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Adoption of Modern Technologies for Disaster Management of Water and Windstorm-related Disasters in Federal University Libraries in North-East, Nigeria

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Abstract

This study surveyed the adoption of modern technologies for disaster management of water and windstorm-related disasters in Federal University Libraries in North-East Nigeria. The population for the study comprised of 240 academic librarians in Federal University Libraries in Northeast, Nigeria. The study adopted a survey research design, No sample was used for the study because the size of the population was small and therefore total enumeration was adopted. The instrument for data collection was a structured questionnaire on four-point response options. Frequency counts, percentages, mean and standard deviation were used to answer research questions. The findings of this study revealed among others that a substantial per cent of the librarians are aware of the modern technologies used in disaster management in libraries in Northeast Nigeria. There was also a significant difference in the mean response of librarians on modern technologies adopted for the management of water and windstorm disaster in university libraries in Northeast Nigeria based on years of working experience. The study concluded that more relevant, adequate and up-to-date technological facilities were available in federal university libraries. The study recommended that a policy framework or disaster plan and comprehensive insurance policy should be in place to safeguard and preserve library resources. Finally, the study also recommended that technological systems such as Geographic Information System, Remote Sensing Technology, Satellite Communication network, and fire suppressants should be installed for disaster mitigation in university libraries in North East, Nigeria

Key Words: Modern Technologies, Disaster Management, Water and Windstorm-related Disasters

Introduction

Disasters have affected human and natural resources for ages. These are events that disrupt the normal activities of an organization, institutions, and countries. Ottong (2013) defined a disaster as any incident which threatens human safety and damages or threatens to damage, a library's buildings, collections and equipment. Man-made disasters are those caused or influenced by man, causing financial losses, risks, hazards and suffering such as war, explosives, liquid chemical spills and terrorism. (Ottong, 2013). Disasters both natural and man-made are leading to escalating disruption in human activities; loss of human lives, destruction of assets and businesses. Disasters challenge institutions and governments causing chaos and disruptions due to limited institutional capacity.

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Similarly, modern technology is a body of knowledge devoted to creating tools, processing actions and extracting materials. The term 'technology" is wide, and everyone has their way of understanding its meaning. Technology is used to accomplish various tasks in our daily lives, in brief; we can describe technology as products and processes used to simplify our daily lives. Technology extends our abilities, making people the most crucial part of any technological system. Modern Technology is also an application of science used to solve problems; technology and science are different subjects that work hand-in-hand to accomplish specific tasks or solve problems (Fernald, 2014). The sporadic hits of disasters in different segments of the society have not exempted libraries where a great amount of the nation information wealth is stocked. Disaster has to do with any event that directly or indirectly affects the smooth administration of a university library by disrupting its normal services to its users. It is an unexpected event that puts library resources or collections at risk. Various incidents of disasters have occurred in libraries worldwide with a magnitude of destruction to valuable information resources.

A report over the years has shown an alarming increase in levels of crime and Boko Haram terrorist attack, especially in North-Eastern Nigeria. Unfortunately, this situation is spreading across the other Africa countries, with countries such as Cameroun, Chad and Niger have now recording disquieting increases in crime levels and attack of Boko-Haram, as Boko Haram Attacks Killed Over 1,000 Civilians in February 2015 (The Sun News 2015) The persistence of insecurity has been claiming precious lives of citizenry and properties, government efforts to tackle the problem through various menial methods and approaches such as the use of police, military, vigilante and local hunters seem not to be yielding success. But deploying technology, through the use of ICT devices such as a computer, internet, mobile phone, close circuit television (CCTV), surveillance cameras, social network analysis, biometry surveillance, data mining, and satellite imagery devices, the modern technology would produce the desired results.

Statement of the Problem

Libraries are referred to as the heart or nerve centres of the institutions. Materials in the libraries are vulnerable to a disaster of various kinds, such as fire, flood, pest's destructions, windstorm and computer viruses. They usually leave in their trail very unpleasant experiences. Effective disaster preparedness in these libraries is necessary. The disaster management preparedness would safeguard the institutions from losing their library materials, as the effect of not having disaster management measures in libraries would cause them to lose their materials when disaster strikes. However, the particular circumstance of disasters in libraries is that they may bring about extensive damage or loss of information resources which is valuable in daily lives. Theft and mutilation of material are quite common problems in libraries throughout the world. However, enhancements in technology and sophistication of electronics have positively affected security equipment. There are many access control, collection security, burglary/theft protection and video surveillance systems available in today's market that can be utilized to secure libraries and their resources. It is against this backdrop the researcher strives to investigate the librarians' awareness of modern technologies in disaster management in federal university libraries in North East, Nigeria

The objective of the Study

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The general objective of this study is to investigate the librarians' awareness of modern technologies in disaster management in federal university libraries in North East, Nigeria. The specific objectives are to determine:

1. The modern technologies adopted for disaster management of water and windstorm in federal university libraries in North East
2. The levels of awareness of librarian's on the adoption of modern technology for disaster management of water and windstorm in federal university libraries in North East.
3. The types of equipment adopted for the management of disasters in Federal University Libraries in North-East Nigeria

Research Questions

1. What are the modern technologies adopted for disaster management of water and windstorm in federal university libraries in North East?
2. What are the levels of awareness of librarian's on the adoption of modern technology for disaster management of water and windstorm in federal university libraries in the North East?
3. What are the types of equipment adopted for the management of disasters in Federal University Libraries in North-East Nigeria?

Methodology

The descriptive survey research design was adopted for the study. This type of research design allows the gathering of information for data analysis. According to Nworgu (2015) descriptive survey research is one in which a group of people or items is studied by collecting and analyzing data from only a few people or items considered to be representative of the entire group. A questionnaire was the instrument used for data collection. The population of the study comprised of 240 staff working understudy. Due to the size of the population, total enumeration was used. Two hundred Forty (240) copies of the questionnaire were administered to the respondents by the researcher out of which 227 was retrieved and found usable for analysis. For analyzing the data, descriptive statistics of frequencies, percentage, mean and standard deviation were used.

Literature Review

In many European countries, mobile phones have been adopted as a technology used in controlling water-related disaster. Mobile phones are used for early warning of people since mobile communications cover a wider range of persons (Guha, Hoyoisand below, 2014). According to Sahu, (2009), remote sensing as one of the technology has been adopted for management disaster that emulated from water and windstorm. Remote sensing technology is a powerful tool in disaster management. It is an investigative technique that uses a recording instrument or device to measure or acquire information on a distant object or phenomenon with which it is not in physical or intimate contact. This tool is used in locating the area of natural disaster and monitor its growing proportions while the forces of disaster are in full swing, providing information on the disaster rapidly and reliably, and thereby ensuring that the extent of destructions is evaluated precisely Again, remote sensing technology helps in monitoring or assessing the disaster event which provides in turn, a quantitative base for relief operations. Such assessment can be used

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to map the new scenario and update the database used for the recovery of lost library resources and also in preventing the recurrence of such disaster in future.

In the opinion of Biswajit, Mukhopadhyay, Buddhadev, and Bhattacherjee (2015), adoption stated that GIS technology has been adopted in some countries to manage disaster that emulates from water and windstorm, it can provide one of the primary components for Computer-aided dispatch (CAD) system. Emergency response units based at fixed locations can be selected and routed for emergency response. The quickest response units can be selected, routed and dispatched to the emergency zone. Depending on the emergency, GIS can provide detailed information for the rescue so that they can locate the disaster area.

Kirste, (2016) stated that Short Message Service (SMS) Technology has also been adopted for management disaster that originates from water and windstorm, the SMS is allowable in most of the mobile phone and permits sending of short messages amount the mobile phone an even landline In case of failure of network the SMS can work on a different band and can be sent or received even when phone lines are congested. During the 2005 Hurricane Katrina disaster in the USA, many affected residence were unable to contact relatives and friends through telephone but they could be able to communicate with each other through SMS. Other communication technologies are used like Cell broadcasting, satellite radio, internet or e-mail, amateur and community radio to warn the people at stake in case of an impending disaster.

Kirste, (2016) stated that Radio Frequency Identification (RFID) has been adopted as a technology to management disaster of water and windstorm. The RFID technology is an integrated circuit and antenna coil that communicates with a reader using radio frequency signal water is also a greater problem than fire because if the fire has not consumed the materials entirely, they will inevitably be damaged by the water. Most often floodwater carries with it mud and would put it on the document. Flooding can be caused by staff negligence, leakage by taps, roofs and pipes, blocked roofs drains or uncontrolled floods during heavy rains. A minor water accident such as a licking pipe can cause extensive and irreparable harm to collections.

Data analysis and Results

Research Question 1: What are the modern technologies adopted for disaster management of water and windstorm in federal university libraries in North East?

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Table 1: Mean and standard deviation of librarians on the adoption of modern technologies used for disaster management of water-related disasters and windstorms in libraries in North-east Nigeria (*N=227*)

S/N	Modern technologies for disaster management of water-related disasters and windstorms	Mean	SD	Remark
1	Satellite communication networks	1.49	.97	Strongly disagree
2	Geographic Information system (GIS)	1.75	.68	Disagree
3	Global Positioning System,(GPS)	1.56	.56	Disagree
4	Forecasting and Warning System.	3.65	.43	Strongly agree
5	Close Circuit Television (C C T V) system	2.73	.56	Agree
6	Photoelectric detectors	1.73	.43	Disagree
7	Fire Suppressants	2.60	1.01	Agree
8	Global Integrated Observing System	3.74	.97	Strongly agree
9	Space-based Technology	2.68	1.11	Agree
10	Remote Sensing	1.97	1.02	Disagree

Results presented in the above table shows the mean and standard deviation of librarians on the adoption of modern technologies used for disaster management of water-related disasters and windstorms in libraries in North-east Nigeria. The analysis reported revealed that librarians strongly agree to items 20 and 24 with mean scores of 3.65 and 3.74; agree to 21 and 25 with mean scores of 2.73 and 2.68; and disagree to items 18, 19, 22 and 26 with mean scores of 1.75, 1.56, 1.73 and 1.97. On the whole, the results indicate that academic librarians strongly agree to the global integrated observing system, agree to CCTV, space-based technology and fire suppressants, disagree to a geographic information system and global positioning system, photoelectric detectors, and remote sensing modern technologies adopted for disaster management of water and windstorms related disasters in libraries in North-east Nigeria. On the other hand, the standard deviation reported shows that the librarians were heterogeneous in the responses.

Research Question 2: What are the levels of awareness of librarian's on the adoption of modern technology for disaster management of water and windstorm in federal university libraries in North East?

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Table 2: Frequency and percentage response on the librarian's awareness of modern technologies used in disaster management in libraries in North-east Nigeria (*N=227*).

S/N	Awareness of Modern Technologies	Aware		Not Aware	
		Freq.	%	Freq.	%
11	Satellite communication networks, ,	175	77.1	52	22.9
12	Geographic Information system (GIS)	164	72.2	63	27.7
33	Global Positioning System,(GPS)	174	76.7	53	23.3
14	Forecasting and Warning System,	164	72.2	63	27.7
15	Close Circuit Television (C C T V) system	161	70.9	66	29.1
16	Metal Detector	175	77.1	52	22.9
17	Fire Extinguisher	162	71.4	65	28.6
18	Photoelectric detectors	169	74.4	58	25.5
19	Fire Suppressants	178	78.4	49	21.6
20	Thermal detectors,	166	73.1	61	26.9
21	Automatic Sprinkler system	183	80.6	44	19.4
22	Remote Sensing	149	65.6	78	34.5
23	Carbon dioxide System	130	57.3	97	42.7
24	Halon BC Dry, Dry Chemical	133	58.6	94	41.4
25	Automated Carbon dioxide System	132	58.1	95	41.9
26	De-humification	139	61.2	88	38.8

Results presented in table 2 show that item by item analysis of librarian's response on their awareness of modern technologies used in disaster management in libraries in North-east. The analysis revealed that automatic sprinkler system (183, 80.6%), fire suppressants (178, 78.4%), satellite communication network (175, 77.1%) and global positioning system (174, 76.7%) had the highest level of awareness as rated by academic librarians. Meanwhile, carbon dioxide system (130, 57.3%), automatic carbon dioxide system (132, 58.1%), Halon BC dry, Dry chemical (133, 58.6%) and De-humidification (139, 61.2%) had the lowest level of awareness as rated by academic libraries as modern technologies used in disaster management in university libraries in Northeast Nigeria.

Question 3: What are the types of equipment librarians adopted and use for modern technology management of disasters in Federal University Libraries in North-east Nigeria?

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Table 3: Mean and standard deviation of a librarian's on the types of equipment adopted for the management of disasters in Federal University Libraries in North-East Nigeria (*N=227*)

S/N	Types of firefighting equipment that can be adopted in disaster management	Mean	SD	Remark
27	Fire Extinguisher	4.00	.93	Strongly agree
28	Carbon dioxide System	3.74	1.00	Strongly agree
29	De-humification	1.09	.84	Strongly disagree
30	Automatic Sprinkler system	2.11	.92	Disagree
31	Vacuum Freezer Dyer	3.10	1.01	Agree
32	High expansion foam	1.01	1.00	Strongly disagree
33	A bulldoze Fire extinguisher	3.88	1.09	Strongly agree
34	Halon BC Dry, Dry Chemical	1.09	1.14	Strongly disagree
35	Fire Suppressants	3.77	.99	Strongly agree

Results presented in Table 3 shows the mean and standard deviation of librarians on the types of firefighting equipment adopted for the management of fire disasters in Federal University Libraries in Northeast Nigeria. The analysis reported revealed that librarians strongly agree to items 27, 28, 33, and 35 with mean scores of 4.00, 3.74, 3.88 and 3.77, agree to 31 with a mean score of 3.10, disagree to items 30 with a mean score of 2.11 and strongly disagree to items 29, 32, 34 with mean scores of 1.09, 1.01 and 1.09. In summary, the respondents strongly agree to fire extinguisher, carbon dioxide system, bulldoze fire extinguisher and fire suppressants. The respondents agree to vacuum freezer dyer, disagree to the automatic sprinkler system and strongly disagree to De-humification, high expansion foam, Halon BC dry, dry chemical as types of firefighting equipment adopted for the management of fire disaster in university libraries in Northeast Nigeria. Similarly, the standard deviation reported shows that the librarians were homogeneous in the responses.

Summary of Findings

1. A substantial number of librarians are aware of the modern technologies used in the management of water-related disasters and windstorms in libraries in Northeast Nigeria.

2. Librarians agree to a level of adoption of modern technologies used for disaster management of water and windstorms related disasters in libraries in North-east Nigeria.

3. The majority of the librarian agrees to the equipment used in controlling fires disasters in libraries in North-east Nigeria. They also, agree to the types of firefighting equipment adopted for the management of fire disaster in university libraries in Northeast Nigeria

Discussion of Findings

The respondents strongly agree that academic librarians strongly agree to the global integrated observing system, agree to CCTV, space-based technology and fire suppressants, disagree to a

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geographic information system and global positioning system, photoelectric detectors, and remote sensing modern technologies adopted for disaster management of water and windstorms related disasters in libraries in North-east Nigeria. The study above agrees with that of **(**Guru,Hotois and Balow 2014**).** In many European countries, mobile phones have been adopted as a technology used in controlling water-related disaster. Mobile phones are used for early warning of people since mobile communications cover a wider range of persons (Guha, HoyoisandBalow, 2014). According to Sahu, (2009), remote sensing as one of the technology has been adopted for management disaster that emulated from water and windstorm. Remote sensing technology is a powerful tool in disaster management. It is an investigative technique that uses a recording instrument or device to measure or acquire information on a distant object or phenomenon with which it is not in physical or intimate contact.

The respondents agree to a level of librarian's awareness of modern technologies used in disaster management in libraries in the North-east. The above study is contrary to that of Waweru (2014) stated that level of awareness on the use of smoke detectors technology, libraries in Africa did not emphasize the use of heat smoke detectors probably because of the cost of purchase or maintenance. Waweru further discovered that libraries depended more on human guards which could be unreliable for detecting fire on time.

The respondents' strongly agree on the types of firefighting equipment adopted for the management of disasters in librarians. The above study is in line with that of (Ojo-Igbinoba in Waweru, 2014), which state in their study that there is the availability of the equipment, but the ability to make used of the equipment in the event of a disaster. Such types of equipment include a vacuum freezer dyer, automatic sprinkler system, De-mummification, high expansion foam, Halon BC dry, and dry chemical.

Conclusion

It has been concluded that the majority of academic librarians rated that they are aware of water and windstorm-related disasters. The study also, concluded that the majority of academic librarians rated that they are aware of the use of modern technologies such as satellite communication networks, global information system, global positioning system, forecasting and warning system, close circuit television system, metal detector, fire extinguisher, photoelectric detectors, fire suppressant, thermal detectors, automatic sprinkler system, remote sensing, in water and windstorm-related disasters.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. The university management should educate the staff on the types of modern technology that can be used in managing disaster in libraries. Frequent training/seminars/workshops should be done to create awareness of the contents of the disaster management policy which will enable the library as a team to fight disasters more efficiently and effectively. Efforts should be made by federal university administrators and library management to improve the level of awareness on modern technologies by academic librarians in the federal, state and private university libraries.

2. The library management should make an appropriate allocation of fund for the purchase and installation of modern disaster technological equipment to detect and fight the disaster. Equipment such as fire alarm, smoke detector, fire tracer, remote sensory technology should be acquired and installed in the library.

3. The university management should provide more relevant, adequate and up-to-date technological facilities should be made available to the federal and state university libraries at all times to enable them to manage possible disasters they face. There is a need for the library to install a fire detector, water sensing alarm and more fire extinguishers as well as regular maintenance of drainage and plumbing system. There should be a regular building inspection to remedy the factors which constitute potential hazards.

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