



Evaluation of the key success factors of drought management based on knowledge management in Iran

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Abstract

Drought is a gradual and creeping phenomenon and including a period of abnormal and dry weather conditions, to be Durable enough arises a serious imbalance in regional hydrological situation. Iran due to its geographical and climatic characteristics as many of Middle East and North Africa countries is suffering from an ongoing drought. According to unintended and negative consequences of the complex and multidimensional phenomenon of drought on the growth and development of communities and the other hand, the drought potential in Iran, Devise directional mechanisms to coping, control and management of drought is necessary. Significant gap between coordination and sharing of knowledge and information has always been one of the missing links in the crisis management of natural disasters such as drought. Therefore, knowledge management can play an important role in crisis management of drought. During the drought crisis, the experiences of involved organizations and individuals in managing the crisis and record these experiences causes to understand organizations its mistakes and begin enterprise-wide training to Facilitates acquisition, Formalization and sharing of the crisis management. The aim of the paper is to evaluate and prioritize the key success factors of knowledge management based on criteria of effective drought management in Iran. The results show that the use of ICT tools, is the most important success factor in drought management.

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Introduction

Drought is a normal, recurrent climate feature which, if badly managed can lead to a loss of crop production, food shortages and, for many, starvation. It originates from a deficiency of precipitation over an extended period, although its characteristics vary significantly from one region to another. However, drought should not be viewed merely as a physical phenomenon; it has profound impacts on society (Keshavarz *et al.*, 2010). Drought in Iran, which entered its third consecutive year in 2001, severely affected rain-fed agricultural production in many areas. In the agricultural sector, Iranian farmers sold roughly 80% of their livestock, and an estimated 800,000 livestock were lost in 2000 as a result of the drought. Affected farmers expected 35-75% reductions in wheat and barley production in 2001. The extreme drought conditions also led to widespread migration and contributed to disease (FAO, 2008). Drought management is carried out at the macro, meso and micro levels. At the macro level, national governments plan and execute programs, laws and regulations to mitigate drought, often seeking international support. They are responsible for minimizing the hardship by organizing relief work, providing loans and generating employment schemes for victims (Paul, 1995). At the meso level, local governments try to mitigate drought with regard to national opportunities and local challenges. Farmers are in the forefront of drought management and suffer most from the consequences. Therefore, the micro-level management that is what farmers do with regard to drought is of great importance. (Viljoen *et al.*, 2001).

knowledge management is about applying the collective knowledge of the entire workforce to achieve specific organizational goals. It is about facilitating the process by which knowledge is created, shared and utilised. Though there is no way of neutralizing all negative impacts resulting from disasters such as droughts, efforts can be made in order to reduce their consequences. Knowledge on drought disaster management strategies, together

with good practices and lessons learned can undoubtedly support this effort through well-informed mitigative measures and preparedness planning (Mohanty *et al.*, 2006). Knowledge on drought management strategies appears fragmented, emphasizing a perceived gap in information coordination and sharing (Mohanty *et al.*, 2006). The experiences, approaches and adopted modalities for drought management remain with individuals as tacit knowledge. Therefore the lack of effective information and knowledge sharing, and knowledge creation on drought management strategies can thereby be identified as one of major reasons behind the unsatisfactory performance levels of current drought management practices (Seneviratne *et al.*, 2010). The objectives of present investigation was to study and Prioritization of the key success factors of drought management based on knowledge management in iran.

Materials and methods

Identification of key success factors within the drought management based on knowledge management will be delivered through interviews with experts who are involved in the drought management process and knowledge management, supported by an expert questionnaire survey. This paper is based on a comprehensive literature survey and review carried out, with special focus on iran droughts, to identify the factors which support successful drought management. In this study, 8 key success factors of knowledge management were identified. Then to prioritize these factors, the four criteria for effective and efficient management of the drought management were extracted from theoretical literature and as an expert paired comparison questionnaire was provided. 20 questionnaires were completed by experts involved in drought management. Data based on Analytical Hierarchy Process (AHP) and by using the Expert Choice software was analyzed. Finally, the validity of the two main research hypotheses were tested and the key success factors for knowledge management in drought management were prioritized.

This study has two main hypotheses are:

- 1) The most important key success factor of drought management based on knowledge management in Iran, are ICT tools.
- 2) The most important criterion of successful drought management in Iran, are interaction, collaboration and participation.

AHP Process

The Analytical Hierarchy Process (AHP) is a multi-attribute evaluation method that involves three phases: decomposition, comparative judgments and synthesis of priorities. In the decomposition phase, the project team can explicitly develop the AHP hierarchy model from the fundamental-objective hierarchy. In the second phase, each decision maker utilizes paired comparisons for the attributes and alternatives to extract judgment matrices with a nine-point scale at each level. In the third phase, the paired comparison process is repeated for each attribute in the alternative prioritization problem based on the largest eigen-value method. Finally, the relative importance of attributes and the global priority of alternatives can be obtained by aggregating the weights over the hierarchy (Saaty, 1980).

In this study, the goal of AHP model is, prioritizing key success factors of drought management based on knowledge management in Iran. Model criterions are

given in Table 1. Model alternatives are given in Table 2. The hierarchical analysis model of drought management based on knowledge management are given in Fig. 1. The next step is preparing the research questionnaires. This questionnaires is designed as saaty spectrum. 20 questionnaires are completed and using the software Expert Choice 11 was analyzed. Overall inconsistency rate of model to 0.09 was calculated that because its less than 0.1, was accepted.

Results

The purpose of this study was to determine and prioritize the key success factors of knowledge management in drought management in Iran. As shown in Table 3 and Fig.2, from the perspective of the model parameters, using the tools of ICT, culture of knowledge exchange and benchmarking are the highest ranking among the 8 key success factors of knowledge management in Iran drought management. Overall inconsistency rate of model to 0.09 was calculated that because its less than 0.1, was accepted. According to the results in Table 3, ICT Tools, with a final weight of 0.222, is the most important key success factor of knowledge management in drought management that confirms the first hypothesis. According to the results in Table 4 and Fig. 3, Increasing Interaction, Collaboration and Participation , with a final weight of 1.000, is the most important criterion for effective drought management that confirms the secound hypothesis.

Table 1. Criterions for effective drought management.

Criterion	References
Risk Reduction and Mitigation	Seneviratne,Zaharia,Ford,Hossain,Klijn, Johnston,Galloway,Davis,Kapucu,Gerber
Improve the Process of Informing and Warning	Seneviratne,Zaharia,Ford,Hossain,Sobel, Marincioni,Tanner,Alexander,Mcguire,Ozceylan, Konecny,Yates,NDM,Johnston,Koustova, Davis,Kapucu
Increasing Coordination	Seneviratne,Zaharia,Ford,Hossain,Sobel,Murphy,Alexander, Mcguire,Deshmukh,Ozceylan,Yates,NDM, alloway,Kapucu,Gerber,Wang
Increasing Interaction, Collaboration and Participation	Seneviratne,Zaharia,Ford,Hossain,Tanner,Özerdem, Deshmukh,Ozceylan,Konecny, Yates,NDM,Kapucu

Table 2. Key success factors of knowledge management (Chang *et al.*, 2008).

Alternative (Factors)
Culture of Knowledge Exchange
Senior Managers Supporting in Involved Organizations
Human Resource Management (HRM)
Training and Education
Knowledge Sharing
Benchmarking
Knowledge-based Strategies and Policies
ICT Tools

Table 3. Prioritizing the key success factors of knowledge management in drought management.

Rank	Key success factors	Final weight	Overall inconsistency rate
1	ICT Tools	0.222	
2	Benchmarking	0.150	
3	Culture of Knowledge Exchange	0.129	
4	Training and Education	0.129	
5	Knowledge Sharing	0.115	0.09
6	Senior Managers Supporting in Involved Organizations	0.099	
7	Human Resource Management (HRM)	0.089	
8	Knowledge-based Strategies and Policies	0.066	

Table 4. Prioritizing criteria for effective drought management.

Rank	Criteria	Final weight	Overall inconsistency rate
1	Increasing Interaction, Collaboration and Participation	1/000	
2	Risk Reduction and Mitigation	0.825	0.07
3	Increasing Coordination	0.472	
4	Improve the Process of Informing and Warning	0.296	

Discussion

As regards, Iran always has been involved with the drought crisis and also its development in the field of information and communication technologies such as fiber-optic network infrastructure, broadband internet, mobile communication and skilled manpower, ICT tools such as internet and Mobile-based alarm systems and, databases, GIS, numerical prediction models of drought and budgeting expert systems can be a most important role in drought management in Iran. Furthermore, the research results show that Increasing Interaction, Collaboration and Participation was known as the

most important criterion in Iran Drought Management that Can reduce the effects of droughts.



Fig. 1. The hierarchical analysis model of drought management based on knowledge management.

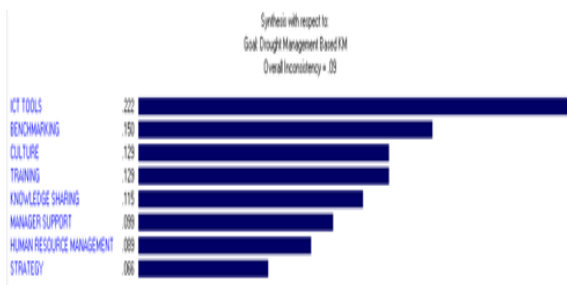


Fig. 2. Prioritizing the key success factors of knowledge management in drought management.

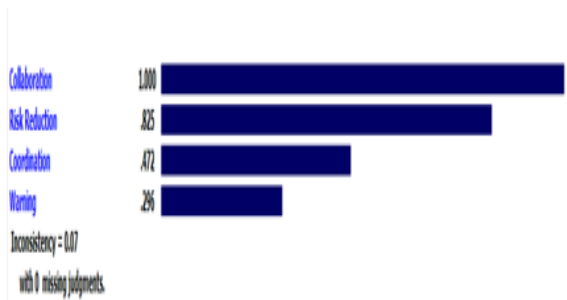


Fig. 3. Prioritizing criteria for effective drought management.

Reference

Alexander D. 2010. The L'Aquila Earthquake of 6 April 2009 and Italian Government Policy on Disaster Response. *Journal of Natural Resources Policy Research* **2(4)**, 325-342. <http://dx.doi.org/10.1080/19390459.2010.511450>

A Review of Drought Occurrence and Monitoring and Planning Activities in the Near East Region. 2008. Food and Agriculture Organization of the United Nations Regional Office for the Near East, Cairo, Egypt.

Chang M, Hung Y, Yen D, Tseng P. 2008. The research on critical success factors of knowledge management and classification framework project in executive Yuan of Taiwan Government. *Expert Systems with Applications*, 11.

Davis L. 2011. Reducing Disaster Risk 1980-2010: Some Reflections and Speculations. *Journal of Environmental Hazards* **10**, 80-92.

<http://dx.doi.org/10.3763/ehaz.2011.0009>

Deshmukh R, Rodrigues L, Krishnamurthy G. 2008. Earthquake Risk and Knowledge Management. *Journal of Knowledge Management Practice* **9(3)**.

Ford K. 2011. The Caribbean Disaster Mitigation Project. *Journal of Environmental Hazards* **10**, 23-29.

<http://dx.doi.org/10.3763/ehaz.2011.0003>

Galloway G. 2010. Flood Risk Management in the United States and the Impact of Hurricane Katrina. *International Journal of River Basin Management* **6(4)**, 301-306.

Gerber B. 2007. Disaster Management in the United States: Examining Key Political and Policy Challenges. *The Policy Studies Journal* **35(2)**, 228-238.

<http://dx.doi.org/10.1111/j.1541-0072.2007.00217.x>

Hossain M. 2011. Disaster Management in Bangladesh: Regulatory and Social Work Perspectives. *Journal of Comparative Social Welfare* **27(1)**, 91-101. <http://dx.doi.org/10.1080/17486831.2011.532978>

Johnston D, Pettersson R, Downes G. 2008. Developing an Effective Tsunami Warning System: Lessons from the 1980 Chile Earthquake Tsunami for New Zealand Coastal Communities. *Journal of Social Sciences Online* **6**, 105-120.

Kapucu N. 2008. Collaborative Emergency Management: Better Community Organizing, Better Public Preparedness and Response. Blackwell Publishing. USA. .

Keshavarz M, Karami E, Haghghi A. 2010. A Typology of Farmers' Drought Management. *American-Eurasian Journal Agriculture & Environment Science* **7(4)**, 415-426.

Klijn F, Samuels P, Vanos A. 2008. Towards Flood Risk Management in the Eu: State of Affairs

With Examples from Various European Countries. *International Journal of River Basin Management* **6(4)**, 307-321.

<http://dx.doi.org/10.1080/15715124.2008.9635358>

Knowledge Management in Disaster Risk Reduction. 2007. Indian Ministry of Home Affairs, National Disaster Management.

Konecny M, Reinhardt W. 2010. Early Warning and Disaster Management: the Importance of Geographic Information. *International Journal of Digital Earth* **3(3)**, 217-220.

<http://dx.doi.org/10.1080/17538947.2010.508884>

Koustova H. 2010. Disaster Information Management Research Center (DIMRC): A Gateway to Disaster Information Resources. *Journal of Electronic Resources in Medical Libraries* **7**, 326-335.

<http://dx.doi.org/10.1080/15424065.2010.527251>

Marincioni F. 2007. Information Technologies and the Sharing of Disaster Knowledge: the Critical Role of Professional Culture. *Journal of Disasters* **31(4)**, 459-476.

<http://dx.doi.org/10.1111/j.1467-7717.2007.01019.x>

Mcguire M. 2010. What if Hurricane Katrina Hit in 2020? The Need for Strategic Management of Disasters. *Journal of Public Administration Review* **201-207**.

<http://dx.doi.org/10.1111/j.1540-6210.2010.02273.x>

Mohanty S, Panda B, Karelia H, Issar R. 2006. Knowledge management in disaster risk reduction: the Indian approach. National Disaster Management Division, Ministry of Home Affairs, Government of India.

Murphy T, Jennex M. 2006. Knowledge Management, Emergency Response, and Hurricane Katrina. *International Journal of Intelligent Control and Systems* **11(4)**, 199-208.

Özerdem A. 2010. The 'responsibility to protect' in natural disasters: another excuse for interventionism? Nargis Cyclone, Myanmar. *Journal of Conflict, Security & Development* **693-713**.

<http://dx.doi.org/10.1080/14678802.2010.511511>

Ozceylan D, Coskun E. 2008. Defining Critical Success Factors for National Emergency Management Model and Supporting the Model with Information Systems. 5th International ISCRAM Conference. USA.

Paul BK. 1995. Flood research in Bangladesh: Major findings and future research direction. The 1995 Annual Meeting of the Association of American Geographers, Chicago, USA. .

Queensland Disaster Management Strategic Policy Framework. 2010. Emergency Management Queensland, Department of Community Safety.

Seneviratne K, Baldry D, Pathirage C. 2010. Disaster Knowledge Factors in Managing Disasters Successfully. *International Journal of Strategic Property Management* **14**, 376-390.

Saaty T.L. 1980. *The Analytic Hierarchy Process*. McGraw Hill, New York..

Sobel R, Leeson P. 2007. The Use of Knowledge in Natural Disaster Relief Management. 2007. *Journal of Independent Review* **11(4)**, 519-532.

Tanner N. 2010. The Importance of Knowledge Management and Trust in Relation to Disaster Response. *Dalhousie Journal of Interdisciplinary Management*. **9**.

Viljoen MF, Pelsers AJ, Steyn MS. 2001. Towards the development of guidelines for the evaluation of social, economic and political impacts of droughts and water scarcity. Departments of Sociology, Agricultural Economics, Political Science and History, University of the Free State, Bloemfontein. Report to

the Water Research Commission, Pretoria.

Wang W, Belardo S. 2005. Strategic Integration: A Knowledge Management Approache to Crisis Management. 38th Hawaii International Conference on System Sciences.

Wilhite D. 2003. Moving toward drought risk management: The need for a global strategy. National Drought Mitigation Center. University of Nebraska: Lincoln.

Yates D, Paquette S. 2011. Emergency Knowledge Management and Social Media Technologies: A Case Study of the 2010 Haitian Earthquake. *International Journal of Information Management* **31**, 6-13.

<http://dx.doi.org/10.1016/j.ijinfomgt.2010.10.001>

Zaharia M, Leon F, Atanasiu G. 2009. Increasing Awareness to Disasters by Knowledge Management with Intelligent Agents. 10th European Conference on knowledge Management **1**, 906-914.