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## **A Comparative study: Safer Electrical Systems In Developing Countries Qualitative Approach**

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### **Abstract**

Although extensive research has been undertaken to improve electrical installation safety in the Industrial Countries (IC), there has been a relative absence of any academic research in this field with respect to Developing Countries (DC). This study investigates the electrical safety experience of the IC, and applies the results within the DC after assimilating within the characteristics of the target society.

**Methodology:** the issue improving safety can be regarded as complex and multi-variable it is a multi-objective optimization problem. The aim of this research has been concerned with gaining a better understanding of electrical safety approach in the IC (causation and analysis) and uses this as a platform for improving electrical safety approach and its management within the DC where it is needed and applicable.

**Goals:** The topic of safety enhancement can be considered Complex, and a multi-functional optimization problem can be considered. The goal of this thesis was to better understand the IC approach to electrical safety (cause and analysis) and uses this as a forum for the improvement of the DC approach to electrical safety and its management where it is required and relevant.

### **Objectives:**

- Improve electrical installation safety.
- Make the work environment in electrical installations safe for workers.
- Facilitating electrical wiring works

**Keywords:** Industrial countries(IC), countries (DC).



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## المخلص

على الرغم من إجراء بحث مكثف لتحسين سلامة التركيبات الكهربائية في البلدان الصناعية (IC) ، كان هناك غياب نسبي لأي بحث أكاديمي في هذا المجال فيما يتعلق بالبلدان النامية. (DC) تبحث هذه الدراسة في تجربة السلامة الكهربائية في IC ، وتطبق النتائج داخل DC بعد استيعاب خصائص المجتمع المستهدف.

**المنهجية:** يمكن اعتبار مسألة تحسين السلامة معقدة ومتعددة المتغيرات ، فهي مشكلة تحسين متعددة الأهداف. كان الهدف من هذا البحث معنيًا باكتساب فهم أفضل لنهج السلامة الكهربائية في IC (السببية والتحليل) ويستخدم هذا كمنصة لتحسين نهج السلامة الكهربائية وإدارتها داخل DC حيث تكون هناك حاجة إليها وقابلة للتطبيق.

**الأهداف:** يمكن اعتبار موضوع تحسين السلامة معقدًا ، ويمكن اعتبار مشكلة تحسين متعددة الوظائف. كان الهدف من هذه الأطروحة هو فهم نهج IC للسلامة الكهربائية (السبب والتحليل) بشكل أفضل ويستخدم هذا كمنتهى لتحسين نهج DC للسلامة الكهربائية وإدارتها حيث يكون ذلك مطلوبًا وذات صلة.

**الأهداف:**

- تحسين سلامة التركيبات الكهربائية.
- جعل بيئة العمل في التركيبات الكهربائية آمنة للعاملين.
- تسهيل أعمال التمديدات الكهربائية

**الكلمات المفتاحية:** الدول الصناعية (IC) ، الدول (DC).



## I. Introduction

There exists an old cliché that reads, “An ounce of prevention is worth a pound of cure”, and the issue of safety can have a powerful effect on people when it is raised. Over the last three decades there has been a boom in the infrastructure and projects in some of the fast developing countries. This evolution has led to excessive use of electricity, a trend that is expected to continue for many years in the future [1], leading to greater demands for safer electrical installations. Electrical safety can be defined as: The process of recognizing hazards associated with the use of electrical energy and taking precautions so that hazards do not cause injury or death [2] . And although electrical energy is used in a similar fashion, and the physical installation remains the same in all areas of the world, the impact on exposure to fatalities and injuries from electrical energy in the DC is much higher compared to AC. This study attempts to develop, with the aid of hypothetical models, a research model of safety management suitable for DC environment from literature available. Some general hypotheses have been suggested to that effect.

## II. Safety System in Industrial Countries

With respect to AC, this study was not aimed particularly at fundamental discoveries, but rather at a review and analysis of what is known about improving electrical safety and how this can be applied to improve the standards of safety and accident prevention in DC. The electricity industry in most IC receives a high priority, it is particularly important because of its significant impact on society, economy, and the environment. One of these priorities is safety, including many engineering programs striving to reduce electrical incidents to a low level. According to Andrews [3] in "Identifying Electrical Safety Needs, Implementing Improvement, and Measuring Results" that: "Electrical safety-related incidents and injuries are associated with both the physical conditions of a facility and the actions of people" So electrical safety can be viewed from two main aspects, namely:

- **Safe Installation**, which deals with the physical environment
- **Safe Work Practice**, which deals with people's action and attitudes

These two elements share a common goal of minimizing injuries. One of the tasks of this study is to define the relationship between the physical conditions and the actions of people, and based on this, define the elements of the safety framework. The IC started a long time ago to think seriously about safety in general and in electrical safety in particular, so the **Safe Work Practices** are less noticeable now, through the various available channels, in these countries, Electrical safety is perceived as a very important issue, society and the media has been vigorously educating the public about the importance of safety practice. Also, universities and technical colleges were beginning to develop the teaching of science and engineering, and because of the engineering institutions play a major role in moderating those courses, at the present time a well establish and high-level teaching of science is concentrated in universities and colleges [4]. For the **Safe Installation**, there are two main standards are used to provide electrical safety in facilities:

1. The International Electrical commission (IEC) system in Europe, and,
2. The National Electrical Code (NEC) in North America [5].

Figure 1 provides visual framework of what is known as the three-legged stool, which consists of three interdependent parts described: code, standards, and inspection. Together they can be thought of as a three-legged stool, each leg must be present for the system to competently support safety [6]

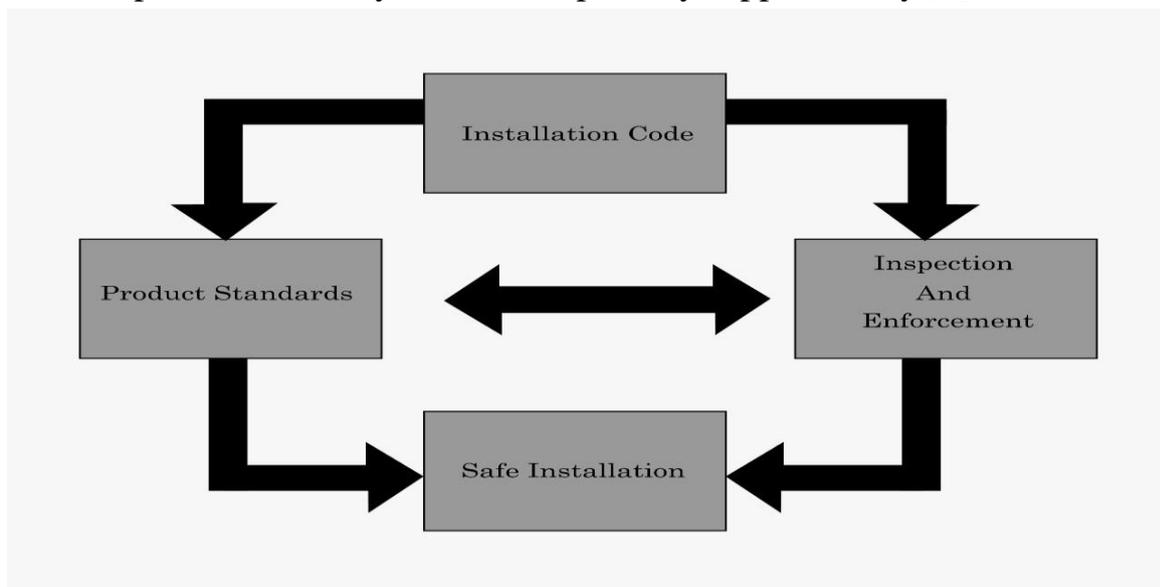


Fig.1 Electrical Safety System (the physical element)[14]  
(III) Safety System in Developing Countries



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While much can be gained from focusing on how the physical system provides for the safety of installation, and although most DC adopted the safety system applied in the IC the accidents rate is still on average ten folds of the IC.

So there is a need to extend the focus beyond the physical element to how individuals perceive and act in the face of risk to understand responses to risks and their implications. A study in DC to investigate the impact of certain cultural factors on risk perception and attitudes of workers and safety officers and their influence on risk management systems [7], concluded from the analyzed data that, workers in the fatalistic cultures perceive risk situations in a naive manner. This is reflected in the difficulty they encounter in abstracting probability that is influenced by subconscious fatalistic attitudes, which negatively affects the organization of risk and safety management and hence the high rate of accidents was largely due to cultural factors. So cultural factors have been shown to be influential at all levels within the construction industry in general.

Therefore, risk perception and attitudes and cultural factors, could be important element when the safety issue is reviewed in the DC.

In another study [8], educational and training factors, and the relative neglect of Vocational Education and Training (VET), in favor of university education, wage structure are also, in essence, social and economic problems. A vocational and technical education is seen as a path for the less able student and hence the quality of the training and the degree of competence would be affected. So the revised framework for the electrical safety system in the DC could be as shown in Fig.2.

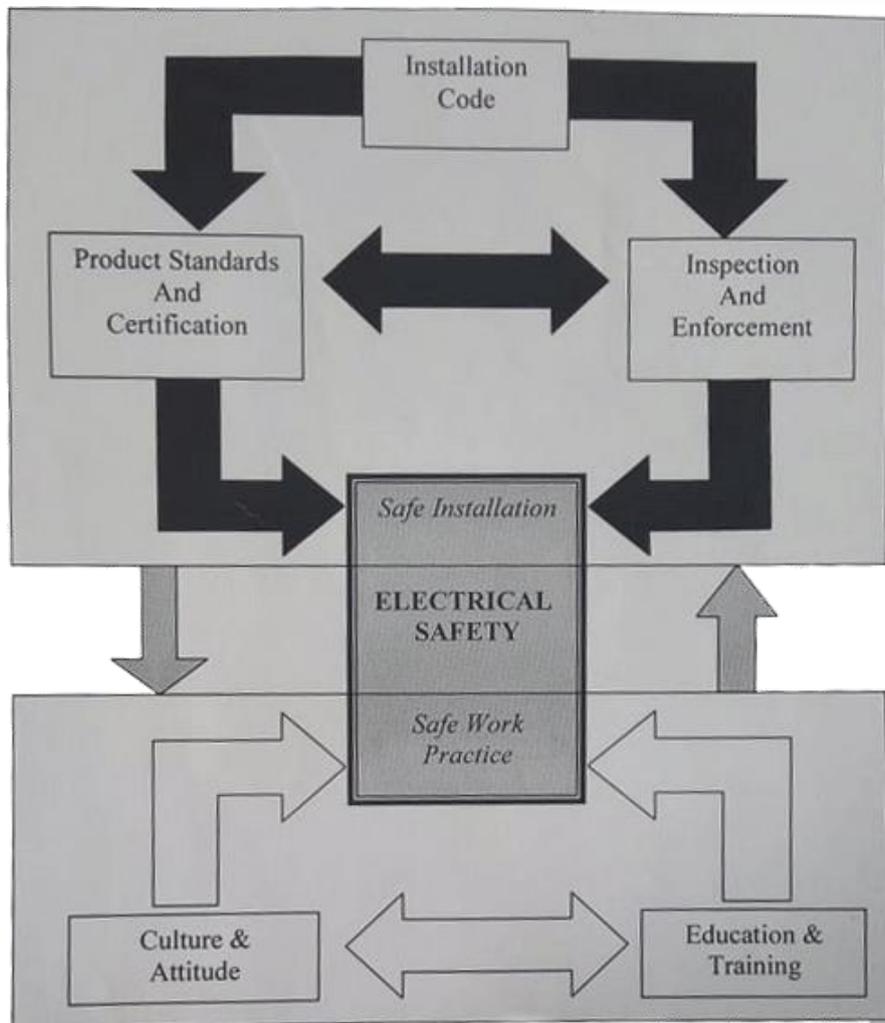


Fig 2. Revised electrical safety System [9]



### **III. Concision**

Hypothetical models, a literature-appropriate safety management model for DC climate. Some general theories have been proposed. Defense infrastructure in developed countries With regard to IC, this study was not aimed directly at fundamental findings, but rather at evaluating and examining what is known about improving electrical safety and how this can be implemented to improve safety and accident prevention standards in DC The electricity industry in most ICs receives high priority because of its important effect on society. One of these goals is protection, including several Engineering projects aimed at minimizing low-level electrical accidents. According to Andrews in "Identifying Electrical Safety Needs, Implementing Improvement, and Measuring Results" that: "Electrical safety-related incidents and injuries are associated with both the physical conditions of a facility and the actions of people" Electrical safety can be viewed from two key aspect Secure installation and Safe job practice Safe job practice.

### **IV. Recommendations**

From the experience gained during the research model, the future research program could address the following:

1-The authorities in most DC need to be more involved in investigating accidents in general and the electrical safety related incidents data in particular, because the main limitation of this research is the source availability of such data.

2-Given the huge number of accidents per year, the establishment of an independent agency for data gathering and subsequently the distribution of information, where and when needed, to open the door for further fruitful and useful research in the field.

3-Subject to data availability, the investigation of the Accident Severity Rate (ASR) in parallel with the existing Accident Frequency Rate (AFR). Subsequently the establishment of accurate long-term trends.



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## V.References

- 1 IEEE Transactions on Industrial Electronics (Volume: 62, Issue: 5, May 2015) -, ' Power Quality Issues in Railway Electrification: A Comprehensive Perspective'
- 2- Mohla [1999]. 'Electrical safety by design'. IAS.
- 3- C Zhang, B Gong, Y Gao, PF Li, HW He - CICTP 2020 - ascelibrary.org 'Analysis of Accidents Caused by Out-of-Control Electric Vehicles and Study of Identification Technology 'Analysis of Accidents Caused by Out-of-Control Electric Vehicles and Study of Identification Technology'
- 4- Fogarty, Michelle ORCID logo; Constant, Chloe; Cooperman, Aubryn; DeMeo, Edgar; Chambers, Emily; Burke, Brandon; Musial, Walter 2020-07-02.' Offshore Wind Electrical Safety Standards Harmonization: Workshop Proceedings'
- 5- Gregory [2000], 'How do the NEC and IEC 60364 help provide electrical safety?. IAS
- 6-Pauley [2000], 'North American codes and standards: a global challenge'. IEEE
- 7- Darwish [1987], 'Risk management development in Iraq'. Polytechnic of Central London
- 8- Mokhtar [2002], The need for restructuring the education systems for technicians in DC'. Egypt
- 9-Kassem [2007), 'A Comparative Study: Safer Electrical Systems in Developing Countries. Brunel University, UK