BUSINESS DISASTER PREPAREDNESS OF SMES: A SURVEY STUDY IN METU TECHNOPARK

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# ABSTRACT

## BUSINESS DISASTER PREPAREDNESS OF SMES: A SURVEY STUDY IN METU TECHNOPARK

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Small and Medium Enterprises have an important role in the economy of Turkey and the economic contribution of these businesses is significantly high. However, SMEs encounter financial, conjectural and disaster related risks. Since disasters are frequently occurred events in Turkey and SMEs are vulnerable to the disasters, this situation affects the businesses negatively. For this reason, organizations must take precautions against disasters to minimize these effects. The aim of this study is to contribute to the literature by investigating the factors affecting the business disaster preparedness.

Previous studies have investigated the effects of *firm size*, *firm age*, *ownership of property*, *financial condition*, *previous disaster experiences*, *source of initial capital*, *risk perception* and *gender* on the total disaster preparedness level of the companies. Different from the past studies, a new variable namely *source of initial capital* was added in this study and the impact of this variables on disaster preparedness was examined.

In order to test which factors are influential in business disaster preparedness of SMEs, questionnaires were applied to the top level managers of the SMEs in METU Technopark which is located in Ankara, Turkey. There are approximately 300 companies operating in METU Technopark currently and the top level managers of

60 of them responded the questionnaires. Using this collected data, the hypotheses were tested by multiple regression analysis.

Results of the study demonstrated that firm size, previous disaster experiences, perception of *probability of being damaged from possible disasters* have a positive impact on disaster preparedness. In addition, female managers are found to take precautions in their organization compared to males. Finally, it was observed that companies which use self accumulation as a source of initial capital are more prepared to disasters.

Keywords: Small and Medium Enterprises, Disaster Preparedness, Technoparks

# ÖZ

KOBİ'LERİN AFETLERE HAZIRLIKLI OLMASI: ODTÜ TEKNOKENT'TE
BİR ANKET ÇALIŞMASI

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Küçük ve Orta Büyüklükteki İşletmeler (KOBİ) Türkiye ekonomisinde önemli bir role sahiptirler ve bu işletmelerin ekonomik katkıları dikkate değer bir biçimde yüksektir. KOBİ'ler finansal, konjonktürel ve afetlerle alakalı risklerle karşılaşmaktadır. Türkiye'de afetler sık rastalanan vakalar olduğu ve KOBİ'ler afetlere karşı hassas oldukları için, bu durum işletmeleri olumsuz olarak etkilemektedir. Bu sebepten dolayı, bu etkileri minimize etmek için organizasyonlar önlem almak zorundadırlar. Bu çalışmanın amacı afetlere karşı hazırlıklı olma durumunu etkileyen faktörleri inceleyerek literature bir katkı yapmaktır.

Önceki çalışmalar, *firmanın büyüküğü*, *firmanın yaşı*, *varlıkların sahipliği*, *finansal durum*, *önceki afet deneyimleri*, *sermaye yapısı*, *risk algısı* ve *cinsiyetin* şirketlerin afetlere hazır olma seviyeleri üzerindeki etkilerini incelemişlerdir. Geçmişteki çalışmalardan farklı olarak, bu çalışmada başlangıç sermayesin kaynağı adıyla yeni bir değişken eklenmiştir ve bu değişkenin afetlere hazırlıklı olma üzerindeki etkisi incelenmiştir.

KOBİ'lerin afetlere hazırlıklı olmalarında etkili olan faktörleri test etmek için, Ankara, Türkiye'de yer alan ODTÜ Teknokent'teki KOBİ'leri üst seviyedeki yöneticilerine anketler uygulandı. ODTÜ Teknokent'te şu anda yaklaşık olarak 300 şirket faaliyet göstermektedir ve bu şirketlerdeki 60 yönetici anketleri cevaplamıştır.

Toplanan bu verileri kullanarak, çoklu regresyon analizi ile hipotezler test edilmiştir.

Çalışmanın sonucu *firma büyüklüğünün*, *önceki afet tecrübesinin*, *olası afetlerden* ve *zarar görme olasılığının algısının* afetlere hazrılıklı olma üzerinde pozitif etkisinin olduğunu gösterdi. Ek olarak, kadın yöneticilerin organizasyonlarıdan erkeklere kıyasla daha fazla önlem aldıkları bulundu. Son olarak, Kendi birikimlerini başlangıç sermayesi olarak kullanan firmalararın afetlere daha fazla hazırlık oldukları gözlemlendi.

Anahtar Kelimeler: Küçük ve Orta Büyükükteki İşletmeler, Afetlere Hazırlıklı Olma, Teknoparklar

To My Family

# ACKNOWLEDGMENTS

# TABLE OF CONTENTS

# LIST OF TABLES

**TABLES**

# LIST OF FIGURES

**FIGURES**

# LIST OF ABBREVIATIONS

SME        Small and Medium Enterprises

SMIDO    Small and Medium Enterprises Development Organization

CEI         Compulsory Earthquake Insurance

VEI         Voluntary Earthquake Insurance

# CHAPTER 1

# INTRODUCTION

Enterprises are the commercial organizations which deliver the goods and services to the consumers. The ultimate target of those business entities is to maximize their financial profits to survive in highly competitive environments. Businesses are categorized into two parts as *big scale enterprises* and *small and medium enterprises* (SMEs).

Turkey is a developing industrial country with its 17th largest nominal GDP in the world (World Economic Outlook, October 2012). In this emerging economy, SMEs have been playing a significant role since they create 99.9% of all entrepreneurial attempts. According to the data of Turkish Statistical Institute, there are 1,858,191 enterprises in Turkey and the number of SMEs is around 1,856,340 which proves that SMEs constitute 99.9% of all enterprises (Turk Stat, 2012).

Different sources describes the definition of the "Small and Medium Enterprise" differently in the literature. Additionally, the scope of it can change from country to country. This academic research is specific to the SMEs in Turkey. For this reason, the declaration of the *Official Gazette of the Republic of Turkey* is used to be more consistent in this study. This notification on the official gazette reveals that the legislation which identifies *the definition*, *the characteristics* and *the classification* of Small and Medium Enterprises were revised and the revised legislation came in to operation (Official Gazette of the Republic of Turkey, November 4, 2012).

Table-1.1 summarizes the categorization of SMEs in a simple way. According to this table, SMEs are divided into three categories in terms of *their number of employees* and *annual net sales*. Micro Scale SMEs are the organizations that employees between 1 and 9 staff, and their annual net sales are less than TL 1,000,000

(included). Small Scale SMEs have from 10 to 49 employees and their yearly sales are between TL 1,000,000 (not included) and TL 8,000,000 (included). The last category is Medium Scale SME and the legislation points out that these enterprises hire from 50 to 249 employees and they generate between TL 8,000,000 (not included) and TL 40,000,000. As it is seen from the table, the number of employees in a commercial organization and the annual net sales are two important criterion for the definition of SMEs.

**Table-1.1:** Types of SMEs

| Types/Criterion | *Number of Employees* | *Annual Net Sales* |
|---|---|---|
| *Micro Scale SME* | 1-9 Employees | TL 0<X≤ TL1,000,000 |
| *Small Scale SME* | 10-49 Employees | TL 1,000,000<X≤ TL 8,000,000 |
| *Medium Scale SME* | 50-249 Employees | TL 8,000,000<X≤ TL 40,000,000 |

SMEs are one of the main drivers of economies and they are really important for the economic growth. With globalization, SMEs became more important than big scale companies all over the world (Ozsagir, 1999). Following table is prepared to demonstrate the importance and the contribution of the SMEs from different countries. It reports the percentage of the SMEs in all kind of enterprises and the percentage of employment that they provide to the economies. This table simply represents that in many countries, between 96% and 99% of all business are SMEs and they provide from 36% to 82% of total employment in different countries (OECD SME and Entrepreneurship Outlook, 2005).

SMEs play a significant role in Turkish economy and the statistics about these organizations prove why they are important. Considering manufacturing and service sectors, SMEs constitute 99.8% of all enterprises in Turkey. In addition this, 76.7% of the total employment opportunities and 26.5% of the total value addition of Turkey are generated by SMEs. Due to this fact SMEs have a crucial impact to create

new employment opportunities and help to solve unemployment problem (OECD SME and Entrepreneurship Outlook, 2005). Following table is prepared to demonstrate the importance and the contribution of the SMEs from different countries. Considering this table, in many countries, between 96% and 99% of all business are SMEs. However, when the total number of employees working SMEs is considered, there are variations among countries. For example, in Japan 81.4% of total employment is generated by the SMEs. This number is higher compared to Turkey because SME policies of Japan started to give importance of SMEs after World War II. Small and Medium Enterprise Agency was established in 1948 in Japan, whereas Small and Medium Enterprises Development Organization in 1990 which means 42 years after Japan (SMIDO, 2014). For this reason, it could be normal to see in Japan; SMEs generate more employment opportunities on percentage basis compared to Turkey since Japan started to make policies on SMEs before Turkey (Small and Medium Enterprises Agency, 2014).

**Table-1.2:** SME Statistics

| Countries/Percentages | Total Number of SMEs/Total Number of Enterprises (%) | Total Number of Employees in SMEs/ Total Employment (%) |
|---|---|---|
| USA | 97.2 | 50.4 |
| Germany | 99.8 | 64.0 |
| India | 98.6 | 63.2 |
| Japan | 99.4 | 81.4 |
| England | 96.0 | 36.0 |
| S. Korea | 97.8 | 61.9 |
| France | 99.9 | 49.4 |
| Italy | 97.0 | 56.0 |
| Turkey | 99.8 | 76.7 |

SMEs are the most dynamic area in Turkey. They operate almost all of the fields in manufacturing and service industries. Most of them are operating in agriculture, machine, metal working, clothing, textile, retail trade, transportation, food, plastic and rubber production and furniture sectors. Most of these organizations are located

in İstanbul, İzmir, Bursa, Denizli, Gaziantep, Kayseri and Eskişehir. For this reason, they are the main economic driver of the country and they can be taught as the backbone of this structure (Ozbek, 2008).

The production method of the SMEs is flexible. This is because SMEs can adopt themselves to the changes in the market and they can easily position themselves. They produce high quality goods and services with low cost strategy. This provides economic balance and with this advantage they can achieve sustainable production (Ozdemir, Ersoz and Sarioglu, 2007).

Their contribution to export is very critical for Turkey's potential economic development. Along with providing input to the export of the country, they have a positive effect on the trade balance of Turkey (Yilmaz, 2004). 62.6% of the total export of Turkey is created by SMEs in 2012 (Turk Stat, 2013). In addition to this, when the foreign trade statistics of Turkey are analyzed, it can be observed that 53.3% of the export to the European countries and 32.6 % of the export to the Asian countries were carried out by the SMEs (Turk Stat, 2012).

In addition to abovementioned benefits of the SMEs to Turkey's economy, these businesses have some social such as removing the regional inequalities, preventing the migration and protecting the environment (SPO, 2000).

Last but not least, statistics exhibits that SMEs in Turkey spent TL 1.376 billion to research and development activities. Total research and development expenditure is TL 9.268 billion in 2010, in other words 14.9% of research and development activities are carried out by SMEs. Moreover, 50.8% of SMEs create new various kinds of technological innovations Furthermore, 23.5% of R&D personnel in entire Turkey are employed by SMEs in 2010 (Turk Stat, 2012).

SMEs encounter various types of risks namely financial, conjectural and the probability of facing with disasters. Disasters can affect the businesses negatively and organizations must take precautions against disasters. For this reason, disaster preparedness is a very important issue for SMEs. The most fateful natural disasters

can be simply classified as earthquakes, snow avalanches, floods, drought, landslides and rock falls. The frequency and the damage of natural disasters vary from geography to geography. Considering Turkey, natural disasters happen frequently and they damage the economic and social life significantly. However, earthquakes are the most destructive natural disasters (Ergunay, 2007).

Technoparks are the places where the universities and the industry cooperate to achieve common goals. Innovation and R&D activities take place in technoparks. The number of technoparks is increasing everyday and the importance of them is grasped. Most of the companies start to collaborate with the universities and they benefit from the advantages of the technoparks (Keles and Tunca, 2010). According to Association of Turkish Technology Parks, there are 32 active technoparks in Turkey and METU Technopark is one of them. Almost all of the operating enterprises are SMEs in METU Technopark.

The purpose of this study is to investigate the factors affecting the organizational disaster preparedness of SMEs because their economic contribution to Turkish economy is high and these businesses are really sensitive to the disasters. To achieve this goal, it was taken the advantage of past disaster studies of several scholars. Benefiting from previous studies, a conceptual model is established. The impacts of *firm size*, *firm age*, *ownership of property*, *financial condition*, *previous disaster experiences*, *source of initial capital*, *risk perception* and *gender* on disaster preparedness were studied by previous scholars. This conceptual model is modified by adding a new variable which is called as source of initial capital. This modified conceptual model make this research different from the others.

Earthquakes are one of the most destructive occurring disasters in Turkey. There were 99 earthquakes which has a magnitude between 6.0 and 6.9 happened in Turkey from 1990 to 2005. (Milliyet, 2005). Not only the big scale companies, but also SMEs are affected negatively from these fatal disasters. For this reason, different from previous studies, earthquake specific disaster preparedness questions are included in a questionnaire to understand SMEs' disaster preparedness level. In this

research, disaster preparedness of SMEs is specifically measured by an index that consists 20 preparation items.

There are almost 300 enterprises operating in METU Technopark and a questionnaire is designed based on past studies and applied to 60 top level managers of SMEs in METU Technopark in Ankara, Turkey. The data which was obtained via questionnaires was analyzed in Microsoft Excel and SPSS. Multiple linear regression models were used to test the hypotheses and 7 different models were examined to understand which factors are influential on disaster preparedness of SMEs.

Useful findings were reached at the end of the research for future studies. In the final model it was found that firm size, previous disaster experience, probability of damage perception has positive and significant relationship with our dependent variable disaster preparedness. In addition to this, gender is another significant variable meaning that companies with woman managers are more prepared. Finally, source of initial capital is the other significant variable which explains the variation in disaster preparedness.

Several businesses prepare plans for post-disaster recovery and applied some procedures in their organizations. However, the plans and precautions to be prepared for disasters, etc. and *business continuity management* should not be confused conceptually. These two concepts are not the same thing. Plans made to be prepared to disaster are one of constituent parts of the business continuity management (Cerullo V. and M. Cerullo, 2004).

There are several studies in literature about SMEs, but this study is the first study that investigates factors affecting disaster preparedness of SMEs in Turkey. Therefore, it is going to be a pioneer research for further studies. This is the first contribution of this study to the literature. Secondly, as distinct from previous studies the effect of a new variable called as *Source of Initial Capital* on disaster preparedness was measured. Finally, the effect of risk perception was investigated by 4 different variables which are *Risk Score, Probability in 10 Years, Maximum*

6

*Magnitude* and *Probability of Damage*. Details of those variables are explained in following chapters. In summary, it is expected that this study will be a base for future studies related to the business disaster preparedness.

# CHAPTER 2

# LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

## 2.1. SMALL AND MEDIUM ENTERPRISES AND TECHNOPARKS

The importance of SMEs in Turkish economy is explained in previous chapter. SMEs can operate in different industries such as agriculture, machine, metal working, clothing, textile, retail trade, transportation, food, plastic and rubber production and furniture. In addition to those sectors, it is possible to observe SMEs which are in software, hardware, and defense, telecommunication, and R&D businesses. SMEs operating in those industries are frequently located in different technoparks. That is why it is aimed to do a research in Technoparks with SMEs.

According to *Law on Technology Development Zones, Law No. 4691*, technoparks are the places where the companies produce technology or software by utilizing the resources of a specific university, an R&D center or a high technology institute. Companies collaborate with universities, R&D centers and high technology institutes and technological innovations are transformed into commercial products, methods or services in technoparks.

Law on Technology Development Zones, Law No. 4691 came into force in 2001. It was planned to build 43 different technoparks in Turkey following the declaration of this law. 32 of these technoparks begun their operations and 11 of them is going to be active businesses in the future. (Association of Turkish Technology Parks, 2014).

METU Tehnopark is the first technopark established in Turkey. It is located in the campus area of Middle East Technical University in Ankara. METU SMIDO Center, METU Halici Software, METU Twins Buildings, Silver Blocks, Silicone Block, SATGEB Buildings, OSTİM Center, Milsoft R&D Building, Gallium Block, METU

MET, SEM 2 and Turkish Telecom R&D Building are the technology development centers in METU Technopark. The main target of this technopark is to develop sustainable relationships between the university and the industry through developing innovative solutions. (METU Technopark, 2014).

A study prepared by Batelle Technology Partnerships Practice (2007) identifies the benefits of the technoparks as following:

- Generating employment opportunities develop talented human resources and providing economic development.
- Supporting and encouraging entrepreneurship, incubation and economic competitiveness for regions.
- Developing relationships between universities and industries, cooperating firms and partners and creating international partnerships.
- Leading to technology development and Financing commercial innovative ideas.

## 2.2. BUSINESS CONTINUITY AND BUSINESS DISASTERS PREPAREDNESS

### 2.2.1. Definition of Business Continuity and Business Continuity Management

Businesses encounter many types of problems and difficulties which interrupt, stop or impede their operations while offering services, producing products and providing value added to the economy. Both big scale companies and SMEs experience those problems that cause the businesses to interrupt or completely stop. The way of dealing with these troubles and risks is called as "Business Continuity Management" (Woodman, 2007).

The concept of business continuity has been identified in different sources in different ways. The businesses competence of working against any event with the potential to disrupt to deliver products and services to the users is called as business continuity (ISO 22301, 2012). In other words, it is all the actions which are taken to ensure the sustainability of the critical business process of an enterprise (Dinckan, 2008).

9

**2.2.2. Types of Business Risks**

Businesses face many risks and those risks cause tasks to be incomplete, pause or sometimes delay. These risks can be divided into 7 categories as ***natural disaster risks*** (earthquake, hurricane, fire, etc.), ***human-induced risks*** (wars, terrorist attacks, etc.), ***financial risks*** (credit risk, bankruptcy risk, liquidity risk etc.), ***operational risks*** (disruptions in production, problems faced with suppliers, problems in distribution channels), ***strategic risks*** (demand fluctuations economic cycles, etc.), ***information risks*** (inaccurate information, unauthorized people's access to the confidential information, cyber attacks, etc.) and ***compliance risks*** ( possible penalties due to the incompatibility to laws and regulations and etc.) (Hiles, 2011).

*August 17, 1999 Marmara Earthquake*, *November 20, 2003 Bomb Attack to Istanbul HSBC Bank Headquarters, September 9, 2009, Flood Disaster in the Marmara Region*, *October 23, 2011 Van Earthquake*, *and May 13, 2014 Soma Mine Disaster* could be given as examples of events that have occurred and affected businesses in Turkey in the last 15 years. However it is serious to note that some of those examples, the earthquakes and floods are related to natural disasters, on the other hand the bomb attack and the mines disaster could be given human-induced risks which damage the social and economic life negatively.

When risks mentioned in previous page are taken into consideration individually, threat of these risks varies for the businesses in different sectors. For example, financial risks are more important than other risks for a commercial bank (Goodhart, 2008). However, natural disaster risk for an oil refinery is more hazardous compared to other threats (Hiles, 2011). For this reason, it is natural to see various business continuity strategies for different organizations because their priorities and conditions are distinctive.

### 2.2.3. Business Continuity Planning

The best way to manage the business continuity in organizations is making a comprehensive business continuity plan. These business continuity plans will differ in scope and intensity based on what type of risks mentioned above firms are exposed to.

The result of a survey covering 37 public institutions in 2005 in Turkey related to the concept of "Business Continuity Management" reveals that only 11% of those establishments have a business continuity plan (Dinckan, 2008). Whereas, 261 medium scale and large scale companies attended to a research done in the USA and Canada and at end of the survey it was concluded that 52 % of them have business continuity plan (Rood, 2006).

Due to its geographical structure and location, Turkey is located in an area where the probability of disaster occurrence is high. Turkey is a country where earthquakes, landslides and floods are often seen (Ergunay, 2007). Hereby, being prepared for the disasters and minimizing the negative impacts of them have gained importance as disaster preparedness is a one of the significant parts of business continuity management.

Business firms in Turkey have only recently started considering business continuity. In a country where disasters are seen frequently, it is an incontestable fact that businesses need to give more importance to disaster management. Whereby they could minimize their possible financial losses and provide continuity of their service and protect their company's prestige and image. They can reach this goal by performing business continuity management. For this purpose, these businesses need to develop the required strategies and do action plans.

Organizations must be aware of the benefits of having a comprehensive business continuity plan. According to the study of Hiles (2011), these benefits can be listed as followings:

- The effects of the hazards could be minimized by identifying the risks correctly.

- Organizations which have business continuity plans become more resilient to the unexpected events. Business continuity plans make the capacity to recover rapidly from unexpected incidences improved.

- The period of interval time between damage and recovery can be reduced.

- Some industries are highly regulated and business in those industries is expected to meet the legal standards. For example, the effects of those standards can be observed in food, finance and pharmaceutical industries. Hence, Business continuity plans provide the compliance with legal obligations.

- Some businesses are dependent to the activities of other businesses and relationship with other partners sometimes become critical. The Business continuity plans build up the business insight and the philosophy of companies.

Corby (2010) shows the advantages of possessing a business continuity plan with a simple graph below. Unexpected events affect the financial performance, reputation and relationship with third parties negatively. Figure-2.1 denotes that the severity of the negative impacts of unexpected events such as disasters can be minimized through having a business continuity plan. Briefly, if the companies figure out the effectiveness of those plans and put the necessary actions into practice, speed of recovery time decreases and organization benefits from the business advantage.
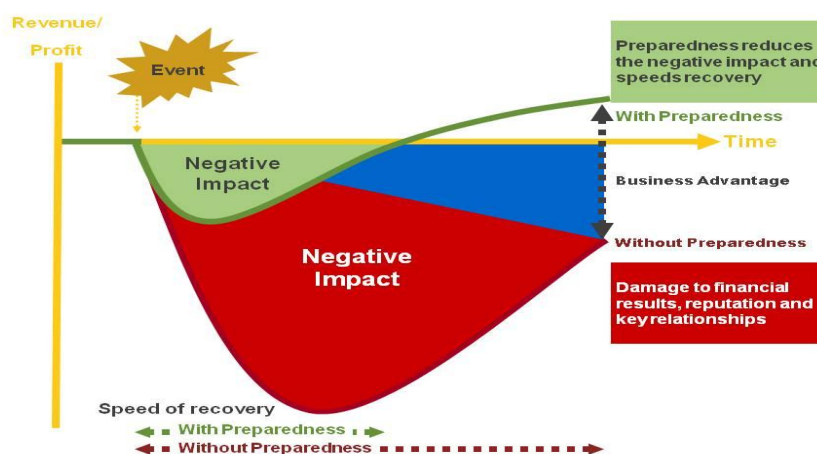


**Figure 2.1:** Impact of Business Continuity on Businesses (Corby, 2010)

12

The basis of the study is disaster preparedness. For this reason, it is focused on disaster side rather the other concepts. As it is stressed, disaster occurrence is really high in Turkey and the social and economic impacts of them are destructive. The most frequent and devastating disaster is the earthquakes. According to earthquake statistics of Kandilli Observatory and Earthquake Research Institute, 759 earthquakes were recorded having a magnitude between 5.0 and 5.9 on Richter Scale basis starting from 1990 to 2005 Turkey (Milliyet, 2005). Therefore, considering all of the disasters, earthquakes are going to be the most dangerous hazard which affects the society negatively (Erdik, 1999).

Following figure tries to summarize the logic of business continuity planning. Identification A business owner should understand what the key assets of the company are, which services are vital, what type of threats and risk can damage to the company. When business continuity plan is covered, most of the owners of companies take only the disasters into consideration, but this is an imperfect approach. Apart from natural disasters (earthquakes, hurricanes, floods), companies may face with different threats namely accidents (fire, utility outage), malicious attacks (sabotage, terrorism and cyber attacks, market trends (relationship with suppliers and competitors, consumer trends) and political risks (legislation issues). In summary, first, the likelihood and severity of the risk must be identified. Then, alternative mitigation options which are avoidance, reduction and transfer of the businesses should be implemented. In addition, response and recovery plans for those unexpected threats must be prepared. Furthermore, communication with staff and their training is other significant element of risk planning. Last but not least those plans must be reviewed frequently. In short, the plans must be prepared in parallel with all of those risks. Being prepared to the disasters is a subset of business continuity planning.
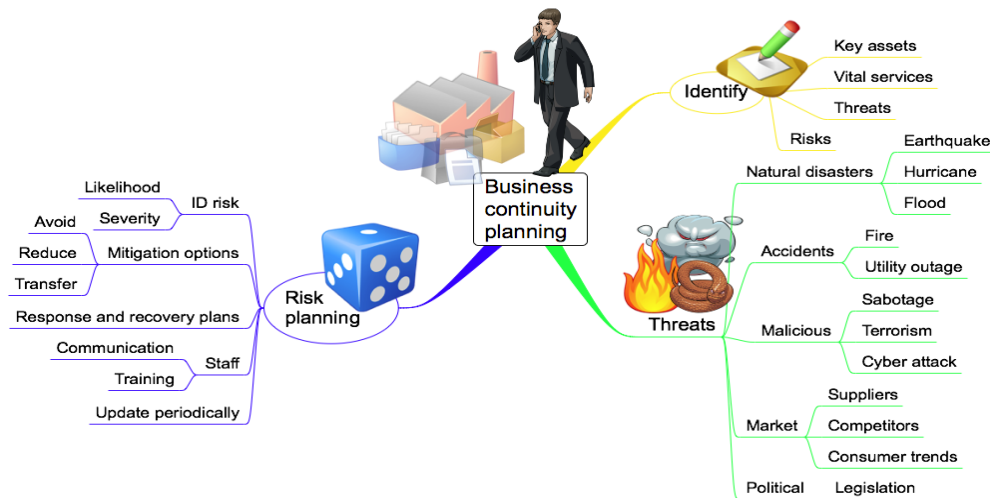
**Figure-2.2:** Business Continuity Planning (Novamind, 2011)

## 2.3. DISASTERS

### 2.3.1 Definition and Type of Disasters

There is not only one definition of disasters. Different resources describe the definition of the disaster differently. According to Hallegate and Przyluski (2010), disasters are the natural incidents that negatively affect the economic structure. The negative impacts can be observed in supply-demand relationships, employment and consumption. Earthquakes, hurricanes, drought can be given as examples.

Disaster can be divided into two categories which natural disasters and man-made disasters. Natural disasters consist of earthquakes, volcanoes, floods, avalanches, tornadoes, typhoons, cyclones. On the other hand, the origin of man-made disasters is not the nature. Nuclear leaks, chemical leak, terrorist attacks and accidents are caused by people. March 11, 2011 Tōhoku earthquake and tsunami in Japan is a natural disaster, whereas September 11, 2001 terrorist attacks to the World Trade Center is an example of man-made disaster (American Red Cross, 2008).

## 2.3.2. Impacts of Disasters

Disasters cause many unfavorable direct and indirect impacts. Those undesirable results might be in different context such as physical, social, psychological, economical and health-related. Followings are the summary of those unwanted influences:

- The major impact of the disasters is the physical harms. Human resources are influenced by injuries and deaths (Smith and McCarty, 1996).

- It is observed that work performance of employees in professional business life tends to deteriorate after disasters since they have emotional disorders (Lutgendorf, Antoni, Ironson, Fletcher, Penedo, Baum, Schnelderman, and Klimas, 1995).

- People can be influenced psychologically after disasters. They lose their families and close relatives. Therefore, the number of psychological trauma cases increase in the post disaster periods (Chou, Huang, Lee, Tsai, Tsay, Chen, and Chou, 2003). In addition to this, people who lose their homes and assets in disasters are suffering from psychological distress (O'Neill, Blake, Bussman, and Strandberg, 1999).

- The number of infectious and non-infectious diseases rise dramatically (Ali, 2007)

- Disasters lead to increase poverty in the society and affect economic development negatively (Raschky, 2008). Productivity levels in the different sectors tend to decline due to these unexpected events (Popp, 2006). In addition to this, unemployment rate increases in the economy. Hence sudden population movements are recorded in post-disaster periods. Moreover, macroecomic variables are affected negatively. For example, balance of payments deteriorate.(Ergunay, 2009)

- After the disaster, many workplaces and buildings are damaged. The structures exposed to damage, should be restored or repaired to be utilized like in the pre-

disaster period. Hence, many type of maintenance costs and extra costs arise (Petrucci, 2012).

## 2.3.3. The Disaster Profile of Turkey

In order to display the disaster profile of Turkey, following table is constructed. Table-2.1 lists 13 different disasters, places, dates fatalities, effected population and economic loss where occurred in Turkey between March 13, 1992 and May 1, 2003. When these numbers are analyzed deeply, it can be inferred that earthquakes are the most frequently happening hazards in Turkey. 17 August, 1999 İzmir Gulf Earthquake led to fatal consequences. 17,440 people had lost their lives and totally 15,000,000 people in the society were affected. Due to this earthquake, $ 13 billion economic loss was recorded (Ergunay, 2007). Apart from this table, October 23, 2011 Van Earthquake was the latest devastating earthquake in Turkey's history and it caused 604 people to lose their lives and 2,608 people to get injured. In addition to this disaster, in November 9, 2011 other earthquake happened in Van and it led to 40 fatalities. Damage to Turkish economy of these two incidents was around 1 and 2 billion Dollars (Erdik, Kamer, Demircioglu and Sesetyan, 2012).

In last 70 years history of Turkey, 600,000 buildings suffered from different type of threats. 66% of those buildings were damaged by earthquakes. Floods damaged 15% of the buildings. The next harmful risky threat is landslides which negatively affects 10% portion. 7% of these structures are affected by rockslides. Meteorological events and avalanches affect 2% of the general sum (Ozkul and Karaman, 2007). Looking at the general picture, the earthquakes are most serious one causing 87,000 people to lose their lives since the beginning of 1900s. In the light of these statistics, it is concluded that earthquakes are the most disruptive natural disasters (Ergunay, 2007). Additionally, those disasters lead to huge losses in the economy. For example, one of the main reasons of 2001 economic crisis in Turkey is the earthquakes. The earthquakes happened in1999 brought $ 15 billion extra burden to Turkish economy. (Cakici, 2001)

**Table-2.1:** Major Disasters in Turkey between 1990 and 2003

| Type of Disaster | Place | Date | Fatalities | Effected Population | Economic Loss ($ Million) |
|---|---|---|---|---|---|
| Earthquake | Erzincan | March 13, 1992 | 653 | 250,000 | 750 |
| Avalanche | Southeastern Anatolia (14 incidents) | 1992 | 328 | 30,000 | 25 |
| Avalanche | Eastern Anatolia and Southeastern Anatolia (31 incidents) | 1993 | 135 | 3,000 | 10 |
| Mud Flow | Senirkent-Isparta | July 13, 1995 | 74 | 10,000 | 65 |
| Earthquake | Dinar | October 1, 1995 | 94 | 120,000 | 100 |
| Flood | İzmir | November 4, 1995 | 63 | 300,000 | 1,000 |
| Earthquake | Çorum-Amasya | August 14, 1996 | 0 | 17,000 | 30 |
| Flood | West Black Sea | May 21, 1998 | 10 | 1,200,000 | 1,000 |
| Earthquake | Ceyhan-Adana | June 27, 1998 | 145 | 1,500,000 | 500 |
| Earthquake | İzmit Gulf | August 17, 1999 | 17,480 | 15,000,000 | 13,000 |
| Earthquake | Düzce | November 12, 1999 | 763 | 600,000 | 750 |
| Earthquake | Afyon Sultandağı | February 3, 2002 | 42 | 222,000 | 95 |
| Earthquake | Bingöl | May 1, 2003 | 177 | 245,000 | 135 |
| **TOTAL** | | | **19,964** | **19,497,000** | **17,460** |

Turkey is divided into 7 different geographic regions and the geological features of each region are variant from each other. In order to comprehend the earthquake risk of these different areas an Earthquake Hazard Map was prepared by Ozmen, Nurlu and Guler (1997). This map is demonstrated in Figure-2.3 below. 5 different degrees are used to show the risk level in the map and they are represented with red, pink, yellow, light yellow and white respectively. The zones which are visualized in red are the most risky parts of the county. 66% of the land of Turkey is in located in I. degree and II. degree risk zones, in other words, 71% of the total population lives in I. degree and II. degree risk areas (Ergunay, 2007).
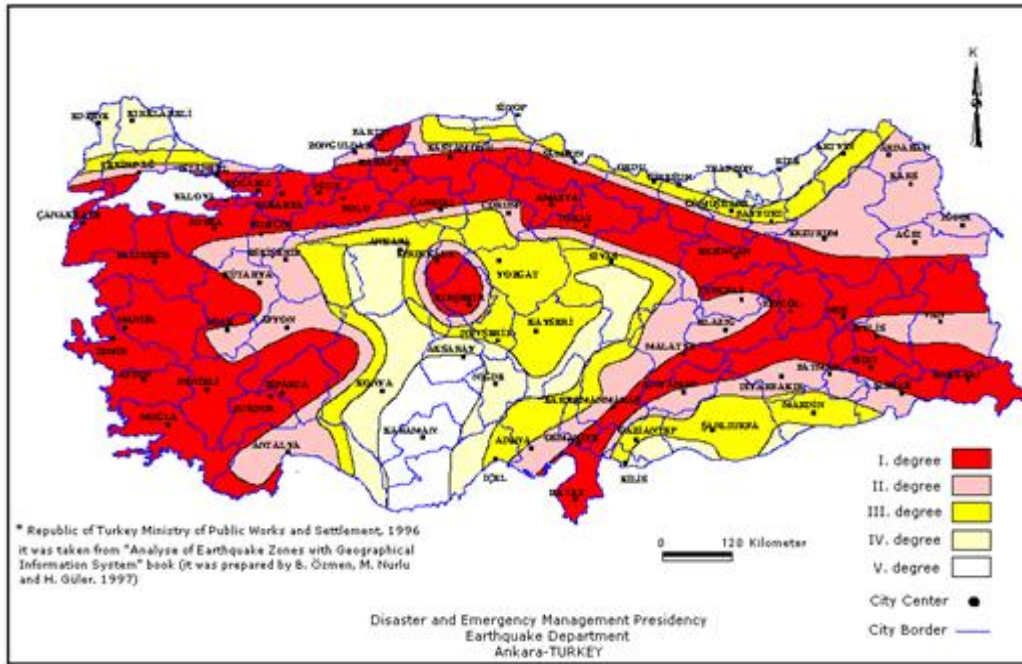
**Figure-2.3:** Earthquake Hazard Map of Turkey

## 2.4. CONCEPTUAL MODEL

In this study, a survey was conducted to the top level managers of the SMEs in METU Technopark. The survey design will be explained detailed in Chapter 3, but in order to construct a scientific questionnaire to measure which factors are influential, it was needed to have a conceptual model. To set up the conceptual model next we investigate the existing literature on disaster preparedness.

Han and Nigg (2011) developed an analytical framework by reviewing the past disaster literature. Figure 2-4 shows the conceptual model based on Han and Nigg's (2011) study. They categorized the factors affecting the business disaster preparedness into two components. The first component is organizational features which refer to firm size, firm age, location patterns, ownership of property, financial condition, sector differences and previous experiences. The second category is called as characteristics of decision makers including risk perception, gender and ethnicity. Those two components of model show the independent variables of the framework.

To test which factors are influential in business disaster preparedness, the next step was constructing a scientific survey based on conceptual model. By utilizing Han and Nigg's (2011) framework, the modified conceptual model was constructed in Figure in 2-5. The modified conceptual model is the basis of this study. All of the measurements were made and all of the questions in the questionnaire were prepared according to modified conceptual model.

There are some differences between the conceptual model in Figure 2-4 and modified conceptual model in Figure 2-5. The modified conceptual model contains two parts as well as the conceptual model: organization features and the characteristics of decision makers. In modified conceptual model, location patterns and sectors differences were removed. Because first, due to the fact that the study was made in METU Technopark, Ankara and all of the SMEs were located in METU Technopark, there are no different location patterns. For this reason it was thought that it might be more logical to remove it from the model. Second, sector differences were not added to the modified conceptual model. Instead of adding this variable to the model, this was measured by collecting statistics. The sector differences will be shown as descriptive statistic to understand the differences between the sectors which operate in METU Technopark. There is just one variable added to the conceptual model which shows the source of initial capital of the SMEs in METU. Technopark. SMEs use different type of financial sources when they start up the business. It was considered that it might be influential for the business disaster policy of the company. As the characteristics of the decision makers, the second general component of the business disaster preparedness framework, there is one difference between the conceptual model and the modified conceptual model. In modified conceptual model, ethnicity variable was removed. Following two figures indicates the details of the conceptual and the modified conceptual models in a detailed way.

**Organizational Features**

- Firm Size
- Firm Age
- Location Patterns
- Ownership of Property
- Financial Condition
- Sector Differences
- Previous Experiences

**Business Disaster Preparedness**

**Characteristics of Decision Makers**

- Risk Perception
- Gender
- Ethnicity
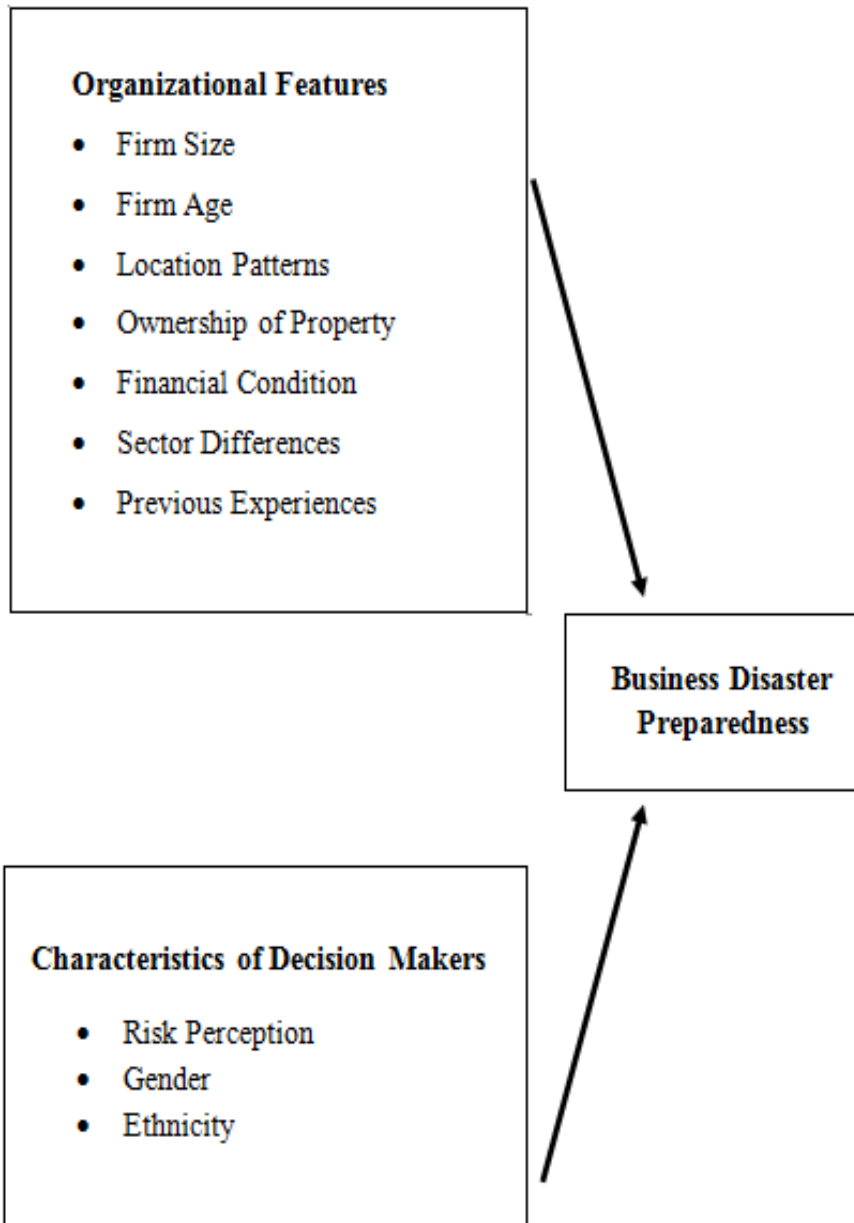
**Figure-2.4:** Conceptual Model
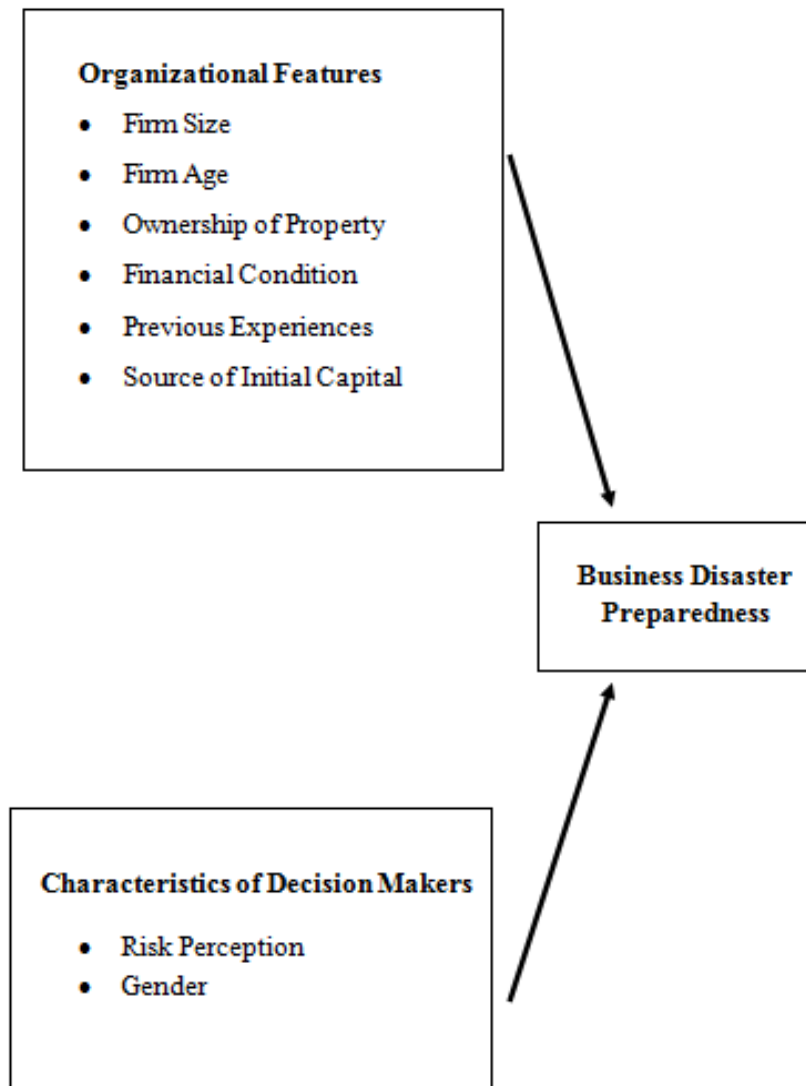
**Figure-2.5:** Modified Conceptual Model

## 2.5. FACTORS AFFECTING DISASTER PREPARENEDSS AND HYPOTHESES DEVELOPMENT

The modified conceptual model visualizes that business disaster preparedness are determined by organization features and characteristics of decision makers. In this part, factors influencing the business disaster preparedness are listed below based on our modified conceptual model. 8 different hypotheses were developed to test the elements of the modified conceptual model.

### 2.5.1. Firm Size

Firm size is one the organization features and it was indicated as the most influential organizational variable in past scientific researches. Most of the scholars take the firm size as the number of the full-time employees working in the company. Quarantelli, Lawrence, Tierney and Johnson (1979) investigated the chemical firms in 18 different parts of the United States of America. According to the results of this study, large sized chemical firms tend to take more disaster preparedness precautions compared to small sized chemical firms in the USA. Drabek also supports this argument by focusing on tourism industry with four different studies mainly. In Drabek's articles, it was found that when the size of firm increases, organizations become more sensitive to business disaster preparedness (Drabek 1991, 1994a, 1994b, 1995). In addition to these arguments, the results of an academic research which was made in Memphis, Tennessee and Des Moines support that the number of employees is the best indicator which shows the level of business disaster precautions in a company and there is a positive correlation between the number of employees and the business disaster preparedness level of the company (Dahlhammer and D'Souza, 1997). Furthermore, Sadiq's recent works report that the number of full-time employees in a business directly impacts the business disaster preparedness positively (Sadiq 2010, 2011). The results of the study of Han and Nigg (2011) are in line with past findings and show that when the number of employees in the companies increases, companies become more prepared to unexpected events such as disasters.

By utilizing the past studies, the hypothesis is constructed as:

**H1:** *Organizations having bigger size in terms of number of employees also have higher disaster preparedness score.*

### 2.5.2. Firm Age

Firm age is the number of years passed that the firms start to operate in its sector. Firm age was found as a determinant of the business disaster preparedness in some studies. There were opposite outcomes shared about the effect of the firm age in previous studies. First of all, old chemical companies take less business disaster precautions than young chemical companies (Quarantelli, Lawrence, Tierney, and Johnson, 1979). Secondly, Banerjee and Gillespie (1994) conversely think that there is a positive and significant association between the business disaster preparedness score of the firm and the age of the firm. On the other hand, the age of the firm does not show any significant impact on business disaster preparedness (Drabek, 1994a). Han and Nigg (2011) did not find any significant and consistent relationship between the age variable and the disaster preparedness scale.

Because there are opposite perspectives in the literature, there is an ambiguity about the effect of the age of the firm. For this reason it is hypothesized:

**H2:** *Firm age does not have a significant effect on the business disaster preparedness.*

### 2.5.3. Ownership of Property

Scholars explored the impact of the ownership of property on the business disaster preparedness. Companies can rent their assets via different sources that they use, or they can have their own assets. Dahlhammer and Reshaur (1996) argued that companies which own their assets engage in disaster preparedness activities less than

companies renting their properties. Opposite to this argument, the study in Memphis and Des Moies supports that companies which own their assets are more careful about taking preparedness precautions than the companies which rent their assets. Property owner companies tend to give more importance on business disaster preparedness compared to renters (Dahlhammer and D'Souza, 1997). On the other side, the research of Han and Nigg (2011) did not find any significant impacts of ownership of property on the disaster preparedness level.

The hypothesis is developed in the light of these studies as:

**H3:** *The ownership of assets has no significant effect on the disaster preparedness.*


### 2.5.4. Financial Condition

One of the significant determinants of the business disaster preparedness is having a strong financial condition. Financial condition and financial size changes from company to company from time to time. Thus, companies cannot generate resources to separate for disaster preparedness, if they have financial troubles. According to Quarantelli, Lawrence, Tierney, and Johnson (1979) chemical companies having better financial positions are more prepared than the ones have financial troubles. Moreover, it was stressed that richer firms could allocate more resources to the disaster preparedness activities, thus they become more prepared to the unexpected events (Alesch, Taylor, Ghanty and Nagy, 1993). Different from these outlooks, Han and Nigg (2011) reports that the companies having richer resources are less interested in disaster preparedness issue than the small ones.

Since most of the studies show the positive association, the hypothesis is:

**H4:** *Financial condition has a positive effect on the business disaster preparedness.*

### 2.5.5. Previous Experiences

In the literature, previous studies represent that having a disaster experience affect the disaster preparedness awareness of the businesses. First of all, Jackson (1981) claims that having unexpected experiences make people more prepared to possible future hazards. The consequences of Memphis and Des Moines study in 1997 brings out that businesses having no disaster experience give less importance on disaster preparedness issue than businesses having disaster experience (Dahlhammer and D'Souza, 1997). Moreover, it was founded a positive relationship between the previous disaster experiences and the level of preparedness in the studies focusing on tourism sector (Drabek, 1994a, 1994b). What's more, Cruz and Steinberg (2005) stated that having a previous earthquake experience increases disaster preparedness level of organizations. In addition to these findings, after destructive disasters, it was indicated that demand for disaster insurance significantly increases. Kunreuther (1996) reports that there is an association between the earthquake experience and the tendency to purchase a disaster insurance. Similarly, according to Browne and Hoyt (2000), the ones who suffered from flood, purchase flood insurance more than the ones who did not experience the flood. Contrastly, a study reports that past disaster experience do not enhance the future preparedness understanding. Siergrist and Gutscher (2008) show that people who were exposed to critical damage from former disasters are more careful about taking precautionary activities against disaster. Likewise these findings, Han and Nigg (2011) show the positive significant relationship between previous disaster experience and the preparedness in their work.

Most of the scholars support the positive relationship between previous experiences and the disaster preparedness, the hypothesis is:

**H5:** *Previous disaster experience positively affects the business disaster preparedness.*

### 2.5.6. Source of Initial Capital

When the companies start to operate in their industries, they can use different types of sources such as government subsidies, family support, bank loans and etc. or they can use their self-accumulation. The study was made on the SMEs in METU Technopark. The enterprises in METU Technopark have various source of initial capital. Some of them were founded with KOSGEB (SMIDO) support; some of them were founded with Ministry of Industry Support. On the other hand, there are some entrepreneurs who benefited from their families' support and bank loans. Moreover, some of business owners used their own self accumulation. For this reason, the effect of self-accumulation on the business disaster preparedness is added different from other studies. Therefore the hypothesis is:

**H6:** *Self accumulation has a positive effect on disaster preparedness.*

### 2.5.7. Risk Perception

Risk perception is one of the indicators which affect the disaster preparedness score of the companies. It was indicated that there is a positive relationship between earthquake risk perception and the disaster preparedness (Lindell and Perry, 2000). In line with these arguments, the association between disaster mitigation and the risk perception is positive (Peacock, 2003). Another supportive view by Miceli, Sotgiu and Settanni (2008) reports that risk perception positively affects the disaster preparedness. Pennings and Grossman (2008) also state that people's precautionary actions against disaster are determined by their risk perceptions. Article by Sadiq (2010) represents that disaster risk perception in Memphis and Tennessee disaster preparedness are positively correlated. Similarly, Yilmaz and Ozdemir (2011) display the positive correlation between the risk perception level of individuals and the disaster adjustment. Finally, according to Han and Nigg (2011) risk perception is a crucial variable which strongly affects organizations disaster preparedness decisions.

Taking the previous perspectives into account, the hypotheses could be developed as:

**H7:** *Organization having higher disaster risk perception also has higher disaster preparedness score.*

### 2.5.8. Gender

Females and males approach to disaster preparedness in a different way. This is why gender difference has a significant role on precautionary measures. According to Neal and Philips (1990) women put more effort into preparedness activities for health and environmental risk and they exhibited more involvement to prepare themselves. In addition to this argument, Cutter, Tiefenbacher and Solecki (1992) examine that men behaves less risk averse and they perceive the risk in a different way. Another research claims that young Non-Anglo women tend to involve to preparedness actions more than others (Dooley, Catalano, Mishra, and Serxner, 1992). Furthermore, it was stated in the study of Flynn, Slovic and Mertz (1994) that white males are less sensitive to environmental health risks compared to white females. Consistent with previous perspectives, women demonstrate more participation in disaster preparedness activities (Fothergill, 1996). As a contrast thesis, Han and Nigg (2011) support that there is no significant relationship between the business disaster preparedness and the gender of the people.

By benefiting from previous inputs of scholars, the hypothesis is shaped as following:

**H8:** *Companies with female managers tend to take more disaster precaution activities.*

# CHAPTER 3

# RESEARCH DESIGN AND METHODOLOGY

This study aims to investigate factors affecting business disaster preparedness of SMEs. In order to identify what factors are influential for determining business disaster preparedness, it was necessary to design and apply a survey. This chapter explains the details of the survey design and measurement, sampling method and data collection method.

## 3.1. SURVEY DESIGN AND VARIABLE MEASUREMENT

There are different techniques of applying surveys. Applying questionnaires is one type of the surveys. In academic researches, questionnaires are frequently utilized (Shaughnessy, Zechmeister, and Jeanne, 2011).

Different studies in the literature were reviewed before starting to make this study. After this investigation, it was understood that most of the scholars measured the business disaster preparedness via questionnaires. By using previous literature outputs and adding some extra questions, the questionnaire was prepared.

There were several studies made by different scholars in the literature. Some scholars developed a scale to measure the business disaster preparedness. Before developing our questionnaire, we looked at those past studies related to business disaster preparedness and it was found that it is effective to utilize past studies.

The questionnaire of this study was attached into Appendices part. The English version can be found in **Appendix C** and the Turkish version of it is attached to **Appendix D**. In our questionnaire, disaster preparedness is the independent variable. To measure our independent variable, 20 different business disaster preparedness

activities were taken into account to measure the total disaster preparedness level of the companies in METU Technopark.

20 different business disaster preparedness activities were measured between Questions 10 and Question 29 in the questionnaire (Appendix C). All of the 17 questions between Question 10 and Question 26 were taken from the study of Han and Nigg (2011). Other 3 business disaster preparedness activities which are between Question 27 and Question 29 are added by us.

**Table 3-1:** List of the Business Disaster Preparedness Activities (Han and Nigg, 2011)

| List of the Business Disaster Preparedness Activities |
|---|
| 1. Attended meetings or received written information on earthquake preparedness |
| 2.Talked with those working in your business about what to do in the event of an earthquake |
| 3. Purchased earthquake insurance to cover damage to your business |
| 4. Purchased business interruption insurance |
| 5. Stored extra fuel or batteries |
| 6. Learned first aid |
| 7. Obtained a first aid kit or extra medical supplies |
| 8. Developed a business emergency plan, covering what to do if an earthquake strikes |
| 9. Developed a business disaster recovery plan |
| 10. Conducted earthquake drills or exercises for your employees |
| 11. Been involved in any earthquake preparedness or response training programs for your employees |
| 12. Arrangements to move the business to another location in case of an earthquake |
| 13. Obtained an emergency generator for use if electrical power fails |
| 14. Purchased a cellular phone for use if telephone fails |
| 15. Taken action to brace shelves or heavy objects that might move during an earthquake |
| 16. Stored water |
| 17.  Had an engineer or other qualified person assess the structural safety of your building for earthquake |
| 18. Taken a precaution against bankruptcy risk |
| 19. Taken a precaution against data loss |
| 20. Taken a precaution against viruses and spy software |

Table-3.1 shows the 20 different business disaster preparedness activities that we benefit to measure the disaster preparedness scale of the companies between Question 10 and Question 29 (Appendix C). As it stated before, the first 17 activities in this list were taken from the previous study of Han and Nigg (2011). In this study, regression analyses are made and the dependent variable is disaster preparedness score of the company. Each preparedness activity means 1 point. For example, if a company has 10 ''Yes'' answers, this demonstrates that the company's business disaster preparedness score is 10 out 20. The minimum number of a company's business disaster preparedness score can be zero; on the other hand the maximum business disaster preparedness score of a company can be 20.

In this study different regression models will be tested. Dependent variables are *Number of Employees, Age of the Firm, Ownership of Assets, Average Monthly Revenue, Source of Initial Capital, Gender, Risk Score, Previous Earthquake Experience, Probability in 10 Years*, *Maximum Magnitude* and *Probability of Damage.*

Each of these variables measure one of the elements in the modified conceptual model.

- Firm size is measured by *Number of Employees* variable in Question 1 (Appendix C). Respondents shared their number of full-time personal information.
- Firm age is measured by *Age of the Firm* variable in Question 2 (Appendix C). In order to calculate the age of the firm foundation year of the firm was taken into account.
- Ownership of property is measured by *Ownership of Assets* variable in Question 3 (Appendix C). To identify the ownership of assets structure of the companies, it was wanted them to tell their estimated percentages of the assets they own and the estimated assets they rented.
- Financial condition is measured by *Average Monthly Revenue* variable *in* Question 4 (Appendix C). SMEs gave their average monthly revenue confidentially.

30

- Previous experiences are measured by *Previous Earthquake Experience* variable in Question 38 (Appendix C). Respondents share their previous experiences with a Yes/No questions. "Yes" represents 1 and "No" refers to 0 in the regression model. This is why it was a dummy variable.

- *Source of Initial Capital* was measured *in* Question 6 (Appendix C). Companies can use different sources in their establishment phase that is why 5 different options were put in this question. Self-accumulation is one of them and if at least one time "Self-accumulation" choice was circled as source of capital; this answer was assessed as 1. On the other hand, if the respondent did not circle ''Self-accumulation'' but circle other, it was assessed as 0. It means that *Source of initial capital* is a dummy variable.

- Risk perception is measured by *Risk Score, Probability in 10 Years, Maximum Magnitude* and *Probability of Damage* variables in Question 37, Question 39, Question 40 and Question 41 (Appendix C). For *Risk Score,* participants choose their estimated risk score out of 100. *Probability in 10 Years* variable directly investigated the perception of the respondents about the probability of an earthquake which will hit Ankara within next 10 years. *Maximum Magnitude* variable was put to understand the risk perception of the interviewees about the magnitude of a possible earthquake on Richter scale basis which might hit the Ankara in the next 10 years. Probability of Damage variable was conducted for analysing the risk perception of attendants about the probable damage of a possible earthquake on their businesses in Ankara in the next 10 years on percentage basis.

- Gender is measured by asking their gender directly *Gender* variable in Question 32 (Appendix C). Participants wrote their gender and it is represented as dummy variable in the regression models. 1 refers to males and 0 refers to females.

In order to determine the characteristics of the sample, 4 questions were asked to the respondents. Those 4 indicators were their age, gender, tenure of service in the firm and total working experience. These indicators are asked in Question 31, Question 32, Question 33 and Question 35 respectively (Appendix C).

Apart from those questions, several others were placed into the questionnaire to understand the sample in a more detailed way. The analysis of these questions put in Chapter 4-Data Description. Sectors that the SMEs operate in and investments tools of the companies were asked in Question 5 and Question 7 respectively (Appendix C). Additionally, status of having optional earthquake insurance and the reasons of not having optional earthquake insurance were investigated with Question 8 and Question 9 (Appendix C). Apart from that, to better grasp the earthquake specific behaviours of the participants, their fear levels for probable earthquakes compared to other unexpected events, the things that they can do for others in an earthquake moment, the responsibility levels of the institutions if the earthquake damage their businesses and their overall knowledge about the earthquakes were examined in Question 42, Question 43, Question 44 and Question 45 respectively. The data analysis of these questions will be done in Chapter 4-Data Description part as it mentioned before.

## 3.2. SAMPLING AND DATA COLLECTION METHOD

The questionnaires were applied to the top level managers of the SMEs in METU Technopark in Ankara. First of all, it was necessary to get permissions from the Presidency of Middle East Technical University. Because of the fact that METU Technopark is inside the university campus boundaries, it was mandatory to get related permissions from the Presidency of METU. The copy of the official permission document of the presidency of METU was attached to **Appendix A**.

Following, we communicated with the University-Industry Cooperation Office to get the permission of METU Technopark Administration to apply this questionnaire. The copy of the official permission document of METU Technopark Administration was attached to **Appendix B**.

Previous study of Fowler, King and Larson (2007) identified that employees in a certain company have lower disaster preparedness perception compared to the top and middle level managers work in that company. In addition to this, employees generally do not have sufficient knowledge of the generic disaster management

strategy of the company. For these 2 reasons, after getting mandatory permissions from the authorities, this questionnaire was applied to the top manager (owner) of the company. Because they are the authority, they know the company's holistic information, the financial performance, and the general disaster preparedness policy of the company better than employees.

On August 26, 2013 the data was started to be collected from the top level managers of the SMEs in METU Technopark. The whole data collection period lasted 2 months until October 28, 2013. Questionnaires were applied on face to face base to the top level managers of the different SMEs. Face to face questionnaire collection method was chosen because in order to have a higher questionnaire response rate it was a necessary action to communicate with people effectively.

There were some confidential questions asked such as the monthly revenues of the companies in the questionnaires. That is why respondents did not write the name of their company and they did not write their names. All of the participants were informed about the responses of them will be confidential and not going to be shared with third parties in the future.

There were 281 SMEs in METU Technopark as of August 26, 2013. The questionnaires were applied to 70 different top level managers from different SMEs. In order to collect the data, convenience sampling method was used because it is the cheapest and least time consuming method of sampling. In addition to this, in order to generate ideas and test hypotheses, this sampling method can be used. Thus, this technique was chosen in this research (Malhotra, 2004).

It was impossible to cover all the population within 2 months since the agenda of top level managers were full and they were outside of the office most of the time. This is because 25 % of the total population was covered in this study. Incomplete questionnaires and wrong answers were not evaluated. Totally 60 questionnaires were found to be worth to analyse which means that the sample size of this study is 60. Microsoft Excel 2013 and IBM SPSS Version 21 were used to analyse the raw

data, construct descriptive statistics, plot the charts and run the regression analysis. Following table shows the sample characteristics of the data in terms of category, frequency and percent of sample.

**Table-3.2:** Sample Characteristics of the Data

| N=60 | | | |
|---|---|---|---|
| Demographic | Category | Frequency | Percent of Sample |
| Age | 21-30 | 7 | 11.67 |
| | 31-40 | 23 | 38.33 |
| | 41-50 | 18 | 30.00 |
| | 51-60 | 10 | 16.67 |
| | 61-70 | 2 | 3.33 |
| Tenure of Service in the Firm (Year) | 1-10 | 43 | 71.67 |
| | 11-20 | 15 | 25.00 |
| | 21-30 | 2 | 3.33 |
| Total Working Experience (Year) | 0-10 | 13 | 21.67 |
| | 11-20 | 26 | 43.33 |
| | 21-30 | 13 | 21.67 |
| | 31-40 | 8 | 13.33 |
| Gender | Male | 35 | 58.33 |
| | Female | 25 | 41.67 |
| Place of Birth | Aegean Region | 4 | 6.67 |
| | Black Sea Region | 3 | 5.00 |
| | Central Anatolia Region | 31 | 51.67 |
| | Eastern Anatolia Region | 3 | 5.00 |
| | Foreign Country | 7 | 11.67 |
| | Marmara Region | 10 | 16.67 |
| | Mediterranean Region | 1 | 1.67 |
| | South eastern Anatolia Region | 1 | 1.67 |

Table-3.2 shows 5 different demographics of the sample: age of the respondents, tenure of the service in the firm on yearly basis, total working experience on yearly

basis, gender and place of birth region. These statistics were asked in Question 31, Question 35, Question 33, Question 32 and Question 34 respectively (Appendix C).

By looking at Table-3.2, it can be understood that most of the participants are between the ages of 31 and 40. In addition, more than half of the respondents have been working in their current company for less than 10 years. Furthermore, majority of the sample has working experience between 11 and 20 years. Moreover, more than half of them are male participants in the sample. Lastly, majority of them were born in Central Anatolia Region.

# CHAPTER 4

# DATA DESCRIPTION

Descriptive statistics will be visualized and interpreted and data analysis will be conducted by using Microsoft Excel 2013 and IBM SPSS Version 21 in this part.

## 4.1. DESCRIPTIVE STATISTICS

### 4.1.1. Descriptive Statistics for Sectoral Differences and Investment Tools

As of August 26, 2013, there were 281 different technology based SMEs working in METU Technopark. Those firms operate in 7 different sectors which are telecommunication, software development, medical device production and development, information technology, electronical device design and development, defence industry and biotechnology. Figure-4.1 visualises the distribution of the sectors on percentage basis in METU Technopark. Following graph reports that most of the companies in METU Technopark are in information technology with 26.67 %. Second most frequent sector is software development, 20% of the sample operate in software development. On the other hand, biotechnology is the less frequent sector among these 7 which has a 6.67% in the sample.
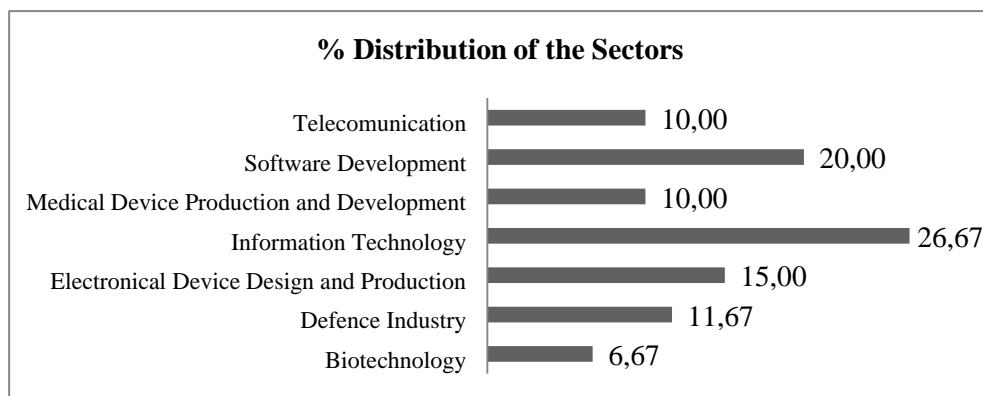


**Figure-4.1:** Bar Graph of % Distribution of Sectors

In previous chapter, 20 different precautionary activities that measures total business disaster preparedness score were listed. As it mentioned before, maximum disaster preparedness score could be 20 which means that this firm takes all of the precautions. On the other hand, if the SME does not take any precaution, its score is calculated as 0. Average of disaster preparedness scores of the 7 sectors are listed in Figure-4.2. When the bar graph analyzed, it can be inferred that SMEs in medical device production and development have the highest average disaster preparedness score with 10.33 compared to other SMEs which engage in other 6 sectors. This is the indication of firms in medical device production and development take 10.33 preparedness activities out of 20 on average. Conversely, software development companies in METU Technopark have the lowest average disaster preparedness score with 4.33. Similarly, the average of information technology companies is 4.43 which is a close value to average of software development sector.

**Average of Disaster Preparedness Scores of the Sectors**

| Sector | Score |
|---|---|
| Telecomunication | 8,83 |
| Software Development | 4,33 |
| Medical Device Production and Development | 10,33 |
| Information Technology | 4,43 |
| Electronical Device Design and Production | 6,11 |
| Defence Industry | 8 |
| Biotechnology | 8,75 |
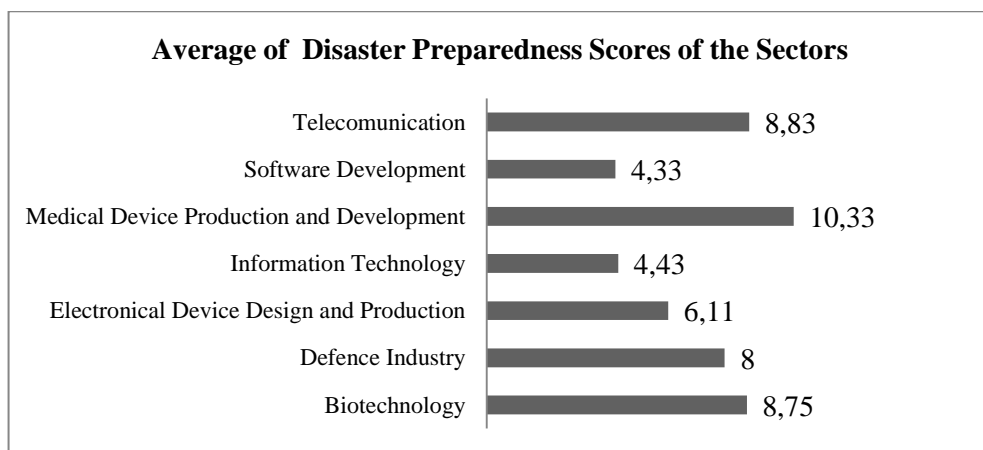
**Figure-4.2:** Bar Graph of Average Disaster Preparedness of the Sectors

Descriptive statistics are also prepared for the investment tools of the SMEs. Investment structures of the firms were investigated with a detailed question. Figure-4.3 represents that 86.7% of SMEs use bank deposits, 6.7% of them put their accumulation in other tools and 6.7% of the firms do not use any investment tool.
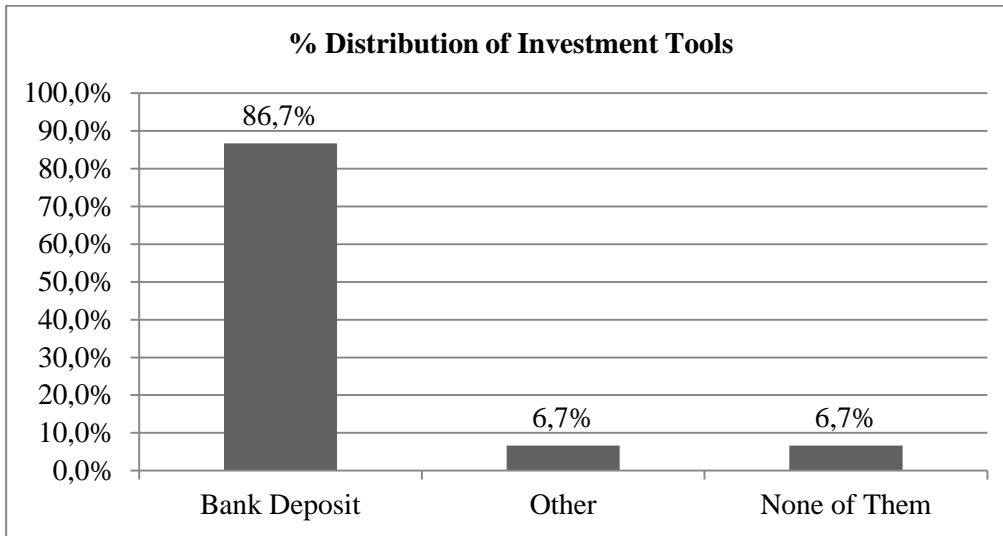
**Figure-4.3:** Bar Graph of % Distribution of Investment Tools

## 4.1.2. Descriptive Statistics for Optional Earthquake Insurance

Having a Voluntary Earthquake Insurance is one of the protective activities for business disaster preparedness. Disaster Insurances Law no. 6305 states that Compulsory Earthquake Insurance (CEI) and Voluntary Earthquake Insurance (VEI) are different from each other. Residential buildings have to have CEI, but public institution buildings, commercial centres and industrial institutions are not covered by CEI. Instead of CEI, they could make VEI to protect themselves.

Techopark is a business center, thus CEI is not mandatory for the SMEs, but it is optional and beneficial to make VEI for protection against earthquakes. The administration of Technopark had an insurance but it does not cover business interruptions, loss of tangible assets and loss of physical materials. This is why VEI is a useful tool to cover different damages. In order to analyze consciousness level of the enterprises, it was asked whether they have a voluntary earthquake insurance or not. Out of 60 companies, 18 of them have voluntary earthquake insurance to cover possible damages. In other words, 70% of companies in METU Technopark do not give importance to the earthquake insurance.

To understand the reasons of not having Voluntary Earthquake Insurance, a question was asked to make deeper analysis. Bar graph in Figure-4.4 shows the reasons of the organizations. Based on these findings, 48% of the enterprises believe that the buildings in Techopark are well resistant to unexpected events. 17% of them think that it does not have any sanctions. Apart from these, 36% assume that Technopark administration had insured all buildings and any possible future losses due to the earthquakes will be covered.

**Reasons of Not Having Voluntary Eartquake Insurance**

I think the building is resistant to the eartquakes    48%

It does not have any sanctions.    17%

Other: I guess management of Technopark insured all buildings    36%
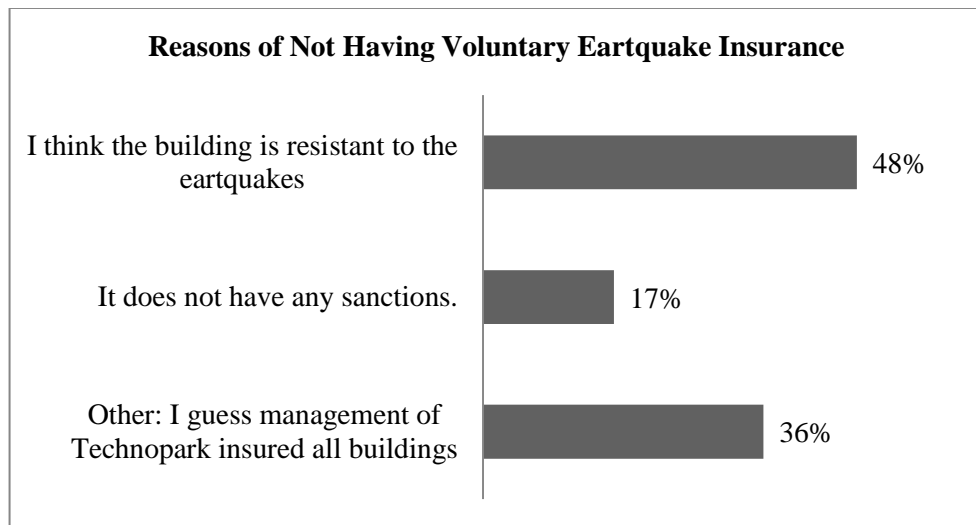
**Figure-4.4:** Bar Graph of Reasons of Not Having Voluntary Earthquake Insurance

### 4.1.3. Descriptive Statistics for the Earthquake Specific Information

Earthquake specific information was added to this study to better grasp the earthquake perception of the individuals and the knowledge level of the participants about earthquakes. Figure 4-5 gives 3 various statistics of the sample of the study. First, it was asked to respondents to tell how appalling earthquakes are considering all disaster. They rated this question from 1 to 7. "1" means less appalling, "7" exhibits most appalling disaster. The average was 5.02 considering 60 respondents as it is represented in Figure-4.5. In other words, majority of the participants perceive earthquakes as appalling disasters. Secondly, it was investigated that if they could do something for other employees in an earthquake moment. The scale is between "1" and "7". The ones circle "1" remarks they could do nothing for other, however "7"

implies that they could do a lot of things for other personnel in a possible earthquake moment. The average is 3.14 which is below median, indicating that most of people could not help others in an unexpected disaster. Next, it was expected form the participants to state their overall knowledge about protecting themselves from earthquakes. The ones who has very adequate knowledge circled "1", contrariwise "7" represents very inadequate knowledge. The average was 5.80 implying most of them do not have significant knowledge about protecting themselves from earthquakes.
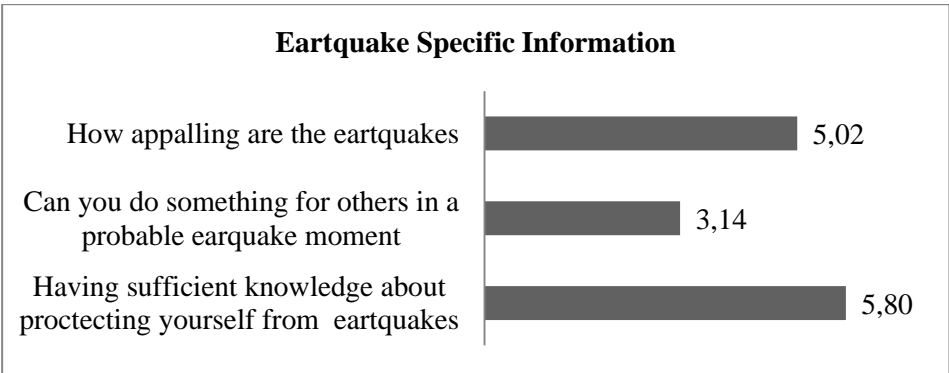


**Figure-4.5:** Bar Graph of Earthquake Specific Information

Another important topic of this study is to identify people's opinion about which institutions are more responsible to protect them and their families from earthquakes. The respondents voted themselves, media, state, municipalities, building company and university administration to identify which of them are the biggest responsibility owners by giving a responsibility score between 1 and 7. After all values were collected from the individuals, they were summed and the average was taken. "1" represents no responsibility, however "7'' shows high responsibility. According to the column graph of the responsibility perception in Figure 4-6, the building company of Technopark is the biggest responsibility owner with 6.77 average score, then municipalities come with 6.47. Participants think that they are the fourth responsibility owner in this ranking with 5.83 average point. The bar graph demonstrates media with 4.93 average score is the least responsible institution from the perspective of the SMEs.
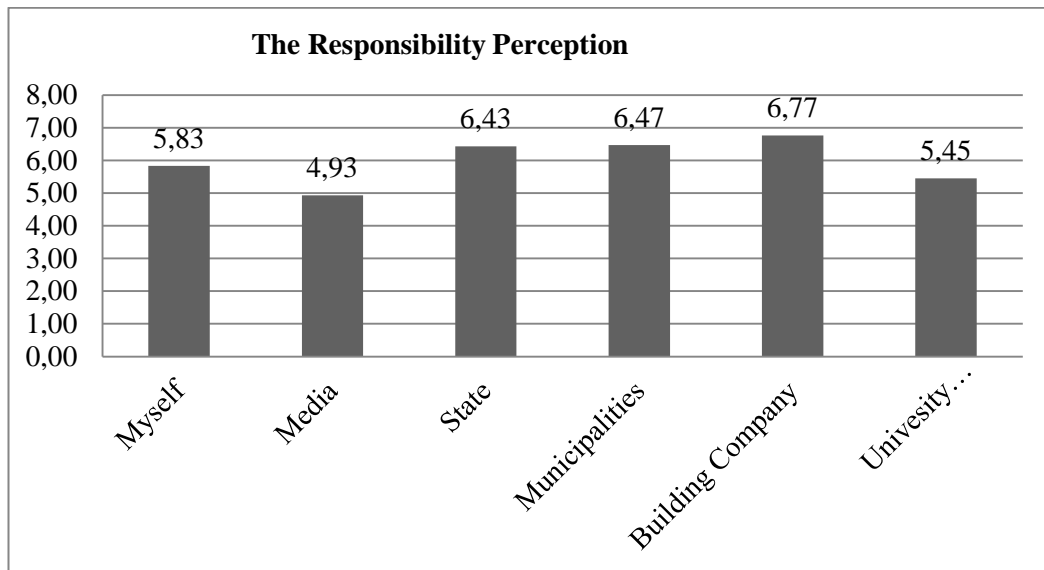
**Figure-4.6:** Column Graph of the Responsibility Perception

### 4.1.4. Descriptive Statistics for Disaster Preparedness Activities

In this study, disaster preparedness is the dependent variable which is calculated by a scale consisting 20 different disaster precautionary activities. Table-4.1 shows all the activities and their means. *Taking a precaution against viruses and spy softwares* is the most frequent mitigation activity in the list. 95% of all companies have a tool to protect themselves against viruses and spy softwares. Second most popular precaution taken by the SMEs in METU Technopark is against *data loss*. 93.3% of companies have a data loss precaution. These two precautions are very common among the SMEs, because all of them are technology based and protecting against viruses, spy softwares and data loss prevention are two vital things for their industries by nature.

On the other hand, some disaster preparedness activities have low scores in the list. Those are *Storing extra fuel or batteries* and *conducting earthquake drills or exercises for their employees*. Only 5% of the businesses has an action related with these two activities. Additionally, *having business interruption insurance* and *storing water* are the two other least frequent protective activities against disasters. 8.3% of organization takes these carry out these items.

41

**Table-4.1:** Descriptive Statistics for Disaster Preparedness Activities

| List of the Business Disaster Preparedness Activities | N | Mean |
|---|---|---|
| 1. Attended meetings or received written information on earthquake preparedness | 60 | .317 |
| 2.Talked with those working in your business about what to do in the event of an earthquake | 60 | .133 |
| 3. Purchased earthquake insurance to cover damage to your business | 60 | .300 |
| 4. Purchased business interruption insurance | 60 | .083 |
| 5. Stored extra fuel or batteries | 60 | .050 |
| 6. Learned first aid | 60 | .450 |
| 7. Obtained a first aid kit or extra medical supplies | 60 | .467 |
| 8. Developed a business emergency plan, covering what to do if an earthquake strikes | 60 | .167 |
| 9. Developed a business disaster recovery plan | 60 | .167 |
| 10. Conducted earthquake drills or exercises for your employees | 60 | .050 |
| 11. Been involved in any earthquake preparedness or response training programs for your employees | 60 | .117 |
| 12. Arrangements to move the business to another location in case of an earthquake | 60 | .133 |
| 13. Obtained an emergency generator for use if electrical power fails | 60 | .550 |
| 14. Purchased a cellular phone for use if telephone fails | 60 | .750 |
| 15. Taken action to brace shelves or heavy objects that might move during an earthquake | 60 | .150 |
| 16. Stored water | 60 | .083 |
| 17.  Had an engineer or other qualified person assess the structural safety of your building for earthquake | 60 | .150 |
| 18. Taken a precaution against bankruptcy risk | 60 | .400 |
| 19. Taken a precaution against data loss | 60 | .933 |
| 20. Taken a precaution against viruses and spy softwares | 60 | .950 |
| Valid N (listwise) | 60 | |

**4.1.5**. **Descriptive Statistics for Dependent and Independent Variables**

To analyse dependent variable and independent variables in our regression models, a table was constructed to show their descriptive statistics. In all regression models, *Preparedness Scale* is the dependent variable and other 11 variables are the independent ones. Table-4.2 lists all of the variables included in all regression models. In the same table standard deviations of the variables are shown.

- To begin with, the average preparedness score of all companies is 6.4.
- Average number of employees work at the SMEs in METU Technopark is 16.18.
- 58.3% of the total sample is male in this study.
- 38.3% of the participants have a previous earthquake experience.
- On average 11.20% of respondents thinks that a potential earthquake could interrupt their businesses.
- 96.83% of assets on average in METU Technopark are owned by the SMEs.
- Firms which were covered in the questionnaire, earn TL 129,703.33 per month on average.
- 66.7% of the SMEs in METU Technopark use their self-accumulation in the establishment phase of the company.
- Average age of the 60 firms are 10.167
- Individuals perceive their risk scores as 55.58 on average.
- According to respondents, the average probability of an earthquake occurs in next 10 years is 19.66%.
- Maximum magnitude of an expected earthquake is estimated by the SMEs on average 4.94 magnitude of Richter scale.

**Table-4.2:** Descriptive Statistics for Dependent and Independent Variables

| Descriptive Statistics | | | |
|---|---|---|---|
| | Mean | Std. Deviation | N |
| Preparedness Scale | 6.400 | 3.3959 | 60 |
| Number of Employees | 16.183 | 25.8834 | 60 |
| Gender | .583 | .4972 | 60 |
| Previous Earthquake Experience | .383 | .4903 | 60 |
| Probability of Damage | 11.208 | 13.4490 | 60 |
| Ownership of Assets | 96.833 | 8.0236 | 60 |
| Average Monthly Revenue | 129,703.333 | 217,682.2268 | 60 |
| Source of Initial Capital | .667 | .4754 | 60 |
| Age of the Firm | 10.167 | 6.9798 | 60 |
| Risk Score | 55.583 | 22.1339 | 60 |
| Probability in 10 Years | 19.667 | 18.7198 | 60 |
| Maximum Magnitude | 4.9467 | 1.04884 | 60 |

## 4.2. CORRELATION

Correlation coefficient points the strength and the direction of the positive or negative linear association between two different variables. However, it is important to note that coefficient of correlation does not provide a causal outcome (Berenson, Levine and Krehbiel, 2006).

Correlation coefficients are within the range of -1 to 1. -1 shows perfect negative linear correlation, whereas 1 states perfect positive association between two variables. On the other hand, if it is 0, it represents no relationship (Newbold, Carlson and Thorne, 2007).

Kinnear and Taylor (1987) explains that any correlation coefficient value between 0.8 and 1 or   -0.8 and -1 signals strong linear association, any value between 0.4 and 0.8 or -0.4 or -0.8 refers moderate to strong relationship and any value between 0 and 0.4 or 0 and -0.4 points weak relationship.

In Table4-3, correlations are illustrated via Pearson Correlation Matrix. If Kinnear and Taylor's explanation above is took into consideration, it is obvious that the relationship between *Number of Employees* and *Average Monthly Revenue* is strong (r=0.854). In addition to this, the correlation between the listed variables *Preparedness Scale* and *Number of Employees* (r=0.520), *Probability of Damage* and *Probability in 10 Years* (r=0.487), *Gender* and *Probability in 10 Years* (0.481), *Preparedness Scale* and *Average Monthly Revenue* (0.448), *Preparedness Scale* and *Probability of Damage* (r=0.438), *Preparedness Scale* and *Gender* (r=0.402) and lastly *Preparedness Scale* and *Probability in 10 Years* (0.401) reveals moderate to strong relationship. Moreover, moderate to weak relationship exists between *Average Monthly Revenue* and *Probability in 10 Years* (r=0.380) and between *Number of Employees* and *Age of the Firm* (r=0.338). Other one to one correlations among the variables reflect weak relationships based on Kinnear and Taylor's description since the coefficients are getting closer to 0.

**Table-4.3:** Pearson Correlation Matrix

| Correlations | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Preparedness Scale (1) | Pearson Correlation | 1 | .520** | -.402** | .283* | .438** | -.043 | .448** | .210 | .212 | .031 | .401** | -.106 |
| | Sig. (2-tailed) | | .000 | .001 | .028 | .000 | .745 | .000 | .107 | .104 | .816 | .002 | .418 |
| | N | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| Number of Employees (2) | Pearson Correlation | .520** | 1 | -.047 | .087 | .157 | .015 | .854** | .073 | .338** | -.056 | .307* | -.288* |
| | Sig. (2-tailed) | .000 | | .723 | .511 | .232 | .909 | .000 | .582 | .008 | .672 | .017 | .025 |
| | N | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| Gender (3) | Pearson Correlation | -.402** | -.047 | 1 | .041 | -.200 | .046 | -.064 | .120 | .011 | -.132 | -.481** | -.076 |
| | Sig. (2-tailed) | .001 | .723 | | .758 | .126 | .727 | .629 | .363 | .936 | .316 | .000 | .565 |
| | N | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| Previous Earthquake Experience (4) | Pearson Correlation | .283* | .087 | .041 | 1 | .259* | .206 | .051 | .121 | -.069 | -.068 | .167 | .077 |
| | Sig. (2-tailed) | .028 | .511 | .758 | | .046 | .114 | .700 | .356 | .603 | .607 | .201 | .560 |
| | N | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| Probability of Damage (5) | Pearson Correlation | .438** | .157 | -.200 | .259* | 1 | -.013 | .067 | .093 | .143 | .227 | .487** | .240 |
| | Sig. (2-tailed) | .000 | .232 | .126 | .046 | | .919 | .611 | .479 | .277 | .080 | .000 | .064 |
| | N | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| Ownership of Assets (6) | Pearson Correlation | -.043 | .015 | .046 | .206 | -.013 | 1 | .003 | -.126 | -.276* | .073 | -.115 | -.027 |
| | Sig. (2-tailed) | .745 | .909 | .727 | .114 | .919 | | .983 | .338 | .033 | .581 | .380 | .838 |
| | N | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| Average Monthly Revenue (7) | Pearson Correlation | .448** | .854** | -.064 | .051 | .067 | .003 | 1 | .059 | .312* | -.160 | .380** | -.146 |
| | Sig. (2-tailed) | .000 | .000 | .629 | .700 | .611 | .983 | | .652 | .015 | .221 | .003 | .264 |
| | N | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| Source of Initial Capital (8) | Pearson Correlation | .210 | .073 | .120 | .121 | .093 | -.126 | .059 | 1 | .262* | -.134 | .069 | -.130 |
| | Sig. (2-tailed) | .107 | .582 | .363 | .356 | .479 | .338 | .652 | | .043 | .307 | .599 | .323 |
| | N | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| Age of the Firm (9) | Pearson Correlation | .212 | .338** | .011 | -.069 | .143 | -.276* | .312* | .262* | 1 | -.164 | .167 | -.069 |
| | Sig. (2-tailed) | .104 | .008 | .936 | .603 | .277 | .033 | .015 | .043 | | .212 | .201 | .601 |
| | N | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| Risk Score (10) | Pearson Correlation | .031 | -.056 | -.132 | -.068 | .227 | .073 | -.160 | -.134 | -.164 | 1 | .169 | .161 |
| | Sig. (2-tailed) | .816 | .672 | .316 | .607 | .080 | .581 | .221 | .307 | .212 | | .196 | .220 |
| | N | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| Probability in 10 Years (11) | Pearson Correlation | .401** | .307* | -.481** | .167 | .487** | -.115 | .380** | .069 | .167 | .169 | 1 | .265* |
| | Sig. (2-tailed) | .002 | .017 | .000 | .201 | .000 | .380 | .003 | .599 | .201 | .196 | | .040 |
| | N | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| Maximum Magnitude (12) | Pearson Correlation | -.106 | -.288* | -.076 | .077 | .240 | -.027 | -.146 | -.130 | -.069 | .161 | .265* | 1 |
| | Sig. (2-tailed) | .418 | .025 | .565 | .560 | .064 | .838 | .264 | .323 | .601 | .220 | .040 | |
| | N | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| **. Correlation is significant at the 0.01 level (2-tailed). | | | | | | | | | | | | | |
| *. Correlation is significant at the 0.05 level (2-tailed). | | | | | | | | | | | | | |

# CHAPTER 5


# REGRESSION ANALYSIS AND RESULTS


In this section, the rationale behind the regression analysis and the results of it will be shared. First of all, it was a necessary step to collect the data from the available sources. In previous sections, it was discussed that how the questionnaire was prepared, what type of questions were asked, which question refers to which variable and how it was applied to the managers in METU Technopark. After the data collection process was completed and past studies were taken into consideration, the regression analysis was done to bring out the factors affecting the business disaster preparedness of SMEs.

Since there are more than one variable in the data set, multiple regressions were used to analyze the factors. Stepwise regression approach was applied to the data in SPSS 21. 7 different regression models were examined while doing analysis. In this chapter, only the results of Model 7 were put, because the analysis and the comments were developed based on Model 7.

SPSS summary output of all models were attached in Appendix E. The summary outputs include "Model Summary" table, "ANOVA" table and "Coefficients" table for each model independently. For further investigation and to have detailed information about the models, it can be done a deep dive using Appendix E.

## 5.1. REGRESSION RESULTS

### 5.1.1. Regression Results of 7 Models

Model 7 is the final model which concludes this study. Starting from model, in each model one variable was removed and to exhibit which variable was removed, Table-6.1 was prepared. This table gives the summary information about 7 models. $R^2$, adjusted $R^2$, F value, significance value for each model are demonstrated. In addition

to these outputs, it can be found the name, the coefficient, t value and the significance (p-value) of the removed variables for each model.

Model 1 contains all of the variables which are *Maximum Magnitude*, *Ownership of Assets*, *Gender*, *Average Monthly Revenue*, *Source of Initial Capital*, *Risk Score*, *Previous Earthquake Experience*, *Probability of Damage*, *Age of the Firm*, *Probability in 10 Years* and *Number of Employees*.

*Age of the Firm* ($\beta$=-.011, p-value=.917) is the most insignificant variable in model 1 and it was known that the effect of this variable is unclear in the past studies of other scholars. Due to these facts, it is not included in Model 2.

*Risk Score* ($\beta$=.028, p-value=.783) is the most insignificant variable in Model 2 and its coefficient's sign is positive. This means that there is a contradiction with the theory. The positive sign denotes that the more risk taker the manager, the more precautions are taken. For these 2 reasons it is not put among the explanatory variables in Model 3.

*Maximum Magnitude* ($\beta$=-.054, p-value=.619) is the most insignificant variable in model 3 and its coefficient is negative which means that the preparedness activities tend to decrease, if the earthquake magnitude estimation of the manager of the company is higher. Because of this conflict and insignificancy issue it is not included in Model 4.

*Ownership of the Assets* ($\beta$=-.064, p-value=.506) is the most insignificant variable in Model 4 and in general companies have 95% of their assets. There is no variation among companies to investigate ownership of the assets has an impact on the disaster preparedness.

*Average Monthly Revenue* ($\beta$=-.721, p-value=.474) is the most insignificant variable in model 5 and it has strong relationship with *Number of Employees* (r=0.854) and weak to moderate association with *Probability in 10 Years* (r=0.380). This situation causes to a multicollinearity problem, thus it is omitted in Model 6.

*Probability in 10 Years* (β=-.117, p-value=.338) is the most insignificant variable in Model 6 and since it has a negative sign coefficient. It comes into conflict with theory, because it is expected that when the probability increases, disaster preparedness level rises for the companies. In addition to this, it has moderate to strong relation with *Probability of Damage* (r=0.487) and *Gender* (r=0.481) which creates a multicolliearity problem. These two causes make it remove in model 7.

Model 7 is the final output for this study with the variables: *Source of Initial Capital*, *Number of Employees*, *Gender*, *Previous Earthquake Experience* and *Probability of Damage*. This model will be reviewed in more detailed way in next section.

Diagnostics of Model 7 were attached in Appendix E to show that normality, linearity, homoscedasticity and multicollinearity assumptions were not violated.

**Table-5.1:** Summary of 7 Models

| Model | R Square | Adjusted R Square | F | Sig. | Variables | Removed Variable in Next Regression | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Name of the Variable | Coefficient | t | Sig. |
| Model 1 | .582 | .487 | 6.1 | .0 | Maximum Magnitude, Ownership of Assets, Gender, Average Monthly Revenue, Source of Initial Capital, Risk Score, Previous Earthquake Experience, Probability of Damage, Age of the Firm, Probability in 10 Years, Number of Employees | Age of the Firm | -.011 | -.10 | .917 |
| Model 2 | .582 | .497 | 6.8 | .0 | Maximum Magnitude, Ownership of Assets, Gender, Average Monthly Revenue, Source of Initial Capital, Risk Score, Previous Earthquake Experience, Probability of Damage, Probability in 10 Years, Number of Employees | Risk Score | .028 | .28 | .783 |
| Model 3 | .581 | .506 | 7.7 | .0 | Maximum Magnitude, Ownership of Assets, Gender, Average Monthly Revenue, Source of Initial Capital, Previous Earthquake Experience, Probability of Damage, Probability in 10 Years, Number of Employees | Maximum Magnitude | -.054 | -.50 | .619 |
| Model 4 | .579 | .513 | 8.8 | .0 | Probability in 10 Years, Source of Initial Capital, Ownership of Assets, Previous Earthquake Experience, Number of Employees, Probability of Damage, Gender, Average Monthly Revenue | Ownership of Assets | -.064 | -.67 | .506 |
| Model 5 | .576 | .519 | 10.1 | .0 | Probability in 10 Years, Source of Initial Capital, Previous Earthquake Experience, Number of Employees, Probability of Damage, Gender, Average Monthly Revenue | Average Monthly Revenue | -.721 | .72 | .474 |
| Model 6 | .571 | .523 | 11.8 | .0 | Probability in 10 Years, Source of Initial Capital, Previous Earthquake Experience, Number of Employees, Probability of Damage, Gender | Probability in 10 Years | -.117 | -.97 | .338 |
| Model 7 | .564 | .524 | 14.0 | .0 | Source of Initial Capital, Number of Employees, Gender, Previous Earthquake Experience, Probability of Damage | - | - | - | - |

### 5.1.2. Regression Results of the Final Model

This study is concluded by Model 7. In this part, Table-5-2, Table-5-3, Table-5-4 and Table 5-5 exhibit model summary, ANOVA, coefficients and summary output respectively. Model 7 includes 5 explanatory variables which are *Source of Initial Capital*, *Number of Employees*, *Gender*, *Previous Earthquake Experience* and *Probability of Damage*. These variables are the ones that affect factors affecting business disaster preparedness of SMEs. On the one hand, *Preparedness Scale* is the dependent variable which represents business disaster preparedness of SMES.

The model is statistically significant to interpret. (F test=13.965, p-value=.000). All other things being constant, independent variables explains 52.4% of change in disaster preparedness significantly (Adj. $R^2$=.524).

*Number of Employees* affects disaster preparedness positively ($\beta$=.438, p-value=.000). *Gender* has a negative impact on disaster preparedness, in other words females are found to take precautions more than males ($\beta$=-.363, p-value=0.00). There is a positive relationship between *Previous Earthquake Experience* and disaster preparedness ($\beta$=.177, p-value=.064). As sample size increases, it is expected that this variable to be significant at 5% significance level. It is founded that *Probability of Damage* perception and disaster preparedness positively associated ($\beta$=.235, p-value=.018). *Source of Initial Capital* is positively correlated with disaster preparedness which means that if the company's source of initial capital is self accumulation, they tend to give more importance on disaster preparedness ($\beta$=.178, p-value=.057). It is almost close to 5% significance level.

**Table-5-2:** Model Summary of Model 7

| Model Summary[b] | | | | |
|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 7 | .751[a] | .564 | .524 | 2.3441 |
| a. Predictors: (Constant), Source of Initial Capital, Number of Employees, Gender, Previous Earthquake Experience, Probability of Damage | | | | |
| b. Dependent Variable: Preparedness Scale | | | | |

51

**Table-5.3:** ANOVA of Model 7

| | Model | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| | **ANOVA**[a] | | | | | |
| 7 | Regression | 383.676 | 5 | 76.735 | 13.965 | .000[b] |
| | Residual | 296.724 | 54 | 5.495 | | |
| | Total | 680.400 | 59 | | | |
| a. Dependent Variable: Preparedness Scale | | | | | | |
| b. Predictors: (Constant), Source of Initial Capital, Number of Employees, Gender, Previous Earthquake Experience, Probability of Damage | | | | | | |

**Table-5.4:** Coefficients of Model 7

| | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | **Coefficients**[a] | | | | | |
| | Model | B | Std. Error | Beta | | |
| 7 | (Constant) | 4.932 | .695 | | 7.098 | .000 |
| | Number of Employees | .057 | .012 | .438 | 4.799 | .000 |
| | Gender | -2.478 | .635 | -.363 | -3.900 | .000 |
| | Previous Earthquake Experience | 1.229 | .651 | .177 | 1.889 | .064 |
| | Probability of Damage | .059 | .024 | .235 | 2.431 | .018 |
| | Source of Initial Capital | 1.273 | .655 | .178 | 1.943 | .057 |
| a. Dependent Variable: Preparedness Scale | | | | | | |

**Table-5.5:** Summary Output of Model 7

| MODEL 7 | | | |
|---|---|---|---|
| **Variable Name** | **Coefficients (B)** | **Std. Error** | **p-value** |
| Number of Employees | .438 | .012 | .000 |
| Gender | -.363 | .635 | .000 |
| Previous Earthquake Experience | .177 | .651 | .064 |
| Probability of Damage | .235 | .024 | .018 |
| Source of Initial Capital | .178 | .655 | .057 |
| **Adjusted R Square**=.524 | | | |
| **F test**=13.965 | | | |
| **p-value**=.000 | | | |

## 5.2. HYPOTHESES TESTING

Hypotheses developed at the end of Chapter 2 are tested in this part of the study by using the regression results of the 7 models.

**H1:** *Organizations having bigger size in terms of number of employees also have higher disaster preparedness score.*

The regression results of Model 7 produced that *Number of Employees* is a significant variable (p=.000). Companies tend to take more precautions as the number employees in the firm is getting higher ($\beta$=.438). This finding is parallel with the previous indications of Quarantelli, Lawrence, Tierney and Johnson (1979), Drabek (1991, 1994a, 1994b, 1995), Dahlhammer and D'Souza (1997), Sadiq (2010, 2011) and Han and Nigg (2011). Hence hypothesis 1 is supported.

**H2:** *Firm age does not have a significant effect on the business disaster preparedness.*

*Age of the Firm* does not a significant (p=.917) effect in Model 1 and it is not included in other models. This outcome is consistent with the findings of Drabek (1994a) and Han and Nigg (2011). For this reason hypothesis 2 is supported.

**H3:** *The ownership of assets has no significant effect on the disaster preparedness.*

According to the results of Model 4, *Ownership of Assets* is not significant (p=.506) and it does not exist in Model 5, Model 6 and Model 7. Previous studies drew an ambiguous picture about the effect of the ownership of assets. While Dahlhammer and Reshaur (1996) supports companies which have their own assets, take less precautions, in another study of Dahlhammer and D'Souza (1997), the opposite of that argument is found. It shows that the effect of the ownership of assets is not clear and recent study of Han and Nigg (2011) documented that it does not have a significant impact on the disaster preparedness. The outcome is in line with Han and Nigg (2011), thus hypothesis 3 is supported.

**H4:** *Financial condition has a positive effect on the business disaster preparedness.*

Financial condition of the companies is measured by *Average Monthly Revenue*, but it is not significant (p=.474). Due to this fact, it is omitted in Model 6. Most of the past studies reported the positive impact of the financial condition on the disaster preparedness. The finding of the regression analysis does not show parallel results with the studies of Quarantelli, Lawrence, Tierney, and Johnson (1979) and Alesch, Taylor, Ghanty and Nagy (1993). Ultimately, hypothesis 4 is not supported.

**H5:** *Previous disaster experience positively affects the business disaster preparedness.*

One of the significant variables of Model 7 is *Previous Earthquake Experience* which refers to previous disaster preparedness (p=.064). It is thought that if the sample size increases, it will be significant in 5% significance level. Standard regression coefficient value implies that companies are more prepared to disaster, if the top manager of the company has a past disaster experience ($\beta$=.177). This result is on the same direction with the perspective of Jackson (1981), Drabek (1994a, 1994b), Kunreuther (1996), Dahlhammer and D'Souza (1997), Browne and Hoyt (2000), Cruz and Steinberg (2005) and Han and Nigg (2011). Therefore, hypothesis 5 is supported.

**H6:** *Self accumulation has a positive effect on disaster preparedness.*

Hypothesis 4 claims that when the business owners use their own self accumulation in the foundation phase of the firm, they put more actions into practice to prepare themselves to the possible disasters. In this thesis study, *Source of Initial Capital* refers to self accumulation and the outputs of Model 7 summarizes that companies which use self accumulation as a source of initial capital, are more prepared to the unexpected events, in other words *Source of Initial Capital* is significant and has a positive impact on the disaster preparedness ($\beta$=.178, p-value=.057). Considering these results, hypothesis 6 is supported.

**H7:** *Organizations having higher disaster risk perception also has higher disaster preparedness score.*

In order to measure the risk perception, there are 4 different variables used to understand which one represents this concept better. *Risk Score* does not give significant outcomes (p=.783), that is why it is removed after Model 2. Similarly, *Probability in 10 Years* is not included in Model 7 since it is insignificant (p-value=.338). *Maximum Magnitude* is not statistically significant and excluded after Model 3 (p-value=.619). The only one which represents the risk perception concept in a significant way is *Probability of Damage* variable (p-value=.018). It claims that companies make more preparations to protect themselves from earthquakes, if the risk perception of the managers is very sensitive to the possible earthquakes. In the past literature the arguments of Lindell and Perry (2000), Peacock (2003), Miceli, Sotgiu and Settanni (2008), Pennings and Grossman (2008), Yilmaz and Ozdemir (2011) and Han and Nigg (2011) are similar to this finding. This is because hypothesis 7 is supported.

**H8:** *Companies with female managers tend to take more disaster precaution activities.*

Based on the results of Model 7, *Gender* is a significant variable (p-value=.000) and its standardized coefficient points out that females are found to take precautions

more than males ($\beta$=-.363). This finding is same with the arguments of Neal and Philips (1990), Cutter, Tiefenbacher and Solecki (1992), Dooley, Catalano, Mishra, and Serxner, (1992), Flynn, Slovic and Mertz (1994) and Fothergill (1996). Due to these facts, hypothesis 8 is supported.

# CHAPTER 6

## DISCUSSION AND CONCLUSION

There is no doubt that SMEs are important figures in Turkish economy due to several reasons such as creating employment opportunities, producing high quality goods and services with low cost strategy, exporting to foreign countries and carrying out R&D activities.

Disasters are the unexpected events which occur very often in Turkey. The earthquakes are the most destructive events which have negative social, economic, physiological and psychological impacts throughout this country's history.

SMEs are very vulnerable organizations to the effects of the disasters. For this reason, in order to minimize the negative effects of disasters, they should have a business continuity plan and be carefully prepared to the disasters.

The aim of this study is to determine the factors affecting business disaster preparedness of SMEs and raise awareness about this significant topic. Previous studies examined which factors are influential in disaster preparedness. Different scholars investigated the effects of *firm size*, *firm age*, *location patterns*, *ownership of the property*, *financial condition*, *sector differences*, *previous experiences*, *risk perception*, *gender* and *ethnicity*.

In order to carry out this study, Han and Nigg's (2011) structure is used as a conceptual model and some changes are made in that model. In this study, *firm size*, *firm age*, *ownership of the property*, *financial condition*, *previous experiences*, *source of initial capital*, *risk perception* and *gender* are studied. By using the modified conceptual model, a questionnaire was prepared and the questionnaires were applied to the top level managers of the SMEs in METU Technopark.

METU Technopark is a technology development area located in the campus of Middle East Technical University. In August, 2013 it is started to apply the questionnaires. 281 SMEs were operating in METU Technopark on this date. In total, 60 questionnaires were evaluated. After that, using computer softwares, regression analyses were applied and 7 models were constructed. Model 7 is the final model that concludes this research.

There are different study examples in the literature, but this study contributes to the literature in 3 different points. First of all, this study is the first one which tries to factors affecting business disasters preparedness of SMEs in Turkey. Secondly, a new variable was added to the model *which* is *source of initial capital*. It can be KOSGEB (SMIDO) support, family support, bank loans or self-accumulation. This variable was a binary variable. If the owner of the company uses any self-accumulation, this variable considered as "1". Source of Initial Capital variable shows that companies are more prepared to the disasters if people use their self-accumulation in the foundation phase of the company because they do not want to put their assets at risk. For this reason they take more precautions. This implication is really important for the policy makers. To raise the awareness of disaster preparedness, policy makers can investigate the source of initial capital of the companies. They can raise the awareness of the companies which do not their self-accumulation. Because the companies which the source of initial capital based on other resources are less prepared to the disasters since they do not use their own financial assets. Thirdly, risk perception is measured by four different variables Risk perception is measured by *Risk Score, Probability in 10 Years, Maximum Magnitude* and *Probability of Damage*.

In conclusion, the study results that disaster preparedness is a function of *Number of Employees, Gender*, *Previous Earthquake Experience*, *Probability of Damage* and *Source of Initial Capital*. This means that firm size, previous experiences, perceived probability of damage positively influence disaster preparedness. In addition, woman managers are found to have taken more precautions. Finally, source of initial capital

is the other significant variable in the final model which explains the variation in disaster preparedness. Conclusion model is represented with an equation below.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5$$

$X_1$ = Firm Size

$X_2$ = Previous Experiences

$X_3$ = Source of Initial Capital

$X_4$ = Risk Perception

$X_5$ = Gender

Following figure demonstrates the conclusion model with a framework.
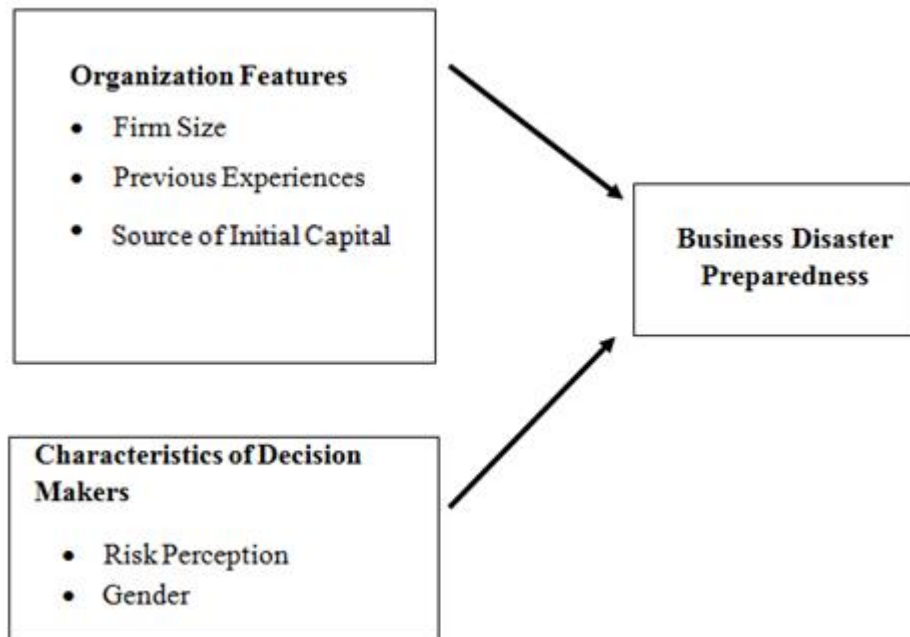


**Figure-6.1:** Conclusion Model

There are some limitations to this study. First, the sample size contains only the SMEs in Ankara, METU Technopark. Thus it does not show diversity. Second, the number of participants to this study is 60. Therefore, for further studies, the sample size should be increased and it should be applied in different cities of Turkey. Providing that it can be reached to more diversified sample which represent the

population more detailed. In order to achieve better results and analyze deeply, assistance of state institutions such as the Scientific and Technological Research Council of Turkey (TÜBİTAK), Disaster and Emergency Management Presidency may be taken financially and academically.

As a last comment, average disaster preparedness of SMEs in METU Technopark is low. This is in line with previous studies. Poeple do not tend to take precautions because they underestimate the probability of a disaster(Kunreuther,1976). In addition to this, this study proves that people do not believe that it can happen to them, if the probability of occurrence is above a threshold level(Camerer and Kunreuther, 1989).

Since there is a high threat of disasters in Turkey, policy makers should understand and highlight the importance of the disaster preparedness concept to make businesses more conscious on this topic. This study can be applied to large number of firms in different sectors and institutions with different sizes to represent Turkey's general disaster preparedness. The reason of the differences among sectors can be investigated. Therefore this research can be a basis for further studies. That is why enterprises should improve their own preparedness cycle. Planning, organizing, training, equipping, exercising, evaluating, and taking corrective actions are the basic phases of preparedness cycle. If each organization takes the necessary actions, the negative effects of those unexpected incidents on society could be minimized.



**Figure-6.2:** Preparedness Cycle (Federal Emergency Management Agency 2013)

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# APPENDICES


## APPENDIX A- OFFICIAL PERMISSION DOCUMENT OF THE PRESIDENCY OF METU
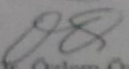


ORTA DOĞU TEKNİK ÜNİVERSİTESİ
MIDDLE EAST TECHNICAL UNIVERSITY
Afet Yönetimi Uygulama ve Araştırma Merkezi
Disaster Management Implementation and Research Center
Ankara 06531-Turkey
Tel: [+90] (312) 210 5410 Fax [+90] (312) 210 1328
e-mail: dmc@metu.edu.tr web: www.dmc.metu.edu.tr
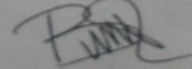
Sayın Yönetici,

Ekteki anket Teknokent'lerde bulunan şirketlerin afetlere karşı hazırlıklı olma sürecini ortaya çıkarmayı amaçlayan ve *ODTÜ Rektörlüğü tarafından desteklenen BAP-08-11-2013-049 kodlu bilimsel araştırma projesinin bir parçasıdır*. Anketi doldurarak bu projeye katkıda bulunmanızı rica ediyoruz. Vereceğiniz cevapların doğruluğu çalışmamız için büyük önem taşımaktadır. *İsim vermeniz gerekmediği gibi tüm cevaplarınız gizli tutulacaktır.* Çalışmanın sonuçları hakkında bilgi taleplerinizi telefon veya e-posta aracılığıyla yapabilirsiniz.

Vaktinizi ayırdığınız için teşekkür ederiz.


Saygılarımızla,

Prof. Dr. Özlem Özdemir Yılmaz
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# APPENDIX B- OFFICIAL PERMISSION DOCUMENT OF METU TECHNOPARK ADMINISTRATION



ODTÜ
**TEKNOKENT**
TEKNOLOJİ GELİŞTİRME BÖLGESİ

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03.05.2013

Sayı:   T02-03052013- 16761
Konu:   BAP Anket Katılımı

Sayın Yetkili,
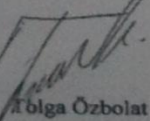
Ekte bilgilerinize sunulan anket, ODTÜ Teknokent'te faaliyet gösteren firmaların afetlere karşı hazırlıklı olma sürecini ortaya çıkarmayı planlamaktadır.

Anket kapsamında planlanan araştırma, ODTÜ Rektörlüğü tarafından desteklenen ve ODTÜ Afet Yönetimi Uygulama ve Araştırma Merkezi ile ortak yürütülen BAP-08-11-2013-049 kodlu bilimsel araştırma projesinin bir parçasıdır.

Bu araştırma projesi, ODTÜ İşletme Bölümü Öğretim Üyesi Prof. Dr. Özlem Özdemir Yılmaz, ODTÜ İşletme Bölümü ve Afet Yönetimi Uygulama ve Araştırma Merkezi Öğretim Üyesi Yrd. Doç. Dr. Berna Burçak Başbuğ Erkan ve ODTÜ İşletme Bölümü Araştırma Görevlisi Türker Aydın tarafından yürütülmektedir.

Anket dolduran firma yetkililerinin tüm cevapları gizli tutulacaktır. Anketi doğru ve eksiksiz tamamlayarak projeye katkıda bulunduğunuz için şimdiden teşekkür ederiz.

Saygılarımızla,
Ortadoğu Teknopark AŞ

Tolga Özbolat
Üniversite Sanayi İşbirliği Direktörü

70

# APPENDIX C-QUESTIONAIRE IN ENGLISH

**This questionnaire will be applied to the owner of the firm or the person in the position of decision-making for disaster management.**

**1.** Number of full-time staff working in the firm_____

**2.** Foundation year of the firm _____

**3.** What estimated percentage of the assets of the company

    **a)** belongs to it _____

    **b**) is rented _____

**4.** What is the average monthly revenue of the firm? _____

**5.** Which sector does the firms operates in? _____

**6.** What was your source of capital when the firm started to operate? (**You can circle more than one option.**)

    **a)** KOSGEB (SMIDO) support
    **b)** Ministry of Industry support
    **c)** Family support
    **d)** Self accumulation
    **e)** Banka loan
    **f)** Other _____

**7.** What kind of investment tools do you utilize for your business?
    a) Bank deposit
    **b)** Share
    **c)** Other_____

**8.** Do you have an optional earthquake insurance for your company?
    ❑  Yes. (If your answer is ''Yes'',  jump to question 10.)
    ❑  No, we do not have.
    ❑  No, we had, but it was expired.

**9.** If you do not have an optional earthquake insurance, or if you have, but you do not renew it, what could be the reasons?

- ❑ Very expensive.
- ❑ I do not trust optional earthquake insurance.
- ❑ I do not believe that the optional earthquake insurance will cover the damages in my business.
- ❑ I do not find the application practical, it takes so much time, a lot of documents are asked.
- ❑ It does not have any sanctions.
- ❑ I think I took the necessary precautions against earthquakes, I do not need insurance.
- ❑ I do not have enough knowledge about this topic.
- ❑ I think the building is resistant to the earthquakes.
- ❑ Other_____

**10.** Have you attended meetings or received written information on earthquake preparedness?

Yes ☐          No ☐

**11**. Have you talked with those working in your business about what to do in the event of an earthquake?

Yes ☐          No ☐

**12.** Have you purchased earthquake insurance to cover damage to your business?

Yes ☐          No ☐

**13.** Have you purchased business interruption insurance?

Yes ☐          No ☐

**14.** Have you stored extra fuel or batteries?

Yes ☐          No ☐

**15.** Have you learned first aid?

Yes ☐          No ☐

**16.** Have you obtained a first aid kit or extra medical supplies?

Yes ☐          No ☐

**17.** Have you developed a business emergency plan, covering what to do if an earthquake strikes?

Yes ☐          No ☐

**18.** Have you developed a business disaster recovery plan?

Yes ☐          No ☐

**19.** Have you conducted earthquake drills or exercises for your employees?

Yes ☐          No ☐

**20.** Have you been involved in any earthquake preparedness or response training programs for your employees?

Yes ☐          No ☐

**21.** Have you made arrangements to move the business to another location in case of an earthquake?

Yes ☐          No ☐

**22.** Have you obtained an emergency generator for use if electrical power fails?

Yes ☐          No ☐

**23.** Have you purchased a cellular phone for use if telephone fails?

Yes ☐          No ☐

**24.** Have you taken action to brace shelves or heavy objects that might move during an earthquake?

Yes ☐          No ☐

**25.** Have you stored water?

Yes ☐          No ☐

**26.** Have you had an engineer or other qualified person assess the structural safety of your building for earthquake?

Yes ☐          No ☐

**27.** Have you taken a precaution against bankruptcy risk?

Yes ☐          No ☐

**28.** Have you taken a precaution against data loss?

Yes ☐          No ☐

**29.** Have you taken a precaution against viruses and spy softwares?

Yes ☐          No ☐

**30.** What do you think about the probability of bankruptcy of your business in percentage basis within 10 years? _____

**31.** What is your age? _____

**32.** What is your gender?

Male ☐          Female ☐

**33.** What is your total tenure of service in your profession? _____

**34.** What is your place of birth? _____

**35.** How long have you been working in this firm? _____

**36.** What is the estimated monthly revenue range of your business?

❑ TL 2,000 - or less

❑ TL 2,000 - TL 4,000

❑ TL 4,000 - TL 6,000

❑ TL 6,000 - TL 8,000

❑ TL 8,000 - TL 10,000

❑ TL 10,000 - or more

**37.** As it is seen below, 0 shows the score of the most risk-averse person, 100 shows the score of most risk-taker person, state your risk level.

Please write your estimated score between 0 and 100 in the blank right. _____

**Score**

| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

**Risk-averse**                                                    **Risk-taker**
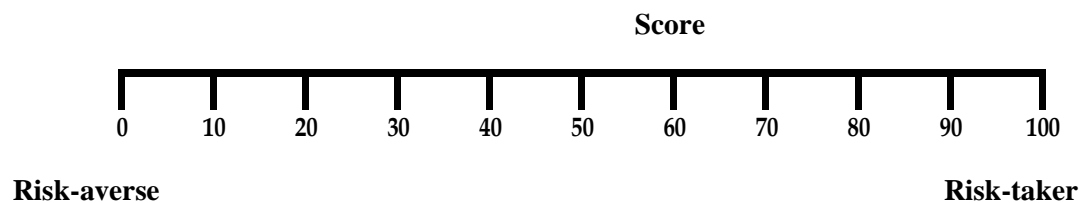
**38.** Have you ever experienced a strong earthquake up to now?

Yes ☐                    No ☐

**39.** What could be the probability in percentage basis that an earthquake will happen in Ankara within the next 10 years? _____ % **(%0 never - 100% definitely)**

**40.** What could be the magnitude of this possible earthquake? **(In Richter scale)**

**41**. What could be the probability in percentage basis that *your business* will be damaged from this earthquake? _____%

**42.** Considering all of the possible disasters which you may come across, if you evaluate ''earthquake'', how appaling it is from 1 to7? **(Circle it.)**

| **Least** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | **Most** |
|---|---|---|---|---|---|---|---|---|
| **appalling** | | | | | | | | **appalling** |

**43.** Do you think that you can do something for yourself and others against a possible earthquake to protect yourself and the other workers in your workplace? **(Circle it.)**

| **I can do** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | **I can do** |
|---|---|---|---|---|---|---|---|---|
| **nothing** | | | | | | | | **many things** |

**44.** What level of responsibility does each of the following institutions have on protecting you and your family from the earthquakes? **(Circle it.)**

| | **Not at all responsible** | | | | | **Very responsible** | |
|---|---|---|---|---|---|---|---|
| Myself | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Media | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| State | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Municipalities | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Building Company | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| University Administration | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Others _____ | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**45.** Do you think that you have adequate knowledge about protecting yourself from the earthquakes?

**(Circle it.)**

**Very adequate**    1    2    3    4    5    6    7    **Very inadequate**

**46.** There are many personal characteristics which <u>may or may not fit you</u> listed below. **Circle** the numbers, state how these characteristics fit your personality.

|  | Not at all suitable | Not suitable | I am undecided | Suitable | Very suitable |
|---|---|---|---|---|---|
| Impetuous | 1 | 2 | 3 | 4 | 5 |
| Sensitive | 1 | 2 | 3 | 4 | 5 |
| Talkative | 1 | 2 | 3 | 4 | 5 |
| Self-Assured | 1 | 2 | 3 | 4 | 5 |
| Cold | 1 | 2 | 3 | 4 | 5 |
| Shy | 1 | 2 | 3 | 4 | 5 |
| Sharer | 1 | 2 | 3 | 4 | 5 |
| Easygoing/Relaxed | 1 | 2 | 3 | 4 | 5 |
| Brave | 1 | 2 | 3 | 4 | 5 |
| Aggressive | 1 | 2 | 3 | 4 | 5 |
| Hard-Working | 1 | 2 | 3 | 4 | 5 |
| Enterprising | 1 | 2 | 3 | 4 | 5 |
| Well Intentioned | 1 | 2 | 3 | 4 | 5 |
| Sincere | 1 | 2 | 3 | 4 | 5 |
| Self-Confident | 1 | 2 | 3 | 4 | 5 |
| Temperamental | 1 | 2 | 3 | 4 | 5 |
| Philanthropic | 1 | 2 | 3 | 4 | 5 |
| Capable | 1 | 2 | 3 | 4 | 5 |
| Lazy | 1 | 2 | 3 | 4 | 5 |
| Irresponsible | 1 | 2 | 3 | 4 | 5 |
| Compassionate | 1 | 2 | 3 | 4 | 5 |
| Passive | 1 | 2 | 3 | 4 | 5 |
| Self-Disciplined | 1 | 2 | 3 | 4 | 5 |
| Nervous | 1 | 2 | 3 | 4 | 5 |
| Genial | 1 | 2 | 3 | 4 | 5 |
| Angry | 1 | 2 | 3 | 4 | 5 |
| Lethargic | 1 | 2 | 3 | 4 | 5 |
| Worried | 1 | 2 | 3 | 4 | 5 |
| Impatient | 1 | 2 | 3 | 4 | 5 |
| Creative | 1 | 2 | 3 | 4 | 5 |
| Capricious | 1 | 2 | 3 | 4 | 5 |
| Withdrawn | 1 | 2 | 3 | 4 | 5 |
| Timid | 1 | 2 | 3 | 4 | 5 |
| Touchy | 1 | 2 | 3 | 4 | 5 |
| Tolerant | 1 | 2 | 3 | 4 | 5 |
| Tidy | 1 | 2 | 3 | 4 | 5 |
| Fussy | 1 | 2 | 3 | 4 | 5 |
| Prudent | 1 | 2 | 3 | 4 | 5 |
| Determined | 1 | 2 | 3 | 4 | 5 |

## APPENDIX D-QUESTIONAIRE IN TURKISH

**Bu anket firma sahibine veya işletmedeki afet yönetimi konusunda karar verici pozisyondaki kişiye uygulanacaktır.**

**1.** İşletmede çalışan tam zamanlı personel sayısı _____

**2.** İşletmenin kuruluş yılı _____

**3.** İşletmenin sahip olduğu varlıkların tahminen yüzde kaçı

   **a)** kendisinin _____

   **b)** kiralık _____

**4.** İşletmenin şu anda ortalama aylık geliri nedir? _____

**5.** İşletmenin içinde bulunduğu sektör nedir?_____

**6.** İşletme, faaliyetine başladığında sermaye kaynağı neydi? **(Birden fazla seçeneği işaretleyebilirsiniz.)**
   **a)** KOSGEB Teşviği
   **b)** Sanayi Bakanlığı Teşviği
   **c)** Aileden gelen sermaye
   **d)** Kendi birikimim
   **e)** Banka kredisi
   **f)** Diğer _____

**7.** İşletmeniz için halihazırda mevcut hangi yatırım araçlarını kullanıyorsunuz?
   **a)** Banka mevduatı
   **b)** Hisse senedi
   **c)** Diğer_____

**8.** Şu anda işyeriniz için ihtiyari deprem sigortanız var mı?

   ❑ Evet. (Cevabınız ''Evet'' ise 10. soruya atlayınız.)

   ❑ Hayır, hiç yaptırmadım.

   ❑ Hayır,yaptırmıştım, süresi bitti.

**9.** İhtiyari deprem sigortasını hiç yaptırmadıysanız veya yenilemediyseniz sebepleri aşağıdakilerden hangisi olabilir?

- ❑ Çok pahalı.
- ❑ İhtiyari deprem sigortasına güvenim yok.
- ❑ İhtiyari deprem sigortasının işyerimdeki hasarı karşılayacağına inancım yok.
- ❑ Uygulamayı pratik bulmuyorum, çok vakit alıyor, çok evrak isteniyor.
- ❑ Bir yaptırımı yok.
- ❑ Depreme karşı gerekli tedbirleri aldığımı düşünüyorum, sigortaya ihtiyaç duymuyorum.
- ❑ Bu konu hakkında yeterli bilgiye sahip değilim.
- ❑ İşyerimin binasının zaten depreme dayanıklı olduğunu düşünüyorum.
- ❑ Diğer_____

**10.** Depremlere hazırlıklı olmakla ilgili toplantılara katıldınız mı ya da bu konuyla ilgili yazılı bir bilgi aldınız mı?

Evet ☐          Hayır ☐

**11**. İşletmede çalışan insanlarla deprem anında ne yapılması gerektiği ile ilgili konuşuldu mu?

Evet ☐          Hayır ☐

**12.** Depremin işletmeye verebileceği zarara karşılık bir sigorta satın aldınız mı?

Evet ☐          Hayır ☐

**13.** İş kesintisi sigortası satın aldınız mı?

Evet ☐          Hayır ☐

**14.** Ekstradan yakıt veya pil depoladınız mı?

Evet ☐          Hayır ☐

**15.** İşletme çalışanları ilk yardım uygulamayı biliyorlar mı?

Evet ☐          Hayır ☐

**16.** İlk yardım çantası veya ekstra tıbbi malzemeler bulunduruyor musunuz?

Evet ☐          Hayır ☐

**17.** Deprem olursa ''ne yapılacağını'' içeren bir acil durum iş planı geliştirildi mi?

Evet ☐          Hayır ☐

**18.** Afet sonrası için toparlanma ile ilgili bir iş planınız var mı?

Evet ☐          Hayır ☐

**19.** Çalışanlarınız için deprem eğitimleri veya deprem talimleri yaptınız mı?

Evet ☐          Hayır ☐

**20.** Çalışanlarınız için depreme karşı hazırlıklı olmakla ilgili programlara veya eğitim programlarına katıldınız mı?

Evet ☐          Hayır ☐

**21.** Deprem sonrası iş yerinizi başka bir yere taşımakla ilgili bir hazırlıklar yaptınız mı?

Evet ☐          Hayır ☐

**22.** Elektrik güç kesintisine karşı acil durum jeneratörü bulunduruyor musunuz?

Evet ☐          Hayır ☐

**23.** Telefon hatlarının zarar görmesi durumunda kullanabilecek cep telefonu satın aldınız mı?

Evet ☐          Hayır ☐

**24.** Deprem sırasında hareket edebilecek raf veya ağır nesneleri sabitlemek için bağlama gibi bir girişimde bulundunuz mu?

Evet ☐          Hayır ☐

**25.** Su depoladınız mı?

Evet ☐          Hayır ☐

**26.** İşletmenizde, binanızın deprem için yapısal güvenliğini değerlendirecek bir mühendis veya kalifiye bir kişi var mı?

Evet ☐          Hayır ☐

**27.** İflas etme riskine karşı bir önlem aldınız mı?

Evet ☐          Hayır ☐

**28.** Veri kaybına karşı bir önlem aldınız mı?

Evet ☐          Hayır ☐

**29.** Virüs ve casus yazılımlara karşı bir önlem aldınız mı?

Evet ☐          Hayır ☐

**30.** 10 yıl içinde % kaç ihtimalle iflas edeceğinizi düşünüyorsunuz?

_____

**31.** Yaşınız? _____

**32.** Cinsiyetiniz?

Erkek ☐          Kadın ☐

**33.** Meslekteki hizmet süreniz?_____

**34.** Doğum yeriniz?_____

**35.** Bu şirketteki çalışma süreniz? _____

**36.** İşletmenizin aylık toplam tahmini gelir aralığı nedir?

    ❑ 2.000 TL - veya daha az

    ❑ 2.000 TL - 4.000 TL

    ❑ 4.000 TL - 6.000 TL

    ❑ 6.000 TL - 8.000 TL

    ❑ 8.000 TL - 10.000 TL

    ❑ 10.000 TL - veya üzeri

**37.** Aşağıda görüldüğü üzere, 0 en çok riskten kaçan, 100 ise en çok risk alan kişinin skorunu gösteriyor ise, kendinizin bulunduğu risk seviyesini belirtiniz.

Lütfen sağdaki boşluğa 0 ile 100 arasındaki tahmini skorunuzu yazınız. _____

**Skor**

```
 |———|———|———|———|———|———|———|———|———|———|
 0   10  20  30  40  50  60  70  80  90  100
```

**Riskten kaçınan**                                     **Risk alan**
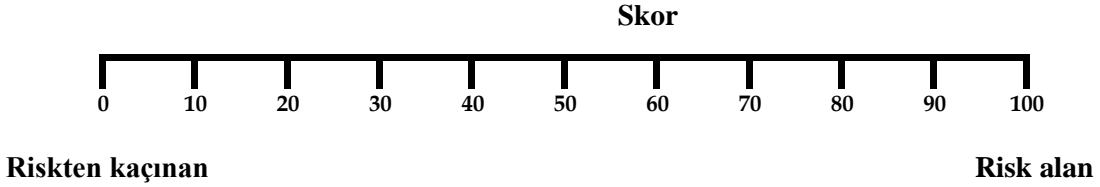
**38.** Şimdiye kadar büyük bir deprem tecrübesi yaşadınız mı?

Evet ☐          Hayır ☐

**39.** Ankara'da önümüzdeki 10 yıl içinde deprem olma olasılığı yüzde kaç olabilir?

%_____ **(%0 hiç olmaz-%100 mutlaka olur)**

**40.** Bu olası depremin tahmini büyüklüğü kaç olabilir?_____**(Richter ölçeği)**

**41**. Bu olası depremde *iş yerinizin* zarar görme olasılığı yüzde kaç olabilir?

%_____

**42.** Başınıza gelecek bütün felaketleri gözönüne aldığınızda "deprem" dehşet vericilik açısından 1'den 7'ye kadarlık derecelendirmede nerede yer alır? **(Daire içine alınız.)**

| **Az derecede** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | **Korkunç derecede** |
|---|---|---|---|---|---|---|---|---|
| **dehşet verici** | | | | | | | | **dehşet verici** |

**43.** Olası bir depreme karşı kendinizi ve iş yerindeki diğer çalışanları korumak için bir şeyler yapabileceğinizi düşünüyorsunuz? **(Daire içine alınız.)**

| **Hiçbir şey** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | **Çok şey** |
|---|---|---|---|---|---|---|---|---|
| **yapamam** | | | | | | | | **yapabilirim** |

**44.** Sizce sizi ve ailenizi depremden korumada aşağıdaki kurumlar ne kadar sorumlu olmalı? **(Daire içine alınız.)**

| | **Hiç sorumlu değil** | | | | | **Çok sorumlu** | |
|---|---|---|---|---|---|---|---|
| Kendim | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Medya | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Devlet | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Belediyeler | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Binayı Yapanlar | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Üniversite Yönetimi | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Diğer _____ | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**45.** Sizce deprem ve depremden korunma konusunda yeterli bilgiye sahip misiniz? ( **Daire içine alınız.)**

**Çok yeterli**    1    2    3    4    5    6    7    **Çok yetersiz**

**46.** Aşağıda size uyan ya da uymayan pek çok kişilik özelliği bulunmaktadır. Bu özelliklerden her birinin <u>kendiniz için ne kadar uygun olduğunu</u> ilgili rakamı **daire** içine alarak belirtiniz.

| | Hiç uygun değil | Uygun değil | Kararsızım | Uygun | Çok uygun |
|---|---|---|---|---|---|
| **Aceleci** | 1 | 2 | 3 | 4 | 5 |
| **Duyarlı** | 1 | 2 | 3 | 4 | 5 |
| **Konuşkan** | 1 | 2 | 3 | 4 | 5 |
| **Kendine Güvenen** | 1 | 2 | 3 | 4 | 5 |
| **Soğuk** | 1 | 2 | 3 | 4 | 5 |
| **Utangaç** | 1 | 2 | 3 | 4 | 5 |
| **Paylaşımcı** | 1 | 2 | 3 | 4 | 5 |
| **Geniş/Rahat** | 1 | 2 | 3 | 4 | 5 |
| **Cesur** | 1 | 2 | 3 | 4 | 5 |
| **Agresif (Saldırgan)** | 1 | 2 | 3 | 4 | 5 |
| **Çalışkan** | 1 | 2 | 3 | 4 | 5 |
| **Girişken** | 1 | 2 | 3 | 4 | 5 |
| **İyi Niyetli** | 1 | 2 | 3 | 4 | 5 |
| **İçten** | 1 | 2 | 3 | 4 | 5 |
| **Kendinden Emin** | 1 | 2 | 3 | 4 | 5 |
| **Huysuz** | 1 | 2 | 3 | 4 | 5 |
| **Yardımsever** | 1 | 2 | 3 | 4 | 5 |
| **Kabiliyetli** | 1 | 2 | 3 | 4 | 5 |
| **Üşengeç** | 1 | 2 | 3 | 4 | 5 |
| **Sorumsuz** | 1 | 2 | 3 | 4 | 5 |
| **Sevecen** | 1 | 2 | 3 | 4 | 5 |
| **Pasif** | 1 | 2 | 3 | 4 | 5 |
| **Disiplinli** | 1 | 2 | 3 | 4 | 5 |
| **Sinirli** | 1 | 2 | 3 | 4 | 5 |
| **Cana Yakın** | 1 | 2 | 3 | 4 | 5 |
| **Kızgın** | 1 | 2 | 3 | 4 | 5 |
| **Durgun** | 1 | 2 | 3 | 4 | 5 |
| **Kaygılı** | 1 | 2 | 3 | 4 | 5 |
| **Sabırsız** | 1 | 2 | 3 | 4 | 5 |
| **Yaratıcı (Üretken)** | 1 | 2 | 3 | 4 | 5 |
| **Kaprisli** | 1 | 2 | 3 | 4 | 5 |
| **İçine Kapanık** | 1 | 2 | 3 | 4 | 5 |
| **Çekingen** | 1 | 2 | 3 | 4 | 5 |
| **Alıngan** | 1 | 2 | 3 | 4 | 5 |
| **Hoşgörülü** | 1 | 2 | 3 | 4 | 5 |
| **Düzenli** | 1 | 2 | 3 | 4 | 5 |
| **Titiz** | 1 | 2 | 3 | 4 | 5 |
| **Tedbirli** | 1 | 2 | 3 | 4 | 5 |
| **Azimli** | 1 | 2 | 3 | 4 | 5 |

## MODEL 1

**Model Summary[b]**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .763[a] | .582 | .487 | 2.4334 |
| a. Predictors: (Constant), Maximum Magnitude, Ownership of Assets, Gender, Average Monthly Revenue, Source of Initial Capital, Risk Score, Previous Earthquake Experience, Probability of Damage, Age of the Firm, Probability in 10 Years, Number of Employees | | | | |
| b. Dependent Variable: Preparedness Scale | | | | |

**ANOVA[a]**

| | Model | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 396.162 | 11 | 36.015 | 6.082 | .000[b] |
| | Residual | 284.238 | 48 | 5.922 | | |
| | Total | 680.400 | 59 | | | |
| a. Dependent Variable: Preparedness Scale | | | | | | |
| b. Predictors: (Constant), Maximum Magnitude, Ownership of Assets, Gender, Average Monthly Revenue, Source of Initial Capital, Risk Score, Previous Earthquake Experience, Probability of Damage, Age of the Firm, Probability in 10 Years, Number of Employees | | | | | | |

**Coefficients[a]**

| | Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 8.949 | 4.720 | | 1.896 | .064 |
| | Number of Employees | .041 | .027 | .312 | 1.523 | .134 |
| | Gender | -2.831 | .760 | -.414 | -3.725 | .001 |
| | Previous Earthquake Experience | 1.446 | .715 | .209 | 2.022 | .049 |
| | Probability of Damage | .077 | .030 | .307 | 2.616 | .012 |
| | Ownership of Assets | -.030 | .043 | -.070 | -.692 | .492 |
| | Average Monthly Revenue | 2.667E-06 | .000 | .171 | .838 | .406 |
| | Source of Initial Capital | 1.240 | .722 | .174 | 1.717 | .092 |
| | Age of the Firm | -.006 | .053 | -.011 | -.105 | .917 |
| | Risk Score | .004 | .016 | .027 | .255 | .800 |
| | Probability in 10 Years | -.027 | .026 | -.151 | -1.063 | .293 |
| | Maximum Magnitude | -.184 | .361 | -.057 | -.509 | .613 |
| a. Dependent Variable: Preparedness Scale | | | | | | |

83

**MODEL 2**

<table>
<tr><th colspan="5">Model Summary<sup>b</sup></th></tr>
</table>

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 2 | .763<sup>a</sup> | .582 | .497 | 2.4088 |

a. Predictors: (Constant), Maximum Magnitude, Ownership of Assets, Gender, Average Monthly Revenue, Source of Initial Capital, Risk Score, Previous Earthquake Experience, Probability of Damage, Probability in 10 Years, Number of Employees

b. Dependent Variable: Preparedness Scale

**ANOVA<sup>a</sup>**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 2 | Regression | 396.096 | 10 | 39.610 | 6.827 | .000<sup>b</sup> |
| | Residual | 284.304 | 49 | 5.802 | | |
| | Total | 680.400 | 59 | | | |

a. Dependent Variable: Preparedness Scale

b. Predictors: (Constant), Maximum Magnitude, Ownership of Assets, Gender, Average Monthly Revenue, Source of Initial Capital, Risk Score, Previous Earthquake Experience, Probability of Damage, Probability in 10 Years, Number of Employees

**Coefficients<sup>a</sup>**

| Model | | Unstandardized Coefficients B | Unstandardized Coefficients Std. Error | Standardized Coefficients Beta | t | Sig. |
|---|---|---|---|---|---|---|
| 2 | (Constant) | 8.805 | 4.470 | | 1.970 | .055 |
| | Number of Employees | .041 | .026 | .309 | 1.542 | .130 |
| | Gender | -2.833 | .752 | -.415 | -3.769 | .000 |
| | Previous Earthquake Experience | 1.456 | .702 | .210 | 2.075 | .043 |
| | Probability of Damage | .077 | .029 | .305 | 2.649 | .011 |
| | Ownership of Assets | -.029 | .041 | -.068 | -.694 | .491 |
| | Average Monthly Revenue | 2.664E-06 | .000 | .171 | .845 | .402 |
| | Source of Initial Capital | 1.224 | .699 | .171 | 1.752 | .086 |
| | Risk Score | .004 | .016 | .028 | .277 | .783 |
| | Probability in 10 Years | -.028 | .026 | -.152 | -1.076 | .287 |
| | Maximum Magnitude | -.185 | .357 | -.057 | -.519 | .606 |

a. Dependent Variable: Preparedness Scale

**MODEL 3**

| Model Summary[b] | | | | |
|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 3 | .763[a] | .581 | .506 | 2.3864 |
| a. Predictors: (Constant), Maximum Magnitude, Ownership of Assets, Gender, Average Monthly Revenue, Source of Initial Capital, Previous Earthquake Experience, Probability of Damage, Probability in 10 Years, Number of Employees | | | | |
| b. Dependent Variable: Preparedness Scale | | | | |

| ANOVA[a] | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 3 | Regression | 395.651 | 9 | 43.961 | 7.719 | .000[b] |
| | Residual | 284.749 | 50 | 5.695 | | |
| | Total | 680.400 | 59 | | | |
| a. Dependent Variable: Preparedness Scale | | | | | | |
| b. Predictors: (Constant), Maximum Magnitude, Ownership of Assets, Gender, Average Monthly Revenue, Source of Initial Capital, Previous Earthquake Experience, Probability of Damage, Probability in 10 Years, Number of Employees | | | | | | |

| Coefficients[a] | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| | | B | Std. Error | Beta | | |
| 3 | (Constant) | 8.867 | 4.423 | | 2.005 | .050 |
| | Number of Employees | .042 | .026 | .319 | 1.634 | .109 |
| | Gender | -2.832 | .745 | -.415 | -3.803 | .000 |
| | Previous Earthquake Experience | 1.425 | .686 | .206 | 2.076 | .043 |
| | Probability of Damage | .078 | .029 | .309 | 2.724 | .009 |
| | Ownership of Assets | -.027 | .041 | -.064 | -.671 | .505 |
| | Average Monthly Revenue | 2.430E-06 | .000 | .156 | .808 | .423 |
| | Source of Initial Capital | 1.202 | .688 | .168 | 1.748 | .087 |
| | Probability in 10 Years | -.026 | .025 | -.145 | -1.055 | .297 |
| | Maximum Magnitude | -.176 | .352 | -.054 | -.500 | .619 |
| a. Dependent Variable: Preparedness Scale | | | | | | |

**MODEL 4**

<table>
<tr><th colspan="5">Model Summary[b]</th></tr>
<tr><th>Model</th><th>R</th><th>R Square</th><th>Adjusted R Square</th><th>Std. Error of the Estimate</th></tr>
<tr><td>4</td><td>.761[a]</td><td>.579</td><td>.513</td><td>2.3688</td></tr>
<tr><td colspan="5">a. Predictors: (Constant), Probability in 10 Years, Source of Initial Capital, Ownership of Assets, Previous Earthquake Experience, Number of Employees, Probability of Damage, Gender, Average Monthly Revenue</td></tr>
<tr><td colspan="5">b. Dependent Variable: Preparedness Scale</td></tr>
</table>

<table>
<tr><th colspan="7">ANOVA[a]</th></tr>
<tr><th colspan="2">Model</th><th>Sum of Squares</th><th>df</th><th>Mean Square</th><th>F</th><th>Sig.</th></tr>
<tr><td rowspan="3">4</td><td>Regression</td><td>394.224</td><td>8</td><td>49.278</td><td>8.782</td><td>.000[b]</td></tr>
<tr><td>Residual</td><td>286.176</td><td>51</td><td>5.611</td><td></td><td></td></tr>
<tr><td>Total</td><td>680.400</td><td>59</td><td></td><td></td><td></td></tr>
<tr><td colspan="7">a. Dependent Variable: Preparedness Scale</td></tr>
<tr><td colspan="7">b. Predictors: (Constant), Probability in 10 Years, Source of Initial Capital, Ownership of Assets, Previous Earthquake Experience, Number of Employees, Probability of Damage, Gender, Average Monthly Revenue</td></tr>
</table>

<table>
<tr><th colspan="8">Coefficients[a]</th></tr>
<tr><th rowspan="2" colspan="2">Model</th><th colspan="2">Unstandardized Coefficients</th><th>Standardized Coefficients</th><th rowspan="2">t</th><th rowspan="2">Sig.</th></tr>
<tr><th>B</th><th>Std. Error</th><th>Beta</th></tr>
<tr><td rowspan="9">4</td><td>(Constant)</td><td>8.014</td><td>4.051</td><td></td><td>1.978</td><td>.053</td></tr>
<tr><td>Number of Employees</td><td>.046</td><td>.024</td><td>.354</td><td>1.962</td><td>.055</td></tr>
<tr><td>Gender</td><td>-2.879</td><td>.733</td><td>-.422</td><td>-3.926</td><td>.000</td></tr>
<tr><td>Previous Earthquake Experience</td><td>1.414</td><td>.681</td><td>.204</td><td>2.076</td><td>.043</td></tr>
<tr><td>Probability of Damage</td><td>.075</td><td>.028</td><td>.298</td><td>2.698</td><td>.009</td></tr>
<tr><td>Ownership of Assets</td><td>-.027</td><td>.040</td><td>-.064</td><td>-.670</td><td>.506</td></tr>
<tr><td>Average Monthly Revenue</td><td>2.185E-06</td><td>.000</td><td>.140</td><td>.742</td><td>.462</td></tr>
<tr><td>Source of Initial Capital</td><td>1.265</td><td>.671</td><td>.177</td><td>1.884</td><td>.065</td></tr>
<tr><td>Probability in 10 Years</td><td>-.030</td><td>.024</td><td>-.163</td><td>-1.233</td><td>.223</td></tr>
<tr><td colspan="8">a. Dependent Variable: Preparedness Scale</td></tr>
</table>

**MODEL 5**

<table>
<tr><th colspan="5">Model Summary[b]</th></tr>
<tr><th>Model</th><th>R</th><th>R Square</th><th>Adjusted R Square</th><th>Std. Error of the Estimate</th></tr>
<tr><td>5</td><td>.759[a]</td><td>.576</td><td>.519</td><td>2.3562</td></tr>
<tr><td colspan="5">a. Predictors: (Constant), Probability in 10 Years, Source of Initial Capital, Previous Earthquake Experience, Number of Employees, Probability of Damage, Gender, Average Monthly Revenue</td></tr>
<tr><td colspan="5">b. Dependent Variable: Preparedness Scale</td></tr>
</table>

<table>
<tr><th colspan="7">ANOVA[a]</th></tr>
<tr><th colspan="2">Model</th><th>Sum of Squares</th><th>df</th><th>Mean Square</th><th>F</th><th>Sig.</th></tr>
<tr><td rowspan="3">5</td><td>Regression</td><td>391.703</td><td>7</td><td>55.958</td><td>10.079</td><td>.000[b]</td></tr>
<tr><td>Residual</td><td>288.697</td><td>52</td><td>5.552</td><td></td><td></td></tr>
<tr><td>Total</td><td>680.400</td><td>59</td><td></td><td></td><td></td></tr>
<tr><td colspan="7">a. Dependent Variable: Preparedness Scale</td></tr>
<tr><td colspan="7">b. Predictors: (Constant), Probability in 10 Years, Source of Initial Capital, Previous Earthquake Experience, Number of Employees, Probability of Damage, Gender, Average Monthly Revenue</td></tr>
</table>

<table>
<tr><th colspan="8">Coefficients[a]</th></tr>
<tr><th colspan="2" rowspan="2">Model</th><th colspan="2">Unstandardized Coefficients</th><th>Standardized Coefficients</th><th rowspan="2">t</th><th rowspan="2">Sig.</th></tr>
<tr><th>B</th><th>Std. Error</th><th>Beta</th></tr>
<tr><td rowspan="8">5</td><td>(Constant)</td><td>5.353</td><td>.806</td><td></td><td>6.638</td><td>.000</td></tr>
<tr><td>Number of Employees</td><td>.047</td><td>.024</td><td>.355</td><td>1.974</td><td>.054</td></tr>
<tr><td>Gender</td><td>-2.864</td><td>.729</td><td>-.419</td><td>-3.928</td><td>.000</td></tr>
<tr><td>Previous Earthquake Experience</td><td>1.303</td><td>.657</td><td>.188</td><td>1.983</td><td>.053</td></tr>
<tr><td>Probability of Damage</td><td>.075</td><td>.028</td><td>.297</td><td>2.700</td><td>.009</td></tr>
<tr><td>Average Monthly Revenue</td><td>2.111E-06</td><td>.000</td><td>.135</td><td>.721</td><td>.474</td></tr>
<tr><td>Source of Initial Capital</td><td>1.330</td><td>.661</td><td>.186</td><td>2.014</td><td>.049</td></tr>
<tr><td>Probability in 10 Years</td><td>-.027</td><td>.024</td><td>-.150</td><td>-1.154</td><td>.254</td></tr>
<tr><td colspan="7">a. Dependent Variable: Preparedness Scale</td></tr>
</table>

**MODEL 6**

| Model Summary[b] | | | | |
|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 6 | .756[a] | .571 | .523 | 2.3455 |
| a. Predictors: (Constant), Probability in 10 Years, Source of Initial Capital, Previous Earthquake Experience, Number of Employees, Probability of Damage, Gender | | | | |
| b. Dependent Variable: Preparedness Scale | | | | |

| ANOVA[a] | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 6 | Regression | 388.815 | 6 | 64.803 | 11.779 | .000[b] |
| | Residual | 291.585 | 53 | 5.502 | | |
| | Total | 680.400 | 59 | | | |
| a. Dependent Variable: Preparedness Scale | | | | | | |
| b. Predictors: (Constant), Probability in 10 Years, Source of Initial Capital, Previous Earthquake Experience, Number of Employees, Probability of Damage, Gender | | | | | | |

| Coefficients[a] | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| | | B | Std. Error | Beta | | |
| 6 | (Constant) | 5.317 | .801 | | 6.636 | .000 |
| | Number of Employees | .061 | .012 | .464 | 4.873 | .000 |
| | Gender | -2.808 | .722 | -.411 | -3.891 | .000 |
| | Previous Earthquake Experience | 1.284 | .654 | .185 | 1.965 | .055 |
| | Probability of Damage | .069 | .027 | .275 | 2.614 | .012 |
| | Source of Initial Capital | 1.325 | .658 | .185 | 2.014 | .049 |
| | Probability in 10 Years | -.021 | .022 | -.117 | -.967 | .338 |
| a. Dependent Variable: Preparedness Scale | | | | | | |

**MODEL 7**

| Model Summary[b] | | | | |
|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 7 | .751[a] | .564 | .524 | 2.3441 |
| a. Predictors: (Constant), Source of Initial Capital, Number of Employees, Gender, Previous Earthquake Experience, Probability of Damage | | | | |
| b. Dependent Variable: Preparedness Scale | | | | |

| ANOVA[a] | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 7 | Regression | 383.676 | 5 | 76.735 | 13.965 | .000[b] |
| | Residual | 296.724 | 54 | 5.495 | | |
| | Total | 680.400 | 59 | | | |
| a. Dependent Variable: Preparedness Scale | | | | | | |
| b. Predictors: (Constant), Source of Initial Capital, Number of Employees, Gender, Previous Earthquake Experience, Probability of Damage | | | | | | |

| Coefficients[a] | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| | | B | Std. Error | Beta | | |
| 7 | (Constant) | 4.932 | .695 | | 7.098 | .000 |
| | Number of Employees | .057 | .012 | .438 | 4.799 | .000 |
| | Gender | -2.478 | .635 | -.363 | -3.900 | .000 |
| | Previous Earthquake Experience | 1.229 | .651 | .177 | 1.889 | .064 |
| | Probability of Damage | .059 | .024 | .235 | 2.431 | .018 |
| | Source of Initial Capital | 1.273 | .655 | .178 | 1.943 | .057 |
| a. Dependent Variable: Preparedness Scale | | | | | | |

**DIAGNOSTICS OF MODEL 7**



Normal P-P Plot of Regression Standardized Residual
Dependent Variable: PreparednessScale



Scatterplot
Dependent Variable: PreparednessScale

Histogram
Dependent Variable: PreparednessScale

Mean = 2,03E-16
Std. Dev. = 0,957
N = 60
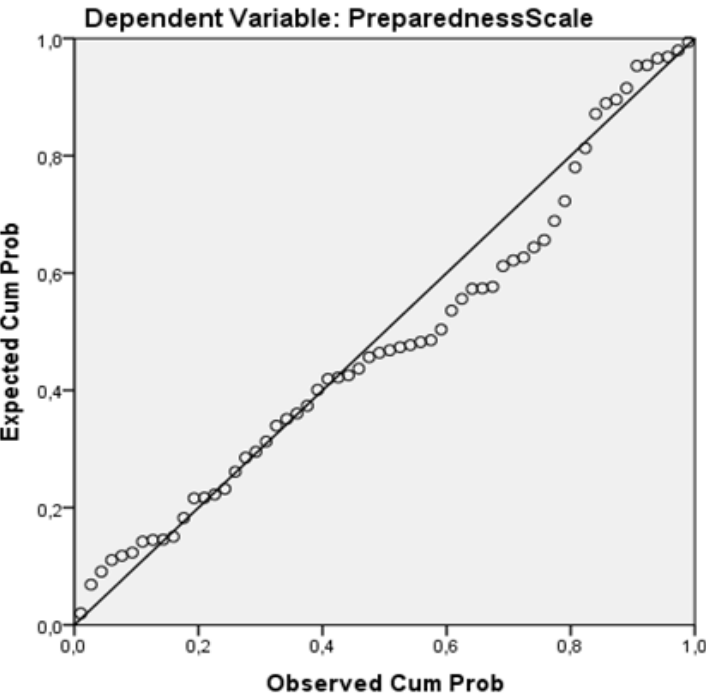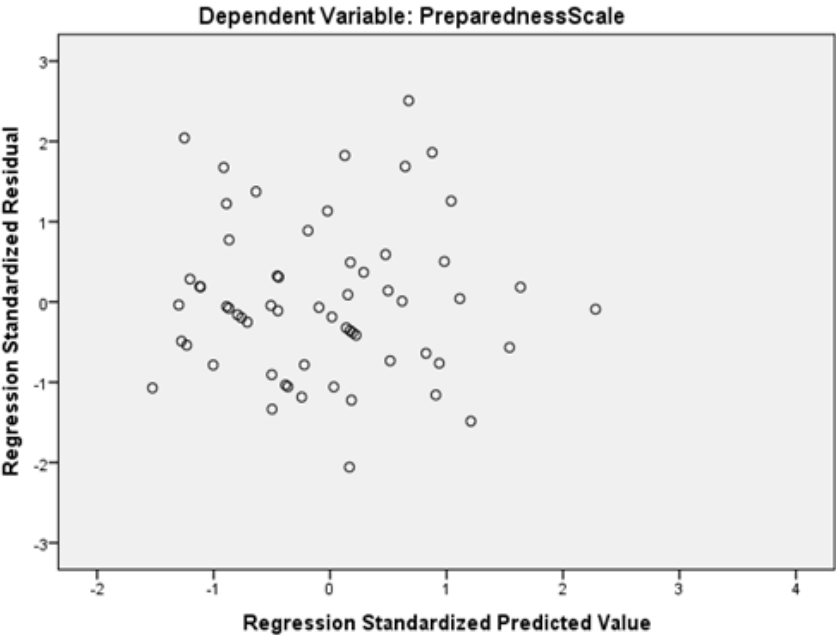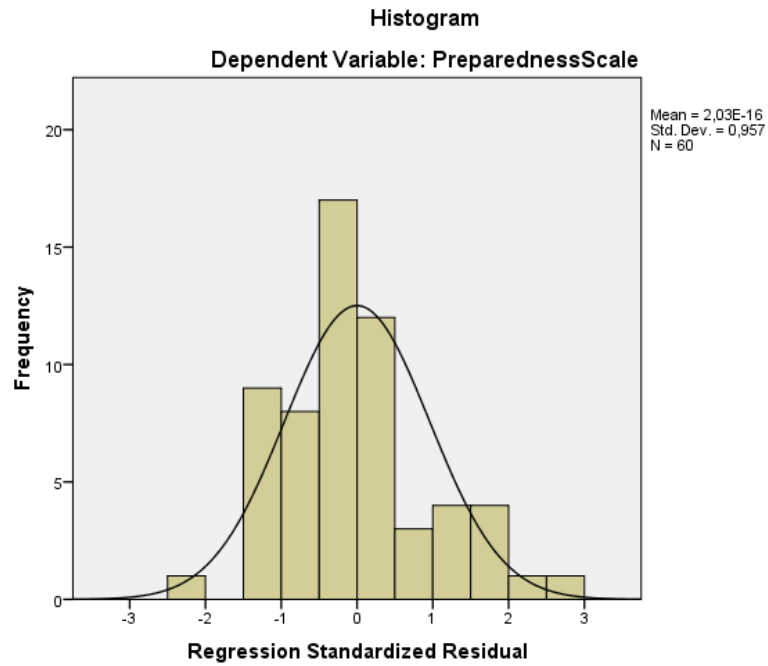
| Model | | Correlations[a] | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|
| | | Zero-order | Partial | Part | Tolerance | VIF |
| 7 | (Constant) | | | | | |
| | Number of Employees | 0.52 | 0.547 | 0.43 | 0.97 | 1.031 |
| | Gender | -0.402 | -0.469 | -0.35 | 0.933 | 1.071 |
| | Previous Eartquake Experience | 0.283 | 0.249 | 0.17 | 0.915 | 1.093 |
| | Probability of Damage | 0.438 | 0.314 | 0.22 | 0.867 | 1.153 |
| | Source of Initial Capital | 0.21 | 0.256 | 0.18 | 0.961 | 1.041 |
| a. Dependent Variable: Preparedness Scale | | | | | | |

# APPENDIX F-TURKISH SUMMARY

İşletmeler, en basit tanım ile kuruluş amacı ürettikleri ürün ve hizmetleri tüketicilere ulaştırıp kar etme hedefi olan organizasyonlardır. İşletmeler büyüklüklerine göre, büyük ölçekli işletmeler ve KOBİ'ler (Küçük ve Orta Büyüklükteki İşletmeler) olarak 2 gruba ayrılırlar. İstatistiksel olarak incelendiğinde, hizmet ve üretim sektörlerinin toplamı düşünüldüğünde, Türkiye'de KOBİ'ler toplam işletmelerin %99,8'ini oluşturmakta ve istihdamın %76,7'sini yaratmaktadır (OECD, Economic Outlook, 2010).

Türkiye, dünyada 17. büyük nominal GSYİH'ya sahip, gelişmekte olan bir sanayi ülkesidir (World Economic Outlook, 2012). Türkiye'deki bütün işletmeleri göz önüne aldığımızda, bütün girişimlerinin % 99.9'unu oluşturmakta olan KOBİ'ler, bu gelişmekte olan ekonomide, büyük bir rol oynamaktadırlar. Türkiye İstatistik Kurumu verilerine göre, Türkiye'de faaliyet gösteren 1.858.191 işletmenin, 1.856.340 tanesi KOBİ'dir (Turk Stat, 2012). Bu istatistik KOBİ'lerin toplam işletmelerin %99.9'u olduğu gerçeğine bir kanıttır.

Farklı kaynaklar, KOBİ tanımını farklı şekillerde yapmaktadırlar. Buna ek olarak, KOBİ'lerin kapsamı ülkeden ülkeye değişebilir. Bu akademik araştırma, Türkiye'deki KOBİ'lere özgüdür. Türkiye Cumhuriyeti Resmi Gazetesi'nde KOBİ'lerin özelliklerini tanımlayan bir mevzuat yayımlanmıştır. O yüzden, bu çalışmada tutarlı olmak için bu tanım dikkate alınmıştır (Türkiye Cumhuriyeti Resmi Gazetesi, 4 Kasım 2012). Bu tanıma göre, KOBİ'ler, çalıştırdıkları kişi sayısına ve yıllık net satışlarına göre üç kategoriye ayrılır. Mikro ölçekli KOBİ'ler, 1 ve 9 arasında personel çalışıtıran ve yıllık net satışı 1.000.000 TL'den (dahil) daha az olan kuruluşlardır. Küçük ölçekli KOBİ'ler, 10 ve 49 arasında çalışanı olan ve yıllık net satışı 1.000.000 TL (dahil) ve 8.000.000 TL (dahil değil) arasında olan işletmelerdir. Son kategori ise orta ölçekli KOBİ'lerdir. Mevzuat bu işletmeleri, 50 ve 249 arasaında çalışanı olan ve 8.000.000 TL (dahil) ve 40.000.000 TL (dahil değil)

arasında yıllık net satışı olan işletmeler olarak tanımlar. Kısaca mevzuata göre KOBİ'leri tanımlayan 2 önemli kriter vardır.

KOBİ'ler Türkiye ekonomisinde önemli rol oynarlar ve neden önemli oldukları belirli istatistiklerle kanıtlanmıştır. İmalat ve hizmet sektörleri göz önüne alındığında, Türkiye'de KOBİ'ler tüm işletmelerin % 99,8'ini oluşturmaktadır. Ayrıca, toplam istihdam olanaklarının %76,7'si ve Türkiye'de oluşturulan toplam katma değerin % 26,5'i KOBİ'ler tarafından oluşturulmaktadır. Bu gerçekler ışığında, KOBİ'lerin yeni istiham olanakları yaratmak ve işsizlik sorununu çözmede yardımcı olmak gibi ekonomiye büyük katkıları vardır. Birçok ülkede KOBİ'ler toplam işlemtmelerin %96 ile %99'unu oluşturmaktadırlar. Örneğin, Japonya'da toplam istihdamın %81,4'ü KOBİ'ler tarafından sağlanmaktadır (OECD SME and Entrepreneurship Outlook, 2005).

KOBİ'ler Türkiye'nin en dinamik işletmeleridir. Hemen hemen, tüm üretim ve hizmet sektörlerindeki faaliyet alanlarında varlık gösterirler. Tarım, makine, metal işleme, giyim, tekstil, perakende ticaret, ulaştırma, gıda, plastik ve kauçuk üretimi ve mobilya sektörleri bunlardan başlıcalarıdır. Bu kuruluşların çoğu İstanbul, İzmir, Bursa, Denizli, Gaziantep, Kayseri ve Eskişehir'de bulunmaktadır. Bu nedenle, ülkenin başlıca ekonomik omurgası olarak düşünülebilirler (Ozbek, 2008).

KOBİ'lerin üretim yöntemi esnektir. KOBİ'ler, piyasadaki değişikliklere kendilerini kolayca adapte edebilirler. Genel stratejilieri düşük maliyete yüksek kalitede mal ve hizmet üretmektir. Bu avantaj ekonomik dengeyi ve sürdürülebilir üretimi  sağlar (Ozdemir, Ersoz ve Sariglu, 2007).

KOBİ'lerin ihracata katkısı, Türkiye'nin potansiyel ekonomik gelişimi için çok önemlidir. Ülkenin ihracatına katkı yapmakla ile birlikte, ticaret dengesi üzerinde de olumlu bir etkileri vardır (Yilmaz, 2004). Türkiye'nin 2012'deki toplam ihracatının % 62,6'sı  KOBİ'ler tarafından yapılmıştır (Turk Stat, 2013).

KOBİ'lerin Türkiye ekonomisine yaptıkları yukarıda belirtilen katkılara ek olarak, bu işletmelerin, bölgesel eşitsizliklerin giderilmesi, göçlerin önlenmesi ve çevrenin korunmasında da bazı sosyal sorumlukları vardır (SPO, 2000).

2010 yılında Türkiye'de KOBİ'ler araştırma ve geliştirme faaliyetlerine 1.376 milyar TL harcamışlarıdır. Türkiye'deki toplam araştırma ve geliştirme harcamaları 9,268 milyar TL'dir. Diğer bir deyişle, araştırma ve geliştirme faaliyetlerinin %14,9'u KOBİ'ler tarafından yürütülmektedir. Ayrıca, KOBİ'lerin %50.8'i yeni teknolojik innovasyonlar üretmektedir. Buna ek olarak, Türkiye'deki 2010 yılında çalışan tüm Ar-Ge personellerinin %23,5'i KOBİ'lerde çalışmaktadırlar (Turk Stat, 2012).

Teknoloji Geliştirme Bölgeleri Kanunu, Kanun No 4691, 2001 yılında yürürlüğe girmiştir. Bu kanun yürürlüğe girdikten sonra Türkiye'de 43 farklı teknokentin oluşturulması planlanmıştır. Bu teknokentlerin 32'si faaliyetlerine başlamıştır. Bunlardan 11'i ise gelecekte aktif olacaktır (Association of Turkish Technology Parks, 2014).

Batelle Technology Practice (2007) tarafından hazırlanan bir çalışmada aşağıdaki gibi teknokentlerin faydaları tanımlanmıştır:

- İstihdam olanakları yaratma, yetenekli insan kaynaklarını geliştirmek ve ekonomik kalkınmayı sağlamak.
- Girişimcilik, inkübasyon ve ekonomik rekabet gücü desteklenmek ve teşvik etmek.
- Üniversiteler ve sanayi arasındaki ilişkileri geliştirilmek, firmalar ve iş partnerleri ile işbirliği yapmak ve uluslararası ortaklıklar oluşturmak.
- Teknoloji geliştirmede öncü olmak ve yenilikçi ticari fikirleri finanse etmek.

Günlük hayatta işletmeler birçok risk ile karşılaşmakta ve bu riskler işin aksamasına, duraksamasına ya da bazen kesintiye uğramasına sebep olmaktadırlar. Bu riskleri *doğal afet riski* (deprem, kasırga, yangın vb.), *insan kaynaklı riskler* (savaşlar, terörist ataklar vb.), *finansal riskler* (kredi riski, iflas etme riski, likidite riski vb.), *operasyonel riskler* (üretimdeki aksamalar, tedarikçiyle yaşanan problemler, dağıtım

kanallarında yaşanan problemler vb.), *stratejik riskler* (talepte yaşanan dalgalanmalar, ekonomik döngüler vb.), *bilgi riskleri* (doğru olamayan bilgi, yetkisi olmayan kişilerin gizli bilgilere ulaşması, siber saldırılar vb.) ve *uyumluluk riskleri* (kanunlara ve yönetmeliklere uyumsuzluktan dolayı alınabilecek cezalar vb.) olarak 7 kategoriye ayırabiliriz (Hiles, 2011).

17 Ağustos 1999 yaşanan Marmara Depremi, 20 Kasım 2003'te İstanbul'daki HSBC Bank Genel Merkezi'ne yapılan bombalı saldırı, 9 Eylül 2009 Marmara Bölgesi'nde meydana gelen sel felaketi ve 23 Ekim 2011 Van Depremi ülkemizde son 15 yılda meydana gelen ve organizasyonları etkileyen hadiselere örnek verilebilir. Ancak dikkat edilirse bu örneklerin dördü doğal afetlerle alakalı risklere, biri ise insan kaynaklı riske örnektir.

Yukarıdaki riskleri tek tek ele aldığımızda farklı sektörlerdeki işletmeler için bu risklerin tehdit unsuru değişkenlik göstermektedir. Örneğin bir banka için finansal risk diğer organizasyonlara göre daha büyük öneme sahiptir (Goodhart, 2008). Ancak bir petrol rafinerisi için doğal afet riski daha önem arz etmektedir (Hiles, 2011). Bu sebepten dolayı her işletmenin, iş sürdürülebilirliği üzerine geliştireceği stratejilerin değişkenlik göstermesi doğaldır.

İş sürekliliği kavramını, farklı kaynaklar değişik şekillerde tanımlamışlardır. İş sürekliği, işleri aksatma potansiyeli olan her türlü hadiseye karşı işletmelerin ürün ve hizmetlerini kullanıcılarına ulaştırabilme yetkinliğine denir (ISO, 2012). Diğer bir tanımla ise işletmenin kritik iş süreçlerinin sürdülebirliğinin sağlanması için yapılan aksiyonların tümüdür. (Dinckan, 2008)

İşletmeler, hizmetlerini sunarken, ürünlerini üretirken ve ekonomiye ek değer sağlarken günlük yaşamda işlerini aksatacak, durduracak ya da sekteye uğratacak birçok problem ile karşılaşmakta ve zorluklar yaşamaktadırlar. İşin kesintiye uğramasına ya da tamamen durmasına sebep olacak bu problemlerle büyük ölçekli olsun, KOBİ'ler olsun bütün işletmeler karşılaşmaktardırlar. Bu sorunlar ve risklerle başa çıkabilmenin yolu iş sürekliliği yönetimine önem vermekten geçer.

Türkiye'deki firmalar son zamanlarda iş sürekliliği konseptini yeni yeni dikkate almaya başlamışlardır. Afetlerin sıkça görüldüğü bir ülkede, işletmelerin afet yönetimine daha fazla önem vermesi gerektği su götürmez bir gerçektir. Bu sayede olası mali kayıplar en aza indirilir, hizmetlerin sürekliliğini sağlanır ve şirketin prestiji ve imajı korunmuş olunur. Bu hedefe, iş sürekliliği yönetimi gerçekleştirerek ulaşabilir. Bu amaçla, bu işletmelerin gerekli stratejileri geliştirmeleri ve gerekli eylem planlarını yapmaları gerekir.

Organizasyonlar kapsamlı bir iş sürekliliği planının faydalarının farkında olmalıdır. Hiles'in (2011) çalışmasına göre, bu faydalar aşağıdaki gibi sıralanmıştır.

- Afetlerin riskleri etkileri, risklerin doğru belirlenmesiyle minimize edilebilir. İş sürekliliği planları olan organizasyonlar beklenmedik olaylara daha dirençli hale gelirler.
- İş sürekliliği planları, beklenmedik olayların etkilierinden hızlıca kurtulmada yardımcı olurlar.
- Hasar ve iyileşme dönemleri arasındaki zaman aralıkları azaltılabilir.
- Bazı endüstriler çok sıkı regülasyona tabidirler ve bu endüstrilerdeki şirketlerin bu yasal zorunlukları karşılamaları beklenmektedir. Örneğin, gıda, finans ve ilaç endüstrilerinde bu regülasyonlar görülebilir. Bu nedenle, iş sürekliliği planları, yasal yükümlülüklere uyumu sağlamaktadırlar.
- Bazı işletmeler, diğer işletmeler ve ortaklarının faaliyetlerine bağımlıdırlar. İş sürekliliği planları iş anlayışı ve şirketlerin felsefelerini geliştirmede yardımcı olmaktadırlar.

Ülkemizde ''İş Sürekliliği Yönetimi'' kavramı ile ilgili 2005 yılnda 37 kamu kurumunu kapsayan bir araştırma sonucunda sadece %11'nin iş sürekliliği planı yaptığı sonucu ortaya çıkmıştır (Dinckan, 2008). Buna karşılık 2006'da ABD ve Kanada'da yapılan bir araştırmaya 261 orta ölçekli ve büyük şirket katılmış ve %52'sinin iş sürekliliği planı olduğu sonucu çıkmıştır (Rood, 2006).

Bazı işletmeler afet sonrası toparlanmaya yönelik planlar hazırlamak ve bazı prosedürleri uygulamaktadırlar. Ancak afetlere karşı hazırlıklı olmak için yapılan planlar, önlemler vs. ile iş sürekliliği yönetimini kavramsal olarak birbirine karıştırmamak gerekir. Bu iki kavram aynı şey değildir. Afetlere tedbirli olmak için yapılan planlar, iş sürekliliği yönetimi bütününü oluşturan parçalardan bir tanesidir (Cerullo, 2004).

Bu çalışmanın amacı, KOBİ'lerin organizasyonel anlamada afetlere hazırlıklı olmalarını etkileyen faktörlerin araştırılmasıdır. Çünkü KOBİ'lerin Türkiye ekonomisine katkısı yüksektir ve bu işletmeler afetlere karşı çok hassastır. Bu hedefe ulaşmak için, literatürde daha önceden afetler üzerine yapılmış olan birçok çalışmadan faydalanılmış ve kavramsal bir model kurulmuştur. Firmanın büyüklüğü, firmanın yaşı, mülkiyetin sahipliği, finansal durum, daha önceki afet deneyimleri, başlangıç sermayesinin kaynağı, risk algısı ve cinsiyetin afetlere hazırlık olma üzerindeki etkileri daha önceki çalışmalarada incelenmiştir. Bu araştırmada literatürdeki kavramsal modele, "başlangıç sermayesinin kaynağı" olarak adlandırılan yeni bir değişken eklenmiş ve kavramsal model modifiye edilmiştir. Modifiye edilmiş kavramsal model, bu çalışmayı diğerlerinden farklı kılar.

Depremler, Türkiye'de meydana gelenen en yıkıcı felaketlerden biridir. 1990 ve 2005 yılları arasında Türkiye'de 6,0 ve 6,9 arasında bir şiddete sahip 99 deprem olmuştur (Milliyet, 2005). Sadece KOBİ'ler değil, aynı zamanda büyük ölçekli şirketler de bu ölümcül afetlerden olumsuz etkilenirler. Bu nedenle, önceki çalışmalardan farklı olarak, KOBİ'lerin afetlere hazırlık olma düzeyini anlamak için yapılan anketlerde deprem özelinde sorular sorulmuştur.. Bu araştırmada, KOBİ'lerin afetlere hazırlık olmaları, 20 hazırlık öğesinden oluşan bir indeks ile ölçülmüştür.

ODTÜ Teknokent'te faaliyet gösteren yaklaşık 300 işletme vardır. Geçmiş çalışmalardan faydalanarak bu çalışma için tasarlanmış olan anketler, Ankara'da ODTÜ Teknokent'teki 60 KOBİ'nin üst düzey yöneticisine uygulanmıştır. Anket yoluyla elde edilmiş veriler, Microsoft Excel ve SPSS programları kullanılarak analiz

edilmiştir. Çoklu lineer regresyon modelleri hipotezleri test etmek için kullanılmıştır. Bu testler 7 farklı model kullanılarak yapılmıştır.

Ülkemiz coğrafi yapısı ve bulunduğu konum itibari ile afetlerin sık yaşandığı bir bölgede bulunmaktadır. Türkiye, depremlerin, heyelanların ve sellerin sık görüldüğü bir ülkedir (Ergunay, 2007). Bu sebepten dolayı iş sürekliliği yönetiminin bir parçası olan afetlere karşı hazırlıklı olma durumu ve afet riskinin azaltmak ayrı bir önem kazanmaktadır.

Afetlerin tek bir tanımı yoktur. Literatürde, farklı kaynaklar afetlerin tanımını farklı yapmaktadırlar. Hallegate ve Przyluski'ye (2010) göre, afetler, ülkelerin ekonomik yapılarını olumsuz etkileyen doğal olaylardır. Olumsuz etkileri arz-talep ilişkilerinde, istihdam ve tüketim üzerinde görülebilir. Depremler, kasırgalar ve kuraklık afetlere örnek olarak verilebilir.

Afetler, doğal afetler ve insan kaynaklı afetler olarak iki kategoriye ayrılabilir. Doğal afetleri depremler, volkanlar, seller, çığlar, kasırgalar, tayfunlar ve hortumlar oluşmaktadır. Öte yandan, insan kaynaklı afetlerin kökeni doğa değildir. Nükleer sızıntı, kimyasal sızıntı, terörist saldırılar ve kazalar insanlar sebep olduğu afetledir. 11 Mart 2011'de Japonya Tohoku'da meyana gelen deprem ve tsunami bir doğal afet iken, 11 Eylül 2001'de Dünya Ticaret Merkezi'ne yapılan terörist saldırılar ise insan kaynaklı bir afettir (American Red Cross, 2008).

Afetler birçok olumsuz doğrudan ve dolaylı etkilere sebep olmaktadırlar. Bu istenmeyen sonuçlar fiziksel, sosyal, psikolojik, ekonomik ve sağlıkla ilgili olarak farklı bağlamlarda olabilir. Aşağıdakiler bu istenmeyen etkilerin özetidir:

- Afetlerin en önemli etkisi topluma verdiği fiziksel zararlardır. İnsan kaynakları, yaralanma ve ölümlerden etkilenir (Smith and McCarty, 1996).
- Profesyonel iş yaşamında çalışanların iş performansı, duygusal bozukluklar yaşadıkları için afetlerden sonra bozulma eğilimi göstermektedir (Lutgendorf, Antoni, Ironson, Fletcher, Penedo, Baum, Schnelderman, and Klimas, 1995).

- İnsanlar psikolojik olarak, afetler sonrasında etkilemiş olabilir. Bazıları ailelerini ve yakın akrabalarını afetlerde kaybetmektedirler. Bu nedenle, psikolojik travma vakalarının sayısı afet sonrası dönemlerde artış göstermektedir (Chou, Huang, Lee, Tsai, Tsay, Chen, and Chou, 2003). Buna ek olarak, afetlerde evlerini ve varlıklarını kaybeden insanlar psikolojik sıkıntılardan muzdarip olmaktadırlar (O'Neill, Blake, Bussman, and Strandberg, 1999).

- Bulaşıcı ve bulaşıcı olmayan hastalıkların sayısı önemli ölçüde artmaktadır (Ali, 2007).

- Afetler toplumda yoksulluğun artmasına ve ekonomik gelişimin olumsuz etkilenmesine yol açmaktadırlar (Raschky, 2008). Farklı sektörlerdki firmaların verimlilik düzeyleri, bu beklenmedik olaylar nedeniyle düşüş eğilimi göstermektedir (Popp, 2006). Buna ek olarak, ekonomideki işsizlik oranı artar. Bu nedenle ani nüfus hareketleri afet sonrası dönemlerde kaydedilir. Ayrıca, makroekonomik değişkenleirn olumsuz etkilendiği gözlemlenir. Örneğin, ülkenin ödemeler dengesi bozulabilir (Ergunay, 2009).

- Afetlerden sonra, birçok işyeri ve bina zarar görür. Hasara maruz kalan yapıların afet öncesi dönemdeki eski halinde kullanılabilmesi için tamir edilmesi veya restore edilmesi gerekmektedir. Bu nedenle, birçok tür bakım maliyetleri ve ekstra maliyetler ortaya çıkar. (Petrucci, 2012).

13 Mart 1992 ve 1 Mayıs 2003 tarihleri arasında Türkiye'de birçok afet meydana gelmiştir. Bu afetler derinden incelenildiğinde, depremlerin en sık görülen ve en çok ekonomik kayba neden olan afetler olduğu anlaşılmaktadır. Örneğin,17 Ağustos 1999 İzmir Körfezi Depremi ölümcül sonuçlara yol açmıştır. 17.440 kişi hayatını kaybetmiş ve toplamda 15 milyon kişi dolaylı dolaysız etkilenmiştir. Bu depremle iligili olarak, 13 milyar Dolar ekonomik kaybın olduğu kayıtlara geçmiştir (Ergunay, 2007). Bunun dışında, 23 Ekim 2011 meydana gelen Van Depremi Türkiye tarihinin son yıkıcı depremi olmuştur. Bu depremde 604 kişi hayatını kaybetmiş ve 2.608 kişi yaralanmıştır. Bu afete ek olarak, 9 Kasım 2011 Van'da meydana gelen 2. bir deprem 40 kişinin ölümüne yol açmıştır. Bu iki olayın Türkiye ekonomisine zararı

yaklaşık 1 ve 2 milyar Dolar arasında değişmektedir (Erdik, Kamer, Demircioglu ve Sesetyan, 2012).

Türkiye'nin son 70 yıllık geçmişinde, 600.000 bina farklı tip olaylardan zarara uğramıştır. Bu binaların %66'sı depremlerden hasar görmüştür. Taşkınlar, binaların %15'ini zarara uğratmıştır. Sonraki riskli tehdit olan heyelanlar ise binaların %10'unu zarara uğratmışır. Yapıların %7'si kaya düşmelerinden etkilenmiştir. Meterolojik olaylar ve çığlar ise genel toplamın %2'sini etkilemişlerdir (Ozkul ve Karaman, 2007). Genel resme baktığımızda, 1900'lü yılların başından itibaren depremler 87.000 kişinin hayatlarını kaybetmesine neden olan en ciddi afettir. Bu istatistiklerin ışığında, depremlerin en yıkıcı doğal afetler olduğu sonucuna varılmıştır (Ergunay, 2007). Ayrıca, bu afetler ekonomide büyük kayıplara yol açmıştır. Örneğin, Türkiye'de, 2001 ekonomik krizinin temel nedenlerinden biri 1999 yılında yaşanan depremlerdir. 1999 yaşanan bu depremler Türkiye ekonomisine 15 milyar Dolar ilave yük getirmiştir (Cakici, 2001).

Bu çalışmada, farklı regresyon modelleri test edilmiştir. Bağımlı değişkenler *Çalışan Sayısı*, *Firmanın Yaşı*, *Varlıkların Mülkiyeti*, *Aylık Ortalama Gelir*, *Başlangıç Sermayesinin Kaynağı*, *Cinsiyet*, *Risk Skoru*, *Önceki Deprem Deneyimi*, 10 *Yılda İçinde Deprem Olma Olasılığı*, *Olası Bir Depremin Makrsimum Şiddeti* ve *Olası Bir Depremden Zarar Görme Olasılığı*dır.

Bu çalışmada hangi faktörlerin KOBİ'lerin afetlere hazırlıklı olmasında etkili olduğunu görmek için aşağıdaki hipotezler test geliştirilmiş ve test edilmiştir:

**H1:** Çalışanların sayısı açısından büyük boyutlara sahip organizasyonların afetlere hazırlıklı olma skoru da yüksektir.

**H2:** Firmanın yaşı afetlere hazırlık olma üzerinde önemli bir etkiye sahip değildir.

**H3:** Varlıkların mülkiyeti, afetlere hazırlıklı olma üzerinde önemli bir etkiye sahiptir.

**H4:** Finansal durum afetlere hazırlıklı olmada olumlu bir etkiye sahiptir

**H5:** Önceki afet deneyimi afetlere hazırlıklı olmayı olumlu etkiler.

**H6:** Sermaye kaynağında kendi birikimlerini kullanan kişilerin olduğu şirketlerin afetlere hazırlıklı olma skorları yüksektir.

**H7:** Risk algısı yüksek olan organizasyonların afetlere hazırlıklı olma skorları yüksektir.

**H8:** Kadın yöneticileri olan şirketler afetlere karşı önlem faaliyetleri alma konusunda daha eğilimindedir.

Çalışmada yapılan ankete göre tanımlayıcı istatistikler şu şekildedir:

- Öncelikle tüm şirketler dikkate alındığında, afetlere hazırlıklı olmada skor ortalaması 6,4 çıkmıştır.
- ODTÜ Teknokent'teki KOBİ'lerde çalışanların ortalama sayısı 16,18'dir.
- Anketlerin %58,3'ünü erkek yöneticiler doldurmuştur.
- Katılımcıların % 38,3'nün önceden deprem deneyimi vardır.
- Katılımcıların otalama %11,20'si olası bir depremde işlerinin kesintiye uğrayacağını düşünüyor.
- ODTÜ Teknokent'teki bütün varlıkların ortalama olarak %96,83'ü KOBİ'lere aittir.
- Ankete katılan firmalar, ayda ortalama 129.703,33 TL kazanmaktadırlar.
- ODTÜ Teknokent'te KOBİ'lerin % 66.7'si, şirketin kuruluş aşamasında kendi birikimlerini kullanmışlarıdır.
- Ankette yer alan 60 firmanın yaş ortalaması 10,167'dir.
- Bireyler kendi risk skoralarını ortalama 55,58 olarak algılamışlardır.
- Ankete göre, yıkıcı bir depremin önümüzdeki 10 yıl içinde olma olasılığı ortalama %19,66'dır.
- KOBİ'ler olası bir depremin maksimum büyüklüğünü Richter ölçeğine göre ortalama 4,94 büyüklüğünde tahmin etmektedirler.

ODTÜ Teknokent, Orta Doğu Teknik Üniversitesi kampüsünde bulunan teknoloji geliştirme alanıdır. 2013 Ağustos'ta tarhinide araştırma için hazırlanan anketler uygulanmaya başlanmıştır. Bu tarihte 281 KOBİ, ODTÜ Teknokent'te faaliyet

göstermektedir. Toplam olarak, 60 anket değerlendirilmiştir. Bundan sonra, bilgisayar yazılımları kullanarak, regresyon analizleri yapılmıştır ve 7 model farklı model kurulmuştur. Model 7 bu araştırmayı sonuca götüren modeldir.

Model 7, yani sonuç modeli aşağıdaki bir denklem ile gösterilmiştir.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5$$

$X_1$ = Firmanın Büyüklüğü

$X_2$ = Daha Önceki Afet Deneyimleri

$X_3$ = Başlangıç Sermayesinin Kaynağı

$X_4$ = Risk Algısı

$X_5$ = Cinsiyet

Literatürde afetlere hazırlıklı olma ile ilgili farklı çalışma örnekleri bulunmaktadır; ama bu çalışma 3 farklı noktada literatüre katkıda bulunmaktadır. Her şeyden önce, bu çalışma, Türkiye'de KOBİ'lerin afetler hazırlık olma durumunu etkileyen faktörleri sorgulayan ilk çalşmadır. İkincisi, literatürden farklı olarak "Başlangıç Sermayesinin Kaynağı" adıyla yeni bir değişken kavramsal modele eklenmiştir. Bu kaynak KOSGEB desteği, aile desteği, banka kredileri veya kendi birikimi olabilir. Başlangıç sermayesi olarak kendi birikimlerini ortaya koyan şirketilerin afetlere daha hazırlıklı olduğu ortaya çıkmıştır. Bunun altında organizasyonların kendi birikimlerini riske atmamak istedikleri yatmaktadır. Bu bulgu politika yapıcılar için gerçekten çok önemlidir. Afet hazırlık bilincini artırmak için, politika yapıcılar şirketlerin başlangıç sermayesinin kaynağını sorgulayabilirler. Kendi birikimlerini kullanmayan şirketlerinin bilincini artırmak gerekebilir. Üçüncü olarak, risk algısı Risk Skoru, Önceki Deprem Deneyimi, 10 Yıl İçinde Deprem Olma Olasılığı, Olası Bir Depremin Maksimum Şiddeti ve Olası Bir Depremden Zarar Görme Olasılığı değişkenleri ile ölçülmüştür..

Özetle, bu çalışmanın sonucunda afetlere hazırlıklı olmayı bir fonksiyon olarak düşünürsek Çalışan Sayısı, Cinsiyet, Önceki Deprem Deneyimi, Olası Bir Depremde Zarar Görme Olasılığı ve Başlangıç Sermayesinin Kaynağı bu fonksiyonu oluşturan

elemanlardır. Bu şu anlama gelir: firma büyüklüğü, önceki afet deneyimleri ve hasar algısı afetlere hazılıklı olma durumunu pozitif etkilemektedir. Buna ek olarak, kadın yöneticiler daha fazla önlem almaktadırlar. Son olarak, afetlere hazırlıklı olmayı etkiyen diğer bir değişken başlangıç sermayesinin kaynağıdır.

Bu çalışmanın bazı sınırlamaları vardır. İlk olarak, örneklem büyüklüğü sadece Ankara, ODTÜ Teknokent'teki, KOBİ'leri içermektedir. Bu yüzden örneklemde farklı şehirlerdeki, farklı KOBİ'ler yer almadığı için, çeşitlilik yoktur. İkincisi, bu çalışmadaki yapılan anketlere katılan katılımcı sayısı 60'tır. Bu nedenle, daha ileriki çalışmalar için, örneklem büyüklüğü artırılmalı ve Türkiye'nin farklı şehirlerde uygulanmalıdır. Böylece toplam populasyonu daha detaylı yansıtabilecek çeşitlendirilmiş bir örnekleme ulaşılabilir. Daha iyi sonuçlar elde etmek ve derin analizler yapmak amacıyla, Türkiye Bilimsel ve Teknolojik Araştırma Kurumu (TÜBİTAK) gibi, Afet ve Acil Durum Yönetimi Başkanlığı (AFAD) gibi devlet kurumlarının desteği mali ve akademik anlamda alınabilir.

Türkiye'de afetler yüksek bir tehdit oluşturduğundan, politika yapıcıların bu konunun önemini daha iyi anlaması ve bu konuda işletmeleri daha bilinçli hale getirmek için afetlere hazırlıklı olma kavramının önemini vurgulayacı çalışmalar yapması gerekir. Bu çalışma, Türkiye'nin afetlere hazırlıklı olmada genel durumunu anlamak için farklı boyutları ile farklı sektörlerde ve kurumlardaki çok sayıda firmalara uygulanabilir. Sektörler arasındaki farklılıkların nedeni araştırılabilir. Bu nedenle, bu araştırma daha ileri çalışmalar için bir temel olabilir. İşletmelerin afetler karşı kendi hazırlık döngülerini geliştirmeler gerekmektedir. Planlama, organize etme, eğitim, donanım, egzersiz, değerlendirme ve düzeltici aksiyonların alınması hazırlık döngüsünün temel aşamaları oluşturur. Her kuruluş üzerine düşen gerekli önlemleri alırsa, toplum üzerinde bu beklenmedik olayların olumsuz etkileri minimize edilebilir.

# APPENDIX G-TEZ FOTOKOPİSİ İZİN FORMU

**ENSTİTÜ**

Fen Bilimleri Enstitüsü ☐

Sosyal Bilimler Enstitüsü ■

Uygulamalı Matematik Enstitüsü ☐

Enformatik Enstitüsü ☐

Deniz Bilimleri Enstitüsü ☐

**YAZARIN**

Soyadı : Aydın
Adı    : Mevlüt Türker
Bölümü : İşletme

**TEZİN ADI** (İngilizce) :Business Disaster Preparedness of SMEs: A Survey Study in METU Technopark

**TEZİN TÜRÜ** :  Yüksek Lisans ■      Doktora ☐

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir. ☐

2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden  kaynak gösterilmek şartıyla fotokopi alınabilir. ☐

3. Tezimden bir bir (1)  yıl süreyle fotokopi alınamaz. ■

**TEZİN KÜTÜPHANEYE TESLİM TARİHİ**: