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The challenges of strategic management of the wastage produced due to earthquake in Kermanshah and Varzaghan-Ahar: A qualitative study

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Abstract:

BACKGROUND: Strategic management of the wastage produced due to earthquakes has faced many challenges over the recent decade. Thus, the present study seeks to identify and explain the challenges in earthquake wastage strategic management.

MATERIALS AND METHODS: The present qualitative study has been steered through a content analysis approach and conducted using semi-structured interviews and a purposive selection of 17 professors, experts, and managers experienced in the field of waste management in Kermanshah and Varzaghan-Ahar earthquakes over 2020-2021. Besides, the interviews were initially categorized using MAXQDA18 software.

RESULTS: Analysis of the experiences and perception regarding the changes in strategic management of wastage produced due to Kermanshah and Varzaghan-Ahar earthquakes revealed 418 codes, 97 subcategories, 33 categories, and 8 main categories including management and leadership, organizational culture, planning, organizational learning, employee management, rules and regulations, resource management, and procedure management.

CONCLUSION: Strategic waste management has not been implemented in a coherent, integrated, and well-planned manner in the cases of the Kermanshah and Varzaghan-Ahar earthquakes. The challenges of strategic waste management turned out to be due to various reasons which will result in many issues in achieving the goals and selecting the suitable method for resource and procedure management should they not be managed well. Hence, policymakers, managers, and executors in the field of crisis management and waste management in disasters -specifically earthquakes- must take the necessary measures to remove these barriers.

Keywords:

Earthquakes, qualitative research, waste management

Introduction

Various forms of natural and unnatural disasters occur across the world every day and leave various impacts on the population and natural and human environments. Most of the disasters influence the capacities of the disaster-struck communities to respond to the disaster such as rescuing people, protecting their assets, and maintaining the stability of the economic and social structures of the community. Although disasters vary in nature, power, and intensity, they usually result in an abundance of waste which is undeniable and is often neglected among the activities carried

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out post-disaster.[1] Earthquakes have left irreparable damages and consequences over history. Disaster Waste Management (DWM) has become an issue of interest over the recent years. Normally, the issues of collecting, transporting, and disposing of waste come to mind when the issue of waste management is discussed; however, the quality of the waste changes drastically after the earthquake since a significant amount of waste is created in such cases. This volume of wastage influences the existing solid waste management personnel and facilities. The wastage due to the disasters impact almost all aspects of response and recovery. Thus, managing such a large amount of waste requires special management and contemplation. Safe handling, elimination, and management of disaster waste are among the important issues in disaster response and recovery, none of which are being completely carried out currently.[2] Most of the studies tend to focus on technical intervention and pay less attention to waste management challenges in disasters, especially in the case of earthquakes. Despite the presence of waste management instructions and documents, most instructions and documents have sufficed for general matters and have not entered the details, as a result of which the ambiguity in the documents and insurrections have turned into a source of administrative confusion.[3] Comprehensive and integrated waste management is a crucial precondition in an emergency and would result in costly and troublesome consequences and issues in the recovery stage.[4] Given the significance and role of strategic management of the wastage due to earthquakes, on the one hand, and the limited number of studies conducted on the challenges of strategic waste management, on the other hand, it appears necessary to study this issue more deeply through the suitable tools such as qualitative studies.

In other words, the real strategies used in earthquake waste management are not completely clear, and the way the authorities have managed earthquake waste, which has not been adequately efficient, is unknown. Although awareness of the factors behind successful strategic management and identification of the challenges leads to better and proper implementation of strategic management. No previous comprehensive study was observed in this regard to clarify the matter.

Thus, the present study has adopted a qualitative method with a guided approach aiming to explain the challenges in strategic management of the waste produced in the Kermanshah and Varzaghan-Ahar earthquakes. Results of the present study can provide managers and policymakers of the institutions intervening in disaster waste management with useful information to reduce the problems stemming from earthquake waste management.

Materials and Methods

Study design and setting

The present qualitative content analysis with a guided approach aims to explain the challenges in strategic waste management based on a cross-case study analysis model over 2020-2021.[5]

Study participants and sampling

The research environment of the present study includes the two earthquakes of Kermanshah and Varzaghan-Ahar, and the participants included experts, managers, and professors experienced in the field of crisis management and health throughout disasters as well as the managers operating in the field of waste management in the Ministry of Health, the Environmental Conservation Organization, the Ministry of Interior Affairs, and the Waste Management Organizations. Participants were selected through purposive sampling which was compliant with qualitative research.

Data collection tool and technique

Similar to other qualitative studies, the sample volume in this study grew to the point of data saturation where no new data were obtained so the sampling ended. Hence, interviews were conducted with 17 people (13 males and 4 females). Having the background and information in the field of waste management as a manager, a history of disasters such as earthquakes, eloquence, and being able to spare the time for an interview was among the most important inclusion criteria of the study, and those who did not have the interest or time to participate in the interviews were excluded from the study. Interviewees were selected in a goal-oriented manner using the snowball method so that those with the richest information regarding the research topic were selected and each was asked to introduce other participants and individuals who they knew would meet the inclusion criteria.

Interviews were semi-structured and scheduled, and the location for the interviews was selected by the participants. The duration of each interview varied between 50 and 75 min. Each interview started with the open question of "Express your experience regarding strategic waste management in earthquakes" to put the participants at ease and empower them to express their thoughts and opinions freely. The interviews took place between December 2020 and September 2021. Articles on waste management in the face of disasters and the respective qualitative approaches were reviewed to develop interview questions. Three pilot interviews were conducted to improve the questions, increase the interviewer's skills, and improve the validity of the research tool. Interview questions were sent over

to experts, managers, and professors experienced in the field of crisis management and health throughout disasters as well as the managers operating in the field of waste management and qualitative research and their feedback was used to revise the final questions that made it to the interview.

The guide of the interview questions was as follows: "What were the tasks and roles of the respective organization in waste management after the earthquake? Was the organization accountable for waste management in your experience? What were the issues that counted as management obstacles for the organization in charge of waste management?" Furthermore, explorative questions such as "What do you mean?" "Please explain further" and "Can you make an example so that I can better understand you" were used to clarify the topic of the interview. Attempts were made to ensure the lowest amount of intervention in the process of the interviews while preventing the interview to deviate from its path by asking suitable questions. At the end of each interview, the key points in the participant's responses were summarized and reviewed to ensure their correctness, and in cases of ambiguity, respondents were asked to clarify the subject.

The stages proposed by Lundman and Granhein (2004) were used for data analysis. The interviews were recorded and transcribed. The transcriptions were then confirmed by the participants and reviewed several times by the authors to achieve immersion in the data and develop a general understanding of them.[6,7] Written texts were typed in Word and transferred to MAXQDA v. 18 software for qualitative data analysis. Data were processed using guided content analysis. Quotes from the interviewees were marked with the letter *P* in this study. At the same time, while carefully intervewing the texts, the written texts were summarized into semantic units and were then converted into codes. Then, the subsequent interviews were conducted. Afterward, the codes were compared based on their differences and similarities and were identified and divided into categories and subcategories.

The criteria of credibility, conformability, dependability, and transferability of results were used as the scientific accuracy criteria in qualitative research proposed by Cuba and Lincoln and were used to ensure data reliability and validity.[8] To increase the credibility of data analysis, coding, and code revision in the present study, categories, and subcategories were determined by the authors. Furthermore, the long engagement of the author in the research and gaining the trust of the participants were used as well. To increase dependability, the terms and expressions used by the respondents were quoted exactly in the Results section. The external check was also used to improve conformability. To increase the transferability, interview transcriptions, semantic units, and the extracted codes were handed out to some of the participants.

Ethical considerations

Before each interview, participants were informed of the research objective, the reason behind recording the interviews, gaining trust, and voluntary participation. Besides, the respondents were asked to sign written consent of their informed participation in the study and were ensured that their data would remain confidential. The ethics code of IR.SSU. SPH.REC.1399.096 was obtained from the ethics committee of the Yazd University of Medical Sciences for the present study as well.

Results

Participants of the present study included experts, managers, and professors experienced in the field of crisis management and health throughout disasters as well as the managers operating in the field of waste management in the Ministry of Health, the Environmental Conservation Organization, the Ministry of Interior Affairs, and the Waste Management Organizations. Table 1 demonstrates the demographic features of the participants.

Analysis of the experience of professors, managers, and experts in the field of earthquake waste strategic management revealed 418 codes, 97 subcategories, 33 categories, and 8 main categories. The main categories extracted from the theme of strategic management included management and leadership, organizational culture, planning, organizational learning, employee management, rules and regulations, resource management, and procedure management. Table 2 demonstrates a report of the process of shaping the codes

Table 1: Participants' demographic features

Demographic features of the participants in the study on the challenges in strategic management of earthquake wastage in the Kermanshah and Varzaghan-Ahar earthquakes

Variable	Level	Frequency (%)
Gender	Male	13 (76)
	Female	4 (24)
Working experience	10 years or less	6 (35)
	11-20	6 (35)
	21-30	4 (24)
	Over 30	1 (6)
Education	Bachelor's	1 (6)
	Master's	9 (53)
	Ph.D. student	3 (17.5)
	Ph.D.	4 (23.5)
Experience with earthquake	Twice or less	10 (59)
	More than twice	7 (41)

and Table 3 indicates the same process for subcategories, categories, main categories, and the theme.

The participants considered poor management and leadership as a significant challenge for the strategic management process. They also mentioned the lack of bylaws, the ambiguity of the tasks, the lack of a plan for allocating the tasks, waste management not being prioritized, the ambiguity of the organizations in charge, the lack of a management structure, the lack of unified and comprehensive management, lack of waste management in small towns, and inadequate insurance coverage in the areas hit by the earthquake -particularly the villages- as the factors for strategic management challenges.

In this regard, participant 1 –a male senior manager in the national healthcare system with 18 years of work experience- stated that "*The Crisis management Organization has asked all the responsible organizations to prepare their own specialized code and, in fact, their own task force. Unfortunately, many of these task forces are merely concerned with the stage of compiling a task force with a specific explanation of the tasks of support and partner organizations. Many of the tasks remain unfulfilled, one of which is the waste management task force*" (P1). The second participant –a male faculty member with 21 years of experience- stated that "*There is almost no bylaws in this regard. Normal rules such as waste management and their bylaws have not addressed waste management in an earthquake or other disasters separately*" (P2). Participant 14 –a male executive manager with 12 years of experience- stated that "*Unfortunately, the organizations' lack of awareness of one another's roles and tasks and the consequent problems in management integration lead to management issues*" (P14). Participant 5 –one of the male managers supervising municipalities and hospitals' waste management operations with 20 years of experience- stated that "*Nowadays, there are waste management units in the municipalities of large cities while there are no waste management units in the municipalities of small towns such as our town, Sarpol Zahab, and Salas Babajani*" (P5). Participant 3 –a male manager in the health network and faculty member with 19 years of experience- stated that "*In the case of animal feces, you know well that cattle are a part of the rural life and animal feces is one of the issues that no one is in charge of. Also, I have not met any specific individual in charge of wastage from clinics and physician offices, and I have no idea what happens in the cities*" (P3).

The largest number of earthquake waste management challenges stemmed from planning, and most of the participants stated that planning is crucial given the vastness of the earthquake-struck area, the wide range of wastage, and the participation of numerous organizations. Factors such as the lack of pre-earthquake planning, capacity improvement planning, recycling plans, and intervention preparation planning are among the technical challenges of earthquake waste strategic management. In this regard, participant 12 –a male HSE expert teaching in the university with 8 years of experience- stated that "*In fact, the organizations involved in strategic planning had no comprehensive and exact plan, which was evident in the respective organizations and manifested itself in the incoordination between them*" (P12). Participant 17 –a male member of the evaluation team with 10 years of experience- stated regarding the lack of capacity-building planning "*Unfortunately, there was no prior knowledge of the conditions of the facilities in the meetings we took part in, which is one of the factors causing problems in capacity improvement planning. It is evident that no plan has been complied with previously based on the references*" (P17). Participant 12 –a male HSE expert teaching in the university with 8 years of experience- stated that "*The relationship between the public, private, and non-governmental organizations is theoretically good, but it did not turn out well in practice since there were so many insignificant connections and slacking off*" (P12).

The poor cooperation which was reliant on manager orientation, the negligence of managers toward waste management, lack of a risk mitigation plan, the ignorance toward waste management even under normal circumstances, and not prioritizing the preparation of a suitable space for garbage disposal are among the cultural challenges of earthquake waste management. Some participants believed that poor coordination and

Table 2: The code formation process

Semantic unit	Code
The Crisis management Organization has asked all the responsible organizations to prepare their own specialized code and, in fact, their own task force, many of which have unfortunately not gotten to point the point of compiling a task force with a specific explanation of the tasks of support and partner organizations, one of which is the waste management task force	Failure to compile codes by the organizations
There is almost no bylaw. The cases of articles with rules on crisis management are limited to regular waste management and its regulations. The waste management law and regulations have not addressed this issue separately	Lack of an independent waste management law
Look, monitoring must become more comprehensive. If the individuals, organizations, and divisions in charge figure that they're being monitored, they will pay more attention to the execution of their plans and won't only hold up appearances	Improper execution of evaluation and monitoring

Table 3: The process of theme formation from the main categories, categories, and subcategories

Theme	Main categories	Categories	Subcategories
Strategic management	Management and leadership	The lack of bylaws	Lack of codes
			Lack of instructions
			Normal bylaws being inapplicable
		Waste management not being a priority	Negligence to prioritize wastes
			Lack of prioritization planning
			Preferring other issues over waste management
	Planning	Lack of capacity improvement planning	Lack of capacity improvement planning
			The same management path before and after the earthquake
		Lack of intervention reparation planning	Lack of preparedness improvement plans
			Slow operation of the organizations
	Organizational culture	Managers' negligence	The insignificance of waste management
			Managers not committing to waste management
		Lack of risk mitigation plans	Risk mitigation plans not being implemented
			Inattention to the lack of mitigation plans
	Organizational learning	Qualitative and quantitative inadequacy of training	Unplanned and nonoperational training
			Maneuvers not being executed in rural and vulnerable environments
		Low awareness of employees and managers	Poor awareness of employees and managers regarding waste management procedures
			Poor awareness of employees and managers regarding waste management technical regulations
	Rules and regulations	Lack of disaster waste management rules	The rules of normal circumstances failure to facilitate the cooperation
			Restrictions of ordinary rules under the circumstance of earthquake
			Lack of independent disaster and earthquake regulations
		Incompatibility between the crime and punishment	No deterrence due to low crime rates
			Low strictness of the normal condition laws
			Various interpretations due to no limitations
		The inefficiency of the existing rules	Too many crisis management rules
			Old regulations
			Organizations' ignorance toward waste management and crisis management rules
	Employee management	Managers inadequate quantitative and qualitative experience	Recruiting managers with irrelevant expertise
			Recruiting managers lacking experience and quality level
		Lack of human resource supply plan	Lack of human resources procurement procedures
			Inadequate human resource supply planning
	Resource management	Inadequate allocated budget	Low credit, the challenging factor in waste management
			Costly waste management
		Lack of a rational and scientific budget allocation plan	Resource allocation per managers' taste
			The generality of the budget
	Procedure management	Unresponsiveness of the current procedure	Low efficiency of normal condition management procedures
			Inability to change the existing procedures
		Numerous working procedures	The vastness of the scope of work
			Working procedures being multi-organizational
		Poor monitoring and negligence	Unprincipled evaluation and monitoring
			Lack of criteria for the evaluation of the impacts and measures taken

cooperation and manager orientation in earthquake waste management have become a major challenge in strategic management. Participant 16 –the senior authority of the county (male, 24 years of experience) stated that "*The truth is that the coordination between the organs depends on the crisis manager in the county or province. This coordination is easily made if the manager is experienced enough*" (P16). Participant 9 –a member of the emergency team (male, 26 years of experience) stated regarding risk mitigation management "*We have no risk mitigation plan even under normal circumstances, let alone during disasters and earthquakes. Overall, we are unprincipled in terms of reducing the risks of wastes*" (P9). Most participants emphasized the negligence of managers toward waste management. Participant 16 –the senior authority of the county (male, 24 years of experience) - stated that "*We don't even have one reconstructed office in any of the three reconstructed cities. All of the offices have remained relocated in vans and are being forgotten. Wastage is definitely not more important than reconstructing the offices, so when the offices are neglected, waste management is sure to be forgotten as well*" (P16).

Many respondents suggested the qualitative and quantitative inadequacy of the training and employees' and managers' poor awareness of waste management rules and procedures as a strategic management challenge. Participant 17 –a male member of the evaluation team with 10 years of experience- stated that "*Maneuvers are a measure that must be taken before the crisis, which is usually not carried out in the field of waste management or has no relevance to the needs of the waste management organization. Most of the maneuvers lack a scenario and are held without the presence of all the support and partner organizations and are more of a show*" (P17). Participant 10 –the CEO of the recycling company (female, 36 years of experience) stated that "*Our managers are not knowledgeable. We have those with academic education, but not anyone who strives for development. An innovative develop-seeking actor might ben elite who has learned something theoretically and gotten a degree, but must have the ability to understand as well*" (P10). Participant 4 –the Environment Organization manager (male, 9 years of experience) stated in this regard that "*Unfortunately, I remember that the mayor of the time had no information on landfills and said that he had never even heard of them. He didn't know what a landfill was. Out mayor had no expertise on waste management, and the fact is that he hasn't learned anything about it since*" (P4).

The poor and restrictive rules of the normal conditions and the lack of independent regulations for disasters, and particularly, the earthquake, were mentioned as another challenge in strategic management. Participant 2 –a male faculty member with 21 years of experience- mentions in this regard that "*There is almost no independent rule. Even in the cases that there are rules or articles regarding crisis management or in ordinary rules such as waste management and its executive regulations, the issue of an earthquake or any other disaster has not been addressed independently*" (P2). Participant 6 –the Deputy Director of the General environment Directorate Supervision and Monitoring unit (female, 10 years of experience) stated in this regard that "*Should any of the stages in waste management not be implemented based on the standard regulation, we consider a crime for the offender; however, these crimes are very few and not restrictive at all. What I mean to say is that this law has no relevance to the type of the crime and I don't see it to be preventive at all either*" (P6).

Factors such as the lack of a plan for supplying human resources and the irrelevance of waste management managers' qualitative and quantitative expertise have also caused challenges for strategic management. Participants mentioned the lack of a plan and human force recruitment instruction, shortage of human resources, and the appointment of people lacking the required expertise as the challenges and weaknesses of strategic management. Participant 12 –a male HSE expert teaching in the university with 8 years of experience- stated in this regard that "*It was extremely poor and unorderly in terms of human resource shortage. We had a surplus of human resources at times and a shortage of human resources at other times*" (P12). Participant 16 –the senior authority of the county (male, 24 years of experience) stated that "*The truth is that we have not performed successfully in terms of reinforcing human resource in this disaster and other disasters*" (P16). Participant 2 –a male faculty member with 21 years of experience- stated in this regard that "*If the waste management in a city with millions of population is a wet or an architect, everything will be affected negatively. No matter where and with what level of quality these people have been educated, they are incapable of their job even in the best case scenarios*" (P2).

According to the participants, factors such as inadequate financial resources, shortage, inappropriateness of the equipment, and the lack of a suitable information system set strategic management up for failure in terms of earthquake waste management. Financial credit shortage was among the challenges of strategic management planning. Participant 8 –a male deputy health expert with 21 years of experience- stated in this regard that "*Since waste management is not a priority for the managers, it usually doesn't receive an adequate budget from the government, especially in the case of an earthquake*" (P8). Participant 15 –a male governor adviser with 18 years of experience- stated regarding the lack of an independent budget that "*There is a credit allocated for reconstruction by the Ministry of Interior and the government. Waste management costs are included in this budget and is only addressed generally*" (P15). Participant 7 – the research manager at the Waste Management Organization (male, 8 years of work experience) stated that "*Sometimes you see that the army has sent over two loaders but there is a shortage of dump trucks. There is usually no proportion between the equipment and the machinery, which means the same number of loaders and dump trucks must be dispatched so that they don't have to wait there. Sometimes you see a shortage of loaders while two dump trucks are left unused*" (P7). Participant 11 –a female health emergency expert with 7 years of experience- stated that "*the information system of earthquake waste management must be updated and comprehensive. We tend to have problems in the evaluation of the operational plan and internal and external environment evaluation due to the lack of such as system*" (P11).

Participants suggested that issues such as unresponsiveness of the current procedure, the numerous work procedures, and poor monitoring and negligence affected earthquake wastage strategic management in the field of procedure management. Many of the participants believed that the inefficiency of the current methods and work procedures are quite high in earthquake waste management which pose challenges to the process of strategic management.

Participant 17 –a male member of the evaluation team with 10 years of experience- stated that "*Although the conventional methods are being used, these methods are slow and time-consuming and are not efficient enough to be used in the event of an earthquake*" (P17). Participant 13 –a female natural disaster researcher with 6 years of experience- stated that "*We have many procedures for earthquake waste management which equals a broad scope of work ranging from urban waste and infectious waste to the ruins and construction wastes. Implementing waste management is difficult under these circumstances*" (P13). Regular and systematic monitoring and evaluation can result in early identification of the problems in the plan so that the necessary corrective measures are taken. According to the participants, despite the developments in the field of strategic earthquake waste management in some divisions, following up on this management does not receive sufficient attention at high management levels. Participant 13 –a female natural disaster researcher with 6 years of experience- stated in this regard that "*Monitoring must become more coherent. If the organizations, individuals, and divisions in charge of waste management figure that they are being evaluated, they will pay more attention to the implementation of their activities and will no longer only care about the appearances*" (P13). Furthermore, some participants believed that qualitative indices are being used more in the evaluation of plans. Participant 11 –a female health emergency expert with 7 years of experience- stated that "*Plans and activities are more focused on numbers and are not really concerned with the quality of the measures taken*" (P11).

Discussion

The main aim of the present study was to identify the challenges of strategic management regarding the earthquake waste due to the Kermanshah and Varzaghan-Ahar earthquakes through qualitative content analysis using a guided approach. The results indicated that earthquake waste management has posed various challenges such as poor leadership and management, improper planning, improper organizational culture, negligence toward organizational learning, poor regulations, and management of employees, resources, and work procedures for strategic management of wastage produced due to earthquakes.

Poor management and leadership are significant obstacles to the success of strategic earthquake waste management in the case of the Kermanshah and Varzaghan-Ahar earthquakes. Since the presence of unified and coherent management alongside operational bylaws is among the components of strategic management, the respective organizations must compile bylaws that can be implemented. Domingo *et al*.[1] reported a lack of unified management at the national level, instructions for action, ambiguous tasks, and common roles among the individuals. Another study suggested that there was no document or guideline regarding the creation of an effective legal, financial, and organizational structure for waste management in the face of disasters that could be used in developed countries.[9] Another study revealed that the role of disaster waste management has been specified only in the USA by FEMA (2007).[1] Other studies suggest that disaster waste management after disasters is unclear at the national level.[1]

Given the previous studies and the present study, it appears that this issue persists in the case of other earthquakes as well, so senior managers must make serious decisions in this regard and adopt a strategic management approach different from the structures designed for normal conditions to ensure the goals of waste management. Thus, strategic waste management organization (s) must compile executive instruction entailing different tasks and obligations compared to the normal conditions to ensure that the wastage is being managed properly so that successful waste management is ensured in the event of an earthquake. Disaster waste management is always a long, costly, and difficult operational process[10] given that natural disaster waste management issues are among the main concerns in ensuring the wise management of disaster waste[11], managers will resort to operational plans to maintain the status quo instead of long-term plans.

Poor and unprincipled planning was one of the challenges mentioned in strategic waste management in the case of the Kermanshah and Varzaghan-Ahar earthquakes. The indicators of poor planning such as the lack of a predetermined plan, the lack of capacity improvement plans, not prioritizing recycling, and the lack of intervention preparedness plan reveal that senior managers have not participated in the process of strategic management actively. It was mentioned in Crowley's study that although predisaster planning helps clean up the waste quickly, the lack of operational plans is usually known as a capacity gap in disaster waste management performance in developed countries.[3] The study of Brown *et al*.[12] also mentioned that disaster waste management plans are rare in developing countries. Emergency waste management programs do not even exist in many cases. This indicates that waste management has a low priority. Besides, waste management in the cases of disasters such as earthquakes is still limited in developed and developing countries, and no significant progress has been made in disaster waste management so far. To confirm this result, it is worth noting that a study conducted in Bam indicated no principled plan and management in this regard.[13] Thus, the significance of planning entails close attention to be paid to it. It was mentioned in the study of Niluka

Domingo *et al*.[1] that predetermined waste management plans, additional resources, strong regulations, and powerful organizations with specific goals and responsibilities must be created.

The present study indicated that unfavorable organizational culture was another challenge in strategic earthquake waste management. Organizational culture encompasses the common norms, values, and beliefs of an organization's employees which determines their habits, behaviors, and attitudes and how they dress and do their tasks.[14] Organizational culture reinforces the unity between the employees in the organization and increases their adaptability to the outside environment. Organizational culture has a significant impact on organizational strategies.[14] The fundamental strategy principles must correspond to the values of organizational culture. For instance, the implementation of management strategies in the organization requires the development of a culture of teamwork, accountability, responsibility, and constant improvement. Waste managers must make changes in organizational culture such as the manager's support and commitment toward the importance of waste, education of employees and managers to commit to waste management, development of plans for mitigating the risks and damages due to wastage, improving of inter-organization communication, constant activity evaluation, and improvement of their cooperation and coordination in the face of earthquakes. Disaster waste management has often been carried out with little to no coordination with other recovery measures in the case of previous disasters. Wang *et al*.[15] mentioned that choosing places for temporary storage and processing sites of wastage is the main challenge in waste management. Furthermore, following the 1999 Marmara earthquake in Turkey, no division took the responsibility for waste coordination which resulted in disorder and cross-sectional management.[16] Long exposure to waste is harmful to the environment and public health, so proper and coordinated planning for response to the events in the community is necessary to minimize the disruptions.[17] Planning for post-disaster recovery such as natural disaster waste management is a part of the strategy to reduce the risk of natural disasters. Still, the weakness in the field of expert forces in developing countries remains among the factors restricting the achievement of disaster risk mitigation goals. As a result, disaster waste management is rare in developing countries. There is no planning for disaster waste management before the disaster in many cases, which indicates that disaster waste management has a low priority.[17-19] Also, the experience of developing countries reveals that the incoordination between the organizations in charge of waste leads to the repetition of efforts in terms of waste management.[1]

Negligence toward organizational learning was discovered as another important challenge in strategic management of the waste produced due to earthquakes. Organizational learning comprises all the procedures, mechanisms, and methods used in the organization for the sake of learning.[20]

Earthquake waste management managers stated that the training had to conform to and cover all quantitative and qualitative needs. In addition, waste management technical requirements and criteria made managers and employees show lower levels of awareness and tendency toward practices involved in this area. On the other hand, despite the presence of waste management instructions and documents, most instructions and documents have sufficed for general matters and have paid much attention to the consequences of waste management activities and decision-making in various areas of natural disasters.[9]

In this regard, Niluka Domingo *et al*.[1] suggested that management and implementation skills have not been prioritized in the existing waste management training programs, and there is no vision to retain the experienced employees.

The lack of a waste management law specific to disasters and earthquakes in particular and poor and ineffective regulations are other challenges in strategic earthquake waste management. To explain the significance of addressing this issue and resolving the respective problems in this field, one must note that rules and regulations play a key role in protecting the environment and human health.[21] Yusof *et al*.[22] stated that disaster waste management rules are not implementable in most developing countries. Crowley *et al*.[3] suggested that disaster waste management regulations and instructions have been compiled in developed countries and a few developing countries, but the respective requirements are not legally implementable.

Poor employee management is another challenge in strategic management of the waste produced due to earthquakes. The human resources working in the earthquake waste management system is one of the influential factors in this system's performance quality. The problems of earthquake waste management in the field of human resource management include the lack of planning for human resource recruitment, and the inadequate qualitative and quantitative expertise of employees and managers. A study on the education level and the expertise of managers and experts in waste management organizations of Iranian cities indicated that people with around 29 irrelevant disciplines, 6 semi-relevant disciplines, and 2 completely relevant disciplines are employed in waste management

organizations in Iran. Also, only around 8% of the experts and managers employed in the Iranian waste management system have expertise in the relevant fields while 92% of the experts and managers employed in the specialized waste management and disposal come from completely irrelevant or semi-relevant fields of study.[23]

Participants of the present study mentioned poor resource management as another challenge in strategic earthquake waste management. The financial resource factor is among the factors that influence all the stages, components, and functions of the waste management system. Examples of poor financial resource management include shortcomings in credit and equipment, lack of allocated budget, inadequate equipment, and lack of rational and scientific credit allocation plan. In this regard, previous studies have stated that inadequate budget is among the challenges of post-disaster waste management in developing countries.[24] Researchers also believe that financial problems are among the main reasons for failure in waste management programs in developing countries.[9]

Poor management of working procedures is another challenge in the strategic management of waste due to earthquakes. Waste management activities in the face of disaster require high adaptability given that disaster waste management systems are always complex, costly, and time-consuming.[25] Employees and managers facing such circumstances are conservative and resist change, and the employees' unawareness of the nature of change and its consequences intensifies this resistance to change. This resistance to change leads to the implementation of ordinary situation management procedures, slacking off, poor monitoring, and the use of too many working procedures. Waste management and monitoring require a 6-12-month period, the first month of which is highly sensitive due to the high volume and density of relief operations. Should the waste be managed inadequately, its further management will grow more costly over time.[4]

Limitation and recommendation

The present study is the first to identify the challenges of strategic earthquake waste management in Iran to the best of our knowledge. Most of the participants agreed on the importance of strategic management in comprehensive waste management. The present study sheds new light on strategic management in the field of earthquake waste. Considering that the Kermanshah and Varzaghan-Ahaa earthquakes were national-level disasters and all participants were experienced professionals from various organizations involved with waste management, the results of the present study can be generalized to other regions of the country to map the national preparedness for waste management in case of an earthquake. Moreover, the present study was qualitative and can be a base for future quantitative studies. One of the difficulties and limitations of the present study was that given the interval between the earthquake and the study conducted on the details of earthquake waste management challenges, reevaluation and further meetings were required. In this regard, the researchers made their best efforts to afford adequate time for interviews. Moreover, great effort was required to control the interview sessions and redirect the interviewees to the main discussion topic and research questions given the novelty of the research subject. Thus, future researchers are recommended to design a standard questionnaire to quantify the challenges of earthquake waste strategic management in the country. The results of the present study indicate that a substantial amount of success in earthquake waste management comes from pre-earthquake planning. In other words, the foundation of most plans is the identification of capacities and capabilities, inter-organizational and intra-organizational interactions and collaborations, concluding memorandums of understanding, and placing binding laws regarding the cooperation of all organizations and institutions involved with earthquakes.

Conclusion

Despite the increasing importance of disaster waste management (DWM) across the world, disaster waste strategic management is still not principled and cohesive after the earthquakes in countries like Kermanshah and Varzaghan-Ahar. Making fundamental changes in comprehensive and principled waste management is an essential prerequisite in earthquakes and requires special attention to strategic management. The results of the present study indicate that the challenges of strategic waste management stem from various factors such as poor leadership and management, improper planning, improper organizational culture, overlooking organizational learning and poor employee management, and working procedures and resources. Should these challenges be managed poorly, many difficulties will arise in achieving the goals and selecting the proper method for the management of processes and resources. Managers and executives in the field of disaster management and disaster waste management should, thus, take the necessary measures to remove these obstacles.

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Conflicts of interest

There are no conflicts of interest.

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