Banizaman Lari, F, Abbasi, H, Poryari, M., "*Experience of Flood Event Documentation in Transportation System*"

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Professional documentation of events covering all engineering and management activities in an extensive way provides executives with a very useful facility to be used for evaluation and review of plans, event routing, figuring out the down points of management processes and finally proposing corrective actions.

Documentation is as a subordinate of knowledge management that draws a logical process in order to gather different levels of with knowledge and to convert them from the most basic level(data) to the highest one(expertise) in a way to be considered in significant decision makings.

This paper has been written based on leading an applied research project which concentrates on designing an applicable structure which is targeted to document past flood events in ground transport system including road and railway section of MRT[i]. In the mentioned project, the optimized level of documentation was set based on investigation of existing condition of documentation in MRT to understand their level of expectation, performing an extensive literature review from the patterns that have been implemented in other countries and finally following existing standards and guidelines.

"Experience of Flood Event Documentation in Transportation System of Iran"

Abstracts

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Key words: documentation knowledge management crises management corrective measures

1-Introduction

With the ever increasing rate of natural disasters worldwide from one side and the amount of expenditures that have been invested on mitigation plans, it has become of significance to review the strategies in order to combat the consequent impacts of disasters based on learning from past events. Event documentation would be found of prime importance when it comes to event analysis. Any documentation; not only should address description of the event itself but also should encompass ranges of relevant engineering and management activities that are carried out in all time steps of event and crisis management including before, during and after the event outbreak. Conducting a professional documentation provides managers and decision makers with

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a platform to rely on for reviewing the plans and activities, investigating the management processes, cause and effect analysis, budget recovery, loss assessment and finally to propose corrective measures. The current paper is the outcome of an applied research project which has been conducted under supervision of Research Institute of Iran's Ministry of Road and Transportation (IMRT) with a focus on the area of flood event documentation.

1-1- Significance of documentation

Documentation is of effective elements associated with knowledge management processes which assist in saving the gained knowledge from organizational expertise in the initial stages then it leads to discovering functional and managerial errors based on document analysis in the further stages. This process result in keeping organizations away from trial and error based on the learning coming out from experiences. Besides, some other advantages of documentation with respect to organizational improvement have been elaborated in the following:

- Historical recordings of experiences together with recording of analysis, failures and successes play an important role in upgrading organizational functions.
- Provision of recordings helps in extension of organizational culture to the next generations and personnel.
- Documentation provides an essential tool for considering different organizational dimensions and a ground for reviewing issues from various insights.
- It provides a ground for reviewing past events activities, possibility of scientific evaluation and pros and cons of organizational function.
- It makes possible taking pattern from best successful past experiences.

1-2-the importance of flood event documentation

In accordance with existing facts and figures, majority of regions of Iran are exposed to different sources of floods. In other word, most parts of Iran even with dry nature (i.e. southern parts of Iran) experience devastating floods annually. Hence, authorities and various stakeholders in local and national level from both road and railway sectors are faced with Great amounts of flood driven losses. Astronomical amounts of budgets have been invested on mitigation plans and recovery-reconstruction projects after floods. The result of investigations from IMRT reveals that flood event tops the list of all probable natural disasters from the view points of frequency of occurrence and incurred amounts of monetary and human losses. This fact makes reasonable performing a practical research work in order to develop a guideline which assists user groups belonging to various levels in carrying out a professional and systematic way of flood event documentation.

1-3-the outline of the study

In order to help IMRT in promoting the documentation all aspects of flood event, the first step is to dig into the current level of the documentation from the view points of quality and quantity and also the undertaken processes. The next step is enhancement of the current documentation approach based on the deficiencies arisen from investigations. Finally, associated personnel should be equipped with an appropriate tool for being capable of gathering relevant data and information related to any corner of flood event and management and conducting a professional documentation. The step wised stages of the study have been described below:

1. Investigation of existing condition of documentation and reporting
2. Comprehensive study of similar cases of documentation worldwide
3. Design of outline and framework of documentation (provision of documentation guideline)
4. Design of information flow, work flow and institutional setup for the guideline
5. Development of Multimedia Data Bank
6. Information gathering from different available data sources of flood cases in Iran
7. documentation in accordance with the guideline and filling up database with data ➲ verification of documentation framework

2-basic principles of documentation

In order to proceed with documentation in a professional way, it should be taken into consideration all facts and evidences associated with all phases of event management together with decisions made. In order to heighten the quality of documentation, the following criteria should be taken into account:

- Accordance with existing standards.
- Coverage of event sequences related to different time steps of before, during and after event strike.
- Inclusion of all symptoms and evidences related to early determination of the hazard.
- Inclusion of precise assessment of budgets, human resources and planning pertaining to problem diagnosis.

In addition to the above principles, in order to make an integrative documentation from any event, it should be produced in a way to be able to provide answer to the 5 so called WH's as below:

1. Who has performed any addressed activity?
2. What activity has been performed?
3. Where an activity has been managed?
4. When a course of action has been issued?
5. How any sort of action has been handled?

Supplement to the above matters, the kind of recordings and reports that should be gathered and recorded, responsibilities, inside and outside communications, procedures, hired equipments and so forth should be recorded.

3-investigation of existing level of flood documentation in IMRT

In order to reach a realistic view relevant to the existing documentation level in IMRT, a comprehensive and extensive organizational survey was performed from different user levels addressing lower levels in provinces, the medium levels in the body of central administration offices plus higher levels of ministry of road and transportation in addition to Ministry of Interior. The aim of the conducted survey was to find out the existing methods and processes of documentation and the quality and quantity of documents and records. The mentioned survey reflected an overall poor level of documentation of events particularly for the case of flood. In accordance with the performed inquiry, the majority of documents were laid in prevention and reconstruction phases. The reason is clear, bearing in mind that having a large amount of time results in better quality and quantity of documentation in comparison with the documentation of items relevant to preparedness and response phases where users are pressed with time. Furthermore, the concept of documentation is mostly considered as aimless recording of piles of data, photographs and movies which are gathered in an unorganized way. The ingredients of the

mentioned documentation are considered as raw data which still needs primary data processing. Based on the above mentioned investigation, the following main results can be illustrated:

- In general, transportation authorities do not have a professional view of documentation concept; instead they have a very basic mindset which is just limited to taking photos and recording movies from the happened event and pertaining response activities. Thus, there is of prime necessary to change the existing view about documentation concept.
- There are some very simple formats which are used to record damage data associated with an event. They are not detailed enough as they are just used to record quantity of the overall damage and the total economic estimation.

Arrangement of this part of the project appeared as a very demanding and time consuming effort to project team members that were dealt with so many restrictions and barriers from local authorities and personnel in data transfer, formalities and bureaucracy during data acquisition process via negotiations.

4-structure of flood event documentation

As mentioned formerly, documentation of any kind of event generally follows a common outline with a slight variation which is associated with nature of the event, consequent activities which should be made in response to event; before, during and after event strike. For the case of flood, by considering crisis management cycle, it was planned to document all aspects which were incorporated in hazard and crises management including Prevention, Preparedness, Response and Recovery. To look deeper to the issue, flood event documentation should cover all activities including engineering and management work, communications, allocated budgets, contact points, machinery, damages, coordination works, planning's and totally any evidence related to flood itself which are assumed to happen in order to manage flood related impacts. By considering the above road map, the project focused on designing various information forms while each of them contains details related to one aspect of flood event management. The number of information forms reached to 38 and are listed in the following:

A-information forms relevant to prevention phase:

1-1-location of prevention project construction
1-2-technical & financial characteristics of plan
1-3-Information of project constructors
1-4-information of inspection from road, Bridges and other related structures
1-5-Identifiction of flood prone zones
1-6-flood plain zoning
1-7-Road rehabilitation studies
1-8-River engineering works
1-9-Bridge rehabilitation works

B-information forms relevant to preparedness phase:

2-1-training, hand outs, syllabuses'
2-2-practices
2-3-participants and executers
2-4-facilities and equipments
2-5-practice evaluation

2-6-flooding zone and location
2-7-weather forecasts and warnings
2-8-responses to flood warnings
2-9-coordination activities in order to control traffic
2-10-coordination with organizations out of Road Ministry of road
2-11-activities managed by executive sections
2-12-reporting's and awareness's made by engaged sub sections

C-information forms relevant to response phase:

3-1-flood event description Inc time of peak, flood intensity etc
3-2-weather condition before flood happening
3-3-Land use statues in flood strike zone
3-4-flood mark information
3-5-reporting and information transferring
3-6-description of sequential events, happenings and activities
3-7-witnessing of striking and significant evident while flooding
3-8- information of damages
3-8-1-Human losses and injuries
3-8-2-damages to Vehicles
3-8-3-damages to road and appurtenances structures'
3-9-Trafic situation information
3-10-Claims

D-information forms relevant to recovery and reconstruction phase:

4-1-location of project construction
4-2-technical characteristics of road and railway
4-3-technical characteristics of bridges and structures
4-4-constructures and executers
4-5-equipments and facilities used in construction
4-6-Co ordinations
4-7-contracts and agreements details

As indicated formerly, information forms were designed based on determination of information gaps in IMRT. Furthermore, information forms should have been designed in a way to be applicable and recoverable by field and office users. This way, the predominant feature of any forms is supposed to be their optimized amount of data coverage, that is, too much fields of data would result in complication of users while filling the forms. On the other hand, least amount of data, does not lead to making any reliable judgment. Though it was a critical task to design the elements and items of forms with an optimized length.

4-1- Drawing Information flow mechanism and work flow for flood documentation:

In order to let data and information related to a case of flood flowing throughout the track between the lowest user levels to the top level, it makes sense to draw the elements of an information flow in the organization and their relationship. This way, it would be possible for data and information to be transferred from any component of sub-organization to other ones. In this part of the project, a demanding effort was made in order to proceed with designing an organizational set up based on the existing organizational scope of work pertaining to different sub-sectors of road and railway administrations in a separated way. The focus was to develop an

organizational paradigm for each of sub-sections to gather the relevant data and information related to any stage of event management with a pre-defined format and layout then to transfer it to the upper level authorities for making any auditing and revising. In the next phase, the upper level authorities' feedback the documents to middle and downstream personnel's in order feedback the result of analysis and to plan for definition of any corrective measure, budget estimation and so on.

Based on the above mentioned design, every sub-sector would provide relevant documents with a predefined pattern and in a systematic way in order to transfers them to a nominated department. A sample of information flow and relevant document matrix is provided in the following. (Figure1 and table 1)

Table 1-illustration of a sample document list to be provided by sub-organizations

Sub-Organization	Records and Documents
Deputy of Maintenance-Road and Properties Maintenance	• Flood Protection Structures Characteristics • Road Structure Inspection • Bridge Structure Inspection • Flood prone Identification zones (road) • Flood prone Identification zones (Bridges and structures) • Flood plain zoning • Mitigation plans and road rehabilitation, road diversion etc • River engineering works In bridge and culvert opening
Deputy of Technical Affairs-Department of studies and Consultations	Technical Characteristics of plans and constructed works
Deputy of Technical Affairs-Contracts and agreements unit	Description of Contracts and agreements
Deputy of Rural Roads	Characteristics of rural road projects
Financial and Administration Deputy	Financial information of projects
Top Executive Manager-Manager in Chief	Executive summary of all the projects and studies

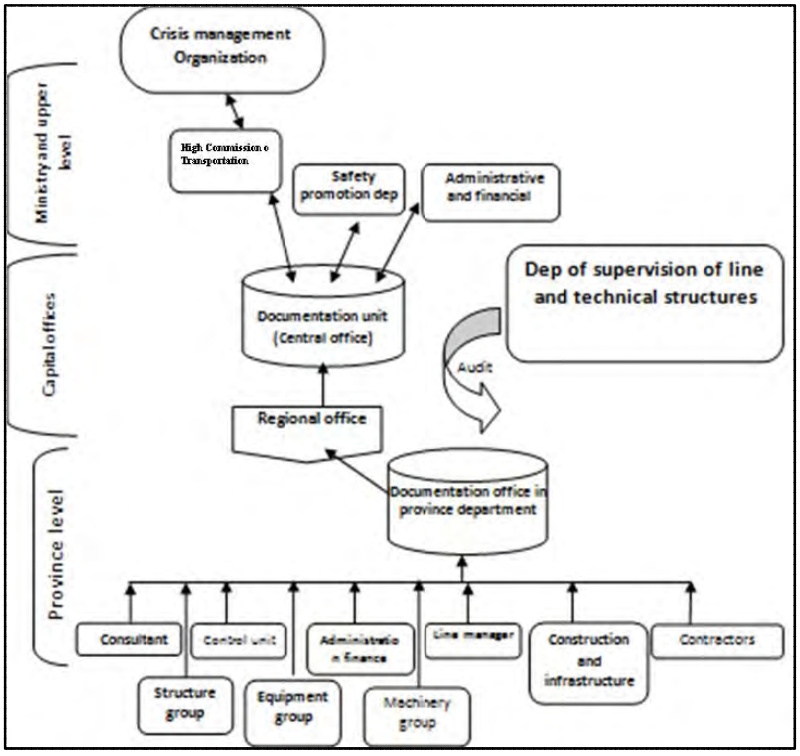

Figure 1-illustration of simple information flow related to reconstruction phase

5-developing flood event documentation databank

In order to record all levels of information including data, information and expertise gained from any stage of flood event management, there is an advanced requisition to record them in a database. Thus, there would be possible to recover data and to manage them conveniently and in an advanced way. A couple of advantages pertaining to developing a flood documentation data base are namely as the following:

- Ability to keep an integrated set of data.
- Convenience in taking out statistics related to various kinds of data.
- Data comparison and visualization of yearly alteration of data by the aid of graphs.

Based on the existing deficiencies and shortages that could be observed in different layers of IMRT regarding documentation, it was recognized to design a database that considers the outmost aspects of flood event.

5-1-characteristics of the data base

In order for being able to configure the database, an extensive survey was made from various existing data bases related to natural hazards and events worldwide to discover their configuration and contents. The objective of this survey was to define the method used for database design. Furthermore, the mentioned survey helped to recognize the situation of the desirable database in comparison with the existing categories of databases as is demonstrated sequentially:

- International databases.
- National databases.
- Local and regional databases.
- Hazard specific databases.

The above mentioned categories are considered as general databases that do not cover in dept details of a specific database which is designed in accordance with special needs of a client. Desired database is considered to be a national data base having in mind that it comprises relevant event data of Iran. Further to the mentioned features, the data base has been developed with the focus on a special event which is flood. The third special feature is that it only contains sorts of data which are related to road and railway infrastructures and stakeholders. A noticeable asset is that the database insights into flood data from many aspects, i.e., damages, activities, communications and coordination works and many other scopes of four stages of event and crises management. In other word, it is more than a very limited database which only keeps consequences of an event.

6-implementation of the plan

For implementation of any plan in an organization it is required to pave the ground in a step-wise manner. For the said pattern of documentation, the following stages have been designed to step forward.

- Introducing the plan to the people from IMRT by holding a couple of forums.
- Bringing the documentation approach up to local authorities and managers by performing professional workshops.
- Broadening the documentation paradigm and method to the level of local personnel and user levels by holding training sessions in order to teach how to fill information forms and check lists and skills related to working with the database.

- Documenting the past experienced events by personnel using the proposed approach.
- Checking the efficiency and feasibility of the method on the periodical basis.
  - Improving the system based on the findings from periodical tests.

7-conclusion

The existing dilemma of lacking recoverable data, information and expertise related to past flood events encouraged the views towards documentation of flood event. It would take a long time to change the paradigm of documentation of numerous professional aspects of an event from a very basic level towards a higher level which not only considers various parameters related to flood individually but also takes into account documentation of a sequence of events related to any flood. Moreover, "it is still a lot to run", means that the developed guideline is considered to be as the first step of a demanding effort in publicizing renovated documentation approach amongst authorities and users in order to upgrade the conventional way of documentation to the more advanced way. A remarkable fact is that documentation of an event in accordance with the proposed process will fill the existing gap in data spectrum. An outstanding outcome of the project is to help data being processed and converted to useful statistics, information and finally advantageous expertise which would be exploited by different user. Regarding implementation of the proposed documentation method, it should be mentioned that majority of road and railway personnel of different administrations except for a few of them will expectedly show resistance against taking up the method due to their mindset towards documentation therefore it is time taking to get accustomed to the approach. On the other hand, group training plays an important role in orienting users towards a professional documentation.

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