

## GRASS-ROOT PREPAREDNESS AGAINST POTENTIAL FLOOD RISK AMONG RESIDENTIAL AND COMMERCIAL PROPERTY HOLDERS

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### Abstract

**Purpose** – This study aims to investigate the level of preparedness among property owners who had experienced flood damage to their properties in two cities in England following the summer floods of 2007. Flooding can have a variety of impacts on residential properties and businesses that may be unprepared and therefore vulnerable to both direct and indirect effects. Research suggests that the focus in analysis of damage to flood plain population (residential and commercial) tends to be on the direct tangible impacts, limiting their ability to recognize the true costs of flooding, thereby leading to unpreparedness to future flooding. Greater understanding of the level of preparedness against different types of flood impacts is likely to contribute towards increased knowledge of the likely resilience of residential and commercial property occupiers.

**Design/methodology/approach** – Primary data obtained through self-administered postal questionnaire survey of floodplain residential and commercial residents provide the basis for the research analysis and findings. The rationale behind choosing the locations for the research was based on the need to investigate areas where a sizeable number of residential and commercial properties were affected during the 2007 event, in this case, Sheffield and Wakefield in the northern part of England were chosen. The data collected were subjected to descriptive statistical analysis.

**Findings** – The result of the analysis revealed that non-structural measures have been implemented by more people when compared to other measures, which can be linked to the fact that non-structural measures, in most, cases do not have financial implication to the property owners. The uptake of the other measures (resistance and resilience) is very low. It can be concluded from the findings that the level of implementation of measures to reduce damage from potential future flooding among the flood plain residents is relatively low and mainly focussed towards reducing the direct effects of flooding. Practical implications – The study argues that increased resilience can be sustainable only by developing integrated attitude towards risk reduction not only by enhancing coping strategy by reducing direct impacts of flooding but also equally focussing on indirect effects.

**Originality/value** – There have been previous studies towards investigating the impacts of flooding on residential and commercial property owners as a separate entity. It is believed that this is the first time in which both residential and commercial properties will be investigated together as one body of research.

**Keywords:** Mitigation, Residential property, Measures, Commercial property, Direct effects, Indirect effects

Paper type: Case study

## 1. Introduction

The occurrence of flood disasters is the most frequent among all natural disasters. The reported number of people affected by floods and the amount of financial, economic and insured damages is a particular concern, especially with threats associated with climate change becoming increasingly apparent (Carter et al., 2009). Scientific evidence suggests that global climate change will increase the number of extreme weather events, creating more frequent and intense environmental emergencies (Field, 2012). It has been predicted that, globally, flooding could directly impact over 54 million people per year by 2050 if mitigation efforts are not stepped up (Bogardi, 2004). Given this trend towards higher loss and damage from flooding and the need to reverse the damage trend despite higher potential levels of hazard, the approach of increasing resilience has been suggested. The approach of resilience refers to the interplay of broader system-level attributes which implies notion of capacity to sustain and continue to function, that is, to cope with change (Anderies et al., 2013). Therefore, to understand resilience, it is important to gain insight on the factors that help in building and increasing the capacity to sustain and function in stressed situations. Preparedness is a key to maintaining operational functionality during shocks such as flood actions (Wedawatta et al., 2011); therefore, preparedness can be presumed to be a key variable in understanding the level of resilience in a flooded community.

The purpose of this paper is to present the knowledge gained from a survey of flood-affected populations to aid in understanding the common features that are preventing improvements in the resilience of owners of both residential and commercial property sectors. The focus of this paper is on the level of preparedness of flood plain residents and businesses against potential future flooding, and how this preparedness reflects on their level of resilience. The study will describe the most widely adopted preparedness strategies among a sample of residential and commercial property owners in England. The result from the responses from the questionnaire survey follows a brief review of literature. Finally, the paper will conclude with a discussion of the relationship between the level of resilience of both residential and commercial flood plain population.

## 2. Review of literature

Engaging floodplain population in the process of flood risk management is an important factor in realizing the aim of emerging flood risk management strategies in the UK. In the residential sector, floodplain residents are encouraged to take actions ranging from registering for flood warnings to installing their own defence and alarm systems in preparation for the potential future flooding (Pitt, 2008). The Environment Agency, for example, has instituted a public awareness programme and undertaken extensive consultations on adaptation measures; whilst in 2007, the UK Government, through the Department for Environment, Food and Rural Affairs (DEFRA), launched a pilot grant scheme that provided over £5 million funding for property-level flood protection surveys and measures in some part of England (JBA, 2012). Despite this, HR Wallingford (2012), concluded that the take up of flood adaptation measures remains low among floodplain resident, a finding common in the literature and observed across many countries (Lamond and Proverbs, 2009; Bubeck et al., 2012). The low level of preparedness among flood plain residents has previously been attributed to several factors, such as financial constraint, emotional constraint, aesthetic and informational barriers (Lamond et al., 2009).

The increase in flood risk within the commercial property sector is attributed to current development and demand in the floodplain coupled with a lack of preparedness to mitigate flood situations (Pottier et al., 2005). Literature indicates that small business holders are less concerned about changing uncertainties of disaster events such as flooding and think that the concept has been blown out of proportion. Their level of exposure, especially for small and medium commercial property sector, is accentuated by lack of preparedness among property owners (Pitt, 2008; Ingirige et al., 2010). Smaller businesses are said to be more vulnerable and also financially ill-equipped to deal with flooding in their premises and recover to continue

business (Clemons, 2008). Despite this, 90 per cent of the businesses are under-insured and 70 per cent are not concerned that flooding will affect them (Crichton, 2006). In the absence of insurance, it is even more important for property occupiers to be aware of the ways the damage can be minimized to allow them to return to their original “business as usual” state (Ingirige et al., 2010). Previous research on the commercial property sector has concentrated on methodologies for assessment of flood damages (Booyesen et al., 1999), flood precaution and coping capacity of companies (Kreibich et al., 2007) or flood action plans to reduce loss in the commercial sector (Gissing, 2002, 2003; Gissing and Blong, 2004). However, these studies were sector specific and localized in nature and lacked the holistic picture of preparedness and recovery strategies to reflect resilience. Therefore, further research is required to look into this gap and identify an integrated picture of existing level of resilience associated with residential and commercial property sectors through the lens of preparedness and recovery actions. Extensive research in this field is essential which can provide adequate guidance to stakeholders in both sectors and encourage them in moving towards building resilience against future flood risk. It has been recognized that new research is required to gain better understanding of the nature and characteristics of flood risk in different sectors and contribute towards inter-sector knowledge transfer. This can help in building resilience among floodplain population.

### **3. Research design and data collection strategy**

#### **3.1 Findings**

An extensive floodplain residential and commercial resident’s questionnaire survey was undertaken to gain better understanding of the level of resilience of the floodplain population. The investigation took the form of postal questionnaire surveys of areas that were affected during the Summer 2007 flood event in England. This flood event was widespread and it affected much of the UK during June and July 2007 which followed the wettest-ever May since national records began in 1766 (Pitt, 2008). The selection criteria for both residential and commercial properties were based on the need to investigate areas where a sizeable number of residential and commercial properties were affected during the 2007 event. In this case, Sheffield and Wakefield in the northern part of England were selected. The rationale behind choosing the locations was that both locations had witnessed frequent flood events in the past decade and are among the areas with a comparatively large number of affected commercial properties. In total, 230 questionnaires were distributed via post to homeowners and 1,830 (in each location) were distributed for business properties. The questionnaire was designed to gather information in three key areas including socio-economic demographics:

- flood experience (previous and subsequent flood experiences);
- flood impacts (financial losses and social impacts); and
- what measures have been implemented to reduce the effect of future flood risk and build resilience

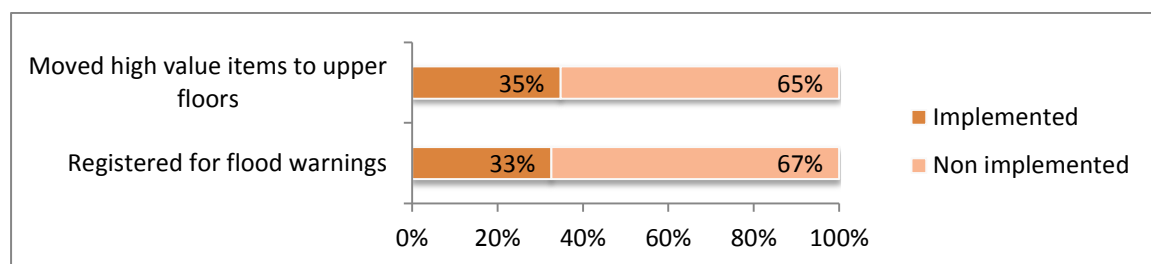
Prior to distributing the questionnaire, a pilot survey was conducted among homeowners who were not part of the main survey to determine the suitability of the questionnaire format and the contents, before being distributed by postal method to the areas affected by the Summer 2007 flood event. The feedback received from the pilot survey showed that because the questions were easy to understand, the questionnaire was distributed with no amendment. A similar pilot of questionnaire was performed with experts for the commercial property questionnaire to appreciate the suitability of the questionnaire among commercial property holders. The survey yielded 46 responses (residential), representing a response rate of 20 per cent, and 213 responses with 69 flooded properties representing a response rate of approximately 6 per cent. The response rate was lower than ideal for survey analysis, but they are not unusual for disaster research. However, a small response rate does not necessarily mean a large response bias, neither does a large

response always guarantee a representative sample (Lamond, 2008). The results of the survey are presented below.

### 3.1.1 Results from residential property survey

Using descriptive statistical analysis on the participants' flood experience revealed that most residential respondents (77.9 per cent) had no previous flood experience prior to the 2007 flood event; 16 per cent reported that they had experienced one previous flood to their properties prior to the 2007 event; and approximately 4 per cent had experienced floods twice and 3 per cent more than twice. Research has shown that experience of flooding can be a source of motivation to individuals to undertake precautionary measures against potential flood risk (Kreibich et al., 2007; Koerth et al., 2013). Further analysis of the data revealed that some 91 per cent of respondents did not experience a flood event after the 2007 summer flood event. This means that only 9 per cent of respondents had experienced further flooding after 2007. The financial costs of flooding were assessed by consideration of the insured costs that were incurred. Because of the nature of the sample selected, all the respondents suffered some damage to their property and possessions and they all had buildings and contents insurance. The mean insured building costs were £37,440, and the mean alternative accommodation costs were £6,520. These estimates are at the upper end of damage statistics previously reported in the UK. For example, Werritty et al. (2007) surveyed flood victims in Scotland and determined that average buildings losses were £31,980, whilst Environment Agency and DEFRA jointly reported that the mean total losses (insured buildings) for a flooded property in England were approximately £30,000 (Environment Agency, 2004).

To determine the social impacts of flooding, respondents were asked to rate the 14 separate variables based on their flood experience, using a 5-point Likert scale (1 no impact, 2 marginal impact, 3 moderate impact, 4 high impact and 5 extreme impact). The relative importance index method was used to rank the responses obtained from the Likert scale questions. All of the variables had a significant impact on flooded households, with the most noteworthy being "the stress of the flood event itself" and "worry about future flooding". These results show a similar pattern to an earlier Scottish study (Werritty et al., 2007), and broadly similar findings to an English-based study (Environment Agency and DEFRA, 2004). These were ranked by the respondent above the more direct physical damage. Three different preparedness scenarios were included in the questionnaire. These are non-structural measures, such as registering for flood alert warnings, implementing resistance measures and implementing resilience measures. The results of the analyses are presented in Figures 1-3.

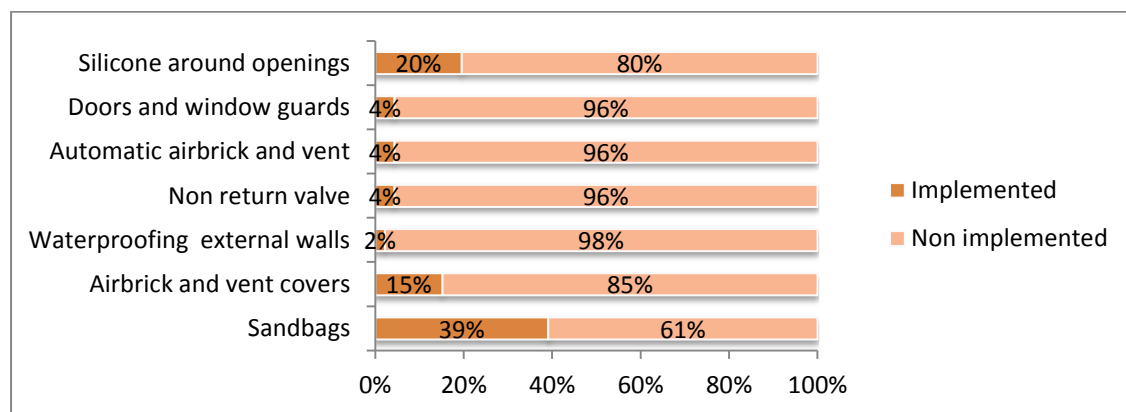


**Figure 1: Percentage of residential homeowners who had implemented non-structural measures**

The non-structural form of mitigation measures are attitude and behavioural changes, and, in most cases, these are carried out without incurring extra expenses. Figure 1 illustrates the percentages of the surveyed respondents who had taken on one form of non-structural measures. In terms of moving high-value items to upper floors, the result shows that some 35 per cent of respondents appeared to have taken action to move high-value items to the upper floor to reduce the level of loss, should there be another flood event. Almost similar number of respondents, 33

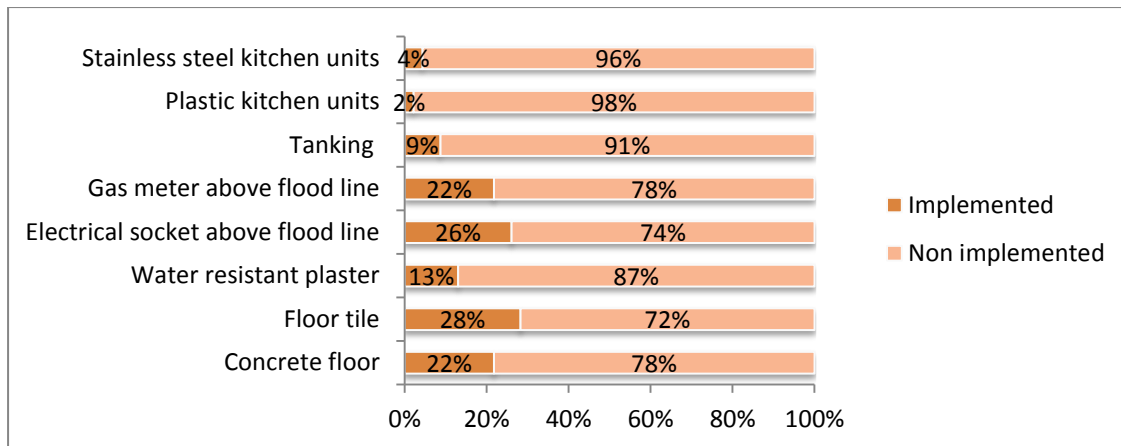
per cent, indicated that they had already registered for flood alert warning system; this result is low compared to previous studies which indicated that some 65 per cent properties have been registered for flood warnings (Pitt, 2008). The difference in the two results may be due to the nature of flooding, for instance, the 2007 flooding experienced in the surveyed location was mostly surface water, which, in most cases, occurs as a result of extensive rainfall.

Research has shown that resistance measures such as flood door guard can reduce the cost of flood damage by about 50 per cent; additionally, it was found that temporary resistance measures can make financial sense for properties in areas with an annual chance of flooding of 2 per cent or higher, or areas where there is an average likelihood of flooding once every 50 years (Thurston et al., 2008). The level of preparedness of homeowners was investigated based on how many respondents had actually implemented one form of resistance measures. Figure 2 illustrates the result of the analysis, 39 per cent of respondents indicated that they used sandbags in preventing flood water from entering their properties, this suggests that these respondents have sandbags ready for potential flood event, despite the consensus in the literature that sandbag is not an effective flood-prevention mechanism. The high percentage of respondents who claimed to have sandbags ready can be linked to the fact that, in most cases, sandbags are provided free of charge to floodplain residents by their local authority. Some 20 per cent of respondents had used silicone around openings; whilst, only 19 per cent had invested in airbricks, vent covers and automatic airbricks.



**Figure 2: Percentage of residential homeowners who had implemented one form of resistance measures**

Resilience measures aim to reduce the consequence of flooding by, for example, facilitating the early recovery of buildings, infrastructure or other vulnerable sites following a flood event (Joseph et al., 2011). Flood resilience measures reduce the cost of repairs after deep and prolonged floods, and can speed up restoration times. Because of the additional cost involved in implementing such measures, they are generally recommended for buildings with high frequency of flood and are more economically viable to be installed when reinstating a building after it has been flooded or as part of planned renovations. In investigating the level of preparedness of the respondents to the potential future flooding, respondents were asked to indicate which resilience measures they had implemented maybe as part of planned renovation or when their buildings were being repaired following the 2007 summer flood event. Figure 3 illustrates the result of the analysis.



**Figure 3: Percentage of residential homeowners who had implemented one form of resilience measures**

Figures reported on the amount spent on these measures have indicated that fewer people appear to have invested in resilience measures. Using floor tiles instead of carpet as floor finishes has been implemented by some 28 per cent, positioning electric socket above the flood line have been implemented by some 26 per cent. The relatively low percentage of people who had invested in resilience measures as a precautionary measure, despite the level of campaign, can be linked to their attitude to risk and the fact that they did not have to because of the provision of insurance.

### 3.1.2 Results from commercial property survey

Similar techniques were applied for surveyed properties affected by flooding in the commercial sector. The surveyed properties were distributed among two regions of Sheffield and Wakefield in England within some selected postcodes. All properties used for analysis were owner occupied. Sixty three per cent of the total number of samples (40) experienced flooding only once, followed by 18 per cent twice and the remaining 20 per cent were flooded more than two times. Most of the surveyed properties indicated the flood event of 2007 which was one of the most extreme events in the past 50 years. Several sources of flooding were identified among which highest percentage (44 per cent) was because of rain followed by mixed sources (36 per cent), riverine (3 per cent) and road drain overflow (7 per cent).

In terms of direct and indirect effects of flooding associated with the owner-occupied properties, it was observed that the most frequently experienced cause of disruption (20 per cent of total affected population) was in the form of access problem to customers. This was followed by operational disruption and access problems to employees (17 and 16 per cent, respectively). About 14 per cent suffered from business closure because of such disruption and other miscellaneous damages affected 12 per cent. Apart from the dominating indirect effect of flooding, other impacts such as direct effect of flood water on stock and machinery (9 and 8 per cent affected) and supply chain disruption (8 per cent affected) and damage inside and outside the affected property (7 and 5 per cent respectively) are the most frequent. Table I indicates the distribution of direct and indirect damages that affected the business properties in times of flooding.

**Table 1 Direct and Indirect effects of flooding on respondents**

Direct and indirect damage and disruption caused by flooding	Percentage of flood affected respondents experiencing damage and disruption
Access problem to customers	20%
Operational disruption	17%
Access problem to employees	16%
Business closure	14%
Other miscellaneous damages	12%
Damage to stock	9%
Damage to machinery	8%
Supply chain disruption	8%
Damage inside building	7%
Structural damage	5%

The recovery process of flooded properties depends on the type of impact that has affected the properties. The results from the surveyed properties indicated that indirect effects of flooding have a relatively higher impact than direct effects of flooding, and therefore, cost of recovery also showed similar trend. Based on the ranks provided by respondents for the factors affecting cost and time of recovery, an insight was gained regarding how they rank within the perspective of commercial property sector. Respondents were asked to rank the factors affecting cost of recovery. Based on the responses, it was witnessed that the cost of damage incurred on indirect flood impact recovery constitutes slightly higher mean average ranking than recovery from direct damages. Among direct damages, the highest mean average rank was assigned to property clean-up and repairing affected machinery. In case of indirect effects, disruption of sales and supply chain followed by working hour loss were assigned the highest mean average ranks. This finding tallies with the results from Table I. In disaster research, the observed trend of building resilience is that, more concentration is provided to mitigate direct effects of flooding than indirect effects of flooding owing to the difficulty in measurement and perceived lesser importance (Penning-Rowsell and Parker, 1987). However, the results from the present study indicate that floods not only cause direct losses but also have a ripple effect in the form of indirect disruptions which are equally important and require greater attention in building resilience, as they involve potential hidden costs of disruption and dislocation of longer-term economic activities.

Business continuity is the key to maintaining business operation, and the sooner the commercial properties can get back in business, the better it is for the financial stability of the local economy. Responses (ranking of factors consuming time of recovery) from the commercial property flood that affected respondents indicated that the highest amount of time is consumed in recovering from cleaning up of properties in case of direct impact of flooding, and for indirect disruptions, most mean average ranking was high for supply and work hour disruptions. One might expect that work hour loss might not be too severe a concern for commercial properties as staff return back to work soon after the flooding. However, as data show, access problem to employees can be quite a big issue, resulting in work hour loss for staff. The highest rank was assigned to factors like lost working hours as a result of access problem, especially to the sectors like manufacturing where working remotely is not possible, and the presence of the workers is required on site. This is followed by disruption causing customers to reach business properties (1st rank) which triggered loss of business utility and therefore affected their annual turnover unless actions were taken to recover faster.

The disruptions caused by flooding may also have an effect on the annual turnover of businesses; 20 per cent of affected business owners indicated that flood affected up to 5 per cent of their

annual turnover, 25 per cent indicated up to 10 per cent impact, 5 per cent indicated up to 20 per cent effect, while the remaining 25 per cent of the sample respondents fall among those who had no effect or they do not know about the impacts on their annual business turnover as a result of flooding. The main sources of finances that majority of the flood affected population in the area used for recovery purpose was self-funding (60 per cent), followed by flood insurance (15 per cent), and a small minority of the population (5 per cent) uses some kind of business reserve for emergencies like flooding. The rest (13 per cent) did not know what kind of financial measures they adopted which can be assumed that they, in general, lack financial resilience against flood impacts. In terms of engagement through preparedness in building resilience, it was observed that 75 per cent of the total sample showed some signs of financial preparedness, with 40 per cent among them prepared before the occurrence of flood event.

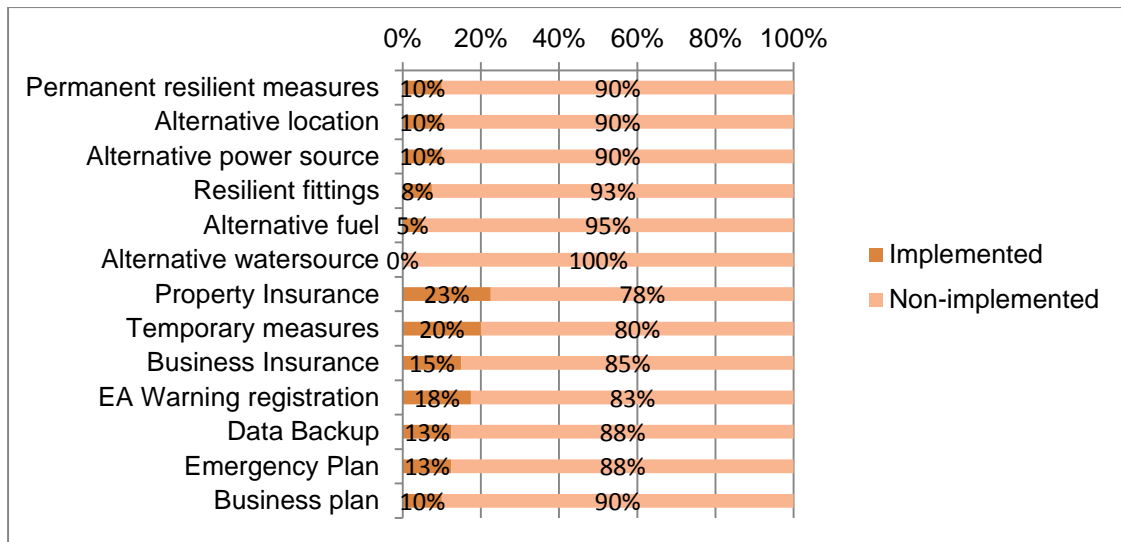
From the above discussion, the business situation and flood impacts were elaborated; it is important to see how the level of awareness of risk varied among the sample in affecting the level of resilience building. Little more than one-third (38 per cent) of the business property occupiers indicated that they had no knowledge of the risk of flooding when they first moved into the property, with same number indicating some knowledge (38 per cent) and rest (10 per cent) were aware of the local flood risk situation. This low awareness may partially explain the low level of preparedness before flooding. However, literature suggested that experience of flooding can have some effect on the preparedness regime (Flynn, 2007; Rose et al., 2012; Samwinga et al., 2004). Table 2 illustrates the situation with differential level of flood experience and flood resilience.

**Table 2 Comparison between preparedness and flood experience (percent having taken at least one measure)**

Flood experience	Percentage % Prepared	Percentage % Prepared before flood	Percentage % Un-prepared
Flooded once	44%	24%	56%
Flooded twice	86%	29%	14%
Flooded three times or more	100%	50%	0%

When the level of preparedness measures were compared between the population with differential flood experience, that is, those flooded once, twice, thrice and more, it was witnessed that 24 per cent of those being flooded once were prepared, out of which 56 per cent were prepared before the flood event; respondents who experienced flood twice are 86 per cent prepared, with 29 per cent prepared before flood and for those flooded more than that, 50 per cent were prepared before the flood event, and 100 per cent of the sample respondents were prepared with some kind of resistant or resilient measures. Although it not possible to generalize that all commercial property owners prepare against flooding after experiencing the second event, however, it seems, from the analysis, that it took them two flood events to get motivated to adopt some sort of measure. It is however important to evaluate the type of measures adopted by the respondents to understand their actual resistance or resilience level against flood risk. Different types of measures were adopted by the respondents.





**Figure 4. Percentage of commercial property occupiers who had implemented some form of preparedness measure**

Figure 4 illustrates the different measures implemented by flood plain business owners. The highest percentage of adopted measure is property insurance (23 per cent) followed by implementation of temporary measure such as sandbags (20 per cent) on an ad hoc basis. The next popular choices are registration to Environment Agency flood warning registration (18 per cent) and business insurance (15 per cent). Despite the fact that the warning service is provided for free and can be considered as a no-cost measure, implementation among the commercial property sector is still low.

There is some level of implementation, albeit low, of resilient measures such as backing-up of important data and business emergency plan (both, 13 per cent). Adaptation of retrofitting properties such as resilient fittings and permanent flood installations (10 and 8 per cent, respectively) against flooding is even less popular among commercial property occupiers. In terms of business continuity, very few properties had existing business plans to tackle after event situation (10 per cent) which can be considered as an effective and relatively low-cost measures. Some business owners (10 per cent) considered alternative location as an option for building resilience, but other aspects such as arrangement for alternative sources of power and water supply were rarely implemented by flooded business owners. The results also indicate that there is need for engendering motivation among flood-affected commercial property owners to adopt higher levels of preparedness (encouraging them to take up low-cost but effective preparedness actions) and mitigation activities to build up their resilience towards existing and future flood risk. Because the data show increased impact of indirect effects over direct impacts on businesses and low level of business and emergency planning among the repeatedly flooded businesses, it is marked that more focus on business continuity and emergency management is needed.

### 3.2 Insights gained from the study

The insights gained from this study helped in obtaining better understanding of resilience actions among residential and commercial properties. Although there are significant differences in terms of economic, social and psychological interests between these properties, certain common themes could be identified from the study. The level of resilience depends upon the antecedent condition such as perception and attitude towards risk, capacity to adapt and influences of various external factors such as characteristics and frequency of hazard occurrence. The general tendency seen in both sectors is towards investing in temporary resistant measures rather than long-term permanent resilient measures. This might be due to the initial investments involved in

the installation of permanent measures. In case of adoption of temporary measures, residential properties showed higher tendency (39 per cent of total respondents) of using sandbags as their main temporary measure despite the consensus in the literature that sandbags are relatively ineffective (Environment Agency, 2009). Conversely, for commercial properties, the percentage of temporary measures is significantly lower than residential property owners (20 per cent). Even in case of low-/no-cost measures, such as developing simple emergency and business plan, there is a general low level of interest observed in the commercial sector. Residential property sector showed much higher interest (33 per cent) towards no-cost preparatory measures such as registration for flood warning with Environment Agency compared to commercial properties (18 per cent). In case of implementation of adaptation measures as a form of preparedness, it was observed that for residential properties, almost 16 per cent of respondents adopted some form of resilient measures, while for commercial properties, the percentage was much lower (8 per cent only). When the same comparison was performed for permanent resistance measures among the residential (8.2 per cent) and commercial property sectors, the latter (10 per cent) performed slightly better. The differences between the adaptation strategies for building resilience among flood-affected properties in both residential and commercial sectors can be attributed to their differential attitude towards flood risk.

#### **4. Conclusions**

The research presented in this paper has aimed to identify the level of preparedness against the potential future flooding among the residential and commercial floodplain population in two cities in Northern England. For residential floodplain residents, three preparedness scenarios were investigated, non-structural, resistance and resilience measures. Among these three scenarios, the non-structural measures have been implemented by more people when compared to other two measures, which can be linked to the fact that non-structural measures in most cases do not have financial implication to the respondents. The uptake of the other measures (resistance and resilience) is very low. With some 35 per cent indicating that they will rely on sandbags for the potential future flooding, despite the fact that sandbags are not as effective when compared to other measures such as door guards. It can be concluded that among the residential floodplain population, the level of preparedness to potential future flooding is still very low.

The trend among commercial property sector showed a slightly different picture. The general pattern of damage and disruption between direct and indirect impacts has shown higher importance towards indirect effects; however, there is a tendency towards preparing more fully to mitigate direct effects of flooding. Although the level of preparedness is still far below expectations, there is a slight indication which shows that commercial property holders react positively to flood experience. Some property holders are using their experience of previous flooding as a motivation for installation of flood safety measures. It is however too early to say the same about the overall picture of the entire flood-affected population in the UK. More case studies concentrating on the commercial sector are required to make general statements regarding preparedness patterns of commercial properties. It is noticed and emphasized that more concentration is provided in protecting properties from direct impacts of flooding; however, data highlight that the indirect effects should have an equally higher rate of attention.

A general lack of investing in mitigation measures is often not rewarded through increased property value or lower insurance premiums in the UK because currently insurance premiums are not risk-based. While regulation and insurability considerations are likely to provide a sufficient trigger to invest in mitigation for new property, for existing homes, there are few incentives for homeowners to invest in mitigation measures purely on a financial basis. In contrast, the National Flood Insurance Programme (NFIP) has moved towards directly incentivizing mitigation through avoidance. Although, the position in the UK insurance market may change in near future because of the transition from the statement of principles to the flood re-agreement, the effectiveness of the "Flood re-agreement" is not yet possible to predict. Under these circumstances, the role of the

building professional in encouraging appropriate mitigation measures, at design and throughout the building life cycle, remains critical. A general lack of preparedness as observed among the flood-affected population investigated in this research shows that investing in resistance or resilience measures is often not rewarded through lower insurance premiums. There is therefore a potential for insurability and regulations consideration to provide a sufficient trigger to increase the level of preparedness by investing in adaptation measures. Further, the attitude to risk by those respondents is one factor which tends to influence their level of preparedness for potential future flood risk. Therefore, new strategies are required so that the flood plain population understands the actual risk and the benefit of preparedness, as this has the potential to motivate them and boost collective resilience.

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