Preventive Operations Study for Motorbike Users by Using Cognitive Work Analysis with Mathematical Models

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Abstract

This paper presents the cognitive work analysis and its significance. Cognitive work analysis is a framework for analyzing complex socio-technical systems. A socio-technical system is one that relies heavily for its overall functionality on the social processes of communication and cooperation, stage at which meets human psychology and technology. This also addresses the basic problems in cognitive work analysis and due to complexity of these problem, some mathematical models are used to solve the scheduling problems.

Keywords: cognitive work analysis, socio technical systems.

1. Introduction

The framework of CWA and is neither a theory, nor a methodology. It is a demonstration of the various dimensions that have to be considered if one wants to achieve all, or most, of the high-level goals of effectiveness in system design. Compared to more traditional analyses of work tasks, CWA focuses on the behavior-shaping constraints of the environment [1]. This is called a formative analysis, in contrast to both descriptive and prescriptive methods for task analysis. In this method consists five types; work domain analysis, control task analysis, strategies analysis, social organisation and strategies analysis, and worker competencies analysis [2]. Cognitive work analysis (CWA) is gaining momentum as an approach for the analysis, design, and evaluation of complex Socio technical systems. The majority of applications of CWA have focused on interface design but in this paper we demonstrate that CWA can also be used for a variety of other applications [3]. These applications include the use of CWA to: identify training needs and training-system requirements; evaluate alternative system design proposals; develop team designs; and identify training strategies for managing human error Work-domain analysis is used in the organization being studied, here, and city government and to identify and describe the functional purpose and structure of the work domain under analysis [4]. Task analysis is help to examine specific tasks involved in information-related behaviors such as drafting a committee agenda or completing departmental reports and also to identify and describe the task required during activity in the system and analysis [5]. Strategies analysis is to identify the strategies that the agents involved may employ during task performance. Social organisation and strategies analysis is to identify exactly how the control tasks are distributed within the system [6]. Worker competencies analysis is to identify the cognitive skill that agents employ during task performance. In order to overcome the human psychology while handling technologies It is a system approach to examine the road

safety domain [7,8]. It can be applied in number of domains, so that we can form a new framework. By this cognitive work analysis, we can develop a strategy analysis diagram which helps us to find the difference in behaviors between road users [9]. The findings indicate that there is great potential for applying CWA-related methods and principles in the road transport domain, in particular during the design, development and evaluation of driver training programs [10,11]. The design, development and analysis of road transport-related technology and artifacts, including intelligent transport systems, vehicle cockpits and road signage, layout and furniture.

2. Cognitive work analysis: applications

As a result of the literature review, CWA applications were identified in the following domains: aviation, process control, nuclear power, military command and control, road transport, air traffic control and manufacturing. Additionally, the literature review indicated that the methods within the CWA framework have been used for a number of different purposes, including: work domain modeling; system design; training needs analysis, training program evaluation and design; interface design and evaluation; information requirements specification, tender evaluation team design and error management strategy design [12,13]. A number of general conclusions regarding the potential application of CWA in the road transport domain were made [14]. A summary is presented below the different CWA phases and methods can be applied throughout the design life cycle; its flexible nature is such that it can be used for a variety of purposes, ranging from training design and evaluation to information requirements specification, the CWA methods are generic and can be applied in any domain error management strategy design [15,16]. One current theme that is receiving attention within complex, socio technical systems is the concept of error management [17]. It was concluded that the CWA framework could potentially be employed in the development of error detection and management strategies for different road user groups e.g. pedestrians and driver's [18]. The analysis also provides an indication of the different stakeholders currently residing within the system and also of their respective roles within the system [19]. The stakeholders identified included road transport authorities and governing bodies, road infrastructure, road transport law enforcement agencies, drivers and vehicle manufacturers. The analysis indicated that the relevant road transport authorities and governing bodies.

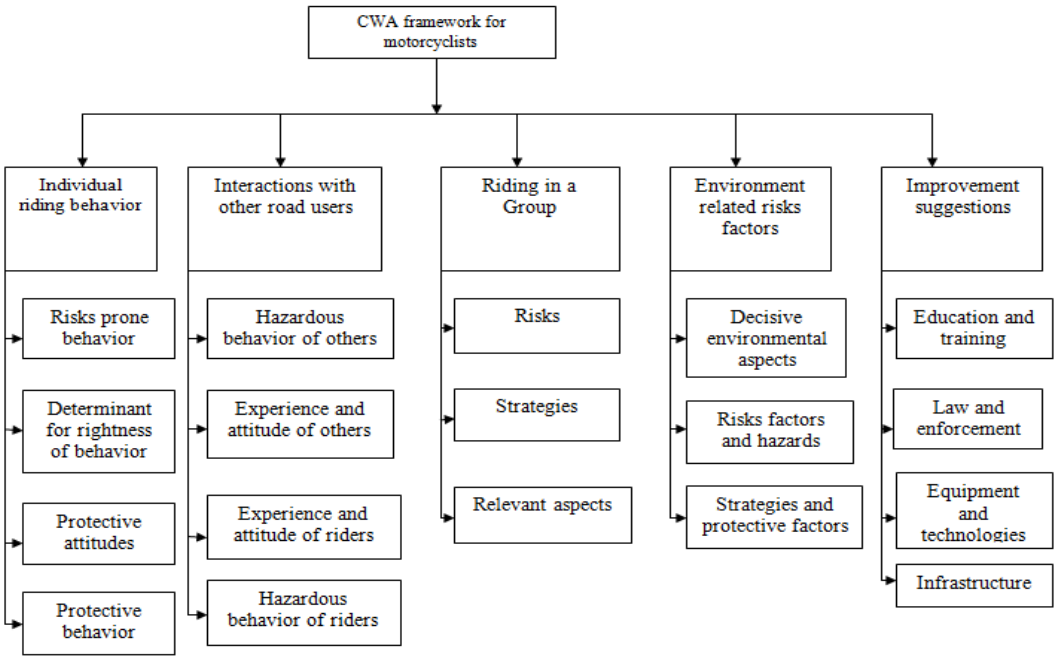

Fig.1: CWA framework

3. Methodology

Regression is the attempt to explain the variation in a dependent variable using the variation in independent variables. Regression is thus an explanation of causation. If the independent variable(s) sufficiently explain the variation in the dependent variable, the model can be used for prediction. The output of a regression is a function that predicts the dependent variable based upon values of the independent variables. Simple regression fits a straight line to the data Regression analysis is widely used for prediction and forecasting, where its use has substantial overlap with the field of machine learning. Regression analysis is also used to understand which among the independent variables are related to the dependent variable, and to explore the forms of these [20]. In restricted circumstances, regression analysis can be used to infer causal relationships between the independent and dependent variables.

The performance of regression analysis methods in practice depends on the form of the data generating process, and how it relates to the regression approach being used. Since the true form of the data-generating process is generally not known, regression analysis often depends to some extent on making assumptions about this process. These assumptions are sometimes testable if a sufficient quantity of data is available. Regression models for prediction are often useful even when the assumptions are moderately violated, although they may not perform optimally. However, in many applications, especially with small effects or questions of causality based on observational data, regression methods can give misleading results . Many techniques for carrying out regression analysis have been developed. Familiar methods such as linear regression and ordinary least squares regression are parametric, in that the regression function is defined in terms of a finite number of unknown parameters that are estimated from the data. Nonparametric regression refers to techniques that allow the regression function to lie in a specified set of functions, which may be infinite-dimensional. If the

number of independent variables on the right hand side is more than one than the corresponding equation is known as multiple regression equation which is,

$$y= a+b_1x_1+b_2x_2+\ldots+b_nx_n. \quad (1)$$

If the value y (dependent variable) may be affected by the components of time series such as trends seasonal, cyclical, and random (refer eq. 1). The integrated study of regression by taking these components into account is called time series analysis.

Questions asked: motorcyclists

- What do you think the reason for accident is?
- What are the sources of distraction on roads?
- What are the alterations you expect to be brought by Ministry of Road Transport and Highways (MRTH)?
- How often do you service your vehicle?
- What intimidates you to speed up when you are driving?
- Tell me the reasons for which you tend to break the rules?
- What are the disturbing factors on Indian roads according to you?
- Why do you want to overtake rather than going with the pace?
- What are the probable annoyances on wearing helmet?
- While riding what type of risks would you dare to take if you are an urge to reach the destination?
- Do you think using mobiles while riding is a reason for accidents and how?
- What is road safety according to you?
- How will you tackle the situation of stray animals while riding?
- How do you manage night vision while riding?
- How do you reveal yourself in a completed dark road while riding?
- What are the factors that affect your sitting posture while riding?
- What kind of vehicular alterations attribute to accidents?
- Alcohol consumption is one of the leading reasons for accidents?
- How do you think weather conditions influence these accidents?
- Do mental distraction is one of the factors for these accidents?

These are some of the questions that are intended to ask to the motorcyclists in order to identify the perception of riders while riding the motor vehicles.

4. Conclusion and future research directions

Hazard of the unfortunate mishap or accident especially one causing physical damage, causality and fatality is enormously much more to motorcycle rider than hitch hiker or traveler. Here we have to analyzed and elaborated systematic plan and safety management, in connection with the method of working two wheeler transport [25,26]. Accident averting is functionalized by a method which absorbs the incidence and control of further mishap.

Further examines the endangerment component related to the fatal accident and unexpected event and paying attention on possibility of incurring lose. Such as research flunk to looking to the dynamism of system. Here we undertaken a scientific description of an individual approach organized by the completed work of perception and learning and reasoning to designate how rider of a two wheeler can administer their own safety and other safety of other who are being a part of a system. The primary aim of this work was to explore safety management strategies associated with operation of powered two-wheel vehicles. This study investigates to decrease the death rate and to increase the safety management for motorcycle users. Thus, with the knowledge of the major reasons responsible for the accidents respective safety strategies can be handled to reduce the accidents. The probable outcome would be a reduced number of accidents that obviously would result in less fatality rate. The future work can be mathematical model should be developed in order to predict the accidents that are possible of occurring in future. This can be predicted and the remedial actions can be taken to avoid these accidents.

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