10	.735	.065	11.302	***	par_41
e11	.694	.062	11.127	***	par_42
e12	.625	.056	11.252	***	par_43
e13	.677	.060	11.283	***	par_44
e14	.657	.060	10.877	***	par_45
e15	.701	.063	11.131	***	par_46
e16	.736	.067	11.010	***	par_47
e17	.810	.073	11.129	***	par_48
e18	.673	.063	10.661	***	par_49
e19	.721	.066	10.869	***	par_50
e20	.766	.069	11.152	***	par_51
e21	.688	.063	10.831	***	par_52
e22	1.125	.094	11.968	***	par_53
e23	.698	.066	10.628	***	par_54
e24	.706	.069	10.195	***	par_55
e25	.692	.064	10.739	***	par_56

Appendix 6.4. Correlation coefficients among all items (AMOS output)

Implied Correlations (Group number 1 - Default model)

	WC3	WC2	WC1	PSR7	PSR6	PSR5	PSR4	PSR3	PSR2	PSR1	SK6	SK5	SK4	SK3	SK2	SK1	SM9	SM8	SM7	SM6	SM5	SM4	SM3	SM2	SM1
WC3	1																								
WC2	0.561	1																							
WC1	0.539	0.568	1																						
PSR7	0.333	0.351	0.338	1																					
PSR6	0.493	0.52	0.5	0.389	1																				
PSR5	0.468	0.493	0.474	0.369	0.546	1																			
PSR4	0.491	0.517	0.497	0.387	0.572	0.543	1																		
PSR3	0.504	0.531	0.51	0.397	0.587	0.557	0.584	1																	
PSR2	0.47	0.495	0.476	0.37	0.548	0.52	0.545	0.56	1																
PSR1	0.48	0.506	0.486	0.378	0.56	0.531	0.557	0.572	0.533	1															
SK6	0.517	0.545	0.524	0.337	0.498	0.473	0.496	0.509	0.475	0.485	1														
SK5	0.537	0.565	0.544	0.349	0.517	0.49	0.514	0.528	0.493	0.503	0.594	1													
SK4	0.503	0.53	0.51	0.328	0.484	0.46	0.482	0.495	0.462	0.472	0.557	0.577	1												
SK3	0.506	0.533	0.513	0.33	0.487	0.463	0.485	0.498	0.465	0.474	0.56	0.581	0.544	1											
SK2	0.518	0.546	0.524	0.337	0.499	0.473	0.496	0.509	0.475	0.485	0.573	0.594	0.557	0.56	1										
SK1	0.501	0.528	0.508	0.326	0.482	0.458	0.48	0.493	0.46	0.47	0.554	0.575	0.539	0.542	0.555	1									
SM9	0.485	0.511	0.492	0.321	0.475	0.451	0.473	0.486	0.453	0.463	0.513	0.532	0.498	0.501	0.513	0.496	1								
SM8	0.486	0.512	0.492	0.322	0.476	0.451	0.473	0.486	0.453	0.463	0.513	0.532	0.499	0.502	0.513	0.496	0.539	1							
SM7	0.491	0.517	0.497	0.325	0.481	0.456	0.478	0.491	0.458	0.468	0.519	0.538	0.504	0.507	0.519	0.502	0.545	0.545	1						
SM6	0.483	0.509	0.489	0.32	0.473	0.449	0.471	0.483	0.451	0.461	0.51	0.529	0.496	0.499	0.51	0.494	0.536	0.536	0.542	1					
SM5	0.481	0.507	0.488	0.319	0.471	0.447	0.469	0.482	0.449	0.459	0.508	0.527	0.494	0.497	0.509	0.492	0.534	0.534	0.54	0.531	1				
SM4	0.497	0.524	0.504	0.329	0.487	0.462	0.485	0.498	0.464	0.474	0.525	0.545	0.511	0.514	0.525	0.508	0.552	0.552	0.558	0.549	0.547	1			
SM3	0.516	0.544	0.523	0.342	0.506	0.48	0.503	0.516	0.482	0.492	0.545	0.565	0.53	0.533	0.545	0.528	0.572	0.573	0.579	0.57	0.568	0.586	1		
SM2	0.504	0.531	0.51	0.333	0.493	0.468	0.491	0.504	0.47	0.48	0.532	0.551	0.517	0.52	0.532	0.515	0.559	0.559	0.565	0.556	0.554	0.572	0.594	1	
SM1	0.457	0.481	0.463	0.303	0.448	0.425	0.445	0.457	0.427	0.436	0.482	0.5	0.469	0.472	0.483	0.467	0.507	0.507	0.513	0.504	0.502	0.519	0.539	0.526	1

Appendix 6.5. Model fit indices of Study 3 second stage model (AMOS output)

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	56	424.276	269	.000	1.577
Saturated model	325	.000	0		
Independence model	25	4933.649	300	.000	16.445

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.051	.902	.882	.747
Saturated model	.000	1.000		
Independence model	.772	.143	.071	.132

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.914	.904	.967	.963	.966
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.043	.035	.051	.918
Independence model	.225	.219	.230	.000

Appendix 6.6. Correlation coefficients among all items of the modified model (AMOS output)

Implied Correlations (Group number 1 - Default model)

	PSR6	PSR5	PSR4	PSR3	PSR2	PSR1	SK5	SK4	SK3	SK2	SK1	SM7	SM6	SM5	SM4	SM3	SM2	SM1
PSR6	1																	
PSR5	0.347	1																
PSR4	0.373	0.551	1															
PSR3	0.378	0.559	0.601	1														
PSR2	0.35	0.518	0.556	0.565	1													
PSR1	0.355	0.524	0.563	0.571	0.529	1												
SK5	0.314	0.463	0.498	0.505	0.468	0.473	1											
SK4	0.328	0.484	0.521	0.528	0.489	0.495	0.591	1										
SK3	0.315	0.465	0.5	0.507	0.47	0.475	0.567	0.593	1									
SK2	0.312	0.46	0.495	0.502	0.465	0.471	0.561	0.587	0.564	1								
SK1	0.316	0.466	0.501	0.509	0.471	0.477	0.569	0.595	0.571	0.565	1							
SM7	0.299	0.442	0.475	0.482	0.446	0.452	0.492	0.514	0.494	0.489	0.495	1						
SM6	0.299	0.441	0.474	0.481	0.446	0.451	0.491	0.514	0.493	0.489	0.495	0.537	1					
SM5	0.301	0.444	0.478	0.485	0.449	0.454	0.495	0.517	0.497	0.492	0.498	0.541	0.54	1				
SM4	0.309	0.456	0.49	0.498	0.461	0.466	0.508	0.531	0.51	0.505	0.512	0.555	0.554	0.558	1			
SM3	0.32	0.473	0.508	0.516	0.477	0.483	0.526	0.55	0.528	0.523	0.53	0.575	0.574	0.578	0.594	1		
SM2	0.318	0.469	0.505	0.512	0.474	0.48	0.523	0.547	0.525	0.52	0.526	0.571	0.57	0.574	0.59	0.611	1	
SM1	0.287	0.423	0.455	0.462	0.428	0.433	0.471	0.493	0.473	0.469	0.475	0.515	0.514	0.518	0.532	0.551	0.547	1

Appendix 6.7. Model fit indices of Study 3 second stage modified model
(AMOS output)

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	39	172.608	132	.010	1.308
Saturated model	171	.000	0		
Independence model	18	3215.772	153	.000	21.018

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.045	.942	.924	.727
Saturated model	.000	1.000		
Independence model	.751	.193	.098	.173

Baseline Comparisons

Model	NFI	RFI	IFI	TLI	CFI
	Delta1	rho1	Delta2	rho2	
Default model	.946	.938	.987	.985	.987
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.032	.016	.044	.994
Independence model	.256	.248	.264	.000

Appendix 7.1. Screenshot examples of Study 4 focus group meeting

University of Nottingham
UK | CHINA | MALAYSIA

Diskusi *focus group*: Umpan balik terkait keamanan di usaha kecil makanan Indonesia

Rizky Silalahi, Dr. Brendan Ryan
Dr. Sue Cobb, Dr. Robert Houghton
Human Factors Research Group
Faculty of Engineering, University of Nottingham
United Kingdom

FB

University of Nottingham
UK | CHINA | MALAYSIA

Diskusi Topik 2 (lanjutan) - Aktifitas

Beberapa aktifitas sederhana...

- Apakah ada masalah lain yang ingin Anda identifikasi?
- Bagaimana Anda memberikan peringkat pada masalah ini, berdasarkan urgensinya?
- Apakah ada potensi rekomendasi dan tantangan atau kesulitan lain yang ingin Ada kemukakan?
- Bagaimana Anda memberikan peringkat pada potensi rekomendasi dan tantangan/kesulitan ini, berdasarkan kepentingannya?

Beberapa masalah	Beberapa potensi rekomendasi	Beberapa tantangan
<ul style="list-style-type: none"> • Kecelakaan/insiden dan cedera (minor) terjadi namun tidak tercatat • Bahaya kerja dari lingkungan, alat, dan cara kerja • Sadar namun tidak begitu memperhatikan kondisi keamanan • Pengetahuan dan pengalaman yang terbatas • Tempat kerja tidak dirancang untuk pekerjaan • Kemauan untuk perbaikan, namun tantangan biaya dan pengetahuan • ...? 	<ul style="list-style-type: none"> • Perubahan/perbaikan biaya rendah untuk tempat kerja (contoh: alat lebih aman, modifikasi tempat) • Akses pelatihan keamanan • Akses dukungan pihak terkait (contoh: pemerintah, akademisi) • Inisiasi pengelolaan/manajemen keamanan dasar dan sederhana • ...? • ...? 	<ul style="list-style-type: none"> • Biaya • Rutinitas/kebiasaan kerja • Perhatian/dukungan pihak terkait (contoh: pemerintah, akademisi) • Pengetahuan • ...? • ...?