Estimation of Economic Damages Caused by Disaster: Event Impact Rapid Assessment and Disaster Scaling (EIRADS) Calculator

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ABSTRACT: This study focused on the modification and application of Costing Model (CM) and it developed an Event Impact Rapid Assessment and Disaster Scaling (EIRADS) calculator. To check the workability, the calculator was applied to an incident that happened at Cherry Hills Subdivision, Antipolo, Philippines. The application yielded the Total Damage Cost of the Event (TDC_E) at US$ 5,244,483.00. The event was categorized as Major Disaster at Barangay level. Thus, provided decision makers and technical experts a platform to assimilate available resources from related agencies that could eventually lead to efficient, effective and economical Disaster Risk Management (DRM).

1 Introduction

1.1 *Background of the Study*

Natural and man-made disasters cause unpredictable losses to human lives, houses, business and communities. The impact not only damages infrastructures, livelihood and existing facilities but also causes suffering in terms of psychological disequilibrium even long after the disaster has occurred. These losses eventually affect the economy of the country. In order to understand and prepare for the response to and mitigate these risks better, it is important to improve knowledge about disaster impact and its costs. This action is needed to safeguard individuals and communities as a whole from devastating disasters through disaster management investment.

Prior to the development of any emergency response and application of Disaster Risk Reduction (DRR) measures, the kind and extent of economic damages (direct tangible, direct intangible, indirect tangible and indirect intangible) incurred and expected to be incurred by the impact need to be identified. It has been noted from experiences that the response and rescue activities are disaster intensity specific. Thus, it is also necessary to know the intensity of the disaster in order to tap facilities of appropriate agencies and acquire related support. Lack of knowledge in hazard impact assessment could lead to costly and disastrous response endangering the environment, infrastructure and humans (Raza, 2002).

Thus, there is a need for an operational definition of disaster, which can provide a clear basis to call hazard a disaster based on economic losses. For instance, in Australia, the Disaster Mitigation Research Working Group (DMRWG) chaired by the Department of Transport and Regional Services (DTRS) provided threshold total cost amounting to Australian $ 10 million for an event to be called a disaster (DMRWG, 2001). Since there was no universally recognized common definition, the author provided a Costing Model (CM) in 2002 to estimate the Total Damage Cost (TDC) that would be incurred by hazard affected areas. Yet this study focused on modification and application of CM, comparing TDC with available economic resources to handle it at different geographic units namely: very immediate, Barangay /municipal/city, provincial/regional and national level in the Philippine context. These comparisons were used as bases in categorizing the intensity (*i.e.* minor, moderate, and major) of the disaster and consequently provided an operational definition of a disaster.

To perform this task the researcher incorporated costing, comparing and disaster intensity components in Microsoft Excel software and developed a so called Event Event Impact Rapid Assessment and Disaster Scaling (EIRADS) calculator. This calculator allowed the user to fill in the pertinent data and get rapid estimation of Total Damage Cost of an Event (TDC_E) and Expected Total Damage Cost of a Potential ($ETDC_P$) event across each functional areas i.e., settlement, production, protection and infrastructure. Hence, using the same calculator, TDC_E and $ETDC_P$ can be compared to the Per Capita Income (PCI) of the victims if the geographic extent is at the very immediate and barangay/municipal/city levels and Gross Domestic Product (GDP) if the geographic

extent is at the provincial/regional and national levels.

In the Philippine context the threshold values considered in classifying the disaster are determined based on PCI saving of the victims to cope with the event and time period needs to have maximum recovery of GDP percent lost due to the event. Further, the geographical extent is primarily based on the political boundaries and secondarily on the number of affected population criteria set by National Disaster Coordinating Council (NDCC, 1998). To check the workability of EIRAC, it was applied to a particular past event that impacted Cherry Hills Subdivision at Antipolo City, Rizal, Philippines on August 3, 1999. The calculator yielded the following results: (1) filled up Rapid Assessment Form; (2) TDC_E at US$ 5,244,483.00; (3) classified the event impact at Barangay level; and (4) categorized the event as Major Disaster at Barangay level. Based on EIRADS output, the policy makers and decision makers can respond to emergency situation rapidly. This also allows them to decide more accurately how much investment would be necessary for DRR activities.

2 Operational Framework

To collect pertinent data to estimate TDC_E, the author designed a fill-in-blank called Hazard Assessment Form (HAF) and to estimate $ETDC_P$, the author used the probabilistic approach developed by the Philippines National Economic Development Authority (NEDA, 2008). Furthermore, the researcher developed various formulas in calculating damage costs, comparing damage costs with economic indicators and determining disaster intensity. The following is the formula used to calculate TDC_E or $ETDC_P$:

$$ETDC_P \text{ or } TDC_E = \frac{Tt_n dd + Tt_n id + Ti_t dd + Ti_t id}{C} \quad (1)$$

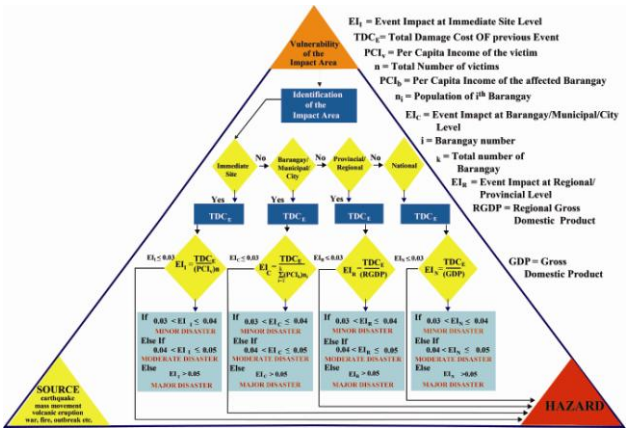
Where:

$ETDC_P$	Expected Total Damage Cost
TDC_E	Total Damage Cost of an event
$Tt_n dd$	Total Tangible Direct Damage
$Tt_n id$	Total Tangible Indirect Damage
$Ti_t dd$	Total Intangible Direct Damage
$Ti_t id$	Total Intangible Indirect Damage
C	US$ currency conversion rate to Ph. Pesos

In addition, figure 1 shows the operational framework that is incorporated in the Microsoft Excel software to determine the intensity of disaster and to differentiate hazard from disaster for the previous and expected events impacts.

In the Philippines the minimum requisite for creation of a Barangay is to have a population of 2000, and if the affected population due to the impact is less than 400 then the affected area will be classified as immediate level. In case of national level the affected population must be more than or equal to 20 percent of the total population of the country. The concept of 20 percent is adopted after one of the criteria for the declaration of state of emergency (NDCC, 1998).

Figure 1. Operational framework incorporated in the calculator



3 Conclusion

With respect to economy of the impact area, a disaster refers to any incident, event, accident, or situation, whether man-made or natural, which causes quantifiable damages on an impact area, on a scale that renders economic growth unsustainable without external help.

The capacity to withstand impact varies from country to country and region to region due to different PCI and expenditure of that country or region and efficiency to recover falling GDP. Thus, the threshold values can be adjusted based on the area under study.

4 References

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