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Preliminary Data Validation for Identification of Teamwork Ethics Influence On Air Traffic Controllers Performance Parameters

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ABSTRACT: The paper intended to provide the data validation for the identification of influence of team ethics on the performance of air traffic controllers among Saudia Arabia air ports staffs. The validation was done selected parameters: individual environment, cognitive process, and team environment on the performance of air traffic controllers (ATCOs) in Saudi Arabia Airports., Teamwork ethics moderation on the relationship between individual environment and air traffic controllers (ATCOs) performance, and team environment and air traffic controllers (ATCOs) performance were intended. Thus, based on the preliminary examination of result, the data are consistent, the parameters are well genuinely represented, therefore the validity analysis within the evaluation degree and framework indicating the instrument designed to measure the designed parameters. Thus, both methods material validity and construct validity show consistent results. Hence, the selected parameters and method adopted are well fitted to this research sand valid for further analysis.

I. INTRODUCTION

Nowadays air route are the major travelling route where safety will never be compromised and today researchers serious looking understanding causes of weakness and strength of airport traffic management and they found that errors in communication with pilot-controller were categorized into three principal forms: the actual back/hear error, which was not correctly read by the pilot and not corrected by the controller, the absence of the pilot read-back error and hearing back errors, where a pilot read-back error involving the pilot's own mistakes was not corrected by this controller[1]. These communication errors were found to lead to aircraft breaches of separation minima within the controller-pilot re-read back-hear back closed loop. [2] concluded that supports for the reduction of pilot-controller contact errors should be prioritised. In a separate study the frequency of the content of communication errors was analyzed by errors reporting from a US control centre. The bulk of errors included errors consisting of error reading back (31% error), incorrect changes to radio communication frequencies (24% error), and addressing wrong aircraft (10%)[3]. Although the mistakes have not necessarily led to the incident, the communication mistake within one month (389) shows the prevalence and possible impacts of communication problems on performance [4]. The benefit of evaluating error reports is that the data are more inclusive than incident reports. Incident reports will only be generated if a violation of separation minima occurs, so that an analysis of main communications failures is more detailed and inclusive. ATC's unit at Saudi Arabia airports was the basis for this study [5].

Similar research must then be conducted in other countries to determine the degree to which the findings are generalized. In aviation literature many forms of miscommunication are documented. Miscommunications can involve ambiguity through word choices or context distortions. If standard phraseology is not used, this is more likely. Slips are also common types of miscommunication that lead to information not intended to be transmitted orally [6]. Of course, the pilot will then follow the instructions if this is not detected in the read back. A variety of physical and psychological causes or contributing factors may contribute to miscommunication. Physically, physical structures may affect speech intelligibility such as blocking calls or distorting communications from the radiotelephone device. III-fitting headphones can also distort verbal messages which could lead to hearing loss, as can high ambient noise in the operating room. The predictive bias is one of the most identified psychological contributors to communication mistakes or errors. In comparison to the more intensive top-down processing, expectation biases are assumed to arise from top-down information processing. Expectations of what the recipient will hear can override direct expectations which can potentially lead to failure to identify hearing errors. The frequency and probable gravity of communications error consequences resulted in pilot crew management and control equipment management including systematic and efficient communication training [7]. These programs have shown that interactions and team success have a positive impact. Where the exchange of information, including speed, precision, clarification, and responsiveness, are a working concept for communication that is customized for the ATC environment [8]. It has been clearly recognized that elements which influence the effective communication of information in the literature are sufficiently wide to include the various and diffused communications that are carried out in ATC operations [9]. Thus, this study examines the validity of selected parameters and the methods adopted.

II. METHODS

To valid the data, it is necessary to clean and screen the raw data obtained prior analysis, the process was done based on following categories of problems and criteria: data normality & linearity and missing observations, data input accuracy, and outliers. To fill out the questionnaires, the researcher take appointment from the respondents; and distributed the questionnaires to them. If the respondents face any difficulty in answering some of the questions, the researcher assisted them in clarifying the questions and helped to make the questionnaires readable. A total of 265 questionnaires were distributed while, 212 questionnaires were filled out by the respondents through scheduled questionnaire technique. Therefore, the non-response rate was 20 %. In social science and management research, most of the studies are performed by means of a questionnaire survey. Many questionnaires remain incomplete in the case of a manually conducted survey. Consequently, missing meaning becomes a common problem in the data analysis process. The lack of value issue arises when the respondents fail to respond to one or more items in the questionnaire. Missing statistics are the root of several problems in quantitative data analysis process. For example, it reduces sample size due to missed responses that reduce statistical capacity. This poses a challenge in a multivariate analysis. Overcoming such serious issues, several researchers proposed four steps to apply: 1) observe the essence of the missing data; 2) inspect the sum of the missing value; 3) investigate the randomness of the missing value; and, finally, 4) introduce solutions, e.g. imputation process. However, there are two types of missing data which are categorised into two groups: 'ignorable' and 'non-ignorable. In addition, the unrecognized form of missing data does not require any remedy for its care and may be part of the survey method. On the other hand, the non-ignorable missing value is a category of data that may be the result of the researcher's technical factors, e.g. errors during data entry or may be the result of the respondents' refusal to reply or inability to enter all the entries. No missing data were found in this study because the researchers took the appointment from the respondents before sitting for filling out the questionnaires.

III. RESULTS AND DISCUSSIONS

For analysis, a total of 212 filled-in questionnaires was used. As soon as the data was gathered through a questionnaire survey, according to the SPSS software. In this research, all questions were asked with a 5-point Likert options questions recorded as 1 – strongly agree, 2 – agree, 3 – neutral, 4 – disagree, 5 – strongly disagree. Data were checked and screened through simple frequency distributions and descriptive statistics. By straight forward checks, values that were out of range or incorrectly coded were identified. For each latent build, a frequency test was carried out to classify any incorrect, illegal, and lacking response. However, the data input was supplied correctly without any incomplete, inaccurate, or illegal values. A case with an extreme value on one variable is known as outlier (Tabachnick and Fidell, 2006). An outliner is one distinct observation from other observations due to very low or very high scores (Hair et al., 2006). Tabachnick & Fidell (2007) stated that the normality of data is affected by outliers and can influence statistical results. There are four reasons for the presence of outliers in the dataset and they are: 1) entering cases that are not part of the target population from which the sample is collected, 2) failure to specify codes for missing data that could be preserved as real data, 3) incorrect entry of data, and 4) including population observation but distribution for the variable in the population has extreme values than the normal distribution. Some scholars have provided some widely accepted thumb rules that suggest that the outlier is one in which the standard Z score can be considered up to ± 3.29 for a large sample size, and it is ± 2.5 or more as an outlier for a small sample size (i.e. 80 or less) (Hair et al., 2006). Researcher obtained z-score through SPSS performing descriptive statistics for the current research, and the values of each observation were transformed into standardized z-scores (Tabachnick & Fidell, 2007). The results of this research showed that the value of IE1, IE2, IE3, IE7, IE10, IE12, CP16, CP17, CP19, CP22, CP26, CP27, TE35. TE36, TE40, TE42, TOE43, TOE44 and TOE50 were more than ± 3.29 (see

Table) and the values of other items were within the cut off values ± 3.29. Therefore, researchers removed the outliers. We should delete the items that have outliers because, these affect statistical results like, mean, regression and so on.

Table 1 Results of univariate outliers based on standardized values

Items	N	Minimum	Maximum	Mean	Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Statistic
IE1	212	-6.58	0.31	0.00	1.00
IE2	212	-3.50	0.87	0.00	1.00
IE3	212	-3.83	0.82	0.00	1.00
IE4	212	-2.91	0.96	0.00	1.00
IE5	212	-2.49	0.98	0.00	1.00
IE6	212	-2.89	0.66	0.00	1.00
IE7	212	-3.79	0.77	0.00	1.00
IE8	212	-1.95	1.40	0.00	1.00
IE9	212	-2.29	1.46	0.00	1.00
IE10	212	-3.92	0.64	0.00	1.00
IE11	212	-3.00	1.26	0.00	1.00
IE12	212	-4.34	0.81	0.00	1.00
IE13	212	-2.73	0.93	0.00	1.00
IE14	212	-1.86	1.40	0.00	1.00
IE15)	212	-2.13	0.89	0.00	1.00
CP16	212	-4.57	0.67	0.00	1.00
CP17	212	-5.41	0.46	0.00	1.00
CP18	212	-2.85	0.61	0.00	1.00
CP19	212	-4.61	0.73	0.00	1.00
CP20	212	-2.24	1.33	0.00	1.00
CP21	212	-3.09	1.14	0.00	1.00
CP22	212	-3.51	1.27	0.00	1.00
CP23	212	-2.22	1.68	0.00	1.00
CP24	212	-2.40	0.87	0.00	1.00
CP25	212	-2.67	1.21	0.00	1.00
CP26	212	-5.03	0.61	0.00	1.00
CP27	212	-4.34	0.66	0.00	1.00
CP28	212	-1.90	1.26	0.00	1.00
CP29	212	-2.87	1.00	0.00	1.00
CP30	212	-2.68	0.67	0.00	1.00
TE31	212	-2.55	1.26	0.00	1.00
TE32	212	-2.70	1.20	0.00	1.00
TE33	212	-1.85	1.84	0.00	1.00
TE34	212	-1.43	2.31	0.00	1.00
TE35	212	-4.84	0.63	0.00	1.00
TE36	212	-3.88	1.39	0.00	1.00
TE37	212	-2.80	0.80	0.00	1.00
TE38	212	-1.90	1.02	0.00	1.00
TE39	212	-2.45	0.95	0.00	1.00
TE40	212	-3.81	0.52	0.00	1.00
TE41	212	-2.30	1.19	0.00	1.00
TE42	212	-3.99	0.62	0.00	1.00
TOE43	212	-3.86	0.90	0.00	1.00
TOE44	212	-3.53	0.90	0.00	1.00
TOE45	212	-3.05	0.81	0.00	1.00
TOE46	212	-2.34	0.85	0.00	1.00
TOE47	212	-3.3	0.91	0.00	1.00
TOE48	212	-3.3	0.87	0.00	1.00
TOE49	212	-2.54	1.00	0.00	1.00
TOE50	212	-3.79	0.84	0.00	1.00
ATCP51	212	-1.27	1.70	0.00	1.00
ATCP52	212	-1.89	1.42	0.00	1.00
ATCP53	212	-1.57	1.90	0.00	1.00
ATCP54	212	-1.23	1.64	0.00	1.00
ATCP55	212	-1.25	1.83	0.00	1.00
ATCP56	212	-1.30	1.82	0.00	1.00
ATCP57	212	-1.32	1.59	0.00	1.00

Multi Collinearity: Researcher described multicollinearity as far as the effect of any variable can be accounted for by other variables. Multicollinearity presents increasing difficulties in interpreting the effects of different variables. In this study, The VIF value was used in these investigations to observe the multicollinearity problem between variables. Tolerance referred to variability in variables not covered by other variables. Meanwhile, the indicator VIF is reciprocal tolerance variables. Meanwhile, the tolerance of all the variables were between 0.643 to 0.814 and the value of VIF were 1.228 to 1.556. It clarifies that the values of tolerance for all variables were greater than 0.1 and the VIF value is below the threshold of 10 (Hair et al., 2010). In other words, tolerance and VIF values of the variables involved in this study were within the recommended threshold values, have concluded that the issues of multicollinearity were not present in this study. Table 2 shows the multicollinearity test.

Table 2 Multi collinearity test

Variable	Collinearity Statistics	
	Tolerance	VIF
ATC performance	.814	1.228
Teamwork ethics	.710	1.409
Individual environment	.790	1.265
Cognitive process	.643	1.556
Team environment	.705	1.418

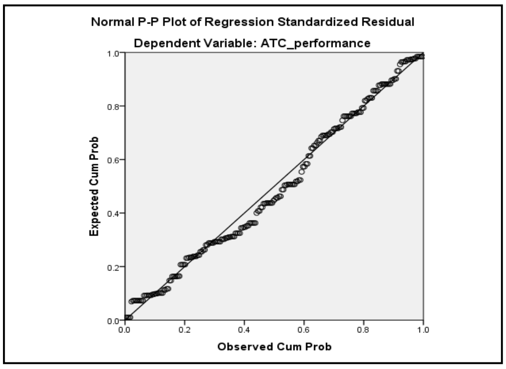
Test Linearity, Homoscedasticity, and Freedom Mistake : A large percentage of previous studies on the need for normal distribution were conducted prior to the determination of an appropriate statistical analysis also noted that the requirement for regular distribution in the use of analytical tools in analysis was devoted to substantial literature. On the other hand, the data showed non-normal allocation in many cases. There are several statistical analysis techniques available for testing data normality, such as histogram, Kolmogorov-Smirnov, skewness & kurtosis, etc. Most of the real-life data is non-normal and has been studied in many previous studies. The other method used to determine the distribution form is skewness and kurtosis. Whereas skewness represents the distribution symmetry, and kurtosis refers to the distribution 'peakedness' or 'flatness' compared to the normal distribution (Field, 2006; Hair et al., 2006). Positive skewness, according to Hair et al. (2006), represents distribution shifted to the left and tails to the right, while negative skewed distribution is reversed. The value of skewness is recommended to be zero for the normal distribution, representing a symmetric shape. In addition, the negative kurtosis value indicates a flatter distribution, whereas the peak distribution is indicated by a positive value. Kurtosis values less than 1 are considered to be negligible and values between 1 and 10 indicate moderate non-normality, whereas values above 10 indicate severe non-normality. In this research, all the variables were within the normal range of skewness and kurtosis, as presented in Table 3. The score, however, has both positive and negative values for skewness and kurtosis. According some of the researchers "negative or positive skewness and kurtosis does not represent any problem until and unless they are within normal range". Negative or positive skewness and kurtosis values also reflect the underlying nature of the construction. The severity of normality is also based on the size of the sample. Whereas the larger sample size decreases non-normality negative effects. In addition, the small sample size (less than 50 cases) has a serious effect on normality compared to the large sample size (more than 200 cases) . In the current study, the workable sample size is 212 and it was found that the data was normally distributed as the skewness value for some items was greater than ± 2 which met the requirement.

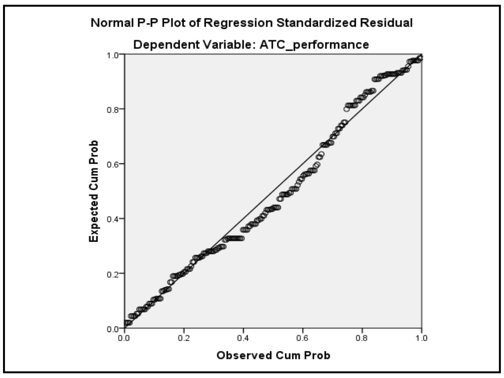
Table 3 Assessment of data normality

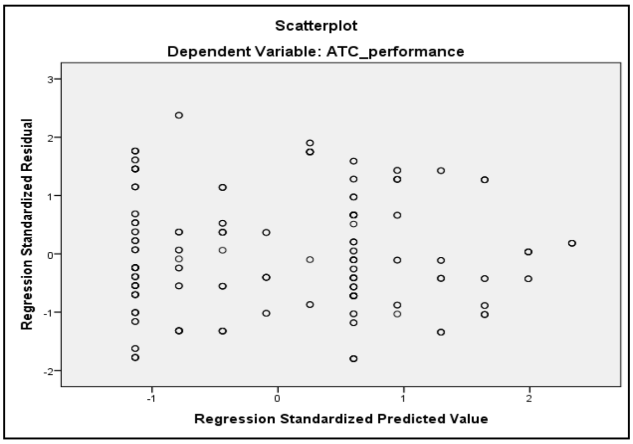
Items	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
IE4	4.25	0.77	-.847	.167	.301	.333
IE5	4.15	0.86	-.565	.167	-.774	.333
IE6	4.44	0.84	-1.467	.167	1.315	.333
IE8	3.33	1.19	-.213	.167	-.822	.333
IE9	3.44	1.07	-.087	.167	-.812	.333
IE11	3.82	0.94	-.805	.167	.758	.333
IE13	3.98	1.09	-.843	.167	-.026	.333

IE14	3.28	1.23	.005	.167	-1.000	.333
IE15	4.11	0.99	-.760	.167	-.618	.333
CP18	4.65	0.58	-1.409	.167	.994	.333
CP20	3.50	1.12	-.236	.167	-.989	.333
CP21	3.92	0.95	-.730	.167	.176	.333
CP23	3.28	1.03	.003	.167	-.565	.333
CP24	4.47	0.61	-.691	.167	-.476	.333
CP25	4.06	0.77	-.665	.167	.336	.333
CP28	4.20	0.63	-.191	.167	-.598	.333
CP29	4.22	0.77	-1.025	.167	1.122	.333
CP30	4.60	0.60	-1.203	.167	.434	.333
TE31	3.68	1.05	-.421	.167	-.425	.333
TE32	4.08	0.77	-.572	.167	.053	.333
TE33	3.01	1.08	.049	.167	-.857	.333
TE34	2.53	1.07	.373	.167	-.560	.333
TE37	4.33	0.84	-1.091	.167	.395	.333
TE38	3.95	1.03	-.638	.167	-.738	.333
TE39	4.16	0.88	-.862	.167	.004	.333
TE41	3.64	1.15	-.417	.167	-.804	.333
TOE45	4.37	0.78	-1.064	.167	.459	.333
TOE46	4.47	0.63	-.751	.167	-.425	.333
TOE47	4.36	0.70	-.889	.167	.513	.333
TOE48	4.38	0.71	-.936	.167	.420	.333
TOE49	4.15	0.85	-.814	.167	.087	.333
ATCP51	2.71	1.35	.254	.167	-1.158	.333
ATCP52	3.28	1.21	-.020	.167	-1.100	.333
ATCP53	2.81	1.15	.169	.167	-.745	.333
ATCP54	2.72	1.39	.188	.167	-1.268	.333
ATCP55	2.62	1.30	.404	.167	-.989	.333
ATCP56	2.67	1.28	.434	.167	-.840	.333
ATCP57	2.82	1.37	.214	.167	-1.214	.333

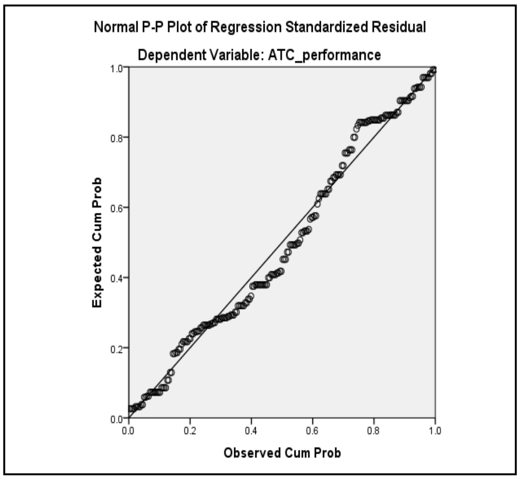
In addition, this assumption was tested by the normal probability plot of the residuals. Histogram and normal probability plot (Plot PP) of regression standardized residual is the normal method that has been validated. At first, both histogram and plot PP is used to ascertain whether it is reasonable to assume that the random errors inherent in the process are obtained from a normal distribution. Therefore, based on Figure 1 (a, b, c, and d) which were considered a good data set was modelled as data distribution did not stray far from the normal curve.







(a) (b)



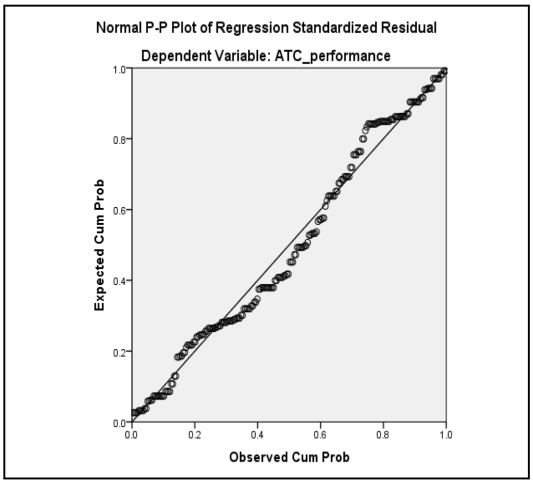
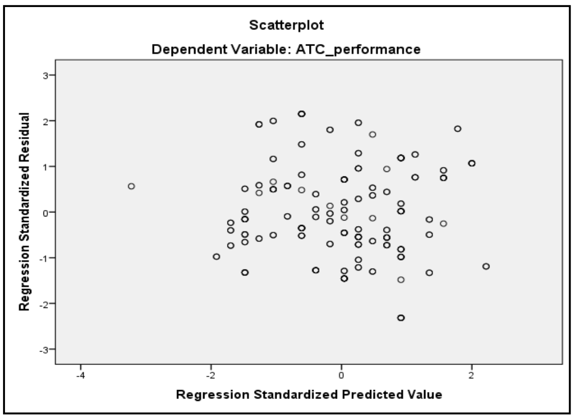
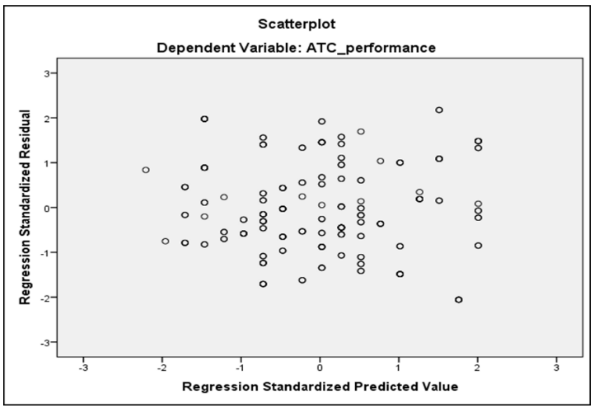


Figure 1 (a) Individual Environment (b)Cognitive Process (c) Team Environment (d) Team Work Ethics

The division has reviewed linearity, homoscedasticity, and freedom by investigating the error term scatterplot of the rest. At first, the scatterplot is often used in this test. It gives an excellent overview of the relationship between variables. In addition, the scatterplot that helps explain the regression model. Scatterplot in Figure 2a, 2b, 2c, and 2d, clearly show that there was no clear connection between the tray and the predicted value. Thus, according to some of the researcher's proposal, because scatterplot explained that no clear relationship between residual and predicted values, it was confirmed linearity, homoscedasticity, and the freedom of the rest.
(b)





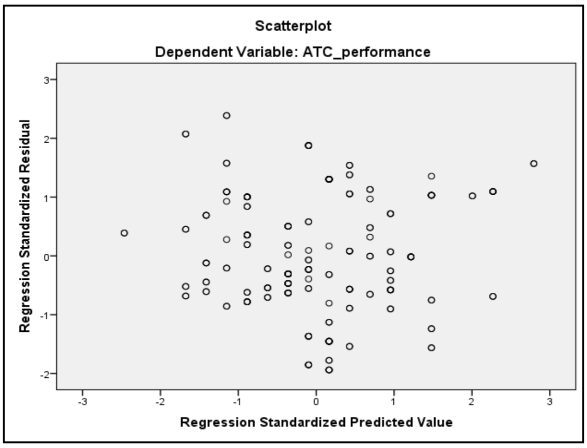


Figure 2(a) Individual Environment (b)Cognitive Process (c)Team Environment (d)Team Work Ethics

IV. CONCLUSION

The study successfully performed data in identifying influence of team ethics on the performance of air traffic controllers among Saudia Arabia air ports staffs. Based on the following parameters: individual environment, cognitive process, and team environment on the performance of air traffic controllers (ATCOs) in Saudi Arabia Airports., Teamwork ethics moderation on the relationship between individual environment and air traffic controllers (ATCOs) performance, and team environment and air traffic controllers (ATCOs) performance were intended. Thus, based on the preliminary examination of result, the data are consistent, the parameters are well genuinely represented, therefore the validity analysis within the evaluation degree and framework indicating the instrument designed to measure the designed parameters. Thus, both methods material validity and construct validity show consistent results. Hence, the study found the parameters and method adopted are well fitted to this research sand valid for further analysis.

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