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Do the Written Examination based Training Courses Affect on Freight Drivers' Skills? An Empirical Study in Iran based on the Kirk-Patrick Model

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Abstract

Transport authorities who are dealing with drivers' training procedures are interested in improving drivers' skills to enhance public transport productivity and promoting road safety. The present research work has been conducted to evaluate the effectiveness of written examination based training courses on freight drivers' reaction, learning, behavior, and reduction on their accidents and traffic violations, so the well-known model of Kirk-Patrick has been utilized. Tehran province, the capital province of Iran, has been selected as the case study where gathering data process has been done through filling out a standard questionnaire composed of 45 pre-designed questions. Commercial freight drivers, consignees, goods owners, and experts filled out the questionnaires and results revealed that the written examination based training courses do not have significant effects on drivers' reactions, learning, behaviors, and performances in freight transportation.

Keywords: Freight Transport, Written Examination, Drivers' Training Courses, Kirk-Patrick Model

1. Introduction

In the last few decades, science and technology have advanced more than any other period in human history. This transformation has termed the present age of the information when in the period in which half of all human information is replaced by new information every few years (Brown and Duguid, 2017). Many organizations are formed based on specific goals, and ultimately are achieving them by meeting the needs of communities. In other words, the existential philosophy of any organization is to provide diverse services to the community for the purposes in which it is intended. Nowadays, the most important factor for achieving the predefined goals in organizations is to have knowledgeable, efficient, innovative, creative and responsible human resources. In this regard, the role of continuous and in-service training to acquire the above-mentioned skills seems to be clear and necessary in advance (Bahmani, 2006). Implementation of the education programs itself raises the issue of evaluating courses and curricula, which is one of the most fundamental stages of educational planning. Evaluation of educating programs enables decision-makers and practitioners to get a big picture of how activities are being done and how to use educational systems to improve the quality of knowledge and skills of human resources in response to individual and community needs (Rovai, 2003).

Today, training is expected to bring about the desired behavioral changes in employees to facilitate the achievement of organizational goals. Therefore, curriculum planners and administrators are not only responsible for identifying the learning resources and facilities needed but are also responsible for determining the impact of educational programs on individual and organization performance. Given the role and purpose expected of the training courses, their implementation will be fruitful and useful if they designed according to the tangible needs of the participants and cause behavioral changes during and after employment. Therefore, it is necessary for the organization to evaluate the training courses in different ways in order to determine the effectiveness of these courses, make the necessary corrections and make the most of the costs spent and finally provide an appropriate training quality in line with the facilities spent (Pineda, 2010). Educational activities without an evaluation mechanism would be merely "dropping the arrow in the dark". As jobs become more complex, the importance of staff training would be increased. When the jobs were simple, learning was easy and technical changes had little effect. Therefore, the staff did not need to increase or change their skills. But the rapid changes that have taken place in modern societies over the last quarter-century put much more pressure on organizations to adapt themselves to the current situation (Blundell et al., 1999).

In a rapidly changing society, staff training is not only desirable but also an activity that must be continually planned, implemented, monitored, and refined in line with the day-to-day needs of businesses. Therefore, the debate about the necessity or priority of investing in human capital and the expression of its desired short-term and long-term effects on the realization of the organizational goals is a well-established argument. However, planners and managers of organizational training are now dealing with a more serious challenge where they have to answer to the question of "to what extent have organizational training been effective in utilizing the allocated human, financial, material, and ultimately accomplished goals?" This is a difficult question but should be answered (Arthur et. al, 2005). The issue can be seen much raised when looking at the process of developing staff training in organizations, including three general stages of “creation and organization”, “quantitative growth” and “ultimately emphasis on quality”, it can be seen that most of the centers of staff training are now in the third stage of transition from the second to the third stage. So, the most important characteristic is the emphasis on the quality of attention to the qualitative evaluations of educational activities or assessing the effectiveness of the training activities (Bazaz Jazayeri, 2005).

2. Problem Definition and Research Goals

Traffic accidents and their impacts are the main transport and economic issues. The impacts of traffic accidents (property damage or life-threatening) double the importance of attention to this issue. Since over 600 thousand of commercial drivers are working in the intercity public transport, the Road Maintenance and Transportation Organization (RMTO for short) has been involved in designing the training courses to improve drivers’ skills. The main question in front of the transport authorities is: “Did the written examination based training courses have significant effects on accidents and traffic violation reduction?” Evaluating the effectiveness of training courses helps transport authorities to have a clear view of how little and how much educational activity is gained by drivers. Given the existing high costs of training programs, evaluating the effectiveness of training courses at different levels should be cautiously assessed to ensure that the training courses are enough effective for truck drivers.

Considering the above-mentioned and the importance and status of staff training in the world together with the belief in the necessity of continuing training, the research methodology was designed based on the evaluating the effects of training courses and their impacts on enhancing the efficiency of staff participating. So, the main research goals are summarized as; 1) Assessing the effect of written examination based training courses on reaction level on drivers, 2) Assessing the effect of the above training courses on learning level on drivers, 3) Assessing the impact of behavioral training courses on drivers, 4) Assessing the impact of the above training courses on the level of outcomes (reducing accidents and violations done by commercial drivers).

3. Designing the Conceptual Model

The conceptual model proposed in this research work is designed based on the Kirk-Patrick model in which four main parts are assessed during their taken or completed training courses. The model is composed of four levels of reaction, learning, behavior, and performances (Kurt, 2016). Figure 1 shows the main concept behind the model in a hierarchical order.

The present study applies the above model as the scientific background so a survey has been conducted using a pre-designed and standard questionnaire to collect data based on the five-score Likert scale. The statistical population of this study includes freight commercial drivers, consignees, goods' owners, and experts of RMTO. Sampling area is restricted over the Tehran province in which the size of the statistical population of the freight drivers who received the training is 9564 but the sample size composed of drivers, customers or consignees, selected from large factories and specific customers (owners of goods), and experts of RMTO. The total number of required sample size is calculated using equation (1) where "n" represents the sample size, N represents the size of the population, p is the ratio of success and ε is accuracy. The success rate in the statistical population is considered as p = 0.5 and the accuracy rate is also set to 0.06. So, the sample size has been calculated as 260, where the number of drivers (population size) in Tehran province is 9564. In this case, 290 questionnaires have been distributed and 260 returned successfully and analyzed. Finally, the statistical sample of drivers (freight transportation) consists of 260 persons, the statistical sample of customers, known as consignees, is 115 persons, and the statistical sample size of experts is 55, both are considered as the available samples.

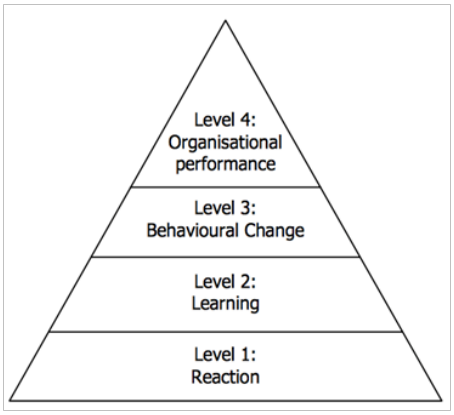

Figure 1: General Framework of Kirk-Patrick Model (Kurt, 2016)

$$n = \frac{N \times (Z_{\propto/2})^2 \times P \times (1-P)}{\varepsilon^2 \times (N-1) \times (Z_{\propto/2})^2 \times P \times (1-P)} \qquad (1)$$

The questionnaire has been previously used by (Khoshi and Ranjbaran, 2017) for evaluating the educational effectiveness in medical activities, based on the Kirk-Patrick evaluation model including 45 questions. But in the present research work, respondents' categories are defined in transport and shown in Table 1. In order to check the validity of responses received from interviewees the well-known measure of Cronbach's Alpha has been calculated and results tabulated in the last column of Table 1 which shows that all is acceptable for analyzing.

Table 1: Population categories by level of efficiency of training programs

Level of Efficiency	Questions	Responder Category	Cronbach's Alpha
Level 1: Reaction	01 - 17	Drivers	0.726
Level 2: Learning	18 - 24	Drivers	0.704
Level 3: Behavioral Changes	25 - 32	Consignees, Customers	0.923
Level 4: Organizational Performance	33 - 45	RMTO Experts	0.881

Given the big available sample size, the normal test is used to check the sample mean hypothesizes which is the same as checking the mean of the population. This type of hypothesis was utilized to test the effectiveness of the written examination based training course at four levels with different samples, separately. It is considered that whether the above-mentioned training courses at the reaction level have a significant impact on drivers' reaction, so the null and competitive hypothesizes are defined as follows:

H_0: Written examination based training courses do not have significant effects on the reaction of freight drivers.

H_1: Written examination based training courses have significant effects on the reaction of freight drivers.

Following the above method, all hypothesize based on Kirk-Patrick model are defined and tabulated in Table 2.

4. Data Analyzing

Since the Likert scale uses 1 for the least and 5 for the best rate and the sample size is enough big, the statistical normal test was performed based on the mean scores of (μ=3). In this method of test, Z-Stat is calculated by equation (2) where $\bar{x}$ is the mean, δ is standard deviation, and μ is the comparative value.

$$Z = \frac{\bar{x} - \mu}{\delta} \quad (2)$$

Table 2: Null and competitive hypothesizes defined for level of efficiency of training programs

Level of Efficiency	Hypothesizes (H_0, H_1)
Reaction	H_0: Written examination based training courses do not have significant effects on the reaction of freight drivers. H_1: Written examination based training courses have a significant effect on the reaction of freight drivers.
Learning	H_0: Written examination based training courses do not have significant effects on the learning of freight drivers. H_1: Written examination based training courses have significant effects on the learning of freight drivers.
Behavioral Changes	H_0: Written examination based training courses do not have significant effects on the behavior of freight drivers. H_1: Written examination based training courses have significant effects on the behavior of freight drivers.
Organizational Performance	H_0: Written examination based training courses do not meet organizational performances. H_1: Written examination based training courses meet organizational performances.

More details on how to utilize such kind of test by a mean of (μ=3) are available at (Pourhossein & Mahmoudabadi, 2019), even the sample size may not be enough big. The mean scores of each category have been averaged followed by calculating standard deviations. The same procedure was applied for all levels of training program efficiencies and results tabulated in Table 3. The first column represents the level of efficiency, the second and the third columns are respectively the numbers of questionnaires distributed and successfully returned. The fourth column is the mean of sample size responses on the five-rate Likert scale (1 for the least and 5 for the best) followed by standard deviations in the fifth column. Z-Stat for each category and its corresponding P-Value based on a confidence interval of 95% (α=0.05) are set in the sixth and seventh columns, respectively. Hypothesis results have been checked based on the above confidence interval. If the P-Value is less than 0.05 or Z-Stat is greater than 1.645, it means that the written examination based training courses have significant effects on the levels of efficiency, otherwise, training courses do not have significant effects. As shown in Table 3, all null hypothesizes are accepted because all P-Values are more than 0.05, so it can be concluded that the written examination based training courses do not have significant effects on freight drivers' skills in terms of reaction, learning, behavioral changes, and organizational performances. In other words, not only drivers believe that the written examination based training courses do not have significant effects on their reaction and learning skills, but also consignees and transport authorities are not statistically satisfied in terms of the desired drivers' skills of behaviors and organizational performances.

Table 3: Results on Likert scale responses for all levels of efficiency

Level of Efficiency	No. Questionnaires		Mean	Standard Deviation	Z-Stat	P-Value	Null Hypothesis (H_0)
	Distributed	Returned					
Reaction	290	260	3.21	0.63	0.333	0.369	Accepted
Learning	290	260	3.57	0.94	0.606	0.272	Accepted
Behavioral Changes	115	81	2.98	0.76	-0.026	0.510	Accepted
Org. Performance	55	55	2.01	1.03	-0.961	0.832	Accepted

5. Summary and Conclusion

Since transport authorities are interested in evaluating the performances of written examination based training courses taken place for truck drivers, a survey has been conducted based on four-level of Kirk-Patrick efficiency model in which truck drivers, consignees, customers and experts who work in Road Maintenance and Transport Organization (RMTO) have been interviewed through filling out a standard questionnaire modified to transport courses. Four levels of reaction, learning, behavioral changes, and organizational performances have been considered for data gathering and analyzing processes, in which organizational performances has been defined as the reduction on drivers' accidents and traffic violence. Hypothesizes are defined to check the effectiveness of training courses on all levels of the Kirk-Patrick model. The interview has been applied in Tehran province (Iran) where 260 filled out questionnaires successfully returned from freight drivers, 81 from goods owners, and 55 from experts. They have been analyzed based on the well-known statistical test of normal sample mean in which the mean of five domain Likert scale's responses have been compared to (μ=3). Z-Stats and P-Values for all tests have been calculated and compared based on the confidence interval of 95% (Z-Stat for Null Hypothesis = 1.645). The results revealed that the training courses designed based on written examination do not have significant effects on freight drivers skills as desired in four levels of reaction, learning, behavioral change, and traffic violence and accident reduction.

For further research, it is recommended to investigate the effects of four levels of the Kirk-Patrick model through indirect methods of data gathering, where drivers' reaction and learning are checked by practical tests and behaviors and performances checked by before-after studies.

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Biographies

Abbas Mahmoudabadi, is currently working as the director of master program in Industrial Engineering at MehrAstan University, Guilan, Iran, received a Ph.D. degree in January 2014 in Hazmat transport optimization. He has published around 85 journal papers or international conference papers in Industrial Engineering, Transportation, Road Traffic safety, and E-commerce. He is working as a senior expert in public transport and road traffic safety at RMTO as well as has around 27 years of experience in developing countries. He has also strong cooperation with national and international agencies on traffic safety and industrial engineering on studying and implementing international projects over the EMRO countries.

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