AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
PUBLIC WORKS

"Analyze Egyptian Railway Accidents and Propose Scientific and Practical Methodology to be Minimized"

A Thesis submitted in partial fulfillment of the requirements of the degree of
Master of Science in Civil Engineering
(Public Works)

By

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STATEMENT

This thesis is submitted as a partial fulfilment of Master of Science in Civil Engineering, Faculty of Engineering, Ain shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

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Acknowledgment

Having the opportunity to write what I feel, it is time I wrote my acknowledgments. First, I want to thank **God** for all the things He has blessed and is still blessing me with, without which I would not be able to pursue knowledge, or even life.

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Mona Essam Fathy

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DEDICATION

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Mona Essam Fathy

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Thesis Summary

The present thesis deals with investigating annual accidents during the period of 2013 till 2017of the six admintrative zones for Egyptian National Railway (ENR). These accidents were classified as absolute and relative values according to their types to determine the worst zones and the worst accident types.
To realize this goal, data collections were obtained for accident fluctuations and the traffic calculated by the use of the official time table 2016 in train.km/day for the ENR six zones.

Accidents cause damage, fatalities, injuries and losses of material, the present thesis conclude to arrange the priority of the zone and type of accidents using a modified risk level based on severity and frequency, then one can prepare a scientific and practical plan to put the important conclusions and useful recommendations for ensuring safety operations with low costs and minimizing the dangerous accidents.

The thesis represents one of useful contributions to propose the effective solutions for the decision maker to enface this very dangerous problem.

The following methodology is applied:

There are four stages to realize the objectives of the thesis as follows:

First stage: Data collections and field survey.

1- Calculating the traffic volume estimated by thousand train km per day for each administrative zone.
2- Collecting data concerning the accident fluctuations during 2013 to 2017.
3- Collecting data concerning both the fatalities and injuries due to accidents to obtain the severity for: all types of accidents, all zones and the corresponding year.
4- Collecting data concerning the frequency of each type of accidents for all zones within 2013 till 2017.

Second stage: Analyzing the collected data.

1-The data were analyzed for the six admintrative zones as total absolute accidents or relative ones from 2013 to 2017.
2- Derivations of some formulae to predict future accident fluctuations if no measures have been done.
3- Preparing the modified average risk permissible level according to accident types using ENR data from 2013 to ٢٠١٧ with or without taking into consideration both frequency and severity.
5- Determining Risk levels based on the frequency and severity of accidents according to both Egyptian National Railway (ENR) and European Standard Specifications (ESS)
6- Modifying the risk level estimation for both the Egyptian method and European method.
7- Proposing ranges of frequency, severity, and risk permissible level.
8- Preparing the frequency, severity, and risk permissible level for each zone applying the proposed ranges.
9-Proposing modified risk permissible level for all zones and all accidents types from 2013 to 2017.
10-Proposing equavalant sevirity for all zones from 2013 to 2017

Third stage: Results and conclusions.

The thesis showed the following:

1-Central zone was the largest accidents for the most accident types within 2013 to 2017
2-The largest total accidents (absolute & relative) were for total collision with percentage 79% of the total accidents, this represents more than half of total accidents from 2013 to 2017 because of large accidents at level crossing especially gate collision accidents.
3-The results of risk permissible level for all types of accidents from 2013 to 2017 are different inspite of types of accidents which have the same risk level when applying both of ENR or Eroupian method, so an approch was taking into consideration a range to avoid this misleading.
4- Determining the priority of all zones and the coresponding types of accidents taking into consideration equavalant sevirity and risk level analysis.

Forth stage: Recommendations.

1-Determining the priority of all zones and the coresponding types of accidents based on equavalant sevirity and risk level analysis together.
2- Proposing scientific and practical solutions to improve the railway operation and the railway traffic.
3-Proposing measures to minimize ENR railway accidents for the three following aspects:

1- Maintenance.
2- Human power.
3- Safety measures.

To achieve the mentioned objectives, this thesis is divided into six chapters, which can be summarized as the following:

CHAPTER 1: INTRODUCTION

It consists of the thesis hypotheses, thesis scope, thesis objectives and thesis methodology.

CHAPTER 2: LITERATURE REVIEW

It is considered as a literature review for national and international studies, projects and textbooks.

CHAPTER 3: DEFINITIONS

This chapter deals with definition of train accident, types of accidents and causes of it according to ENR (Egyptian National Railways).

CHAPTER 4: DATA COLLECTIONS AND FIELD SURVEY

The data collections were divided into five types: