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AN OVERVIEW ON THE RELATIONSHIP BETWEEN REACTION TIME AND ATTENTION TO PERFORMANCE OF PRESSING PERSONNEL

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ABSTRACT

Reaction time, attention and concentration have been mentioned as general psychological functions that conduct fulfillment of activities and pave the way for efficiency. The present research has been conducted aiming at examining the relationship between reaction time, attention and concentration and job performance of pressing personnel in Iran Khodro. The present research is a descriptive correlation survey, for which 279 staffs among pressing personnel in Iran Khodro company have been selected. The research instruments include Japan's Kobe Steel Inventory to determine job performance and reaction time test to determine attention and concentration, used to collect data; further, D2 has been targeted to determine reaction time. Findings through Pearson correlation coefficient indicated that there is a significant relationship between selective and diagnostic reaction time and job performance and there is a positive significant relationship between attention and concentration and job performance. Results of this research indicate the necessity for selection of the staffs well suited with their physical and mental characteristics at different occupations. With regard to theoretical background based on an overview on literature review concerning research questions, the hypothesis below is represented: The staffs who have less reaction time and more attention have more job performance.

Keywords- *Reaction Time, Attention and Concentration, Job Performance*

INTRODUCTION

Industrial-organizational psychology refers to use of principles, theories and psychological research at work environments. In Industrial-organizational psychology, the issues including personal differences, human characteristics, measurement instruments for these characteristics, measurement and evaluation of job performance, analysis of job duties, and selection of job applicants and ultimately formulation of educational programs are more likely examined. The characteristics of a healthy organization are targeted in this way that the staffs' physical and mental health should be drawn into attention by manager at organization exactly the same as the production and productivity have been drawn into attention. Mental health at work environment implies resistance against emergence of mental distresses and behavioral disorders among staffs working in organization and purification of psychological space and environment (Babazade, 2012). Job performance includes those actions and behaviors that associate to aims of organization. Indeed, job performance refers to what must be fulfilled by managers at organization for which they employ staffs, expecting from staffs to accomplish it properly. One of the fundamental duties by managers at any organization lies on proper evaluation of staffs' job performance within organization. Evaluation of job performance must be continued regularly so as to use the results from it to increase the productivity within organization. Evaluation of competence or skill or staffs in fulfillment of special job duties has been mentioned as the best method for evaluation of job performance. At current age, selection and employment of new staffs must be considered through a strategic attitude so as to pave the way for access by management to optimal levels of organizational productivity. To achieve this, proper criteria and scientific methods must be used to select individuals. In general, it can say that philosophy of selection and employment lies on building balance between job needs and personal characteristics of job applicants at organization. A majority of industrial-organizational psychologists believe that it can embed useful personal differences in evaluation of job behaviors in four general classifications: cognitive abilities, physical abilities, personality characteristics and interests. Evaluation of individuals' characteristics for selection and determination of their organizational position is an important task

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considered by industrial-organizational psychologists within organizations. Psychological test has been mentioned as one of the methods for evaluation of personal characteristics associated to job. Reaction time, attention and concentration have been mentioned as personal differences that can be measured through psychological tests. Individuals differ in sake of their performance, so that the psychologists can compare the individuals' action under their good or bad performance and observe the personal differences existing in different aspects of their behavior during work. However a study on reaction time, attention and concentration is used for different purposes, discovery of the best behavioral patterns during fulfillment of a job has been mentioned as the most important reason for conducting such study. In the present research, the constructs of personal differences including reaction time, attention and concentration and their relationship with job performance are examined. Psychology refers to a scientific study on behavior and subjective processes by individuals. Psychology includes different fields including Experimental Psychology, Applied Psychology and Industrial/Organizational Psychology, so that Industrial/Organizational Psychology refers to one of applied fields of psychology that deals with development and application of scientific principles at work place. This field of psychology includes two major sections: industrial and organizational. Industrial psychology more likely examines personal differences, characteristics of humans, measurement instruments of human characteristics, job performance, the proposed models for job performance, measurement and evaluation of performance, analysis of job duties, selection of job applicants, formulation of educational program, a variety of educational methods and so on. The main assumption in this field of industrial-organizational psychology lies on this fact that there are stable differences between job behaviors and characteristics of different group of individuals, that acquisition of information on these differences can come beneficial in prediction, maintenance and improvement of job performance. Organizational psychology can be searched in ideas and theories proposed at the area of social psychology. In this field, motivational and emotional dimensions of job are more likely examined. The important issues which are examined in organizational psychology include: job motivation and factors affecting level of motivation, attitudes, emotions or feelings of staffs, job satisfaction, balance between job and life, balance between person and organization, stressful job factors and so on (Babazade, 2014). Job performance due to a huge effect on effective performance and aims within organization is considered as one of the fundamental constructs in industrial-organizational psychology. Job performance has been defined as the individuals' performance based on certain legal duties, describing the extent of effort and success by staffs in implementation of job duties and behavioral tasks. Examination and recognition of factors affecting job performance have been mentioned as the important programs targeted by manager within organization so as to implement the contributing factors including acquisition and retention of staffs in a better way by human resources management (Yadolah and Mehri, 2012). Performance refers to behavior, that is, what the person engages in it practically and observes it in most cases. To date, numerous studies have been conducted on staffs' performance, yet organizational/industrial psychologists intend to achieve a deeper understanding from the concept of performance and find more methods or approaches for improvement of staffs' performance level. The more staffs have acceptable job performance- the organization will achieve more successes. Proper job performance results in increasing productivity within organization, resulting in improvement of national economy and services within organization (Mohammadi, 2013). Evaluation of staffs' job performance within organization is a duty at any organization. Evaluation of job performance, measurement and valuation of job performance can come to realize during a certain period of time. The results from evaluation of job performance include familiarity with capacities and deficiencies of human resources within organization, determination of educational needs and persuasion of staffs to attend in special courses, determination of salary, improvement and familiarity with staffs' strengths and weaknesses in staffs' job (Saatchi, 2011). The managers at departments and heads at factories and all the ones who are in charge for administration of staffs are well informed of their personal differences. Further, they know that there are clear differences between the staffs or workers who work with similar machineries or certain device. These differences in job performance have a fundamental significance because of determining the person's behavior and job style. Nowadays, industrial and administrative

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systems of country express a special susceptibility to proper guidance by individuals. The proper guidance is targeted not just on staffs' ability in fulfillment of their job but on adjustment in their psychological state. Guidance of staffs and workers will face success when it comes to realize based on their personal differences, claiming that anyone must be considered in a position corresponding to his/her special talents and characteristics. Fleishman(1950) in a comprehensive research project strives to detect the most common subjective and physical abilities associated to humans' performance, i.e. this includes 52 different abilities that can be considered in three general classifications including cognitive abilities, physical abilities and motor-perceptual abilities(quoted from Babazade). Any job requires for different characteristics of person including knowledge, skill, ability and other personal characteristics. Knowledge refers to what a person knows about his job, like what knows a lawyer about law. Skill refers to what a person can engage in it such as a computer program. Ability refers to the person's ability for learning such as the ability for learning how to play music instruments. Other personal characteristics including interests, personality and physical characteristics such as height and previous experience associate to job. Four-dimensional characteristics of any job are determined by an explanatory study named as analysis of job. This study includes different techniques which result in providing a checklist for the characteristics required for job. After determination of characteristics, the approaches required for measurement of such characteristics must be selected in job applicants. Selection or substitution of the individuals who have the required characteristics has been mentioned as the basis in doing so. However, this process does not assure job success for all the selected individuals, it increases the chance for a good selection compared to rest of selection approaches (Mohammadi, 2013).

Majority of industrial/organizational psychologists believe that it can classify useful personal differences in evaluation of job behaviors in four general classifications: cognitive abilities, physical abilities, personality characteristics and interests. When industrial/organizational psychologists use approach "personal differences", they assume five principles clear.

1-individuals have different characteristics such as intelligence, personality, experience, interest and so on that such characteristics remain constant during a certain period of time.

2-these characteristics differ among different individuals (personal differences associate to job performance and job success)

3- Personal differences among different individuals remain constant after holding educational courses and acquiring new experiences

4-doing duties at any job area requires different characteristics

5-these characteristics can be measured

In 1879, Wilhelm Wundt in a laboratory invented some techniques to examine individuals' feelings and reactions in Germany and intended to examine the speed of individuals' reaction against environmental signals of the poorest light observed by humans, the poorest sound heard by humans and so on through these techniques. During different experiments, Wilhelm Wundt perceived that speed of individuals' reaction against environmental signals as well as the poorest light observed by them differs; in other words, they perceive that there are significant differences among individuals .

Hugo Munsterberg intended to predict disasters which occur during job through overview and measurement of different abilities of staffs working in textile factories. Walter Dill Scott Known as one of the leading founders of industrial/organizational psychology writes down in one of his famous articles in this way: overview and measurement of personal differences has been mentioned as the most important achievement that U.S psychology association has acquired it to date.

According to a research by Tiffin and Mc Cormik (1967) on administrative staffs, it has been indicated that there is a significant relationship between intelligence and job difficulty. Range of personal differences is so extensive, that managers within organizations must give a priority to these differences. They must know that doing any task cannot be expected from anyone and at anytime. They must know that attention to personal differences causes increasing production and paving the way for satisfaction by job owners (Babazade, 2012). Acquisition, selection and employment of staffs required for organization in a scientific way have been mentioned as the leading activities by industrial/organizational

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psychologists. If selection of individuals within organization is not accomplished via scientific methods, performance of staffs will not increase. The philosophy of selection and employment of staffs lies on building balance and adjustment between job needs and personal characteristics of job applicants within organization. Adjusted employment tests have been mentioned as scientific methods for selection of staffs. Test is an adjusted and objective means used to measure a sample of person's certain behavior and states (Saatchi, 2011). Psychophysics refers to a part of research at the area of psychology which argues about the relationship between intensity of stimulant and intensity of perception. Measurement of feeling has been mentioned as the preliminary issues at the area of Psychophysics. Measurement in Psychophysics implies building a relationship between physical characteristics of stimulant and sensory experiences in a quantitative way. The personal differences that can be measured through Psychophysics include reaction time, attention and concentration (Ganji, 2013).

Reaction time refers to a period of time which takes last a person gives response to a complicated stimulant. Since reaction time is considered as a test for accuracy and stability of accuracy, measuring it necessitates in most of experiments. Indeed, it can say that reaction time is considered in all human activities, e.g. when we oblige accomplishing a job in a limited time, when we face danger during driving, an action must be taken in a limited time. Those who have a good reaction time or speed at action act successfully in most of cases. Reaction time has been considered as an important Psycho physiological indicator drawn into attention by psychologists from the long lost past. Further, with regard to new theory of data processing and its role in evaluation of intelligence and cognitive activities, reaction time has been drawn into attention as an indicator which has a close relationship with processing speed. Application of reaction time measurement in relation to selection of individuals in industrial and military centers and organizations especially in developed countries has been seriously drawn into attention by industrial psychologists.

Donders (1868) has recognized three types of reaction time:

- the first type: simple reaction time to a unique stimulant by means of a unique reaction
- the second type: selective reaction time at which different responses are given to different stimulants
- the third type: diagnostic reaction time at which the respondent gives a response to a stimulant and does not give response to other stimulants which are different or similar to that stimulant

Information processing theory includes three stages including detection of stimulant, selection of response and planning for responses; on the other hand, reaction time is considered as the indicator for speed of information processing in central neural system(Mahdi Namazi zade, quoted from (Schmidt, 2007). Reaction time is used in different cases for psychological-physiological evaluations, e.g. evaluation of speed of action and accuracy of heavy vehicles drivers, evaluation of speed of action and accuracy in selection of pilots, evaluation of speed of action and accuracy of military forces which work with special instruments, evaluation of speed of action and accuracy of technical workers which work with pressing machines and evaluation of speed of action and accuracy of the individuals who have been subjected to drugs (Khodadadi, 2014). A variety of factors affect reaction time including stimulation level, intelligence, age, gender and personality. Selection of the individuals with faster reaction time and higher accuracy causes increasing productivity and quality of job on one hand and reduction of disasters in industrial and military environments on the other hand.

According to a research by Ravari (2013) concerning the effect of different environmental colors on simple reaction time to auditory stimulant, findings indicated that subjecting to a blue environment can increase speed of auditory information or decrease auditory reaction time in human. Attention and concentration have been mentioned as other personal differences, mentioned as general psychological functions that conduct doing activities and pave the way for efficiency. Attention refers to a means through which a limited amount of information among mass volume of information which has been stored in memory is actively processed. Attention includes conscious and non-conscious processes, so that non-conscious processes are much more difficult because you are not aware of them (Kamal, 2003). Attention implies continuous, centralized and performance oriented selection of stimulants. The term "performance oriented" implies that attention grants this ability to the person to engage in those internal

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and external stimulants which are important for problem resolving and analyze them rapider and remove competitor stimulants from the locus of attention (Bagheri, 2002). Specifically, cognitive psychologists are interested in Sustained attention, Vigilance, Selective attention, divided attention and search. Attention has been mentioned as one of the most important executive-cognitive functions of brain. The man needs attention as a significant information and ignorance of unassociated information in order to have an adaptive performance.

Roth and Schiottke (1991) stated about attention in this way: attention refers to an interaction between mechanisms of sensory selection and memory. According to Newman theory (1996), attention has been known as the product of a series of neurological structures and sub-structures. Further, the process of attention refers to selection due to the ability for engaging in purposeful activities. Another point lies on this fact that selective attention is understood with more purposeful actions (Bagheri, 2014). There is no difference between two concepts of attention and concentration in science of psychology, that both these terms are used as synonyms. According to point of view of Imhof dna Burke (1995), attention has been mentioned as a precondition for concentration. The difference between attention and concentration lies on this point that attention includes readiness to receive information or selection of special behavioral patterns. Yet, concentration includes setting special aspects of information and/or behavioral patterns at the locus of focus, which is followed by more effort and difficulty and more activity of cortex. In other words, attention is associated to the process of feeling and perception and concentration is associated to processing what perceives.

The term "concentration" implies concentrating attention and subjecting an issue with limited range in the locus of focus. Therefore, selective attention and concentration both are similar. Fernandez Castillo and Caurcel in a study in 2014 measured attention and concentration of a group of students and examined anxiety and concentration degrees in them. They indicated that anxiety degree can be an important factor in attention with a negative effect in quality of their exams.

In another study, the danger of neurophysiologic disorders in retired staffs at industries using solvents via test d2 has been examined. Results of this study indicated that such disorders remain for years after ending the work (2015). Further, shenas *et al.*, (2008) in their study indicated that neuropsychological tests can separate offending driver from competent drivers. In this research, 23 tests including reaction time, memory, sensory- motor and so on have been used.

Another research "evaluation of heat stress effect on selective attention and reaction time among the workers in a factory" has been conducted by Golbabaei (2014) that the results indicated that heat stress causes increasing reaction time and decreasing selective attention among individuals. Among effective factors in performance, role of manpower is of great importance. Industrial productivity is optimal when the best individuals are selected for production, so that implementation of tests affecting selection of individuals has been mentioned as the best method for selection of the best individuals. The individuals who are selected via suitable tests can be distributed among jobs through proper conductance in a way that the individuals express maximum capacity and efficiency and take step in line with development of organization. Personal differences are of great importance in job successes. Managers can act more successfully through proper understanding of the differences among staffs in selection and evaluation of job performance and use of their effectiveness.

Neglecting the realities associated to personal differences causes the managers face problem in harmonization of individuals' activities under their supervision.

With retrospect to this fact that few studies have been conducted at the area of effectiveness of psychological and physiological characteristics on job performance of staffs, there are serious gaps at this area that the present research intended to resolve this gap by overview of the relationship between job performance and two psychological characteristics and paved the way for operationalization of this gap in automotive centers through conclusions. With regard to 100 disasters due to working in pressing hall during 2013 and 2014 as well as high financial and psychological costs due to damages to the workers, significance of attention to personal differences in employment of workers seems essential. It requires considering a research approach at the area of job analysis so as to pave the way for substitution of job

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applicants corresponding to psychological characteristics of each job, examining the relationship between psychological characteristics and job performance, formulating necessary instruments to quantify job performance.

The First Hypothesis

The workers who have less reaction time and more attention have more performance.

This hypothesis was confirmed, claiming that the workers who have less reaction time and more attention have more performance.

To test this hypothesis, firstly Pearson correlation coefficient has been used and then contribution of reaction time, attention and concentration in prediction of job performance has been specified via step-wise regression method. A significant correlation has been witnessed between diagnostic reaction time, selective reaction time, efficiency of concentration and efficiency of attention and job performance. Two models were used in step-wise regression.

In the first model, selective reaction time is the only predictor variable. This model is significant at significance level under 0.001 based on variance analysis test for significance of regression coefficient, and further 3% of the fluctuations in job performance are determined through selective reaction time via adjusted R-square. Selective reaction time is significant at level under 0.001 based on t-test, i.e. Selective reaction time plays a potential role in prediction of job performance.

In second model, predictor variables include selective reaction time and efficiency of concentration. This model is significant at level under 0.0001 based on variance analysis test for significance of regression coefficient. Further, with regard to adjusted R-square, 5% of fluctuations at job performance are determined through selective reaction time and efficiency of concentration. As specified, the second model has greater power in determination of fluctuations in job performance.

Selective reaction time at the significance level under 0.01 and efficiency of concentration at the significance level under 0.05 are significant based on t-test, i.e. selective reaction time and efficiency of concentration have a potential role in prediction of job performance.

As observed previously, statistical results indicated that there is a negative correlation between diagnostic reaction time and selective reaction time, and there is no relationship between simple reaction time and job performance. Results of the present research concerning the first hypothesis compared to the study by Shahnaz (2011) indicated that there is a significant difference on function of attention between offending driver and competent driver, such that Offending drivers acquired higher scores than competent drivers during reaction time.

Further, a research has been conducted by Khademi in 2004 concerning applying General Aptitude Test Battery (GATB) in staffs' job performance in D.M.T Company across Isfahan. Results indicated that there is a significant relationship between general talent and job performance. A research has been conducted by Hamid concerning general talent and job performance among a group of engineers in SAIPA Automobile Manufacturing Group Company, that the results indicated that there is a significant relationship between general talent and job performance. This hypothesis was confirmed in sake of error rate, efficiency of concentration and error percent. Therefore, there is a significant relationship between error rate and efficiency of concentration and job performance. Firstly Pearson correlation coefficient has been used to test this hypothesis and then efficiency of attention and concentration in prediction of job performance has been specified through simple regression method. Pearson correlation coefficients indicated that there is a significant correlation between error rate, error percent, efficiency of attention and concentration and job performance. This model is significant for prediction of job performance based on variance analysis test for significance of regression coefficient at level under 0.001, determining 7% of the fluctuations in job performance based on value of adjusted R-square. T-test is significant for removal of error at level under 0.01 and for efficiency of concentration and error percent at level under 0.05. Results of the present research concerning the first hypothesis compared to the study by Golnosh (2011) indicated that there is a significant difference on function of attention between offending driver and competent driver, such that Offending drivers acquired higher scores than competent drivers during reaction time. For this, it is suggested implementing psychological evaluate before employment.

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Further, studies by Brickman (1962) have been grounded on this hypothesis that there is a significant relationship between attention and concentration and competence in driving vehicles. Obtained results confirmed that the individuals who failed in driving test obtained the worst scores among three groups, that average scores belonged to a group who finished the test successfully and the best scores belonged to police drivers. Results of research indicated that job performance increases under reduction of reaction time and increase of attention.

The present research has aimed to increase job performance of staffs under reduction of reaction time and increase of attention, so that these two factors including reaction time and attention have been regarded as the personal differences among staffs. With regard to Campbell's model in job performance, the factors affecting job performance include theoretical knowledge, practical knowledge and skills, motivation. Practical knowledge and skills imply the knowledge on how to engage in job duties and learn the required skills including cognitive skills, motor-physical skills, inter-personal skills and management skills. Further, with regard to model of Borman and White, the contributing variables in job performance have been introduced in a model, that the cognitive variables including attention, memory and information processing have been examined in the process of evaluation. Peterson elaborated the characteristics associated to job behaviors in this way: managers and supervisors must consider the characteristics such as hard work, attention and concentration and alertness to evaluate job performance. It is expected from major hypothesis of research to pursue increasing job performance under reduction of reaction time and increase of attention. To sum up, with regard to clinical observations by researcher during implementation of tests, the staffs with higher intelligence and accuracy, more learning power, average stimulation, more emotional stability and self-confidence have enjoyed higher job performance.

REFERENCES

- Babazadeh F, Panjali Z and Rahmani A (2012).** The effect of environmental factors on job performance using manual and subjective tests. *Journal of Health and Safety* (2).
- Bagheri F (2012).** *D2 Test of Selective Attention, Concentration and Effort*, (Tehran: Arjomand publication).
- Ganji Hamza (2013).** *Practical Guide to Experimental Psychology*, (Tehran: Savalan).
- Ganji Hamza (2013).** *Psychology of work*, (Tehran: Savalan).
- Khodadadi M and Amani H (2014).** Reaction time software: Cognitive Behavioral Science Research Institute Sinai.
- Paul Spector (2013).** *Industrial and Organizational Psychology*, translated by Shahnaz Mohammadi, (Tehran : Arasbaran).
- Saatchi Mahmoud (2011).** *Psychology of Strategic Productivity*, (Tehran :Virayesh).
- Saatchi Mahmoud (2013).** *Work Psychology (Application of Psychology in the Work, Organization and Management)*, (Tehran: Virayesh).
- Saatchi Mahmoud (2014).** *Industrial and Organizational Psychology*, (Tehran: Virayesh).
- Yadu'llah M (2012).** The relationship between reaction time, intelligence and anxiety levels. *Journal of Developmental Psychology* (9) 62-53.