

# **Investigating the Factors Affecting Human Resource Planning after Large-scale Natural Disasters: A Case Study on the Bam Earthquake**

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## **ABSTRACT:**

Human Resource Planning (HRP) plays a pivotal role in organizations through providing the balance between supply and demand for qualified human resources; in times of crisis, especially those cases with large number of fatalities, HRP will become even more important. In the case of Bam earthquake in 2003, the public education system of the region, with around 32000 students and 2700 teachers, was heavily struck by loss of around 900 teachers. The present research, therefore, aims to investigate the various factors affecting the implementation of HRP in the studied case, through a qualitative method (case study), using semi-structured interviews as well as archived documents. Our findings delineate that a variety of factors affect human resource planning after large-scale natural disasters, the most outstanding of which being the access to reliable information and statistics, as well such social factors as immigrations to and from the region due to the disaster, or other population factors like birth rate during the decade after the disaster. Classifying the factors and proposing a model for this planning in similar future disasters is another contribution of this paper.

## **KEYWORDS:**

Human Resource Planning, Natural Disasters, Bam Earthquake, Statistics, Social Factors, Public Education System

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## 1- Introduction

The present paper aims to conduct a case study on the public education system in Bam city, Kerman, southeastern Iran following the catastrophic earthquake of 2003, with the main goal to investigate the factors affecting human resource planning (HRP) post to large-scale natural disasters. Keeping into account the specific characteristics of public education system of a country (including its size, diversity, and complexity), performing HRP for such a system is of considerable significance; on the other hand, teachers as human resources with a key role in delivering educational services to the public deserve special attention.

To establish and maintain the balance between the HR supply and the demand for enough number of qualified and competent teachers is the focal point in human resource planning in public education systems. The relatively large background regarding the amount of damages and fatalities caused by numerous recent earthquakes in Iran clearly necessitates an in-depth exploration of the factors influencing human resource planning for similar coming crises. In spite of the obvious importance of this research subject (not only for education system but for all major organizations of a nation), there was found no library sources and only a few internet scholarly search queries for human resource planning after disasters: the majority of the studies having concerned firstly, health and medical care and secondly, the construction and rebuilding issues.

In time of large-scale crises including strong earthquakes, serious challenge is imposed to human resource management in general (in its function of “staffing”) and human resource planning in particular. The 13-second long 6.6-magnitude earthquake hit the historic city of Bam at 05:26 AM on December 26, 2003, with an epicenter at 10 kms southwest of the city and within a 16-km radius (Adams et al., 2004); a population of 93000 living in traditional clay and mortar houses had other misfortunes of the early morning time of the earthquake and the cold winter. Approximately 26.000 people were killed, more than 30.000 were injured, and about 45.000 were displaced from their homes (Table 1). From the total number of 35769 students in Bam before the earthquake, about 8000 lost their lives in this earthquake (Table 2) and from the total number of 3226 teachers of the public education of the city, 941 were reported to be either killed or disabled (Table 3).

Taking into consideration different demographic variables (including numerous immigrations into Bam due to flow of facilities to the region after the earthquake, recruitment of new teachers and other school staffs, and the change in birth rate in the decade post to the earthquake and its subsequent effects on the number of children entering elementary school) have all affected the supply and demand of human resources in the public education system of the region thus making this topic of research appealing to the authors of the present paper. The main goal of the present research, therefore, is to investigate the factors affecting human resource planning after large-scale natural disasters. The research questions posed by the study are as follows:

- 1- How was the situation of the supply and demand in human resource planning of Bam public education system before the 2003 earthquake?
- 2- What changes arose in the situation of the supply and demand in human resource planning of Bam public education system due to the 2003 earthquake?

- 3- What initiatives were taken for re-establishment of this supply-demand balance?
- 4- What other factors ought to have been considered in re-establishment of this supply-demand balance?

The rest of the paper will firstly review the literature, followed by introducing the research method; after designing the case study and clarifying the research method and data analysis, the research findings and implications will be represented.

## **2- Theoretical Background**

The process of human resource planning is divided into distinct steps by different scholars; the most common phasing consists of 3 main steps (i.e. forecast of the demands for HR, 2) forecast of the supply of HR (from both inside and outside the organization), and 3) providing the balance between the forecasted demand and supply (Abtahi, 2002); some other scholars have explained the HRP process to be comprised of four main stages: 1) collection and analysis of the required data and information with the aim to forecast the HR demand and supply, 2) goal-setting and policy-making for the overall HR policies, accompanied by the top-managers' support and approval, 3) design and implementation of the approved plans and actions for different HR functions (including recruitment, training, and development) and 4) control and evaluation of the plans applied in order to facilitate the advance of the HRP within the organization (Shimon and Rendel, 1999).

HRP faces new challenges in times of natural disasters, especially those crisis cases with large casualties. In classifying the crises, "natural disasters" is one of the 18 threatening phenomena which endangers the life and properties of civilians and social systems (Mitroff, 1988). The most recent one of the largest natural disasters in Iran is the 2003 earthquake in Bam city, Kerman province, southeastern Iran. Earthquakes do not discriminate or differentiate among communities or nations; they indiscriminately shatter lives, destroy communities, destroy national economies, cause panic and leave behind frustrated people, agonizing losses, bereaved families and sad stories (Baytieh & Naja, 2013). Iran holds the 4<sup>th</sup> place among all countries of the world regarding the frequency of natural disasters occurrence; a disaster is a natural or man-made event that negatively affects life, property, livelihood or industry often resulting in permanent changes to human societies, ecosystems and environment (Quarantelli, 1998, cited in Eshghi, 2008). Disasters are relatively sudden, highly disruptive and in most cases time limited (although the effects may be longer lasting) (ibid). only the past 50 years, 50 earthquakes stronger than 6 richter have struck the country (Azin, 2011). 18% of all destructive earthquakes of the history of the world were in Iran; 80% of the destruction and deaths by earthquake belong to 6 countries, with Iran being one of the most vulnerable of the list. 80% of the habitable area of this country is vulnerable to earthquakes (Raeesidana, 2006).

Crisis management has been defined from different aspects such as administration, recovery and response activities, mitigation efforts or organizational collaboration, for example (Petak, 1985, cited in Unlu, et al. , 2010); the crisis management concept consists of rescue, preparedness, mitigation, and resilience efforts made by governments, volunteer organizations or other local departments (ibid). The governments should ensure that there is appropriate information and effective consultation with the locals and other stakeholders since this would assist in the decisions to be made about future effects and outcomes (Mijoni & Izadkhah, 2009).

crisis management, in another research work (Drabk, 2004, cited in Hosseini, et al., 2013) is defined as an integrated system using science, technology, management, and planning for dealing with disasters that kill many people, destroy or damage the property of the people, and disrupt social life.

Regarding the casualties, the 2003 Bam earthquake was the worst registered natural disaster in the history of Iran; even before this earthquake, Iran was the 4<sup>th</sup> country of the world to be the most vulnerable to natural disasters (Adams et al., 2004). Although it is difficult to measure, the biggest cost of disasters, both natural and technological, is the human cost of lives lost, shattered and changed. For survivors, the effects may last a lifetime. For the same reason, the economic and environmental impacts of these disasters to the whole world are uncountable and extremely difficult to answer (Eshghi, 2008). In a period of 95 years, from the 1908 Silakhor earthquake (with destruction of 64 villages and death of about 800) to the 2003 Bam earthquake (with destruction of about 19,000 buildings and 8,000 hectares of gardens along with around 45,000 deaths), there were 95 strong earthquakes hitting different regions of the country, that is on average, there has been one major earthquake every year, totally killing 150,000 humans, injuring 350,000 and leaving hundreds of thousands as homeless. (Raeesidana, 2006). Iran, because of its extent, geographical situation and climatic variety, is one of damageable countries of the world (Iranian Institute of Management and Planning Studies, 2005, cited in Ajami & Fattahi, 2009).

During the last 100 years, only in Kerman province, where the bam earthquake took place, there have been about 60 earthquakes with magnitudes higher than 5 richter (Mahvi, et al. 2006). In the last decade, around 950 earthquakes hit Iran, resulting in, excluding the casualties of the Bam earthquake, 37,600 deaths, 53,300 injuries, and above 2,157 Billion Rials. The greatest recent earthquake happened in Manjil, northern Iran on June 21<sup>st</sup>, 1990, destroying 27 cities and 1871 villages, with a magnitude of 7.3 richter and within an area of 100 square kms in Guilan and Zanzan provinces (Araghizadeh, et al. 2003).

Effective planning is the best defensive strategy for mitigating the devastation and confusion caused by any natural disaster (Beggan, 2011). It is important to consider earthquake risks as part of strategic planning for societies that are vulnerable to future earthquakes (Momani, 2012). Among various factors affecting the human resource planning after the above-mentioned natural disasters, the accurate information and statistics is one of a main prerequisite; reliable and up-to-date information can have impact on destruction factors and prevent them. Because of the financial and human damages of disasters, establishing a general, scientific and practical management network is necessary (Ajami & Fattahi, 2009). In Iran, the absence of timely reporting of most of data before, during and after earthquakes; defective, insufficient and inaccurate registration of data; declaration and publishing different and contradictory population statistical reports by related organizations; and weakness of using reliable information to support the prevention systemic planning. Unfortunately, earthquake information in Iran is inadequate in providing the needed management support. Therefore, it needs to reform and design a model proposed by it (Institute of Management and Planning Studies, Tehran, Iran, 2005, cited in Ajami & Fattahi, 2009).

Social factors, including such population changes as immigrations into and out of the area, birth-rate, marriages, school dropouts, shall be, as a second set of influencing factors, taken into consideration, as well; in a study by Cohan and Cole (2002), it was found that marriages

increased the year following the hurricane in 1990 compared with prior levels in the affected counties. Increases in marriages after a disaster highlight the relevance of interpersonal growth, in line with personal growth models of stress (Tedeschi and Calhoun, 2006, cited in Prati & Pietrantoni, 2014). The theoretical support for the increases in marriages after a disaster can also be found in the terror management theory (Solomon et al., 1991). This theory emphasizes the role of the existential fear of death and posits that, in response to reminders of death people, people may increase commitment to a romantic partner as a way to cope with the fear of death through social support (Prati & Pietrantoni, 2014).

Therefore, this review of this sparse literature concerning disaster management and human resource planning, despite highlighting the distinguished scholarly works on each of these two sides separately, justifies quite well a conduction of a deeper study on these two areas accumulatively (which has motivated the present authors to delve more into this case study research).

### **3- Methodology**

A qualitative research approach oriented towards discovery, description, and holistic understanding of processes and initiatives is a suitable point of departure; the methodology of this study, thus, has the following specifications:

- This applied research conducted an exploratory and descriptive analysis, aiming to explore and investigate the factors affecting Human Resource Planning.
- The level of analysis is the public education system of Bam city and its earthquake-stricken suburbs (i.e. all elementary, middle, and high schools of the region).
- The approach is “inductive”, using both quantitative and qualitative research data (i.e. for quantitative data: the available statistics and for the qualitative data: the interviews, observations, and content analyses of the documents and information archives on the case).
- The research strategy is “case study”.
- The source of data comprise of all documentations, archived information, as well as semi-structured interviews.

The main goal of the present paper is to reach a relatively comprehensive perception of human resource planning in cases of large-scale disaster; the case study on the 2003 Bam earthquake was thus conducted with an aim to investigate the neglected factors affecting HRP in the public education system of the studied region. Exploring the obstacles and challenges ahead of a successful implementation of HRP after large-scale natural disasters is another goal for this research. Therefore, the emphasis in this paper is on an exploratory analysis which aims to discover a series of factors or objectives which may reach to investigation of the main limitations (here: the challenges and barriers against human resource planning after large-scale natural disasters).

This research follows a holistic-inductive paradigm, thus accentuating the two following qualitative issues: 1) inductive analysis, and 2) qualitative data. Data collected in this study are first analyzed inductively and then interpreted in a way that “plunging into the specifications

and details of the data with the aim to explore the important issues, dimensions, and inter-relations, and finally resulting in exploration of open-ended questions rather than mere theoretical examination of deductive hypotheses" (Patton,1990). In addition to qualitative data acquired from several interviews, a series of quantitative data is also presented and utilized in analyses and interpretation of different aspects of human resource planning in the studies case.

The method applied in this research is "case study", an empirical enquiry that, as Yin (1989) states "allows the researcher to investigate, using multiple sources of evidence, a contemporary phenomenon within its real-life context especially when the boundaries between the phenomenon and its context are not clearly evident". Case study can employ a wide variety of data sources such as interviews, observations, archived documents, and audio-visual materials (Yin, 1989); the present research has utilized all the above sources, except for the last one. This potential of case study to apply a combination of different sources is a point of strength for this method (ibid). Another considerable point about case study is that it relies on analytical generalization rather than statistical generation which is common in quantitative hypotheses checking methods (Eisenhardt, 1989).

Regarding the "reliability" of this research, a case-study protocol was developed to conduct the research process. Using a protocol is a main tactic for enhancing the reliability, which guides the researcher through the process of case-study research work (Yin, 1989). This protocol consists of tools (i.e. interview questions) as well as procedures and main rules to be followed. Two main aspects of case study methodology is: 1) the case-study protocol, and 2) data-collection procedure; the protocol, indicating what data are to be collected, consists of tools, procedures, and main rules which ought to be followed throughout the research process. Not only does this protocol increase the reliability of the study, but it also constantly reminds the researcher what the case-study is being conducted for and thus assists him/her in conducting the case study.

This research was organized so as to collect the required data through conducting library searches, inquiring from all relevant online and paper databases, as well as communicating through phone and mail, or visiting the individuals and/or authorities involved in the case under study. Semi-structured interviews were applied, together with gathering the data from national and international reports on the case, reviewing the academic research papers on the topics related to the case, and delving into local and national newspaper archives within the time period of the occurrence of the disaster. All interviews were digitally recorded (where permission was given) and fully transcribed. Notes from observations were accurately taken and their details were interlinked and saved. The transcription of the interviews were typed and the returned to the interviewee, and each interview had at least two rounds of feedback.

Eisenhardt (1989) introduces two major steps in data analysis: intra-case analysis and inter-case analysis; to conduct inter-case analysis, it is required that we not have a single-case study so that we may analyze several cases simultaneously and, after deep investigation of each case, perform a comparison-and-contrast analyses among the results of pairs of analyses of the cases, finally leading to a considerable reduction of the amount of accumulated data. The present paper, however, does not have this type of analyses since it is a single-case study and can only benefit from intra-case analysis; therefore the following three steps were applied for data analysis, taken from Patton (1990):

- Collecting and organizing the raw data, including the script of the interviews, notes taken from observations, documents in newspapers and media, reports and articles published by national and international organizations related to the case under study, academic research works conducted by universities and research institutes, and surfing through internet data-bases.
- Editing the acquired data, summarizing and outlining the information related to each person, omitting the repetitive, parallel, or redundant information, and organizing and classifying the data for quick access to the needed sets.
- Creating summaries of classified sets of edited and abridged data inside each category of data, and developing the result of this step in as the explored findings of the research.

#### **4- Findings**

Our research findings can be divided in two main groups:

- 1- Findings which emphasize lack of accurate information and statistics necessary for implementation of human resource planning
- 2- Findings referring to socio-demographic factors influencing the process of human resource planning (including immigrations to and from the region, and the trend for birth rate in the decade following the disaster).

Instances of findings in the two above-mentioned groups are mentioned based on excerpts and quotations from the interviews and documents of the case study.

- 1- Lack of accurate information and statistics

*Doc. No. 1:*

*“Experience of the past earthquakes show that the number of deaths in the 1962 Boeinzahra earthquake was estimated a lot fewer than reality (being announced 10.000 deaths while it was indeed 25,000 to 30,000; on the contrary, in more recent earthquakes, sometimes the statistics for casualties and losses is exaggerated, due to social or media policies (as in the case of the 1990 Rudbar & Manjil earthquake which was reportedly having around 25,000 deaths); it is interesting that the official reports for the last example reported a 35,000 deaths, perhaps with an aim to attract more local and international aids; more interestingly, when it comes to responding for the statistics announced, the same tribunes easily turn to announcing much smaller figures!” (Raeesidana, 2006).*

*Interview No. 1:*

*“On the first and second day after (the Bam) earthquake, everyone who could find a person out of the ruins, would personally decide whether the guy is dead or not; [...] in cases, the relatives would come and take the corpses and bury them, before having them counted as dead in statistics. That’s why there is so much contradiction in the statistics announced. [...]It was only after the third day that a workgroup was made for checking the identity of*

*the deceased; and three or four days after the earthquake, the legal medicine started to certify death records.”*

2- The factors found to have been affecting HRP in Bam schools after the 2003 earthquake:

A) Factors which have been considered in performing the HRP in the case under study:

- Decrease in the number of classrooms and schools:

*“From the total number of 292 schools in Bam, 80% are completely destroyed.”  
Archive of Iran Daily (December 29<sup>th</sup>, 2003)*

*“Only 51 schools are remained usable.” Archive of Iran Daily, (January 1<sup>st</sup> 2004)*

*“Reconstruction of Bam, according to the UN report, needs 700 million to 1 billion dollars.”  
(BBC News, January 9<sup>th</sup>, 2004)*

*“The Government of Iran has estimated the economic loss to be 1.5 billion dollars; another official report announces 4 trillion Rials).  
(Keyhan Daily, January 1<sup>st</sup>, 2014)*

*Interview No. 1:*

*“[...]Re-opening of the schools in the soonest time possible had five main goals:*

- 1- To give hope for life to teachers and students*
- 2- To find about the number of teachers and students killed by the earthquake*
- 3- To pull the sorrow-stricken students and teachers out of the tents*
- 4- To lessen the sorrow of the teachers and students*
- 5- To attract the teachers and students who had immigrated to the neighboring cities back to Bam.”*

*Interview No. 2:*

*We started with two schools: Raf’at & Navid; 50 students in the morning (from the total number of 34,000 last month)! Little by little, joy was coming back and hope: on that day, the number of students enrolling in these two schools reached 600; to the end of that week, it became 4,500. [...]Our main aim for this quick re-opining of schools was to: 1- pull back the children who had immigrated from the city to their own hometown; 2- give back the hope of liveliness to Bam and its residents, and 3-keep the students and teachers amused so that they could [...]cope with the sorrow of the deaths and losses.”*

*Interview No. 3:*



*"We worked day and night and didn't stop building schools; schools re-opened in Fahraj and Narmashir suburbs so that the black sorrow get lost with arrival of the white flowers going to school; [...] this way, children who had abandoned Bam, could return to their hometown and schools re-opened on January 5<sup>th</sup>. "*

*Doc. No. 2:*

*"According to UNICEF Report, 18,000 children lost both of their parents, 5,000 children lost one parent, and 2,000 children were taken to orphanage.  
(Government of Kerman province, 2003, cited in Vaziri & Jahani, 2006)*

*Doc. No. 3:*

*"The number of orphan children in Bam increased from 150 to 5649 and the number of individuals enrolled in Imam Charity Org. in Bam increased from 370 to 9494." (Hosseini & Ghafoury, 2007)*

B) Factors which have not been considered in performing the HRP in the case under study:

- Population changes in general:

*Doc No. 4:*

*"The population of Bam was 98,435 in the 1996 census, which, despite a decrease of 26,271 due to the 2003 earthquake, increased to 282,311 in the 2006 census; at the same time, the population of Bam's neighboring city, Jiroft, was 208,874 in 1996 census, which decreased to 187,595 in the 2006 census; another main city neighboring Bam is Kahnuj which had a population of 194,936 in the 1996 census and decreased to 105,207 in 2006. The population of Bam ranked the third in all 16 main cities of Kerman province in the 2006 census (only after Kerman and Rafsanjan and with a slight difference); according to the same census, population of Bam's rural areas is the first in Kerman province (173,207).  
(National Statistical Center, 2006)*

*Doc. No. 5:*

*"Two months after the Bam earthquake, several official and non-official reports were published pinpointing that the 85,000 populated city of Bam before the earthquake, in spite of losing 35,000 of its residents, reached a population of nearly 200,000! Based on the Red Crescent's registered residents for the city and the number of care packages distributed among people, the population of Bam city was nearly 213,000 (Torabi, 2003, cited in Raeesidana, 2006). At the same time, the governor of Bam city announced the population as "around 75,000"; nevertheless, it is expected for the population of disaster-stricken cities to have an increase up to 1.5 to 3 times more than their population before the event: apart from the flow of the survivors' relatives and friends to the city for help, many poor villagers would move to city which had then become the center of attention and thus foods and other facilities. Also, when the main city in the region was destroyed, many jobs in the neighboring villages (which were sending their products to that city for*

*sale) were resultantly cut and thus they were forced to move to the main city as a helpless child seeks shelter to its mother's arms." (Raeesidana, 2006)*

*Interview No. 3:*

*"[...] To where shall the survivors of this disaster escape to?! Where can they find people to believe in how well he used to be and how he is now? [...] What can we do to prevent all this flood of incomers who only wish to benefit from the facilities provided? On the one hand, we have to sympathize with those entering Bam from the neighboring village (for they have no source of income anymore) but on the other hand, we must find a way to prevent the rush of thieves who saw there was no security or protection preparations and started robbing the properties left behind and the loads of helps sent to the city. Since an earthquake of this strength would annihilate the hope for finding anyone alive out of the ruins after two days [...], perhaps we could have control all incoming and outgoing gates of the city.*

*Doc No. 7:*

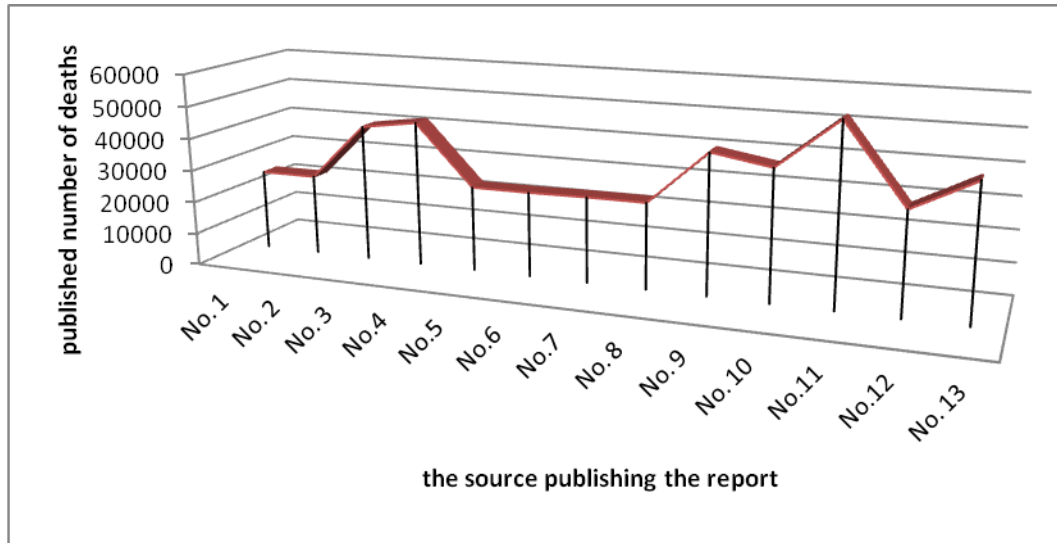
*"Significant demographic changes are noticeable in Bam after the earthquake; the population of the city was 83,000 and the total population of the surrounding villages was 100,000 before the earthquake; the city and those villages had a very close trade relationship: villagers would carry their products (mainly palm dates and citrus fruits) to Bam for sale and/or for storage); the earthquake caused the destruction of most buildings which used to serve for such purposes and, moreover, many of the survivors who could afford moving to bigger cities (and who were the affluent minority who were buying the agricultural products of the farmers) also left Bam. Thus a lot of the villagers had to move to the city for a living. The result was a significant increase in the population of Bam after the earthquake. Many families left Bam while many more entered the city; those leaving were mostly either the rich minority who could afford the immigration or had relatives in other cities; students who registered in Bam schools after the earthquake were very different from the time before, lack of interest in studying was more evident among boys and teachers prefer to work on their pupils' emotional and psychological needs rather than their curriculum." (Raeesidana, 2006)*

*Doc No. 8:*

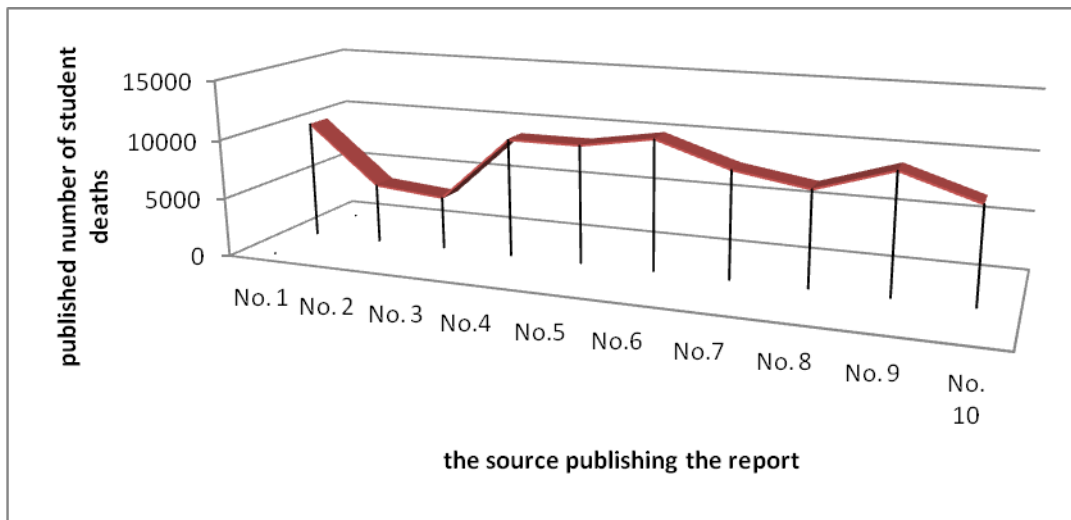
*"Due to the large number of human resources in public education system, loss of even a small number of the staff from the system may create a huge gap in the process of human resource planning and organizing; the total number of teachers all over Iran who were not active in 2003 (due to the sabbaticals granted, healthcare leaves, etc.) was 208,524 (which is equal to 82,363 full-time employees). Kerman province in the same year (2003) had 1,755 extra staff and, at the same time, a demand for 1,643. Again in that year, 941 teachers were killed in the Bam earthquake. Putting all this together, one may find how weak the the public education system is in human resource planning." (Mohammadi, 2008)*

The following charts (and their corresponding tables in the Appendix), elaborate the findings of the present paper in more details.

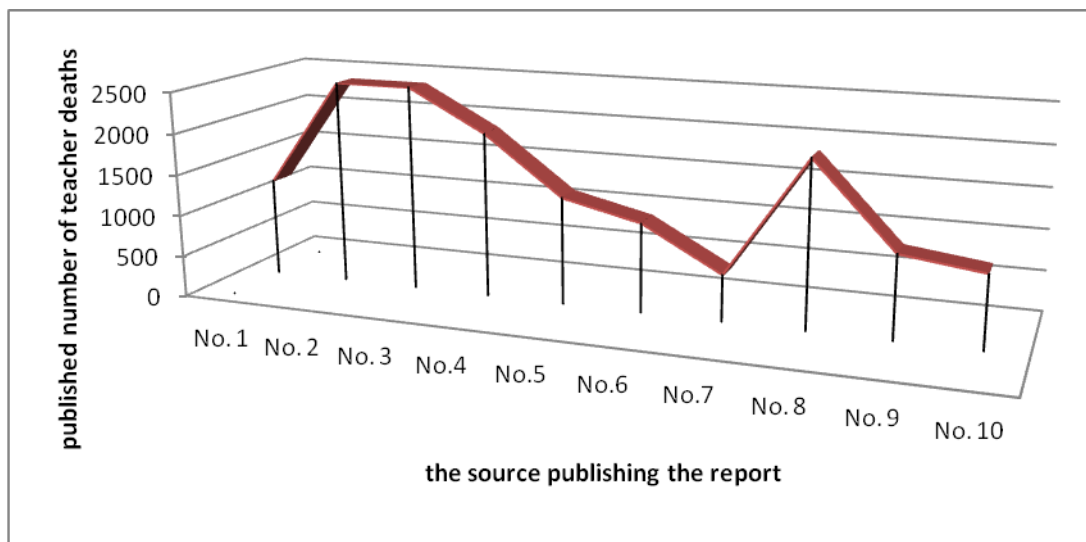
**Chart 1. Information in reports published for the total number of deaths in the 2003 Bam earthquake (authors' findings)**



**Chart 2. Information in reports published for the number of student deaths in the 2003 Bam earthquake (authors' findings)**



**Chart 3. Information in reports published for the number of teacher deaths in the 2003 Bam earthquake (authors' findings)**



Another finding in the present case-study was the psychological factors affecting the implementation of HRP after natural disasters; the psychological aftermath of large-scale natural disasters (i.e. loss of one's family and/or friends, loss of one's home and other properties, etc.) is a factor needing special attention; in the case under study, one of the very few carefully-attended areas was the psychological needs of the student survivors: the relatively quick re-opening of schools can be counted as a positive and considerate initiative taken by the public education administrators of the region, which was introduced, in the interviews conducted in the present research, to be with an aim to "bring back hope for life to students and their teachers); it is , nevertheless, noteworthy that students' psychological health care was supported through other actions including arrangement of camping trips to Shiraz and Isfahan, as well as pilgrim tours to Mashhad for students; teacher survivors, however, stated in the interviews that there had been not such facilities provided for their psychological recovery and support, and rather complaining about the pressure from being obliged to go back to work so quickly right after the disaster.

## 5- Discussion

Based on the analysis of both the quantitative and qualitative data in this case-study research, the most significant pitfall and limitation explored is lack of reliable information and statistics required for implementation of the most basic level of human resource planning . This finding can be divided in the following four categories:

- Lack of reliable statistics regarding the number of deaths:
- Large variance in statistics announcing the number of deaths (as a factor that *decreases* the both the HR demand and HR supply)

- Large variance in statistics announcing the number of student deaths(as a factor that *decreases* the HR demand)
- Large variance in statistics announcing the number of teacher deaths as a factor that *decreases* the HR supply)
  
- Lack of statistics regarding the demographic characteristics of the casualties:
  - Lack of demographic information about age group and gender of the students killed (as a factor affecting the HR demand).
  - Lack of demographic information about teaching level (elementary, middle, or high school) for the teachers killed (as a factor affecting the HR supply).
  
- Lack of statistics regarding the immigrations to and from the city:
  - Lack of statistics showing the number of immigrants into Bam after earthquake (as a factor *increasing* both the HR demand and HR supply)
  - Lack of statistics showing the number of immigrants out of Bam after earthquake (as a factor *decreasing* the HR demand and HR supply)
  - Lack of statistics showing the number of students who immigrated into Bam after earthquake (as a factor *increasing* the HR demand)
  - Lack of statistics showing the number of student survivors who immigrated out of Bam after earthquake (as a factor *decreasing* the HR demand)
  - Lack of statistics showing the number of teachers who immigrated into Bam after earthquake (as a factor *increasing* the HR supply)
  - Lack of statistics showing the number of teacher survivors who immigrated out of Bam after earthquake (as a factor *decreasing* the HR supply)
  
- Lack of adequate statistics regarding the socio-demographic changes during the decade after the earthquake:
  - Lack of statistics showing the trend for changes (due to the increase in birth-rate in Bam in the years following the earthquake) in the number of first-year students entering elementary school during the 2003-13 decade, (as a factor affecting the HR demand)
  - Lack of statistics showing the trend for changes in the number of last-year students graduating the high schools during the 2003-13 decade, (as a factor affecting the HR demand)
  - Lack of statistics showing the trend for changes in the number of dropouts during the 2003-13 decade, (as a factor affecting the HR demand)
  - Lack of statistics showing the trend for changes in the number of teachers retired or deceased during the 2003-13 decade, (as a factor affecting the HR supply)

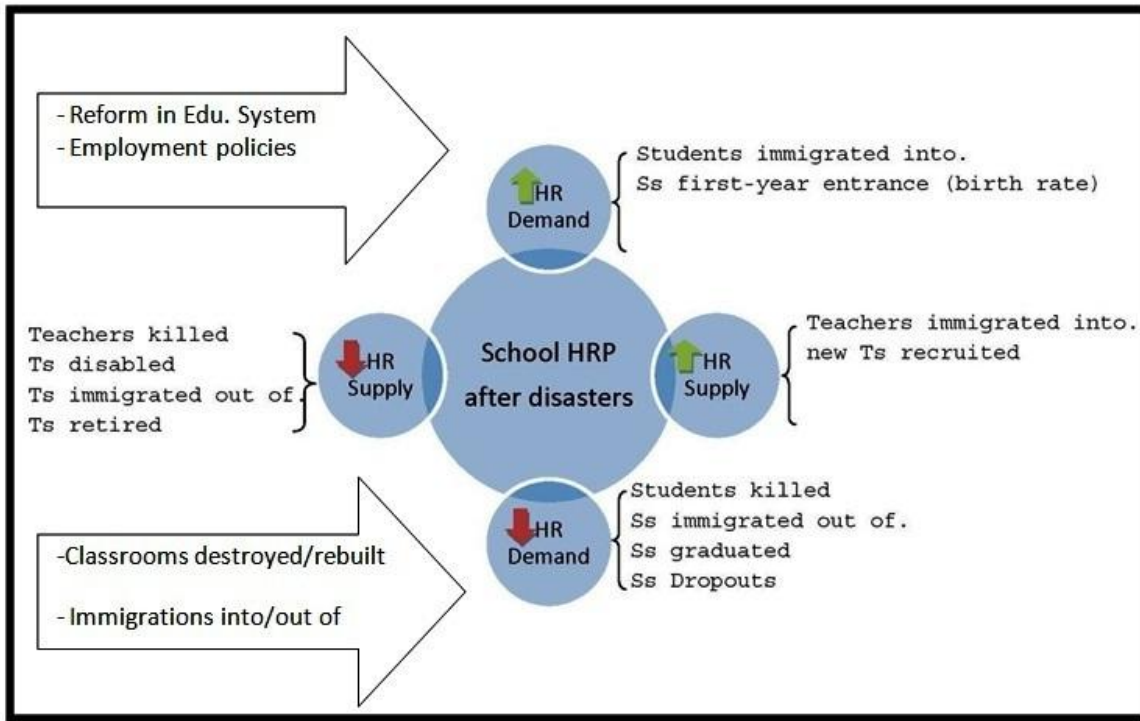
## 6- Conclusion

To sum up, it can be stated that, based on the case-study conducted, implementation of human resource planning for the Bam's public education system after the 2003 earthquake was significantly more difficult and complicated than it had been assumed; two categories of factors were found through the present case study to have been neglected, namely: a) basic information and statistics required for determining the quantity and quality of the organization's HR supply and HR demand (including the statistics regarding the reliable and accurate number of student- and teacher deaths, lack of data regarding the age-group and gender of the students killed, as well as lack of data regarding the levels and grades in which the deceased teachers had been working). b) a series of socio-demographic factors, like the population changes due to immigrations into and out of the region after the earthquake, change in birth-rate (and consequently the change in the number of students entering elementary school within the time span of a decade after the earthquake), and other social factors such as dropouts due to the psychological effects of the disaster (Figure 1).

Based on the discussion in the previous section, the factors found to be influencing the implementation of HRP in large-scale natural disasters can be summarized as follows:

- 1- Number of student deaths
- 2- Number of dropout students (due to psychological effects of the disaster)
- 3- Number of students immigrating into the city after the disaster (due to economic problems of their families)
- 4- Number of student survivors immigrating out of the region
- 5- Number of first-year entering students during the decade after the disaster
- 6- Number of the last-year graduating students during the decade after the disaster
- 7- Number of the teacher deaths
- 8- Number of the teachers disabled or retired due to the disaster
- 9- Number of students immigrating (transferred) into the region after the disaster
- 10- Number of teachers immigrating (transferred) out of the region after the disaster
- 11- Number of the newly recruited teachers
- 12- Number of classrooms destroyed
- 13- Number of schools repaired and reconstructed
- 14- Number of newly built classrooms
- 15- Changes in the education system (e.g. the recent reform in the number of levels and grades)
- 16- Socio-demographic changes (e.g in population and birth-rate) as a result of the disaster losses
- 17- Psychological and social changes due to the psychological pressure of the disaster on survivors

**Figure 1. Proposed Model for investigated factors affecting HRP after large-scale natural disasters:**



From another point of view, nevertheless, there are other problems concerning the process of planning within the ministry of education in general and the education administration headquarters in specific; the ever-existing extra (i.e. inactive) staff for such reasons as sabbaticals, temporary leaves, etc. and, at the same time, the need for more human resources is an issue for the whole system of this large public organization. More specifically, in Bam city, as a region located in the hottest and driest part of Kerman province (which is, by itself, one of the desert areas of the country), there have always been a tendency among the uninterested and unmotivated teachers to be transferred out of Bam (to other cities of the province); lack of domestic staff in this city (due to the relatively low level of education of people of this region) is yet another issue always exacerbating the conditions for human resource planning.

The results of the present case-study were in line with previous researches (Eshghi, 2008, Zolala, 2009, Azin, et. al. 2009), regarding the role and importance of fundamental information and statistics required for even the most basic and primitive human resource planning (rather than an optimal one with consideration of the quality and competence of the resources); lack of accurate recording of facts and information in times of disaster is, to some degree justifiable; Unfortunately, even for many major disasters in the world no accurate official record in economic damages has been reported ( Eshghi, 2008). Likewise, our findings show a very considerable deviation in the reports for the casualties of the studied event; Zolala (2010), for instance, in an article entitled “Data collection after massive natural disasters”, found that “the limitations are rooted in basic problems within the existing data collection

system and a lack of coordination between the groups collecting data, including national and international aid groups that provided help after the earthquake“. In another research on the same case, Azin, et al. (2009) have pinpointed this factor (i. e. lack of reliable statistics) as a root cause for “management of identification, death approval, and burial procedure of earthquake victims in Bam earthquake”.

There is no doubt that the impacts of future disasters will not be the same as previous ones but lessons from the past can be very helpful for improving one’s knowledge about disasters and providing better response programs for local and international organizations (Eshghi, 2008). Global experiences of disaster management have also mentioned the same problem; Kunji, et al. (1995), in their research on the Hanshin-Awaji earthquake in Japan, Mumtaz, et al. (2008), in their work on the 2005 Keshmir earthquake in Pakistan, as well as several studies on Katrina hurricane in 2005 in the U.S. and the studies on other major earthquakes (e.g. O’Connor, 2013, Geale, 2012), have all discussed the necessity of standardized and accurate data for decision-making after large-scale natural disasters.

Of limitations of the present study, one can mention the limited scope of its applicability, due to the nature of single-case studies, as well as our fundamentally primitive concept of human resource planning (excluding such aspects as competency and quality of the human resource in the HRP); the latter can be justified by the very wide lack of required statistics for such a planning. Future research can work on utilizing different quantitative research tools as well as other qualitative methods so as to prioritize and rank our investigated factors according to their weight in implementation of HRP in similar cases; moreover, other influencing factors may be elaborated using different research methods. New classifications for the factors influencing the HRP after such disasters may be another development in this research area.

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**Appendix:**

i. List of sources of data for the present case-study

No.	Source of data for case-study
1	Interview No. 1 (with the supervisor of education administration of Bam, October 2013)
2	Interview No. 2 (with the former manager of the education administration of Kerman province, September 2013)
3	Interview No.3 (with school teachers of Bam, autumn and winter 2013)
4	Archive of "Science Daily" newspaper on January 16th, 2004
5	Archive of the "BBC" TV channel on January 9th, 2004
6	Archive of "Iran" newspaper on No. 8, 9, 11, & 15 of Dey 1382 (Dec 2003, Jan 2004)
7	Archive of "Keyhan" newspaper on No. 6, 10, & 16, of Dey 1382 (Dec 2003, Jan 2004)

ii. Tables 1, 2, & 3 (corresponding to charts 1, 2, & 3)

Table 1. Information in reports published for the number of deaths in the 2003 Bam earthquake

Source No.	Number of deaths announced	Source	Date of announcement	details
1	around 25,000	Keyhan newspaper	Dec 27th, 2003)	In an interview with the president of Kerman University of Medical Sciences
2	25,000 so far	Iran newspaper	Dec 30th, 2003)	Based on the number of buried corpses
3	42,500	Keyhan newspaper	Apr. 5th, 2004)	According to statistics office of Kerman University of Medical Sciences
4	45,000	Keyhan newspaper	Apr. 5th, 2004)	According to the statistics by Bam Governor's Office
5	26,271	Keyhan newspaper	Apr. 5th, 2004	Based on the number of death certificates issued
6	26,271	Tierney et al.	2004	2004 UN Report
7	26,500	Ghafouri	2004	IIEES's Report ( International Institute of Seismology and Earthquake Engineering)
8	26,500	Kishore et al.	2004	2004 UN Report
9	Above 43,000	Emami et al.	2005	Journal publication
10	Above 40,000	Mahvi, et al ( In Farsi)	2006	Journal publication
11	55,000	Raesidana (In Farsi)	2006	Journal publication
12	31,383	Hosseini & Ghafouri	2007	Journal publication
13	41,000	Adams et al.	2007	Journal publication

Table 2. Information in reports published for the number student deaths in the 2003 Bam earthquake

Source No.	Number of student deaths	Source	Date of announcement	details
1	About 10,000	BBC	Jan 5th, 2004	In an interview with the new manager of the public education administration of the region
2	4000 to 6000	Iran Daily ( in Farsi)	Dec, 29, 2003	
3	4,450	Keyhan Daily ( In Farsi)	Dec, 31, 2003	
4	About 10,000	Iran Daily ( in Farsi)	Jan, 5, 2004	
5	Above 10,000	Keyhan Daily (in Farsi)	Jan, 6, 2004	In an interview with the head of education administration for Kerman province
6	Nearly 11,000	Ghafouri	2004	IIEES's Report ( International Institute of Seismology and Earthquake Engineering)
7	8,000 to 10,000	Tierney et al	2004	
8	8,000	Vaziri & Jahani	2006	Cited from the 2003 report by Government of Kerman province

9	10,000	Hosseini & Ghafouri	2007	
10	About 8,000	(authors)	2013	Authors' interview with Bam education administration
Table 3. Information in reports published for the number teacher deaths in the 2003 Bam earthquake				
Source No.	Number of teacher deaths	Source	Date of announcement	details
1	1,200	BBC	Jan 5th, 2004	In an interview with the new manager of the public education administration of the region
2	2,000 to 3,000	Iran Daily ( in Farsi)	Dec, 29, 2003	In an interview with the local committee for teacher and student survivors affairs
3	40% to 50% of all teachers of Bam	Iran Daily ( In Farsi)	Jan, 1, 2004	In an interview with the head of education administration for Kerman province
4	2,000	Iran Daily ( in Farsi)	Jan, 5, 2004	
5	1,300	Keyhan Daily (in Farsi)	Jan, 6, 2004	In an interview with the head of education administration for Kerman province
6	1080 (One fifth of the total 5400)	Ghafouri	2004	IIEES's Report ( International Institute of Seismology and Earthquake Engineering)
7	560	Tierney et al	2004	
8	2,000	Vaziri & Jahani	2006	Cited from the 2003 report by Government of Kerman province
9	1,000	Hosseini & Ghafouri	2007	Science and Business Media
10	876	(authors)	2013	Authors' interview with Bam education administration (apart from 67 disabled teachers)