DISASTER AWARENESS AND PREPAREDNESS OF MICRO, SMALL AND MEDIUM ENTERPRISES: THE CASE OF TAUNGGYI (MYANMAR)

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With 9 figures and 4 tables
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Summary: Myanmar is a disaster-prone country, experiencing frequent hazards, such as fires, floods, cyclones, landslides, heatwaves and droughts, as well as a high earthquake risk. In such countries, it is crucial that societies become as resilient as possible to disasters. To improve resilience, it is essential that there is a solid understanding of disaster awareness and preparedness throughout society, as this is a prerequisite for successful disaster risk management. In most countries, including Myanmar, micro, small and medium-sized enterprises (MSMEs) form the backbone of the economy and society. These enterprises generate income (by offering jobs) and make a significant contribution to the livelihoods of local people. However, very little is known about the relationship between such enterprises and disasters. The present study focuses on Myanmar and aims to reduce this knowledge gap by answering the following three questions: (1) How do enterprises perceive and assess disasters? (2) How intensively and with which measures do enterprises prepare for such an event? (3) What kind of differences in terms of disaster awareness and preparedness exist in relation to enterprise characteristics (e.g. enterprise size, previous disaster experience). The research is based on a mixed-methods approach. A quantitative survey was conducted with 300 enterprises in Taunggyi, Myanmar, in 2023, and 18 qualitative interviews were conducted with experts working in MSME development and enterprise owners in 2023 and 2024. The results show that awareness and preparedness measures are not satisfactory. While enterprises are well prepared with regard to fire extinguisher maintenance and hygiene measures, deficits exist regarding data security, warning apps and insurance coverage. Enterprises with previous disaster experience have higher awareness levels and have implemented more preparedness measures. Other enterprise characteristics (e.g. firm age and firm size) have a comparatively smaller impact.

Keywords: Disaster risk awareness, disaster risk reduction, resilience, preparedness measures, MSME, Myanmar

1 Introduction

Myanmar frequently experiences hazards such as fires, floods, cyclones, landslides, heatwaves and droughts, and there is a high probability of earthquakes (NDMC 2017, Kraas et al. 2017, MIMU 2022). The annual economic damage caused by disasters amounts to billions of dollars (Kmoch et al. 2021). For instance, Myanmar incurred economic losses of approximately USD 4 billion from Cyclone Nargis in 2008, equivalent to around 2.7% of the country's GDP (IRP 2010). Similarly, the estimated damage from Cyclone Mocha in 2023 was around USD 2.24 billion, equivalent to 3.4% of the 2021 GDP (GFDRR & World Bank 2023). In countries in this situation, it is crucial that their societies become as resilient as possible to disasters at all levels. Notable international documents such as the Hyogo Framework for Action 2005-2015 (UNISDR 2005) and the Sendai Framework for Disaster Risk Reduction 2015-2030 (UNISDR 2015) provide a basis for changing approaches to disaster management to meet citizens' needs. Community orientation and integrated approaches have been important aspects of such management ever since. Integration spans different levels, issues and elements related to disasters, including actors ranging from individuals and households to enterprises, authorities and organisations (Sandoval et al. 2023).

In most countries, micro, small and medium-sized enterprises (MSMEs) form the backbone of the economy and society. By offering jobs, they generate income and make a significant contribution to the livelihoods of local people (OECD & ERIA 2018). However, the role of MSMEs in economic growth has not been received adequate attention from public and private institutions in many countries, particularly not in developing ones (Pedraza 2021). Furthermore, the importance of MSMEs in disaster situations has been widely neglected; their survival and resilience can be crucial for societies in the aftermath of a disaster (UNDP 2013). To improve their resilience, it is essential to have solid knowledge of the pre-disaster situation, particularly with regard to awareness and preparedness, is of eminent importance (e.g. UNDP 2013, Sigurado et al. 2020). Furthermore, under-

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standing the pre-disaster state of these factors is a prerequisite for effective and successful integrated and comprehensive disaster risk management (e.g. Sandoval et al. 2023, Renn et al. 2018).

In general, there are two types of research into disaster awareness and preparedness: post-disaster research findings (e.g. Games et al. 2020, Hewawasam & Matsui 2023, Wedawatta & Ingirige 2012) and pre-disaster research findings (e.g. Josephson et al. 2017, Kato & Charoenrat 2018). With regard to MSMEs, literature based on post-disaster research is particularly relevant in relation to flood events. While such research provides valuable insights into the gaps in MSME disaster management, it is usually limited to a specific type of disaster and its aftermath. Little research has been conducted on the disaster awareness and preparedness of MSMEs during the pre-disaster period, i.e. before a disaster has occurred. While such research cannot predict how enterprises will behave during a disaster, it can analyse their preparedness for an impending event, providing information that can inform measures to improve their awareness and preparedness.

As the authors understand it, both types of research have their merits. While post-disaster research tends to focus more on recovery situation and subsequent activities, pre-disaster research can focus on enterprises' general awareness and preparedness. This means that disaster awareness and preparedness are not central to enterprises' tasks or daily work. However, in order to develop and initiate measures to enable enterprises to respond better to future disasters without suffering the large-scale problems that regularly occur, it is of great importance for disaster management to gain deeper insights into this topic.

There is very little knowledge about the relationship between enterprises and disasters in Myanmar. This study aims to address this knowledge gap by answering the following three questions: (1) How do enterprises perceive and assess disasters? (2) How intensively do enterprises prepare for such an event, and what measures do they take? (3) Are there differences in disaster preparedness relating to enterprise characteristics (e.g. enterprise size, previous experience)?

The study aims to contribute to an understanding of how MSME preparedness works in relation to multiple disasters, how preparedness measures are implemented, and to provide a deeper understanding of the situation regarding the connection between MSMEs and disasters, investigating the case of Taunggyi, Myanmar.

2 MSMEs in Myanmar – an overview

A market-oriented economic system was introduced in Myanmar in 1988, encouraging the private sector to invest in trade, manufacturing and services. This was formalised in 1990 with the Private Industrial Enterprises Law (SLORC 1990). The first Myanmar Citizens' Investment Law (SLORC 1994) was enacted in 1994, allowing newly established micro, small and medium-sized enterprises (MSMEs) to operate. MSMEs were seen as an important element that would contribute substantially to the development of Myanmar society with regard to the supply of goods, services and jobs. This development intensified at the start of the reform period in 2011, accelerating particularly in 2015 with the adoption of the Small and Medium Enterprise Development Law (Union of Myanmar 2015). This law defines what constitutes a small or medium-sized enterprise and outlines the organisations and agencies responsible for SMEs and their support. According to this law, SMEs are defined by three criteria: the number of employees, enterprise capital and enterprise turnover. Additionally, enterprises must belong to specific economic sectors, particularly manufacturing, wholesale, retail and services (Tab. 1).

The first comprehensive report on the situation of SMEs in Myanmar was compiled by Polsaram et al. (2011). This report formed part of a study on SMEs in four Southeast Asian countries (Brunei, Cambodia, Laos and Myanmar) initiated by the Japan Overseas Development Corporation. The report provides an overview of the historical development of the private sector in comparison to state-owned enterprises in Myanmar. The detailed analysis focuses on registered SMEs in the industrial sector, as defined by the Private Industrial Enterprise Law. According to Polsaram et al. (2011), of the 43,503 privately owned enterprises in total in 2007, 40,020 were SMEs (= 91.99%). As the report was published at the beginning of the reform period in Myanmar and is based on 2007 data, it describes the situation of SMEs approximately ten years prior to the adoption of the Small and Medium Enterprises Law (Union of Myanmar 2015).

An OECD report from 2013 (OECD 2013) provides similar information on the situation of SMEs in Myanmar. According to the President's Office's, Myanmar had around 127,000 registered enterprises in January 2013. Of these enterprises, 99.4% were classified as SMEs – a higher proportion than that published by Polsaram et al. (2011).

Tab. 1: Definition and categorisation of SMEs in Myanmar according to the small and medium enterprises development law 2015

		Sector					
Size	Indicator	Manufacture	Lab. int. Manufacture	Wholesale	Retail trade	Services	Other activity
Small	Capital (million Kyat)	≤ 500	≤ 500				
	Turnover (million Kyat)			≤ 100	≤ 50	≤ 100	≤ 50
	Employees (persons)	≤ 50	≤ 300	≤ 30	≤ 30	≤ 30	≤ 30
Medium	Capital (million Kyat)	500 - 1000	500 - 1000				
	Turnover (million Kyat)			100 - 300	50 - 100	100 - 200	50 - 100
	Employees (persons)	51 - 300	301 - 600	31 - 60	31 - 60	31 - 100	31 - 60

Source: CSO & UNU-WIDER (2018: 2)

A study by Kapteyn & Saw Htay Wah (2016) points out that it is not possible to provide precise information on SMEs, since no comprehensive list of SMEs exists for the following reasons: Different authorities and ministries are responsible for SMEs depending on their sector. In addition, only formal SMEs are registered. According to the authors, "83% of all private enterprises are in the informal sector, a majority of which are family-owned and self-employed" (Kapteyn & Saw Htay Wah 2016: 1). This finding is similar to that of Vanek et al. (2014), who found that around 70% of non-agricultural employment in South Asia is in the informal sector. The empirical part of Kapteyn & Saw Htay Wah's (2016) study is based on two quantitative surveys carried out in the Yangon area. One survey was carried out with around 900 respondents; the second, with an identical questionnaire, focused exclusively on SMEs owned by ethnic minorities (around 100 respondents). The study reveals that loans from the government or banks are a major problem for the companies. Loans are either unavailable, unfamiliar or considered too complicated to apply for. However, quite a few of the interviewees use private loans from family or friends. Similar results regarding credit are reported in a CSO & UNU-WIDER (2019) study based on qualitative interviews with 108 experts. Thus, similar behaviour can be expected with regard to credit behaviour in disaster cases.

A database on MSMEs in manufacturing was conducted in 2017 (with 2,496 enterprises and 6,722 employees) and in 2019 (with 2,497 enterprises and 5,227 employees), with the aim of characterising such enterprises and describing their dynamics (CSO & UNU-WIDER 2018, 2020). Based on these data, articles were published on more specific topics, such as the relationship between wage returns and workplace training (Hansen et al. 2022), and the relationship between good business practices and productivity (Falco et al. 2023).

According to data from the Department of Micro, Small and Medium Enterprises Development, the number of registered enterprises in January 2025 was 291,317 (Ministry of Industry 2025).

3 Disasters and MSMEs – a literature review

Compared to disaster-related studies that focus on individuals and households, little research has been conducted on MSMEs. Most studies examine the behaviour of enterprises after a disaster (post-disaster research), particularly the recovery process and future prevention (e.g. Asgary et al. 2012, Chinh et al. 2016, Hewawasam & Matsui 2023, Pathak & Ahmad 2016, Wedawatta & Ingirige 2012). The literature sheds light on research gaps in MSME disaster management. Recovery after disasters is severely hindered for several reasons. Some of these reasons are connected with the enterprises themselves, e.g. their financial background, while others are due to mismanagement by governments. Although awareness of and willingness to prepare for disasters has increased, this has not increased as much as expected. Nevertheless, other research (e.g. De Mel et al. 2012, Berkel et al. 2021) indicates that recovery can occur surprisingly quickly.

Post-disaster research often refers to floods in different regions of the world. Wedawatta & Ingirige (2012), for example, examine the various response strategies adopted by businesses following the 2007 flood in London, UK. Sakai & Yao (2023)

investigate financial losses and flood damage in the UK. Flood-related research focuses on the activities, continuity and recovery of enterprises, for example in Thailand (Asgary et al. 2012, Chinh et al. 2016, Marks & Thomalla 2017), Indonesia (Neise & Revilla Diez 2019), Sri Lanka (Hewawasam & Matsui 2023) and Ghana (Owusu et al. 2021). This research covers events in both so-called developed and less developed countries. The results often indicate that enterprises take a long time to recover, i.e. reopen after the flood event, and that improvements in terms of future protection are often not satisfactory. This applies to physical protection measures such as dams and pumps, as well as insurance. In contrast, the situation of SMEs in other disaster events, such as storms or earthquakes, has received less attention in research (e.g. Games et al. 2020, Liu et al. 2013).

Research on the disaster awareness and preparedness of SMEs in the absence of recent disasters is scarce. Kato & Charoenrat (2018) examine the business continuity management practices of SMEs in Thailand, while Josephson et al. (2017) look at how small enterprises in the USA prepare for hurricanes. These studies reveal a pronounced lack of awareness and preparedness with regard to simple protective measures such as fire extinguishers and sandbags, as well as insurance. However, some studies have found a high level of preparedness. For example, Berkel & Tarp (2025) found this to be the case with microenterprises in Mozambique.

Compared to other countries, including those in Southeast Asia, there is little research on disaster awareness and preparedness in Myanmar. Heinkel et al. (2022) focus on disaster preparedness and resilience at the household level, examining how specific measures could enhance preparedness. Zin Mar Than et al. (2020) examine institutional preparedness for multiple risks. Fernandez et al. (2018) focus on the factors that influence the perception of risk relating to fire, earthquakes and hurricanes. Zin Mar Than et al. (2023), meanwhile, examine how socio-demographic characteristics and previous experiences of individuals and their households influence their perception of disaster risk and their level of preparedness. These articles are based on surveys conducted in Yangon. Some research also relates to other regions of Myanmar. For example, Ko Ko Lwin et al. (2020) investigate the social resilience of flood-prone communities in the Ayeyarwady Delta, while Su Su Tun (2018) focuses on the challenges of good governance in disaster management in the Ayeyarwady Region during the 2015 floods.

Myanmar society is characterised by a notable degree of social cohesion, which is attributed to a number of factors. One such aspect is the tendency to provide mutual help as a fundamental component of the social fabric. It is widely acknowledged that individuals have a responsibility to contribute to the maintenance of social harmony. The active participation of individuals in community activities has been demonstrated to foster social connectivity. Furthermore, the presence of robust social networks, which function as support systems, is of crucial importance during periods of crisis. This robust social cohesion is a vital element in the event of a disaster, as evidenced by research conducted by Zin Mar Than et al. (2020). In the field of disaster research, the concept of social cohesion has emerged as a pivotal factor in enhancing disaster resilience within communities (see Carrasco et al. 2024, Patel & Gleason 2018, Townshend et al. 2015). The authors observe that the intensity and nature of such relationships can vary from community to community. This subject has also been examined in the context of disaster research on Myanmar (e.g. Heinkel et al. 2022, Ko Ko Lwin et al. 2020). Research of this nature is typically conducted with individuals and households. Nevertheless, the fundamental components of social cohesion can also be pertinent to enterprises, particularly micro, small and medium enterprises.

The extant literature focuses on individuals, households and (public) institutions, but not on MSMEs as basic entities. To the best of our knowledge, there has been no specific research conducted on the topic of 'disaster and MSMEs' for Myanmar.

It is important to acknowledge that MSMEs frequently possess limited financial resources and access to formal credit (e.g. Kapteyn & Saw Htay Wah 2016, CSO & UNU-WIDER 2018). Additionally, a significant proportion of these enterprises are relatively recent, having been established primarily following the adoption of a market-oriented economy in 1990. Consequently, their primary interest lies in achieving stability within conventional economic activities, with minimal consideration allocated to undertaking additional measures to mitigate disaster risks.

4 The framework of the study

4.1 Method, empirical design and material

The research utilised a mixed methods approach, incorporating a quantitative survey of MSMEs and qualitative expert interviews. The survey was con-

ducted in May and June 2023 with the managers and owners (henceforth referred to as owners) of 300 registered enterprises in Taunggyi Township. This area encompasses the 22 wards of Taunggyi City and the towns of Ayetharyar, Shwe Nyaung and Kyauktalonegyi. The participation of each individual was requested verbally, and the completion of a questionnaire was only requested of those participants who consented.

In the initial phase of the study, a sample of 300 proprietors from enterprises across all economic sectors was invited to participate in an interview. These enterprises were registered with the Taunggyi Development Department and were requested to complete a questionnaire. However, it should be noted that not all of the participants were able to attend. In the subsequent phase of the study, the interviewers proceeded to the industrial zone and the city centre, where they randomly selected additional enterprises, with the objective to achieving a total of 300 questionnaires. In the course of the distribution of the questionnaires in Taunggyi Township, an attempt was made to ensure comprehensive coverage of the entire area (Fig. 1). Two primary clusters are evident in Figure 1. Firstly, a concentration of enterprises is observed in the city centre, and secondly, a significantly larger concentration is seen in the southwestern ward of Ayetharyar, where the industrial zone is situated. This zone was established in 1995 (Aung Min & Kudo 2012). As stated by the Shan State Development Department (information obtained verbally on 20th May 2023), the number of MSMEs registered in Taunggyi at the time of the survey was 5,124. This figure indicates that approximately 6% of registered MSMEs participated in the survey. As the process of registration has, as previously stated, been found to be deficient, it is possible that the percentage may be lower than anticipated.

The quantitative questionnaire encompassed the following subjects: (1) the cultivation of risk awareness and measures to minimise risk, (2) the evaluation of insurance coverage, (3) the analysis of digitalisation, (4) the management of information and communication, (5) the promotion of social cohesion, and (6) the dissemination of information on the pandemic caused by the SARS-CoV-2 virus.

In comparison with the official size classification of SMEs in Myanmar (see Tab. 1), a more detailed subdivision was made for small enterprises by defining the categories '1 employee' and '2-10 employees' separately, which collectively form the category 'micro enterprise'. This enables a particular emphasis to be placed on micro-enterprises, in accordance with international definitions of MSMEs. Many countries,

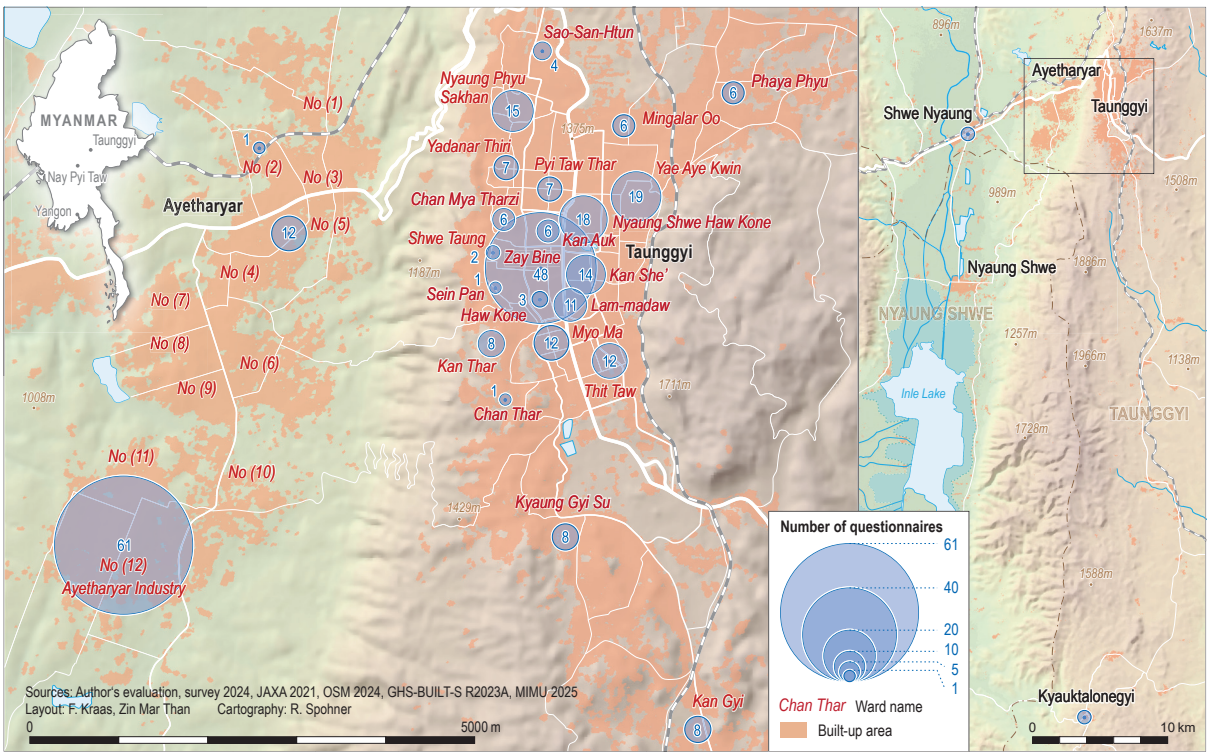

Fig. 1: Spatial distribution of questionnaires in Taunggyi

including several in Asia (e.g. Indonesia with up to four employees (Tambunan 2018)), specify the category of micro-enterprises in their respective definitions of MSMEs. However, the size thresholds vary between these definitions. In the EU, micro-enterprises are defined as businesses with fewer than 10 employees (EC 2003). According to the pronouncements of experts of the MSME Department of the Ministry of Industry, a new definition is currently being prepared for Myanmar, which will include micro-enterprises as a discrete category. The definition is expected to encompass a maximum of 10 employees.

In 2023 and 2024, a total of eighteen qualitative expert interviews were conducted with members of institutions involved in the management of MSMEs (e.g. banks and business agencies), as well as with enterprise owners. Themes addressed encompassed the prevailing circumstances of MSMEs, risk evaluation, contingency measures, financial resources and insurance provisions. The interviews, conducted in Myanmar or English language, were conducted in the offices of the interviewees, with an average duration of 54 minutes (range: 20–120 minutes), and were recorded with the interviewees' prior consent. The data was then translated into English, fully transcribed using the software programme F4, and analysed with the software programme MAXQDA. The interviews were coded with numbers (cited in the text, e.g. INT-12).

4.2 Taunggyi as case study

This study forms part of a broader research project examining multiple disaster risk management in several cities across Myanmar, including Yangon, Mandalay and Taunggyi.

Shan State is one of Myanmar's most expansive states. It functions as an active gateway for border trade with China and Thailand, and there is considerable potential for investment in trade, agriculture, manufacturing and tourism (DICA 2017). Taunggyi, the capital of Shan State, is an important regional, secondary centre of Myanmar. The 2023 GAD report recorded a population of 564,205 (GAD 2023). Situated at an altitude of 1,436 metres above sea level, the city boasts a pleasant, cooler climate, mountainous surroundings and a diverse ethnic and cultural heritage (GAD 2023). It is a prominent tourist destination in Myanmar, contributing significantly to the nation's economy (Kraas & Zin Nwe Myint 2015). Moreover, the city provides raw materials for various industries, particularly food processing and agro-based products (DICA 2017).

Until recently, Taunggyi's disaster situation was less severe than in other cities in Myanmar, as stated in interviews with experts (INT-8, INT-10). However, in recent years, one of the townships of Taunggyi, Shwe Nyaung, has experienced severe flooding as a result of the cyclones Mocha and Yagi, which has an impact on the area that was previously unparalleled. Furthermore, there has been an increased risk of landslides in the region (INT-9, INT-18). Typically, these storms do not exhibit significant magnitude, yet their severity has increased in recent years due to their frequent association with substantial precipitation (INT-18). Such landslides predominantly impact residential quarters located on hill slopes, as opposed to enterprises, which are predominantly situated in the comparatively safer areas of Ayetharyar. Fortunately, Taunggyi City was not impacted by the heavy earthquake on 28 March 2025. However, the city has previously experienced significant seismic activity, including the earthquake in 1912, which had a magnitude of MsGR 8.8; Ms 7.6-7.7 (Crosetto et al. 2019). Although the city has not historically experienced the same level of disaster risk as other cities, it is nevertheless vulnerable to multiple disaster risks.

5 Disaster awareness and preparedness of MSMEs

5.1 Characterisation of the MSMEs

The five economic sectors of retail, consumer-related services, business-related services, hotel/restaurant and manufacturing are the ones to which owners allocate their enterprises with greater frequently (always more than 15%) than to the other sectors (Fig. 2). The most prevalent sector to which enterprises are allocated (27.6%) is 'retail'. The manufacturing industry occupies fifth position, with 17.2% of the enterprises.

The results indicate that the overwhelming majority of enterprises (89.4%) had up to 30 employees (see Fig. 3), thereby classifying them as small enterprises. Approximately 80% of the enterprises had either one employee or between two and ten employees, thus categorising them as micro-enterprises. A proportion exceeding 10% of the enterprises surveyed were of medium size.

The vast majority of enterprises (more than 90%) were founded subsequent to the introduction of a market-oriented economy in the early 1990s (Fig. 4), thus

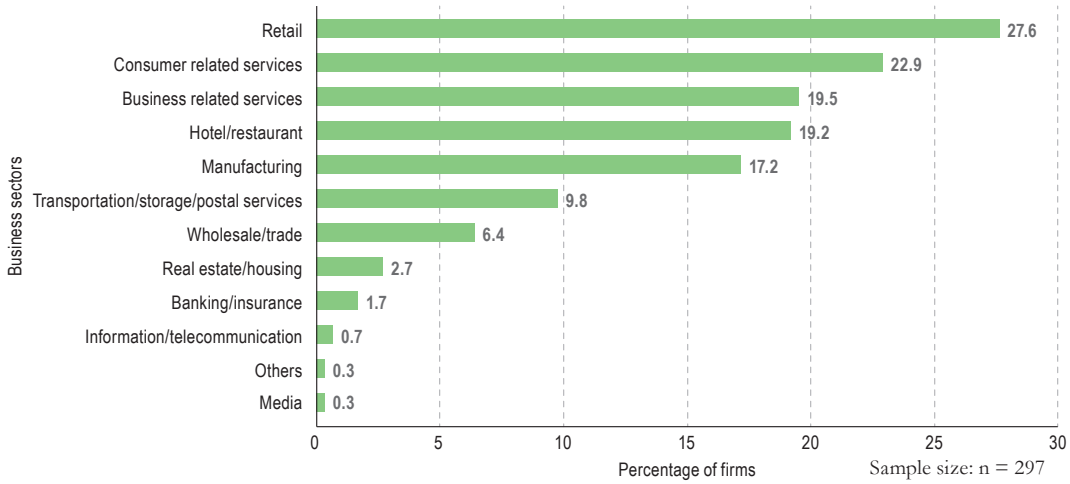

Fig. 2: Economic sectors of MSMEs in Taunggyi

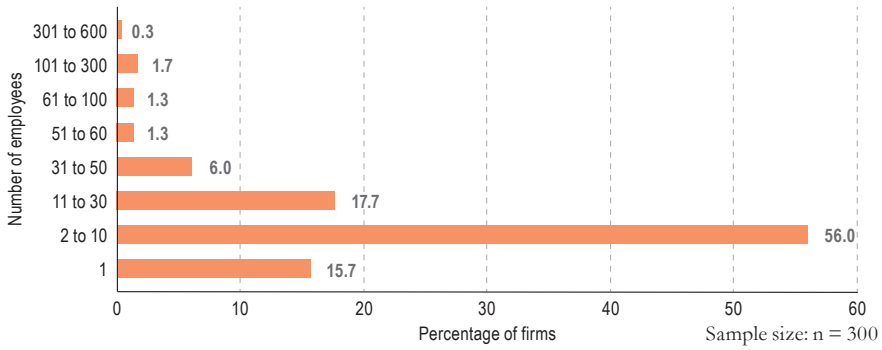

Fig. 3: Size classes of MSMEs in Taunggyi

indicating that they are just 30 years old or younger. It is notable that almost half of these enterprises were founded since 2011, i.e. since the commencement of the reform period.

Given that the majority of the enterprises were micro and small, it can be posited that the owners of these enterprises tend to wield significant influence. Consequently, the information regarding the characteristics of the owners is of significance. The majority of the owners were male (61.9%), with only 38.1% of the owners being female. This finding aligns with the conclusions of other studies (e.g. CSO & UNU-WIDER 2018) on Myanmar, as well as those of Pathak & Ahmad (2016) on SMEs in Thailand. A mere proportion of the respondents were within the 15-25 age bracket, constituting 6.3% of the total sample. The majority of the owners were of a middle age, defined as between 26 and 50 years of age (70.7%). The educational attainment of the owners was notably elevated, with approximately two-thirds of the owners possessing a university degree or a post-graduate qualification. A mere 1.0% of respondents had only completed primary school, while 1.3% had no qualifications.

5.2 The disaster in the minds of enterprises

A mere 84 of the owners surveyed reported having previously experienced a disaster. This suggests that the respondents did not perceive the COVID-19 pandemic as a disaster, which is somewhat surprising. However, respondents, who provided details of the types of disasters they had experienced most frequently cited the pandemic and fire disasters, at around 45% (Fig. 5), followed by heavy rainfall with almost 36%. It is evident that the prevalence of enterprise owners citing drought, earthquakes and cyberattacks as major concerns is minimal.

Furthermore, fire and pandemic were identified as the two most severe types of disaster (Fig. 6). Utilising a 6-point rating scale, a significant proportion (more than 50%) of enterprises reported a substantial impact

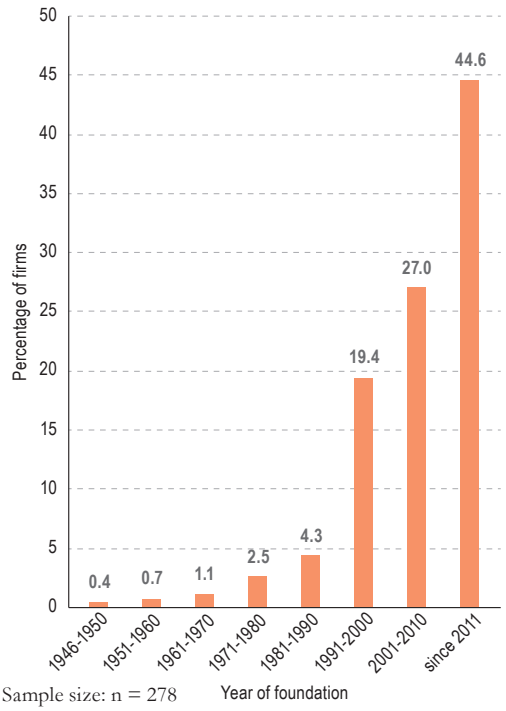

Fig. 4: Age of MSMEs in Taunggyi

on their business operation. Specifically, over 70% of enterprises experienced significant impact due to fire, while nearly 60% encountered substantial impact due to pandemic-related events. The categorisation of these two types of disasters as the most serious is unsurprising, considering the recent and pervasive impact of the pandemic on all enterprises. Fire was the most frequently cited disaster the enterprises had experienced. In the middle of the responses were assessments of heavy rainfall, earthquakes and storms as damaging events. Heavy rainfall was classified as at least serious by just over 20% of enterprises, while the figures were 30% for earthquakes and 35% for storms. However, even among these groups, a significant proportion of enterprises reported no or only minor problems, with an almost 40% response rate. Conversely, the majority of enterprises reported no problems with cyberattacks, and the majority also regarded flood and drought risks as less significant (possibly due to the infrequency of such events in Taunggyi; personal communication with an expert, INT-10).

5.3 Disaster preparedness of enterprises

5.3.1 Specific measures to reduce the impact of disasters

In response to the query regarding the implementation of specific measures by enterprises to mitigate the impact of disasters, the responses revealed a diversity of approaches. In an effort to mitigate the consequences of particular hazards, certain owners have implemented measures such as the installation of fire alarms, fire doors or sprinkler systems, as well as the maintenance of fire extinguishers. In the context of flood risk, these owners have also implemented flood protection measures Other reported measures against disasters were trainings and drills, IT protection, insurances and regulatory compliance plans. A total of 287 responded to the question. On average, the owners named almost four different measures of listed ones (Fig. 7) that they used or implemented. Two measures were mentioned frequently: firstly, the maintenance of fire extinguishers (72.5%), and secondly, hygiene measures, such as the usage of face masks or a disinfection stand (61.0%) (Fig. 7). As fire was mentioned by most enterprises as the disaster they feared most (with the rating 'most affected'), and in light of the experiences from the COVID-19 pandemic, these decisions are understandable. Three other measures demonstrated a range of 30% to 40%: namely, the availability of a power generator (37.6%),

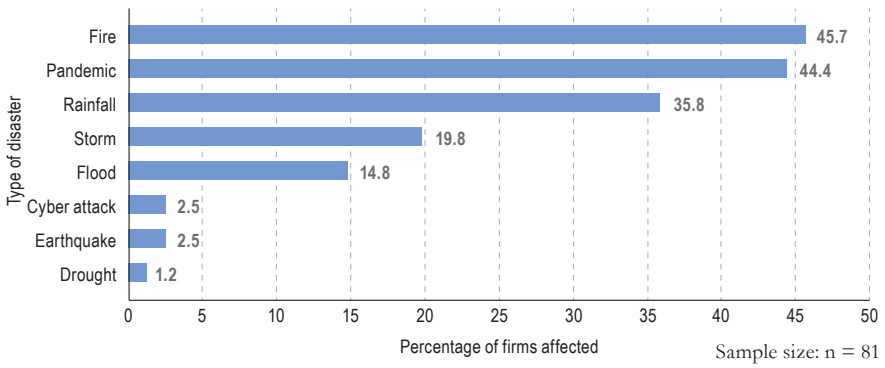

Fig. 5: Previous disaster experiences in Taunggyi – types of disaster

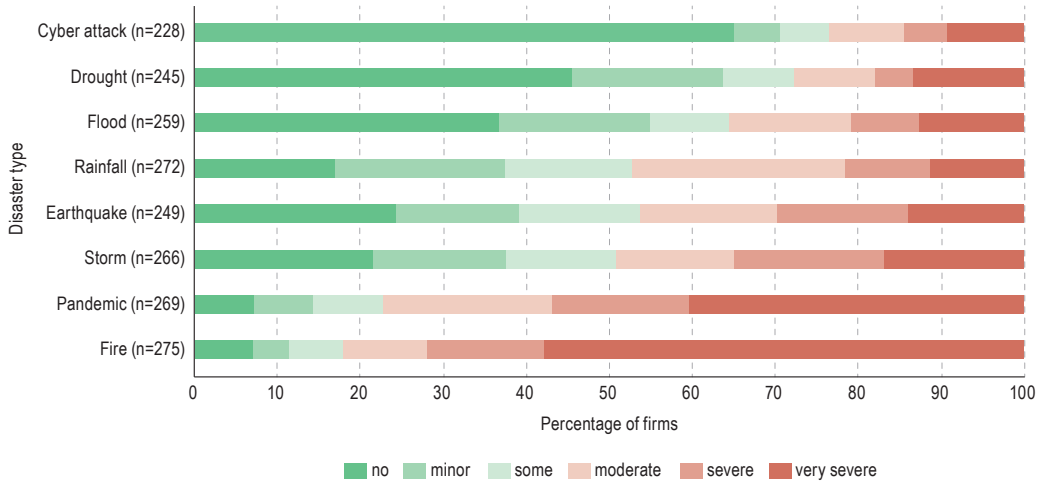

Fig. 6: Evaluation of the impact of disaster types in Taunggyi

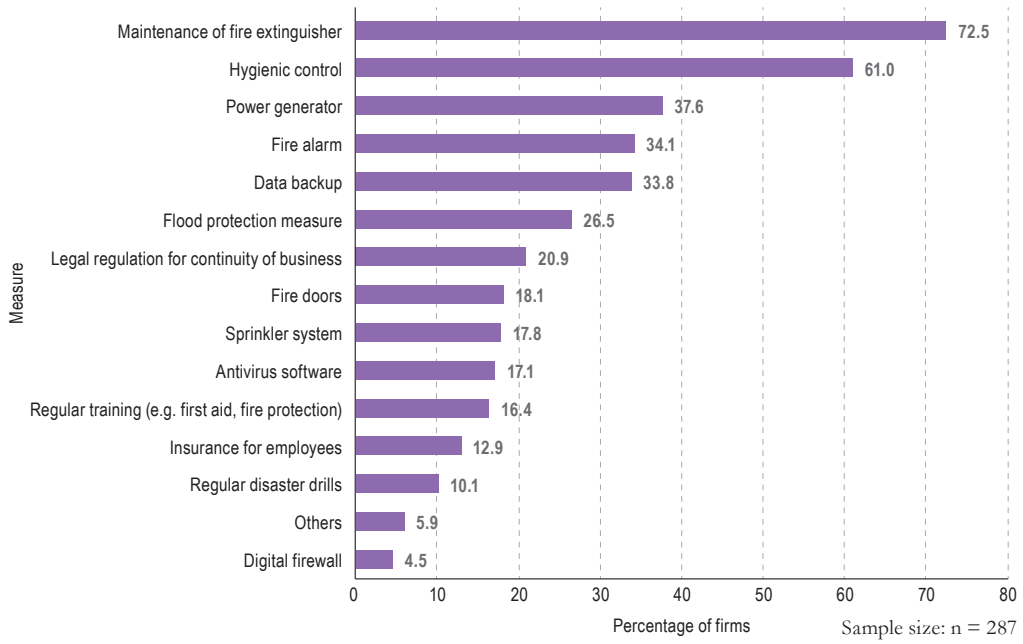

Fig. 7: Measures to reduce the impact of disasters

a fire alarm (34.1%) and the IT-related measure 'data backup" (33.8%). As indicated by the responses to the survey, 26.5% of enterprises cited the implementation of flood protection measures, including the utilisation of sandbags. The majority of the other measures were mentioned on a relatively infrequent basis. This included a variety of other fire protection measures, such as sprinkler systems or fire doors. The expense associated with the installation of these measures is a salient factor that appears to influence their adoption. This group of measures, which are seldom referenced, encompasses a variety of elements, including drill and training measures, designed to protect the IT system, as well as considerations pertaining to insurance and legal regulations.

In conclusion, the activities of enterprises to reduce the consequences of disasters were found to be inadequate in many cases and must be classified as insufficient.

5.3.2 Disaster insurance

Risk insurance is a financial instrument designed to mitigate the mostly economic losses that result from potential adverse events. These losses,

which are often of a financial nature, can have a significant impact on individuals or organisations. A total of 282 enterprises provided responses to this inquiry concerning insurance coverage. A significant proportion of the respondents, 55.3%, reported having obtained at least one or more insurance policies, a notable figure for a developing country. However, the insurance policies in question were frequently standard health or automobile insurance policies, which are not directly related to disasters. A significant majority of enterprises with insurance policies (87.8%) undertook an annual review of their policies to ascertain their continued relevance to the enterprise's circumstances. In contrast, the others engaged in this practice at intervals every two years or less frequently.

The mean number of insurance policies held by the enterprises was two. A limited number of insurance policies were referenced with high frequency, specifically those pertaining to fire (63.9% of enterprises) and motor vehicles damage resulting from accidents (46.5%). A portion of these enterprises had opted to provide life insurance (24.5%) and health insurance (34.2%) to their employees. A mere 5.2% of enterprises had obtained insurance to safeguard their valuable assets, such as machinery or buildings, against the potential risks of damage or loss during a disaster.

Insurances, as a general rule, represent a significant approach for the transfer of risk (Hewawasam & Matsui 2023). However, they are not a prevalent phenomenon in Taunggyi. The underlying factors contributing to this phenomenon are the financial burden of insurances and the absence of a well-developed insurance market in Myanmar (INT-16, INT-12). One expert commented that "our society was not adapted to official procedures. We were not used to legal issues. Nobody tried to practice to get used to it" (INT-2).

5.3.3 Digital business data and security

The relevance of digitalisation was observed to be applicable to just over 50% of the enterprises surveyed, with a further 10.8% indicating it was at least partly relevant. Conversely, 27.2% of the enterprises expressed that digitalisation was not relevant to them. Additionally, 237 enterprises provided responses to the question regarding backup devices for digital data. Furthermore, 41.4% of these enterprises used external hard drives or USB sticks. The practice of backing up digital data to an external server or cloud was mentioned, albeit less frequently (14.3%). The majority of enterprises (approximately 89%) utilise a single device for the purpose of backing up their digital data. Furthermore, 11% of respondents indicated that they did not back up any data.

The enterprises that make a backup named various locations for the backup. However, a significant number of these locations appear to lack the requisite security measures. For instance, over 50% of respondents identified the enterprise as a backup location, with more than 20% citing the owner's home as a backup site, which was located in close proximity to the enterprise. It has been determined that a minimum of 70% of enterprises stored their backups in locations that were similar to the original digital data, which is often deemed to be critical.

The vast majority of owners stored their analogue data at home (47.0%) or at work (36.7%), i.e. more than 83% of the enterprises. The utilisation of alternative storage solutions for analogue data, such as a bank safe, was a rarity. At the time of the survey, the proportion of enterprises engaged in the process of digitising their analogue data was less than 13%.

The survey results indicate that a considerable proportion of the 271 enterprises surveyed reported conducting regular backup procedures. It is worthy of note that 80% of these enterprises indicated that they performed these backup procedures at least once a month, with 48% conducting them on a daily basis or more frequently. However, it is also important to note that almost 20% of respondents backed up less frequently than once a month, and almost half of these did not back up at all. It is disconcerting to note that the failure to back up business data with greater frequency is a prevalent issue, giving rise to concerns regarding the capacity to restore lost data. Approximately 26% of enterprises regarded recovery as straightforward, however, a more substantial proportion, approximately 29%, perceived this process to be arduous.

5.3.4 Disaster emergency plans

In the course of the survey, 297 of the enterprises were answered whether they had a disaster plan. Of these, 243 subjects (equaling 81.8%) indicated that they had formulated a plan of this nature. Of these enterprises, 238 (98%) indicated that they had established at least an emergency plan. It is noteworthy that the vast majority of these enterprises – more than 90% – were equipped with a comprehensive

plan in the event of a fire. However, for nearly all other types of disasters, less than 20% of enterprises had formulated a plan, and frequently, this figure was less than 10%. However, in the context of a pandemic (the previous one being the novel strain of Coronavirus, known as SARS-CoV-2, which had just concluded at the time of the survey) this figure exhibited a slight increase, reaching just over 20%. This outcome appears congruent with the experiences during the pandemic.

5.3.5 Information and communication in the event of a disaster

In response to the question regarding the sources of information utilised by enterprises in the event of a disaster, 297 enterprises provided a response. The mean number of sources cited by respondents was four. The most frequently cited sources of information were social media (78.5% of the enterprises) (Fig. 8), followed by personal direct exchange (67.7%), the internet (64.0%) and mobile phone calls (52.5%). Newspapers, radio and television were used by just over a third of the enterprises, at a distance. It is noteworthy that alarm sirens received minimal mention, with only 17.2% of respondents reporting their use. Similarly, warning applications and fax machines received even fewer mentions. The paucity of references to warning applications (2.7%) is striking, given that the Government of Myanmar published the warning application DAN (Disaster Alert Notification) in 2019. However, the survey results indicated that the app was only known to 49 (16.5%) of the enterprises surveyed, and only four of them actually used it.

5.3.6 Assistance and social cohesion in the event of a disaster

In the event of a disaster, it is vital that there is cohesion in the neighbourhood and that mutual help among neighbours is in place. The majority of enterprise owners expressed a favourable view of social cohesion in their neighbourhood (see Tab. 2). Furthermore, the majority of respondents expressed a high level of satisfaction with the cohesion within the neighbourhood, with many reporting a strong sense of community and willingness to assist their neighbours. Further, almost 40% saw this cohesion as at least relatively close. A mere 3% of respondents expressed a low level of social cohesion.

The concept of social connectedness, facilitated by both formal and informal networks within the neighbourhood, was a pivotal factor in the event of a disaster. This interconnectedness enabled individuals to provide mutual assistance, thereby fostering a sense of community resilience. Furthermore, 78.3% of owners were aware of the value of such networks or groups.

The proprietors were involved in organisations concerned with disaster prevention and management. A significant proportion of the subjects in this study (28.3%) were affiliated with such groups. In the primary instance, the involvement of these groups was in the capacity of rescue organisations or religious and charitable institutions. Participation in a COVID quarantine centre was also mentioned quite frequently (14.2%). However, participation in semi-public organisations such as the auxiliary fire service or the Red Cross was mentioned only very rarely (in approximately 5% of cases each).

The enterprise owners were further asked to provide an estimation of the reliability of assistance from

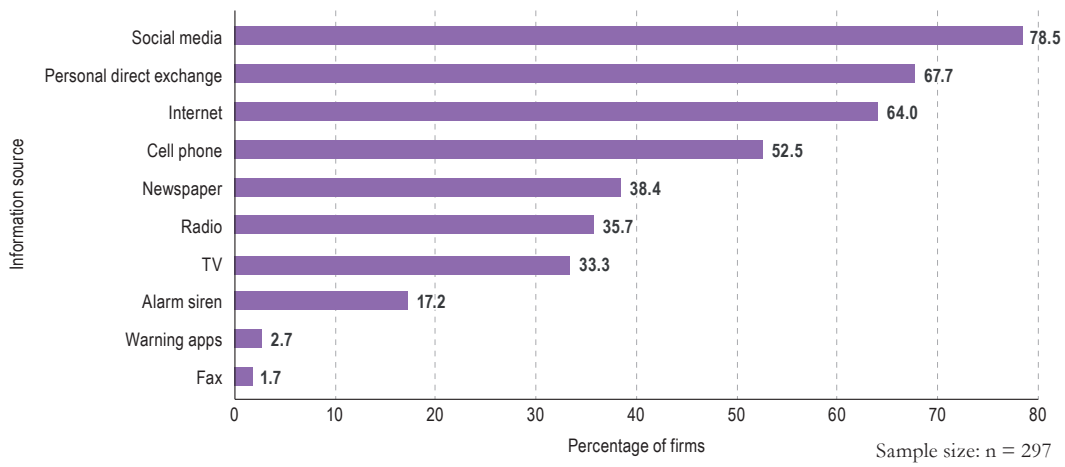

Fig. 8: Sources of information in the event of disasters

Tab. 2: Social relationships in the neighbourhood

Assessment of neighbourhood relations	no of enterprises	% of enterprises
Very close and with a lot of mutual support	163	57.0
Relatively close with mutual support	113	39.5
Distanced with little mutual support	9	3.1
I don't know my neighbours	1	0.4
In total	286	100.0

Tab. 3: Utilisation of assistance by state or civil society organisations in the event of a disaster

Evaluation of reliability	no. of enterprises	% of enterprises
By no means	32	11.3
Very low	39	13.7
Little	79	27.8
Sufficient	72	25.4
Yes, well	24	8.5
Yes, very good	38	13.4
Enterprise as a whole	284	100.0

the state or civil society organisations (CSOs) in the event of a disaster. Just over half of the enterprises experienced little or no assistance, while the others believed that they could at least rely sufficiently on such organisations (see Tab. 3). However, only slightly more than a fifth of the enterprises surveyed stated that they could rely on such assistance well or very well.

With regard to the provision of support and the promotion of social cohesion, the majority of enterprise owners expressed a favourable opinion of the relationships within the neighbourhood. The cohesion within the community was deemed paramount in the event of requiring assistance, a consideration that far surpassed the significance accorded to support from government entities or civil society organisations (CSOs).

5.3.7 Self-assessment of own preparedness

The proprietors were invited to provide an assessment of their enterprise's actual preparedness. The proportion of enterprises indicating a lack of preparedness was found to be remarkably high. Approximately 40% of respondents expressed concerns regarding their enterprise's inadequate preparation, categorising their level of preparedness as somewhat, marginally or not at all prepared. Conversely, only approximately 25% of respondents indicated that their enterprise was adequately prepared (cf. Fig. 9).

5.4 Disaster preparedness as a function of enterprise characteristics

5.4.1 Basic considerations on relationships and differences

In the present study, bivariate relations between several aspects of preparedness and the following enterprise characteristics were analysed:

- Enterprise size: The size of an enterprise has been demonstrated to have a significant impact on disaster preparedness, with larger enterprises generally possessing superior insurance coverage. It is also conceivable that larger enterprises are better prepared for digitalisation because

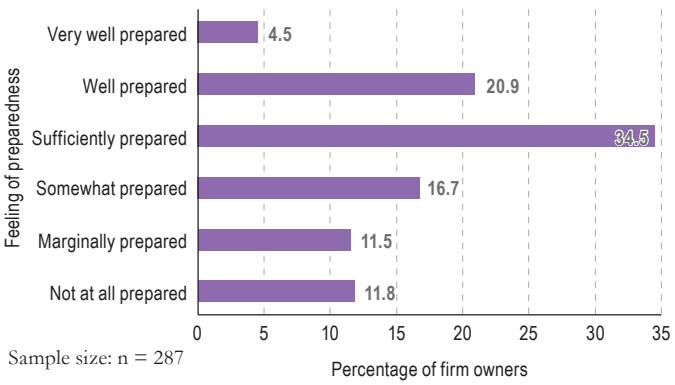

Fig. 9: Assessment of the owners' preparedness in relation to the enterprise

their daily work is more dependent on it. As demonstrated in the studies conducted by Sakai & Yao (2023) and Neise & Revilla Diez (2019), larger enterprises have been shown to possess a superior financial foundation, enabling them to allocate more substantial resources towards investment in disaster prevention and mitigation strategies.

- Economic sector of the enterprise: Depending on the economic sector, enterprises can vary significantly in terms of their production and working methods. It is an irrefutable fact that certain enterprises require a substantial production area or costly machinery. It has been determined that certain individuals require a lesser amount of equipment. For such enterprises, the most essential facility is a telephone or a stable connection line. The manner in which production is conducted and embedded within an economic sector has been demonstrated to exert influence on the preparedness and the reaction of enterprises to a disaster (UNDP 2013).
- Age of the enterprise: The age of the enterprise has been demonstrated to exert an influence on the matter. For instance, older enterprises have been shown to be more established and to have accumulated greater experience of dealing with disasters, which can result in superior preparedness. It is acknowledged that nascent enterprises may not have the time and financial resources to invest in preparedness measures, as these enterprises require resources to start and operate (e.g. UNDP 2013, Josephson et al. 2017, Hewawasam & Matsui 2023). Conversely, it could also be hypothesised that older enterprises are not interested in preparedness measures because they had not been affected much by disasters.
- Age of the owner: The age of the owner can also be a factor, with older people having more experience of running a business and of disaster events. This may result in them being more vigilant (e.g. Josephson et al. 2017, Castañeda et al. 2020, Hewawasam & Matsui 2023). Conversely, younger managers may have received better training and consequently prioritise the mitigation of disaster consequences (Pathak & Olmo 2021).
- Gender of the owner: Research on disaster risks has indicated that women demonstrate a heightened awareness of disasters and consequently exhibit a greater propensity to fear their consequences (e.g. Sjöberg 2000, Josephson et al. 2017, Zin Mar Than et al. 2023). Consequently, female owners may tend to be better prepared for disasters. However, it should be noted that such a relationship does not always exist (see Pathak & Olmo 2021).
- Disaster experience: It is hypothesised that, in cases where enterprises or their owners have previously encountered disasters, this experience may influence their level of preparedness and the intensity with which they approach mitigation measures. This assertion is supported by the findings of studies such as those conducted by the United Nations Development Programme (UNDP 2013), Kato & Charoenrat (2018) and Josephson et al. (2017). Nevertheless, there are instances in which experience does not appear to be significantly associated with preparedness behaviour (Zin Mar Than et al. 2023).

The preparedness aspects that were the focus of the study (see Tab. 4) were divided into four categories, and the relationship between enterprise characteristics and the aspects contained within these categories was analysed. The four categories are:

- Disaster prevention measures (in general): The measures in question are of a common nature and are intended to be utilised in the event of a disaster (e.g. fire extinguishers).
- Insurance activities: Insurances have been shown to play a pivotal role in the mitigation of the impact of disasters on enterprises.
- Digitalisation: This is a subject of increasing importance in the context of business activities. Nevertheless, this can also render enterprises vulnerable, which may result in additional risks.
- Social cohesion: In the context of Myanmar society, the provision of assistance and the receipt of donations by neighbours have been identified as significant components in the collective efforts to overcome the consequences of disasters.

5.4.2 Procedure for analysing the relationships

It is evident that both the enterprise characteristics variables and the variables for disaster prevention measures are all categorical in nature. Therefore, a contingency table analysis was utilised to assess the correlations between enterprise characteristics and disaster risk reduction aspects. All tests were conducted with a significance level of 5% (sig. <0.05) or 1% (sig. <0.01). The evaluation of preparedness is conducted through the utilisation of a 6-point rating scale. In order to fulfil the prerequisites for the

Tab. 4: Enterprise characteristics and preparedness aspects – a contingency table analysis

	Enterprise characteristics											
	Economic sector		Enterprise size		Enterprise age		Age of the owner		Gender of the owner		Disaster experience	
Aspect	C	sig.	C	sig.	C	sig.	C	sig.	C	sig.	C	sig.
Preparedness activities (general)												
Emergency plan	0.3315	*	0.2588	*	0.1459		0.1006		0.0145		0.1453	
	n=201		*n=297*		*n=277*		*n=297*		*n=296*		*n=296*	
Exercise for employees (drill)	0.1489		0.1189		0.2490		0.0656		0.1345		0.3072	**
	n=162		*n=239*		*n=232*		*n=239*		*n=238*		*n=238*	
Frequency of revision of the plan	0.8565	**	0.1197		0.1704		0.2474		0.1913		0.0496	
	n=149		*n=212*		*n=206*		*n=212*		*n=212*		*n=211*	
Degree of preparedness (enterprise)	0.3428		0.2407		0.1979		0.1789		0.1682		0.3637	**
	n=194		*n=287*		*n=272*		*n=287*		*n=286*		*n=286*	
Insurance activities												
Number of insurance policies	0.2651		0.2521		0.2272		0.2141		0.1687		0.3855	**
	n=192		*n=282*		*n=263*		*n=282*		*n=281*		*n=282*	
Frequency of the insurance review	0.3760		0.3181		0.2543		0.1056		0.0832		0.1526	
	n=114		*n=172*		*n=165*		*n=172*		*n=171*		*n=172*	
Digitisation												
Frequency of data backup	0.3679		0.2123		0.2992		0.1917		0.1539		0.2873	*
	n=182		*n=271*		*n=258*		*n=271*		*n=270*		*n=270*	
Recovery from data loss	0.3178		0.2142		0.1913		0.1003		0.1383		0.1896	
	n=188		*n=281*		*n=267*		*n=281*		*n=280*		*n=280*	
Social cohesion												
Relationship in the neighbourhood	0.2565		0.1683		0.1681		0.2999	**	0.2187		0.3234	**
	n=192		*n=286*		*n=274*		*n=286*		*n=285*		*n=285*	
Networks in the neighbourhood	0.1120		0.1298		0.1473		0.1245		0.0575		0.1864	*
	n=200		*n=295*		*n=275*		*n=295*		*n=294*		*n=294*	
Volunteering in civil protection	0.2508		0.2456	*	0.0407		0.2497		0.2507	**	0.0587	
	n=198		*n=290*		*n=270*		*n=290*		*n=289*		*n=289*	
Dependence on support from the state or civil society organisation	0.3897	*	0.2823	*	0.2036		0.1553		0.2228		0.3330	**
	n=191		*n=284*		*n=267*		*n=284*		*n=283*		*n=283*	

* = sig. 0.05 ** = sig. 0.01

tests (e.g. cell frequency ≥ 5), such variables were converted into variables of a 4-point rating scale (by combining neighbouring categories, e.g. the first two and the last two categories). All calculated contingency coefficients *C* were normalised in accordance with the specified protocol:

$$C_{corr} = \frac{C}{C_{max}} = \sqrt{\frac{X^2}{X^2+n} \cdot \frac{k}{k-1}}$$

with k = min (r*, c*) (r*= number of rows, c* = number of columns)

It can thus be concluded that the contingency coefficients are comparable and independent of both the sample size and the number of cells. In the ensuing discussion, these coefficients are designated as *C* for the sake of brevity.

In relation to the enterprise characteristic 'economic sector of the enterprise', it should be noted that some enterprises assigned themselves to more than one economic sector. Consequently, the 'economic sector of the enterprise' is a phenomenon of multiple responses and not a variable in the statistical sense, which assigns only one value to each unit (= enterprise/respondent). Consequently, the application of numerous statistical procedures – including contingency table analyses – is rendered unfeasible. Therefore, a novel variable, designated as the 'economic sector of the enterprise' was delineated as follows: The analysis was conducted exclusively on enterprises that had allocated themselves to a single economic sector.

A total of 297 enterprises provided responses to the question regarding their classification within an

economic sector. Of these enterprises, 59 enterprises assigned more than one economic sector, while 238 assigned their enterprise to only one economic sector. The new variable 'economic sector of the enterprise' encompasses exclusively those enterprises falling within this category. The post-reduction proportions of the economic sectors were found to be largely comparable to their pre-reduction counterparts. Consequently, the reduction does not result in a substantial alteration of the sample. In light of the fact that a number of enterprise sectors were only mentioned by a small number of enterprises, the contingency analysis was only undertaken for those sectors in which a greater number of enterprises were included than in other sectors. That is to say, the proportion should be approximately 10% of the total number of enterprises (= 238). The reduction procedure resulted in the identification of five distinct sectors: business-related services, hotels/restaurants, manufacturing, retail and consumer-related services. These sectors exhibited a significantly higher proportion than the others.

5.4.3 The relationship between enterprise characteristics and aspects of preparedness

The contingency coefficients and the significance information (Tab. 4) demonstrate that there is a negligible relationship between the enterprise characteristics and the preparedness aspects, with the exception of a reasonable extent for the characteristic 'disaster experience'. In particular, the characteristic 'enterprise age' has no significant relation with the preparedness aspects, and 'gender of the owner' and 'age of the owner' each show only one significant correlation. The characteristics 'enterprise size' and 'economic sector' demonstrate only a minimal degree of significant correlation. The correlation between 'enterprise size' and activities relating to insurance or digitalisation is negligible. However, it has been demonstrated that 'enterprise size' is associated with the implementation of an emergency plan. In the context of one-employee enterprises, such plans were virtually non-existent; in medium-sized enterprises (more than 30 employees), such plans were disproportionately common. In addition, a mere three significant correlations have been identified in relation to the 'economic sector' (sig. <0.05). These are as follows: the emergency plan, the frequency of revision of the plan, and the dependence on support from the state and civil society organisations. A disproportionately low number of enterprises in the business-related services sector revised their emergency plan on an annual basis; a significant proportion only revised them every three years or after an even longer period of time. In contrast, a smaller proportion of hotels and restaurants conducted a revision on a triannual basis. There was no evidence of disproportionate distribution in the other sectors. With regard to the emergency plan, the correlation was primarily attributable to the 'retail trade' sector, where a disproportionately high number of enterprises lacked an emergency plan, while there was no disproportionate distribution in the other sectors. In relation to the question of reliance on state support, a disproportionately high proportion of manufacturing enterprises stated that they relied sufficiently on this support. Conversely, a disproportionately low proportion of enterprises expressed reliance to a sufficient or very good extent. Enterprises in the consumer-related services sector were found to be disproportionately less reliant on state support. Therefore, the manner in which enterprises within distinct economic sectors respond to state support varies considerably. In some sectors, state support is frequently received, while in others, it is seldom granted.

The 'disaster experience' emerged as the sole enterprise characteristic that was frequently and significantly associated with preparedness aspects. It was found that more than half of the twelve aspects exhibited a significant (sig. <0.05) or highly significant (sig. <0.01) correlation. A substantial degree of correlation was identified among the elements constituting the four aforementioned preparedness categories. The correlation was such that enterprises with experiences were disproportionately likely to demonstrate good preparedness. For instance, training for employees (drill) occurred with a disproportionate frequency in enterprises with disaster experience, while enterprises without experience exhibited a disproportionate absence of insurance. It is not unexpected that enterprises with disaster experience allocated a higher rating to the neighbourhood relationship. The findings pertaining to the inquiry into the enterprises' reliance on support from state organisations or CSOs are noteworthy. Enterprises with prior experience of a disaster were disproportionately likely to express a degree of reliance on their support, either to a considerable extent or only to a minor degree. Concurrently, a disproportionately low number of such enterprises expressed the opinion that they could not rely on it at all or only to a limited extent. In this respect, the responses were found to be mixed. Furthermore, the characteristic

'disaster experience' did not demonstrate a clear result in one direction.

In general, only the characteristic 'disaster experience' was often correlated with the preparedness aspects (7 out of 12 aspects), while this rarely occurred with the other characteristics. For instance, the characteristics 'economic sector' and 'enterprise size' demonstrated negligible correlation with the preparedness aspects. The results for the characteristic 'disaster experience' are readily interpretable, and demonstrate that disaster experience generally leads to improved preparedness behaviour.

6 Discussion

In Taunggyi, the disaster awareness and preparedness of MSMEs is found to be inadequately developed in a number of areas, irrespective of enterprise characteristics. With regard to straightforward risk-mitigation strategies, the maintenance of fire extinguishers is the most compelling measure. Maintenance is mandatory for enterprises to obtain and prolong their business licence, as asserted by experts (INT-15, INT-8) and in the Myanmar Fire Safety Code 2020 (Union of Myanmar 2020). Furthermore, the efficacy of hygiene checks is irrefutable. Despite the existence of insurance policies, these were not typically obtained for the purpose of disaster preparedness. The unique circumstances present in Myanmar may offer insights into the observed lack of insurance-related disaster preparedness. The insurance sector is not yet fully developed. Similar results are mentioned by Pathak & Ahmad (2016) for Thailand and Chinh et al. (2016) for Vietnam. Insurances have been shown to add substantially to costs (INT-16, INT-12), and as experts have noted, enterprises lack both the knowledge and the willingness to take out an insurance policy due to their unfamiliarity with the legal issues involved. With regard to the possession of knowledge, this is also applicable to financial assistance provided by the government. According to experts (INT-8, INT-15), enterprises are unaware of the application process and the relevant channels for doing so. In certain instances, enterprises may encounter difficulties in accessing or providing the necessary documentation, such as financial records, due to a lack of awareness regarding government support programmes. This phenomenon can be attributed to inadequate documentation practices among some enterprises (INT-2, INT-4). This finding aligns with the observation reported by Kapteyn & Saw Htay Wah (2016) and Pedraza (2021). While the majority of enterprises recognised the importance of digitisation, measures to secure data were often not satisfactory and backup copies were kept in the same place as the originals. While this may be an effective solution in the event of a computer failure, it is not adequate for addressing a disaster such as a flood or fire. In the context of disaster resilience, this approach necessitates modification to enhance resilience and redundancy (O'Rourke 2007). It was also evident that there were deficiencies in the disaster response plans and in the disaster information and communication systems. With regard to the latter, it is surprising that DAN, the official warning application for disasters in Myanmar, was not known to the majority of enterprises and was not used by almost all of them – even if they were aware of the application. The enterprises expressed a high degree of scepticism regarding the likelihood of receiving support from the government and other official institutions, a possibility that might ensue from the political change in Myanmar (INT-1). A further potential explanation could be that the enterprises were unable to provide the necessary documentation to the institutions (e.g. collateral, insurance) (INT-9, INT-12). Conversely, the assistance provided by the neighbourhood and local community was evaluated to a significantly higher degree, although this was not to an excessively elevated extent.

A number of reasons can be advanced to account for the dearth of awareness and preparedness. A lack of awareness regarding the potential risks is a salient concern. A further rationale pertains to the fact that a significant proportion of small enterprises are compelled to prioritise their daily operations in order to maintain their viability. The results from Asgary et al. (2020) for SMEs in Turkey – namely: SMEs appear to prioritise economic risks over environmental risks (e.g. extreme weather events, major natural disasters), are a concern that is also relevant for MSMEs in Taunggyi.

An examination of the characteristics of enterprises and their influence on preparedness measures revealed that enterprises' (and their owners') previous disaster experiences seem to have impacted many aspects of preparedness. Enterprises with prior experience of disaster were more aware and better prepared, and utilised a greater number of measures. For the remaining characteristics (namely economic sector, enterprise size, enterprise age, owner's age and gender), significant correlations could only be identified for a very limited number of aspects, or not at all (as in the case of the enterprise age). It is im-

portant to note that the analysis exclusively encompassed disaster preparedness aspects that are generally relevant to enterprises, as opposed to those that are very specific aspects and relevant only to certain types of enterprise.

The results obtained in this study are consistent with those of other studies, while others differ. For instance, Hewawasam & Matsui (2023) discovered in their study of the Colombo district (Sri Lanka) that the age and education of the owners are significant factors. In their study of small businesses in southern Mississippi (USA), Josephson et al. (2017) cite previous experience and the gender of the owner as characteristics that have an influence. In their study on enterprises in Thailand, Kato & Charoenrat (2018) also mention previous experience, alongside the economic sector and the size of the enterprise.

From a disaster risk management perspective, it would be ideal if all or at least the majority of the enterprises had a high level of disaster awareness and preparedness, with no differences depending on enterprise characteristics. The existence of these discrepancies suggests the presence of circumstances that render integrated disaster risk management more complex.

With regard to MSMEs, two deficits must be addressed in Myanmar to improve disaster risk management. Firstly, there is a pressing need to enhance disaster risk awareness and preparedness on a broad scale. Secondly, disparities in disaster risk awareness and preparedness must be levelled out. The Taunggyi case demonstrates that significant disparities exist with regard to experience, i.e. enterprises lacking disaster experience exhibit a lower level of awareness and preparedness.

However, it is imperative to explore strategies that could motivate enterprises to enhance their disaster preparedness investments. From an enterprise's perspective, it may even be rational to disregard disaster-related issues. This phenomenon has been termed a wait-and-see strategy (Neise & Revilla Diez 2019). It is acknowledged that implementing such measures would result in additional expenses; however, it is asserted that, to date, the existing approach has proven effective without necessitating the implementation of costly measures. It is evident that the provision of further information pertaining to disasters and their deleterious consequences would undoubtedly constitute a preliminary, yet pivotal, measure in fostering enterprise awareness of disasters in general, their ramifications, and the methodologies by which they can be addressed. This could result in a heightened awareness and increased readiness among enterprises to prepare for disasters, thereby enhancing their resilience. In addition to the implementation of knowledge-promoting campaigns, the provision of government support programmes to assist enterprises in implementing disaster preparedness measures would be advantageous. This could contribute to facilitating a shift in corporate behaviour, encouraging enterprises to adopt a more proactive stance on disaster preparedness. However, the feasibility of implementing such incentives in Myanmar remains uncertain, given the prevailing circumstances. Furthermore, the extent to which enterprises would proactively adopt incentives to enhance their disaster preparedness remains to be ascertained. The recent earthquake in the Mandalay, Sagaing and Nay Pyi Taw areas, which was of a significant magnitude, may serve as a strong impetus for enterprises in Taunggyi and other regions to enhance their disaster preparedness activities.

7 Concluding remarks

The present study focuses on the disaster risk awareness and preparedness of MSMEs in a single regional city, Taunggyi. In light of the pervasive multiple disaster risk situation in Myanmar, it can be posited that the identified deficiencies are likely to be applicable to MSMEs in other cities and towns in Myanmar. However, it is also probable – in accordance with the assertion by Josephson et al. (2017) – that the deficits in other cities may manifest differently, for instance, in terms of enterprise characteristics or particular forms of risk.

It is acknowledged that the results of this study are not generalisable to other cities. However, the study can act as a model for similar research in other cities. It is asserted that these measures are indispensable in order to obtain reliable information about the disaster risk awareness and preparedness levels of MSMEs, and in order to support the implementation and improvement of MSME-based integrated disaster risk management. This study can be regarded as a first contribution to the field in Myanmar. Furthermore, the article provides an initial overview of a topic that encompasses several scientifically relevant aspects that merit further exploration. (a) In the present study, the exclusive inclusion criterion applied was that of registered enterprises. It is evident that a greater proportion of enterprises are to be found in the informal sector, where financial backing and business conditions are often more challenging. The incorporation of such enterprises is precluded by the prevailing circum-

stances. (b) A detailed analysis of the contributions of social cohesion to MSME disaster risk resilience should be conducted in the immediate aftermath of a disaster, as this would provide valuable insights based on relatively recent experiences and evaluations. This would contribute to the better integration of this aspect into MSME-based integrated disaster risk management. (c) Furthermore, it is imperative to undertake a thorough examination of the reasons why formal assistance, such as credits or government aid, was not extensively sought following a disaster. The following research questions are proposed: Does assistance of this kind occur with infrequency in Myanmar, and if so, what are the underlying causes? Are enterprises unaware of the existence of such assistance, or are they unable or unwilling to apply for it? Which potential obstacles (e.g. the provision of collateral, interest rates) are in existence, and are they excessive? The growing impact of multiple risks, which is manifesting itself primarily in densely populated cities as increasing threats to societies, economies, infrastructure and ecosystems, makes adaptation measures essential, and, likewise, greater disaster risk awareness and preparedness. Whilst increasing attention has been paid in recent years to institutions, private households and infrastructure, much less is known to date about the extent to which the private sector – and in particular micro, small and medium-sized enterprises (MSMEs), which are numerically dominant in many economies – acts as a driving force for greater resilience through improved adaptation to a wide range of risks. The same applies to the question of how aware and prepared these MSMEs specifically are regarding multiple risks. This is noteworthy insofar as these enterprises bear the brunt of the economic consequences of disasters and thus play a decisive role in the improved resilience of societies and, ultimately, greater resilience of cities, entire regions and economies. Many developing and emerging economies are of particular focus here, as multiple risks in these countries are compounded by a range of other fundamental challenges. To date, only a few publications have focused on gaining a deeper understanding of the awareness and preparedness of MSMEs. Improving both strengthens the resilience of societies and economies. The socio-economic success and resilience of nations are also significantly influenced by the extent to which countries are able to manage multiple risks, mitigate them and capitalise on the opportunities that increased disaster risk awareness and preparedness bring at many levels.

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