

# **Influence of Preparedness Measures on Re-Opening Time for Small Businesses after 2011 Thai Flood:**

## **A Case Study of Sai Mai District in Bangkok Metropolitan Administration**

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Little evidence from previous studies is available for businesses and disasters in developing countries context, which have a higher probability of being located in hazard prone areas. The objective of this study is to investigate what the most important preparedness measure influenced on re-opening time for small businesses rapidly after the 2011 flood finished in Sai Mai district of Bangkok Metropolitan Administration (BMA). The output of Multiple Regression Model from 200 business owners shows that the most important preparedness measure is to get information about past floods in BMA. This preparedness measure influenced other preparedness measure which could reduce the time of business recovery.

**Keywords :** *2011 Thai flood, preparedness measures, re-opening time for small businesses, Sai Mai district*

### **1. Significance of Investigating Factors that Influenced Re-Opening Time for Small Businesses Rapidly after 2011 Flood**

Small businesses are the foundation of local economy by providing jobs, goods, services, and tax money<sup>1</sup>. Most business owners usually pay attention to finding the best location for generating revenues than the disaster vulnerability of locations. The small businesses, especially retail and service stores are located in historical areas where locations or structures do not match with current codes<sup>2</sup>. Although those locations are good places for tourist attraction to generate business revenues, the locations may also be more vulnerable to disasters. Furthermore, small businesses are unable to transfer their risks because they do not have financial resources and often operate in one location with a few or no employee<sup>1,3,4</sup>. Therefore, an important factor when a disaster hit small businesses, is business owners' preparedness measures that may affect their ability to re-open rapidly after a disaster. This study focuses on the influence of preparedness measures on re-opening time for small businesses after 2011 Thai flood in Sai Mai district, Bangkok Metropolitan Administration (BMA). The finding can contribute to proposing disaster mitigation policy for small businesses in other districts of BMA including small businesses located in historical areas.

### (1) Impacts of 2011 Flood on Small Businesses in Thailand

A massive flood in 2011 is considered as the worst flood event in Thailand. This flood covered 66 of Thailand's 77 provinces. Economic losses were estimated by the World Bank at THB1.4 trillion (USD45.7 billion)<sup>5</sup>. Small and medium-sized enterprises (SME) contributed 3.75 trillion baht to the economy or 37% of GDP in Thailand. In 2011 flood event, there were 550,000 small businesses affected by this flood, in which 264,000 businesses were retail and wholesale sector. Direct and indirect damages for SMEs were estimated at 71.1 billion baht within a month, with 2.32 million jobs affected<sup>6</sup>.

As of 2<sup>nd</sup> November 2011 in area of BMA, there were seven areas where evacuation was needed such as Sai Mai, Don Muang, Laksi, Bang Phlat, Taling Chan, Thawee Watthana, and Bang Phai<sup>7</sup>. According to the damage assessment report of the census of business and industry in 2011, the number of enterprises that were affected by this flood in Sai Mai district was higher than others at 7,023 enterprises, 89% of all enterprises was small businesses (1-5 employees)<sup>8</sup>.

This study was conducted to investigate 200 shop owners who could open the same business after 2011 flood in Sai Mai district, with the question "How long did it take to re-open your shop after 2011 flood finished?". All respondents answered the numbers of day that they took to re-open shop after 2011 flood finished (0 day, 1 day, 2 days, etc.). Fig. 1 shows that 35% of all shop owners took less than one month for re-opening after 2011 flood finished while 41.5% took one month and 22.5% took more than one months. It points out why some business owners had to take more than one months while some business owners took less than one month. To answer this questions, this study focuses on factors that influenced taking time for re-opening shop rapidly after 2011 flood finished in Sai Mai district.

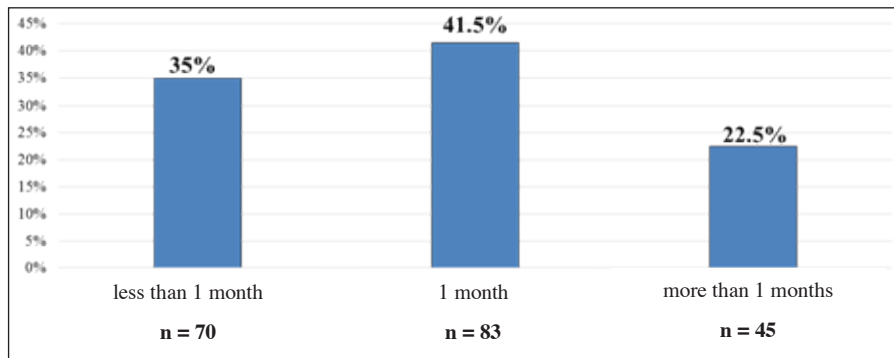


Fig. 1 Taking time for re-opening shop after 2011 flood finished in Sai Mai district

### (2) Little Evidence from Previous Studies about Businesses and Disasters in Developing Countries

This study reviews research on businesses and disasters, focusing on disaster preparedness measures of business owners, disasters impact on business operation and post-disaster business recovery. Most previous studies have been conducted in developed countries, especially in the United States. Little evidence from previous studies have focused on recovery time and been conducted in developing countries, where businesses have a higher probability of being located in hazard prone areas<sup>1,2,3,4</sup>. According to a study by Alesch et al.<sup>4</sup>, that explored factors that influenced recovery time of 500 small businesses after the 2010 flood in Pakistan in nine severely impacted districts, twelve factors had significant impact on the recovery time, for instance, average monthly sale, past disaster experience, damage to shelf items/inventory, disruption in supply chain, etc. That study just showed the relationship between selected variables and recovery time, which did not focus on what the most important factor. Furthermore, that study did not deeply treated with what kind of preparedness measures influenced recovery time after flood disaster.

Contrary with previous studies, the objective of this study is to investigate what the most important preparedness measure influenced on re-opening time for small businesses rapidly after 2011 flood finished in Sai Mai district of BMA.

### (3) Factors Used for Investigating Influence on Re-Opening Time for Small Businesses after 2011 Flood

To investigate what the most important preparedness measure influenced on re-opening time for small businesses rapidly after 2011 flood finished in Sai Mai district of BMA, preparedness measures before 2011 flood that are independent variables in this study are divided into two groups as soft and hard measures.

The three soft measures consist of getting information about past floods in BMA, talking with relative, friend, neighbors and employees about what to do in the event of flooding, and searching or reading information about flood risk area and preparedness. The three hard measures consist of preventing shop by sandbag and/or pump, moving inventories and/or equipment to second floor, and bracing up shelves, vulnerable furniture, and equipment. Dependent variable in this study is time for re-opening business after 2011 flood finished. The scope of taking time for re-opening business shows in Fig.2.

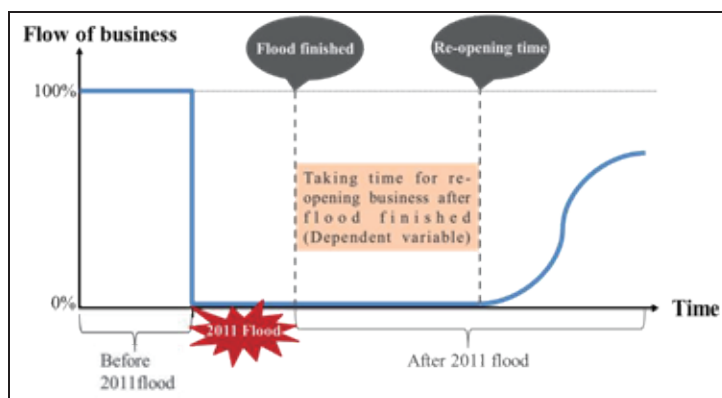


Fig. 2 The scope of taking time for re-opening business after 2011 flood finished as a dependent variable

## 2. Background of Two-hundred Business Owners



Fig. 3 Shops in Sai Mai district

This study interviewed some business owners and distributed 200 questionnaires to business owners, who could re-open the same business after 2011 flood in Sai Mai district of BMA. The survey was conducted during 1 February – 9 March 2014. The questionnaires asked as what kind of preparedness measures that business owners took and did not take before 2011 flood, how long the business owners took to re-open shop after 2011 flood finished, and the background of business owners.

Types of businesses are retail shops at 66% (i.e. variety shop, restaurant, pharmacy, etc.), followed by service shops at 28.5% (i.e. bike/motorcycle/car repair, tailoring, beauty salon, etc.), and doing both retail and service within a shop at 5.5% respectively (i.e. food and variety shop, copy shop and restaurant, etc.). These shops have been open for 4 to 48 years before 2011 flood and 81% (n = 162) of all samples do their business by labor in household. Fig. 3 that shows some shops in case study area, are mostly two and more than two storied building. Building use are mix use between commercial and residential at 62.5%, and only commercial at 37.5%. Most of the business owners' room ownership is at 71.5%, and room tenant is at 18.5%.

## 3. The 2011 Flood Situation and Preparedness Measures of Business Owners

### (1) The 2011 Flood Situation Interrupted Small Businesses in Sai Mai District

According to the interviews with business owners, Sai Mai district had not experienced flood before 2011 flood. Although in 1995 some areas located in lowland were flooded, the water height did not exceed 20 cm. As of 23<sup>rd</sup> October, 2011, the water from neighborhood areas and drains flowed into this area rapidly. The

next day (24<sup>th</sup> October, 2011), Bangkok Governor announced to warn residents to move their belongings to high area. As of 28<sup>th</sup> October, 2011 the water level was high at 1m to 2 m., Bangkok Governor announced to evacuate from this area. This flood took almost three months for some shops (September to December).

In case of business owners, data from 200 questionnaires shows that 68.3 % of all samples could not do their business during 2011 flood, 27.6% could do their business during flood about one week, and 4% could do their business during flood.

**(2) Preparedness Measures before 2011 Flood of Business Owners in Sai Mai District**

Fig. 4 representing preparedness measures before 2011 flood of business owners in Sai Mai district, shows that most samples took hard measures than soft measures; 84.5% of samples moved inventories and/or equipment to second floor and braced up shelves and/or vulnerable furniture and/or equipment, followed by shop prevention by using sandbag and/or pump at 64%.

In case of soft measures, samples got information about past floods at 47.5%, talked with relative/friend/neighbors/employees about what to do in the event of flooding at 35.5%, and searched or read information about flood risk area and preparedness at 24%. The next section discusses relationship between preparedness measures and taking time for re-opening business after 2011 flood finished by Crosstabulation Method.

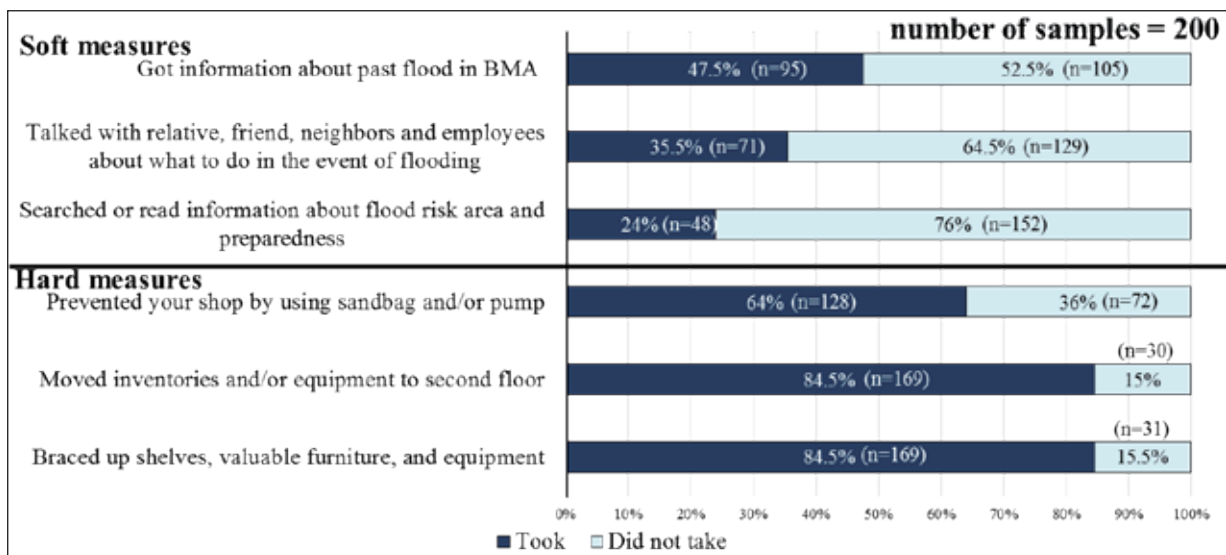


Fig. 4 Preparedness measures before 2011 flood of business owners in Sai Mai district

**(3) Relationship between Preparedness Measures and Taking Time for Re-Opening Business after 2011 Flood**

The outputs from Crosstabulation Method for explanation about the relationship between the preparedness measures and re-opening time as shown in Fig. 5 and 6. To investigate what kind of preparedness measures have the relationship with re-opening time rapidly (short time), the outputs from Crosstabulation Method in term of three soft measures can be concluded as follows: First as shown in Fig. 5 (a), most samples who got information about past floods in BMA, took short time (less than 1 month) for re-opening shop than samples who did not get information about past floods in BMA. Second as shown in Fig. 5 (b), most samples who did not talk with relative, friend, neighbors, and employees about what to do in event of flooding, took short time (less than 1 month) for re-opening shop than samples who talked. Next as shown in Fig. 5 (c), most samples who did not search or read information about flood risk area and preparedness, took short time (less than 1 month) for re-opening shop than samples who searched or read.

Fig. 5 (a), (b), and (c) point out that only getting information about past floods in BMA has the relationship with the re-opening time rapidly (less than 1 month), so this study will choose only this variable hereafter.

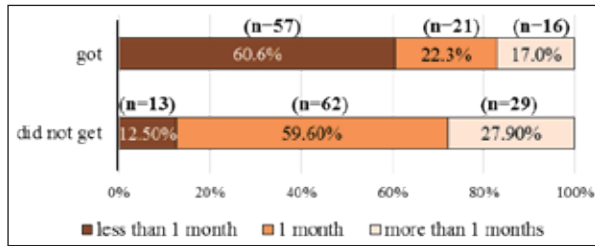


Fig. 5 (a) Got information about past floods in BMA

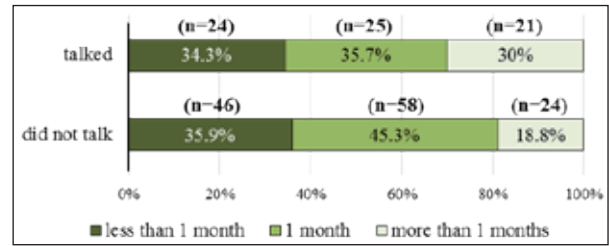


Fig. 5 (b) Talked with relative, friend, neighbors, and employees about what to do in the event of flooding

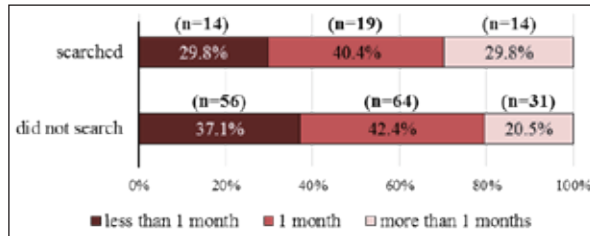


Fig. 5 (c) Searched or read information about flood risk area and preparedness

Fig. 5 Soft measures divided by re-opening time

Fig. 6 points out that preparedness measures in terms of three hard measures have some relationships with re-opening time. Those relationships can be concluded as follows: First as shown in Fig. 6 (a), most samples who moved all inventories to second floor, took short time (less than 1 month) for re-opening shop than samples who moved some or did not move any inventories. Second as shown in Fig. 6 (b), most samples who braced up all shelves, took short time (less than 1 month) for re-opening shop than samples who braced up some or did not brace up any shelves. Next as shown in Fig. 6 (c), most samples who did not prevent shop by sandbag and/or pump, took short time (less than 1 month) for re-opening shop than samples who prevented. Therefore, the study will use two hard measures such as moving all inventories to second floor and bracing up all shelves, to test influence on re-opening time rapidly.

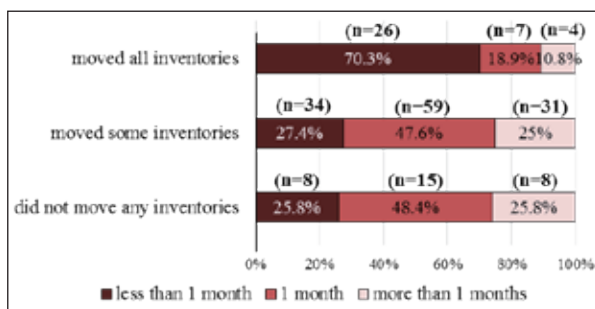


Fig. 6 (a) Moved all inventories and/or equipment to second floor

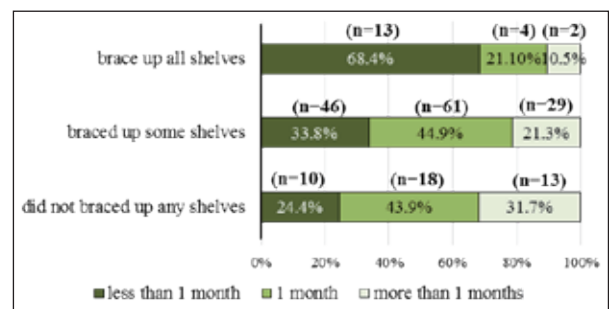


Fig. 6 (b) Braced up shelves, valuable furniture, and equipment

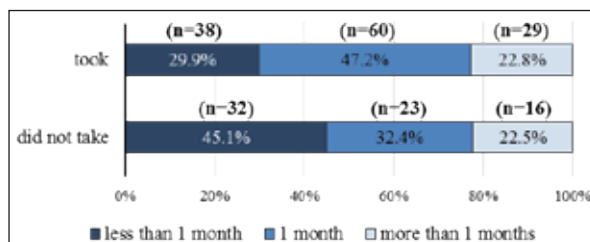


Fig. 6 (c) Prevented your shop by using sandbag and/or pump

Fig. 6 Hard measures divided by re-opening time

#### 4. Investigating the Most Important Preparedness Measure Influenced on Re-Opening Time Rapidly

##### (1) Multiple Regression Model for Investigating the Most Important Preparedness Measure Influenced on Re-Opening Time Rapidly

Table 1 shows the variation in re-opening time from explanation by getting information about past floods in BMA, moving all inventories or equipment to second floor, and bracing up shelves or vulnerable furniture or equipment by using Multiple Regression Analysis. The adjust R<sup>2</sup> value at 0.15 indicates that 15% of the variation in taking time for re-opening shop rapidly (short time) can be explained by this model (goodness of fit). The output of Multiple Regression Model points out that influence of getting information about the past floods in BMA on re-opening time is statistically significant at the 0.001 level. The output also indicates that as getting information about past floods in BMA, re-opening time for small businesses after 2011 flood decrease by 12 days. This interpretation is true only if the effects of moving all inventories or equipment to second floor and bracing up shelves or vulnerable furniture or equipment are held constant. The Multiple Regression Model of getting information about past floods in BMA influenced on re-opening time, is shown in equation (1) below:

$$Y = 39.14 - 12.63 * X_1 \quad (1)$$

where, Y is Re-opening time for small businesses after 2011 flood (0 day, 1 days, 2 days, 3 days, etc.)  
X<sub>1</sub> is Getting information about past floods in BMA (0 = did not get; 1 = got)

Table 1 Multiple Regression Model for predictors on re-opening time

	<b>b</b>	<b>SE</b>	<b>β</b>	<b>p</b>
Constant	39.14	2.02		
Getting information about past floods in BMA (X <sub>1</sub> )	-12.63	3.06	-.29	.000**
Moving all inventories or equipment to second floor (X <sub>2</sub> )	-8.92	4.90	-.16	.071
Bracing up shelves or vulnerable furniture or equipment (X <sub>3</sub> )	-1.34	6.34	-.02	.833

Note: X<sub>2</sub> is moving all inventories to second floor (0 = did not move and moved some inventories; 1= moved all inventories)  
X<sub>3</sub> is bracing up shelves or equipment (0 = did not brace up and braced up some shelves; 1= braced up all shelves)  
Note: R<sup>2</sup> = .15 (\*\*p < .001)

Therefore, the most important preparedness measure that influenced on re-opening time rapidly for small businesses after 2011 flood finished in Sai Mai district, is getting information about past floods in BMA. The getting information about past floods in BMA has negative effect on re-opening time, that means increase in getting information about past floods in BMA influenced on decrease in re-opening time (short time).

To answer “*Why did getting information about past floods in BMA reduce re-opening time?*”, authors assume that getting information about past floods in BMA might have an influence on other preparedness measures (hard measures) which could reduce the time of shop recovery. Therefore, the next section will test the relationship between getting information about past floods in BMA and selected hard measures by Pearson’s chi-square test. After that, this study will also test whether the factor of getting information about past floods in BMA has an influence on hard measures or not by Multiple Regression Analysis.

##### (2) Investigating Why the Factor of Getting Information about Past Floods in BMA Reduced Re-Opening Time

As mentioned earlier, first, this section examines the relationship between getting information about past floods in BMA and selected hard measures by Pearson’s chi-square test as shown in Table 2. The output of Pearson’s chi-square test points out that there is a relationship between getting information about past floods in BMA and selected hard measures. The p-value in Table 2 shows that getting information about past floods in BMA and moving all inventories to the second floor has a strong relationship at the 0.001 significant level,

while getting information about past floods in BMA and bracing up shelves has a relationship at the 0.05 significant level.

Table 2 Relationship between getting information about past floods in BMA and selected hard measures

	Pearson $\chi^2$	<i>p</i>
Getting information about past floods in BMA and moving all inventories or equipment to second floor	21.69	.000**
Getting information about past floods in BMA and bracing up shelves, vulnerable furniture or equipment	10.28	.006*

Note: \*\**p* < .001; \**p* < .05

Second, this study also examines whether the factor of getting information about past floods in BMA has an influence on hard measures or not by Multiple Regression Analysis. As shown in Table 3, when removes the factor of getting information about past flood in BMA from Multiple Regression Model, found that moving inventories or equipment to second floor has significant level at 0.05. Therefore, it is possible to conclude that getting information about past floods in BMA has an influence on hard measure which could reduce the time of shop recovery (Fig. 7).

Table 3 Multiple Regression Model for predictors on re-opening time in case of removing getting information about past floods in BMA

	<b>b</b>	<b>SE</b>	<b><math>\beta</math></b>	<b><i>p</i></b>
Constant	34.09	1.68		
Moving all inventories or equipment to second floor ( $X_2$ )	-14.09	4.94	-.26	.005*
Bracing up shelves or vulnerable furniture or equipment ( $X_3$ )	-1.22	6.61	-.02	.854

Note:  $R^2 = .07$  (\**p* < .05)

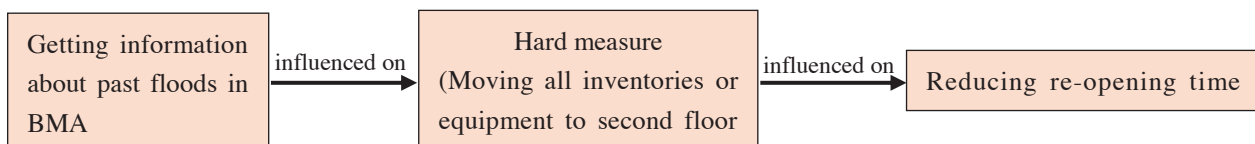


Fig. 7 An influence of getting information about past floods in BMA on hard measure

According to the interviews with some business owners in Sai Mai district, three categories of people who said “I got or knew information about past flood (before 2011 flood) in BMA”. The three categories are, first, BMA had not experienced with flood, second, BMA was ever flooded but water level was not high (20 cm), and third, BMA was ever flooded and in some areas water level was high (60 cm).

According to the report of Panya Consultants, there were exceptional large floods before 2011 flood in 1942, 1978, 1980, 1983, 1995, 1996, 2002 and 2006 in the area of BMA. For example, in October, 1995, the Northern, Eastern, and Western part of Bangkok were flooded extensively. The inundation depth was between 0.5 m and 2.0 m<sup>9</sup>.

## 5. Conclusion

The 2011 flood had impact on re-opening time for small businesses in Sai Mai district of Bangkok Metropolitan Administration (BMA). After the 2011 flood finished, some business owners had to take more than one months while some business owners took less than one month for re-opening shop. However, little evidence from previous studies is available for recovery time of small businesses in developing countries. The objective of this study is to investigate what the most important preparedness measure influenced on re-opening time rapidly for small businesses after 2011 flood finished in Sai Mai district of BMA.

The output of Multiple Regression Model from 200 business owners pointed out that the most important

preparedness measure influenced on re-opening time, is to get information about past floods in BMA. This preparedness measure also influenced on other preparedness measure especially, moving inventories or equipment to second floor, which could reduce re-opening time of businesses.

Therefore, increase in knowledge of business owners about information of past floods in BMA is an important preparedness measure, which might influence on re-opening time rapidly if a flood occurs. Furthermore, this policy can also be applied to the context of disaster mitigation for small businesses in BMA including small businesses located in historical areas.

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