

---

# Validating Individual Work Performance Questionnaire (IWPQ): A Second Order Confirmatory Factor Analysis

Waiphot Kulachai<sup>a\*</sup>, Khwanta Benchakhan<sup>b</sup>, Adi Tedjakusuma<sup>c</sup>, Patipol Homyamyen<sup>d</sup>

<sup>ab</sup> College of Politics and Government, Suan Sunandha Rajabhat University, Thailand

<sup>c</sup> Faculty of Business and Economics, University of Surabaya, Indonesia

<sup>d</sup> Faculty of Business Administration and Information Technology, Rajamangala University of Technology Suvarnabhumi, Thailand

Corresponding Email Address of Corresponding Author: waiphot.ku@ssru.ac.th

## Abstract

The main objective of this study was to validate the Individual Work Performance Questionnaire (IWPQ) developed by Koopmans et al. in 2011. The data were collected from 645 police officers attending the training courses administered by the Police Education Bureau, the Royal Thai Police, Thailand. The Second Order Confirmatory Factor Analysis was employed to validate the scale. The results showed that all sub-scales of the latent variable (work performance) had a high level of reliability. The measurement models of the three dimensions (task performance, contextual performance, and counterproductive work behavior) had a good fit with empirical data. There was a reasonable fit for the Second Order IWPQ Confirmatory Factor Analysis. We concluded that the IWPQ scale showed unreasonable fit and could not be applied directly in the Thai context. Some items and dimensions should be revised prior to adopting this scale.

**Keywords:** work performance, IWPQ, confirmatory factor analysis

## 1. Introduction

Employee performance refers to behaviors or actions that align with an organization's goals (McCloy, Campbell, and Cudeck, 1994). It can be measured by the results of work, turnover, sales volume, and quality of service delivery. Being a successful organization and achieving the organization's goal requires the cooperation of employees. However, it's important for employees to perform well. Their skills, experience and ability must be trained through the training, learning and development process from the organization including human resource management practices of the organization. Shermerhorn et al. (2000) say that performance refers to the behavior that a person performs to accomplish an assigned task. Work performance therefore refers to the outcomes that result from working to achieve an employee's goals. The performance of a person's work depends on personal characteristics, individual efforts, and organizational support.

Employees' work performance (WP) could be influenced by various factors. Sawar and Aburge (2013) found that job satisfaction makes employees more active at work. Once they are satisfied with their jobs, they will work properly, provide good service to customers, come to work on time, innovate, and create a sense of belonging to the organization, which directly affects the performance of employees and helps the organization to be more profitable. A study in Thailand by Tengpongsthorn (2017), who focus on the factors relating to the work effectiveness of police officers in the Thai Metropolitan Police Bureau, found that enough equipment was a factor facilitating an increase in work performance, whereas the imbalance of manpower and scarcity of modern equipment were factors which were obstacles to work performance of the police in Bangkok. Ahmad et al. (2018). Conducted research in Malaysia. They examined the predictive factors of job performance of police in Selangor, Malaysia. The findings revealed that job performance of the police was influenced by work stress, social support, and emotional intelligence. According to their study, emotional intelligence was the

most influential factor. Zakarani and Noor (2021) examined the influence of the workplace environment that is physical environment, supervisor support, and performance feedback on the performance of employees at the Sepang Police District Headquarters, Malaysia. The results revealed that the physical environment, supervisor support, and performance feedback significantly influence the performance of police officers. In addition, supervisor support acts as the most significant predictor of job performance of the police. Rifa'i et al. (2020) conducted a study entitled "Determinants factors affecting performance of police officers in Tangerang City, Indonesia: Role of work experience and domicile as moderating variables." They explored the influence of organizational culture, employee, engagement and work-life balance with work experience and domicile distance as moderating variables on the work performance of police officers at the Tangerang City Police." They found that organizational culture and employee engagement had a positive impact on the work performance of police officers. However, there was no relationship between the work-life balance and work performance of the police in Tangerang City.

Scholars and researchers employed various work performance measurements. Zakarani and Noor (2021) used the five-item employee's performance scale as created by Brennan, Chugh, and Kline's (2002). Ahmad et al. (2018) employed the Formal Performance Appraisals initiated by Pearce and Porter (1986) as modified by Ngah et al. (2009) to measure the performance of the police. This measurement has eight items, such as "On the whole, my performance is good," and "I can set up a task within the stipulated time frame." The Cronbach's alpha of this scale was 0.95 according to their study. In addition, Rifa'i et al. (2020) adopted the work performance scale initiated by Aguinis (2009), which consists of two dimensions and eight statement indicators. In Thailand, Tengpongsthorn (2017) created the questionnaire to measure work performance of the police based on the assessment of Thai Royal Police effectiveness rule B.E. 2547 (Royal Thai Police, 2004). This measure comprises of 10 indicators which are responsibility, quality of work, knowledge and critical thinking, willingness, punctuality, compliance, ability to manage, initiative, cooperation, and resource use. Koopmans et al. (2014) validated the construct of the Individual Work Performance Questionnaire (IWPQ) and found that there are three constructs, namely task performance (TP), contextual performance (CP), and counterproductive work behavior (CWB). These three dimensions has five, eight, and five statement as shown in Table 1.

Table 1 The IWPQ Scale

Items	
Task performance (TP)	
In the past 3 months...	
TP1	I managed to plan my work so that it was done on time.
TP2	My planning was optimal.
TP3	I kept in mind the results that I had to achieve in my work.
TP4	I was able to separate main issues from side issues at work.
TP5	I was able to perform my work with minimal time and effort.
Contextual Performance (CP)	
In the past 3 months...	
CP1	I took on extra responsibilities.
CP2	I started new works myself, when my old ones were finished.

---

CP3	I took on challenging work tasks, when available.
CP4	I worked at keeping my job knowledge up-to-date.
CP5	I worked at keeping my job skills up-to-date.
CP6	I came up with creative solutions to new problems.
CP7	I kept looking for new challenges in my job.
CP8	I actively participated in work meetings.

---

Counterproductive behavior (CWB)	
In the past 3 months...	
CWB1	I complained about unimportant matters at work.
CWB2	I made problems greater than they were at work.
CWB3	I focused on the negative aspects of a work situation, instead of on the positive aspects.
CWB4	I spoke with colleagues about the negative aspects of my work.
CWB5	I spoke with people from outside the organization about the negative aspects of my work.

---

Based on the results of their study, they concluded that the overall construct validity of IWPQ was acceptable. Its convergent validity proved to be sufficient, and its discriminative validity very good. The IWPQ provides researchers with a reliable and valid instrument to measure IWP generically, among workers from different occupational sectors, and workers with and without health problems. This present therefore validated the IWPQ of Koopmans et al. (2014) whether it is suitable for the Thai context, especially the Royal Thai Police.

## 2. Research Methods

### 2.1 Population and Samples

The population used in the study were 1,060 police officers who were trained in high police administration courses, such as Superintendent and Inspector Course at the Police Education Bureau, the Royal Thai Police. The samples or respondent size was 572 police officers derived from G\*Power3 program. This program is flexible, easy to use, and suitable for determining sample size in cases where the research uses a family of test statistics, such as F-test statistics, and chi-square test statistics (Faul et al., 2007). In the present study, we used the difference between the average before and after interventions that this research can accept or the effect size of 0.3, which is a moderate influence size, and the power of test value is .80. Then, simple random sampling was employed to collect data from prospect participants.

### 2.2 Measures

The Individual Work Performance Questionnaire (IWPQ) was employed in the present study. It consists of three dimensions and eighteen items as mentioned in Table 1. Prior to collecting the empirical data, the validity and reliability of the questionnaire were tested. Validity was examined whether questionnaire contains the full substance of the measured subject. In this present study, we used the Item-Objective Congruence Index (IOC) to indicate the validity of the questionnaire. This approach requires the discretion of at least five experts in the relevant fields to avoid the problem of ideas divided into two poles (Tirakanan, 2006). The index showing such conformity values is called the Item-Objective Congruence Index (IOC). The IOC values range from -1 to 1. Any good question should have an IOC value of close to 1, while any question with an IOC value below 0.50 should be revised (Prasitratasindh, 2003). The results showed that all questions had an IOC value above 0.50, so none of them were eliminated and the authors updated some of the text of the questionnaires based on expert recommendations and used the updated questionnaires to test their reliability.

The authors conducted a reliability test by means of a coefficient of reliability, or internal consistency, called Cronbach's Alpha. If the alpha value is below .50, it is considered less reliable (Prasitrattasindh, 2003). The authors collected data from samples similar to the actual sample of 30 people in order to analyze the data for the coefficient of reliability. The analysis result revealed the Cronbach's alpha coefficient of 0.74. However, three items of task performance (TP), and four items of contextual performance (CP) were eliminated according to the advice of the statistical program. Hence, the total scale was 11 items (see table 2 below).

Table 2 The revised IWPQ Scale

Items	
Task performance (TP)	
In the past 3 months...	
TP4	I was able to separate main issues from side issues at work.
TP5	I was able to perform my work with minimal time and effort.
Contextual Performance (CP)	
In the past 3 months...	
CP3	I took on challenging work tasks, when available.
CP4	I worked at keeping my job knowledge up-to-date.
CP5	I worked at keeping my job skills up-to-date.
CP6	I came up with creative solutions to new problems.
Counterproductive behavior (CWB)	
In the past 3 months...	
CWB1	I complained about unimportant matters at work.
CWB2	I made problems greater than they were at work.
CWB3	I focused on the negative aspects of a work situation, instead of on the positive aspects.
CWB4	I spoke with colleagues about the negative aspects of my work.
CWB5	I spoke with people from outside the organization about the negative aspects of my work.

### 2.3 Data Collection

The simple random sampling technique was used to administer the questionnaire to police officers attending training program at the Police Education Bureau. Each participant also gave consent before completing the questionnaire. After three months of the data collection process (October and December in 2019), 572 people participated in the survey questionnaire. The demographic characteristics of the sample are summarized in Table 3.

Table 3 The demographic characteristics of the sample (n = 572)

Characteristics	Percentage	Frequency
Gender	Male	497
	Female	75
Marital status	Single	145
	Married	390
	Widowed	5
	Divorced	30

	Others	2	0.35
Education	Secondary school or lower	1	0.17
	High school or equivalent	17	2.97
	High vocational or equivalent	7	1.22
	Bachelor's degree	310	54.20
	Master's degree or higher	237	41.43
Position	Sub-inspector	342	59.79
	Inspector	6	1.05
	Deputy superintendent	171	29.90
	Deputy commander	53	9.27
Type of work	Traffic	30	5.24
	Investigation	215	37.59
	Criminal suppression	172	30.07
	General affairs	155	27.10
Other characteristics		Mean	S.D.
	Age	43.582	7.6910
	Tenure	20.264	8.4076
	Income*	37,219.86	17,818.83

\*1 THB = 0.030429636 USD

## 2.4 Data Analysis

According to the data analysis, descriptive statistics for analyzing various statistical values, including percentage, frequency, mean, and standard deviation were employed. To validate the IWPQ constructs, the Second Order Confirmatory Factor Analysis was employed. The Second Order CFA is a statistical method employed by the researcher to confirm that the theorized construct in a study loads into certain number of underlying sub-constructs or components. There are six steps of conducting the Second Order CFA as follows (Suksawang, 2013):

1. Model specification: The specification of the model refers to defining the structural relationships in each element of the subject in the model.
2. Model identification: The identification of the model refers to specifying whether a subject can estimate a parameter as a single value.
3. Model estimation: The estimation of the model is the estimation of the various parameters of the model as indicated by the single probability value of the model. Different methods of approximation can be chosen including instrumental variables (IV), two-stage least squares (TS), unweighted least squares (UL), generalized least squares (GL), weighted least squares (WL), and maximum likelihood (ML) (Jöreskog & Sörbom, 2012). The present study employed ML to estimate the parameters since it is an ideal method for data with interval, ratio, and ordinal scale, where there is normal distribution or slightly irregular distribution of the data (Schumacker & Lomax, 2010).
4. Model testing: It is a step that researchers must carefully consider the model consistency index, with three principles to consider: 1) consider the consistency of the structural equation model developed with empirical data, 2) determine whether each parameter is different from zero, and 3) consider the reasonableness of the size and direction of each parameter.

5. Model modifications: Model modification is a procedure that is performed only if there are certain parameter values that do not differ from zero ( $|t| \leq 1.96$ ) or the direction of the parameter values does not match the theory.

The fit index used to determine the conformity of a hypothetical model to the empirical data consists of the various index as illustrated in Table 4.

Table 4 The fit indexes

Fit indexes	Possible values	Criteria for consideration
Chi-square	0 (perfect fit) to positive value (poor fit)	The p-value must be greater than 0.05.
Relative Chi-square	0 (perfect fit) to positive value (poor fit)	Less than 2.0
Goodness of fit Index	0 (no fit) to 1 (perfect fit)	Greater than 0.95
Adjusted Goodness of Fit Index (AGFI)	0 (no fit) to 1 (perfect fit)	Greater than 0.95
Comparative Fit Index (CFI)	0 (no fit) to 1 (perfect fit)	Greater than 0.95
Tucker - Lewis Index (TLI)	0 (no fit) to 1 (perfect fit)	Greater than 0.95
Non Norm Fit Index (NNFI)	0 (no fit) to 1 (perfect fit)	Greater than 0.95
Norm Fit Index (NFI)	0 (no fit) to 1 (perfect fit)	Greater than 0.95
Root Mean square Residual (RMR)	0 (perfect fit) to positive value (poor fit)	It has a value approaching zero (depending on the degree determined by the researchers)
Standardized RMR (SRMR)	0 (perfect fit) to positive value (poor fit)	Less than 0.05
Root Mean Square Error of Approximation (RMSEA)	0 (perfect fit) to positive value (poor fit)	Less than 0.05 or 0.08
Parsimony Normed Fit Index (PNFI)	0 (perfect fit) to positive value (poor fit)	Compare alternative models, which models have a higher PNFI value are better
Akaike Information Criterion (AIC)	0 (perfect fit) to positive value (poor fit)	Compare alternative models, which models have less AIC value are better

Source: Suksawang (2013)

The present study employed index of statistical values that are used to examine and show whether the model is fit with the empirical data. It consists of  $p$ -value  $> .05$ ,  $\chi^2/df < 2$ ,  $GFI > 0.95$ ,  $NFI > 0.95$ ,  $CFI > 0.95$ ,  $RMSEA < 0.05$  (Hair, Back, Babin, & Anderson, 2010; Suksawang, 2013). However, prior to the analysis, the assumptions of a CFA including multivariate normality, a sufficient sample size ( $n > 200$ ), the correct a priori model specification, and data must come from a random sample were considered.

### 3. Results and Discussion

#### 3.1 Multivariate Normality Testing

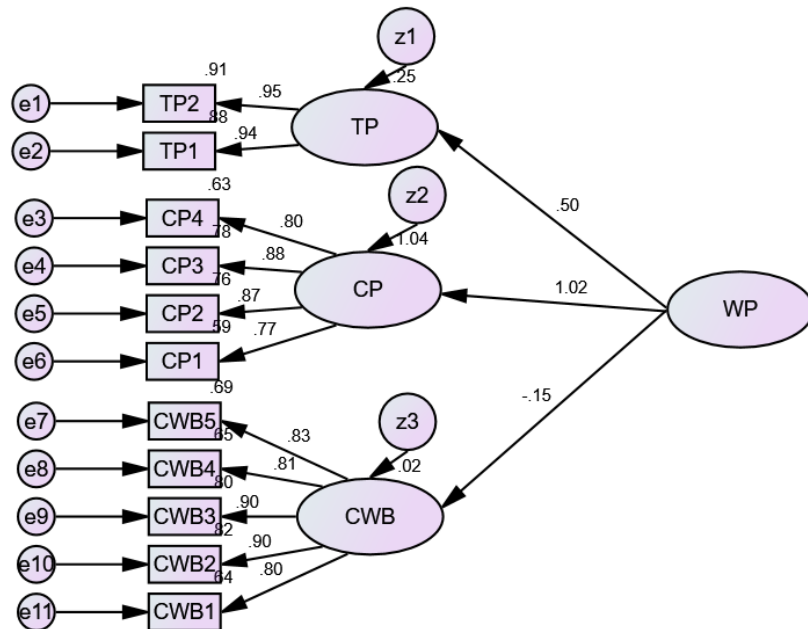
To test the multivariate normality, the authors employed kurtosis ( $< 10.0$ ) and skewness ( $< 3.0$ ) as criteria indicating normal distribution. The analysis results indicate that there is multivariate normal distribution as shown in Table 5. According to table 5, the skewness value is between .199-1.427, while the kurtosis value is between .083 - 1.616 indicating normal distribution criteria is accepted.

Table 5 Skewness and Kurtosis

Observed variable	Mean Statistic	S.D. Statistic	Skewness		Kurtosis	
			Statistic	Std. Error	Statistic	Std. Error
TP1	4.040	.6320	-.199	.102	.083	.204
TP2	3.990	.6721	-.439	.102	.754	.204
CP1	4.075	.7221	-.758	.102	1.616	.204
CP2	4.089	.6831	-.478	.102	.602	.204
CP3	4.180	.6435	-.502	.102	.939	.204
CP4	3.965	.6893	-.437	.102	.611	.204
CWB1	2.086	1.1126	.757	.102	-.289	.204
CWB2	1.682	.9635	1.427	.102	1.339	.204
CWB3	1.799	1.0198	1.226	.102	.811	.204
CWB4	2.135	1.0902	.764	.102	-.235	.204
CWB5	1.874	1.0677	1.154	.102	.536	.204

### 3.2 Second Order CFA Results

The results revealed the model chi-square of 790.430 with 52 degrees of freedom. The *p*-value was significant. According to Hair et al. (2010), the number of samples greater than 250, and the observed variables less than 12, the insignificant *p*-value should be expected. Hence, the chi-square goodness-of-fit statistic did not indicate that the observed covariance matrix matches the estimated covariance matrix within sampling variance. The value of GFI and RMSEA, the absolute fit index, were .845 and .158 in that order. These values indicate that the model was not fit. The normed chi-square was 15.201 which falls above 2.00 indicating an unacceptable fit for the CFA model. According to the incremental fit indices, the CFI, an incremental fit index, had a value of .806, which does not exceed the suggested cut-off values. In addition, the AGFI, a parsimony fit index, had the value of .803, which reflects a poor model fit as illustrated in Figure 1.



Chi-square = 790.430, df = 52, Chi-square/df = 15.201, p = .000, GFI = .845, AGFI = .803, CFI = .806, TLI = .794, RMSEA = .158, RMR = .282, NFI = .795

Figure 1 Hypothesized CFA model

Figure 2 illustrates the modification of the model according to the modification indices. The results of the revised model revealed the model chi-square of 642.642 with 49 degrees of freedom. The p-value was significant. According to Hair et al. (2010), the number of samples greater than 250, and the observed variables less than 12, the insignificant p-value should be expected. Hence, the chi-square goodness-of-fit statistic did not indicate that the observed covariance matrix matches the estimated covariance matrix within sampling variance. The value of GFI and RMSEA, the absolute fit index, were .891 and .146 in that order. These values indicate that the model was not fit. The normed chi-square was 13.115 which falls above 2.00 indicating an unacceptable fit for the CFA model. According to the incremental fit indices, the CFI, an incremental fit index, had a value of .844, which does not exceed the suggested cut-off values. In addition, the AGFI, a parsimony fit index, had the value of .854, which reflects a moderate model fit. All information of goodness-of-fit statistics is illustrated in Figure 2.

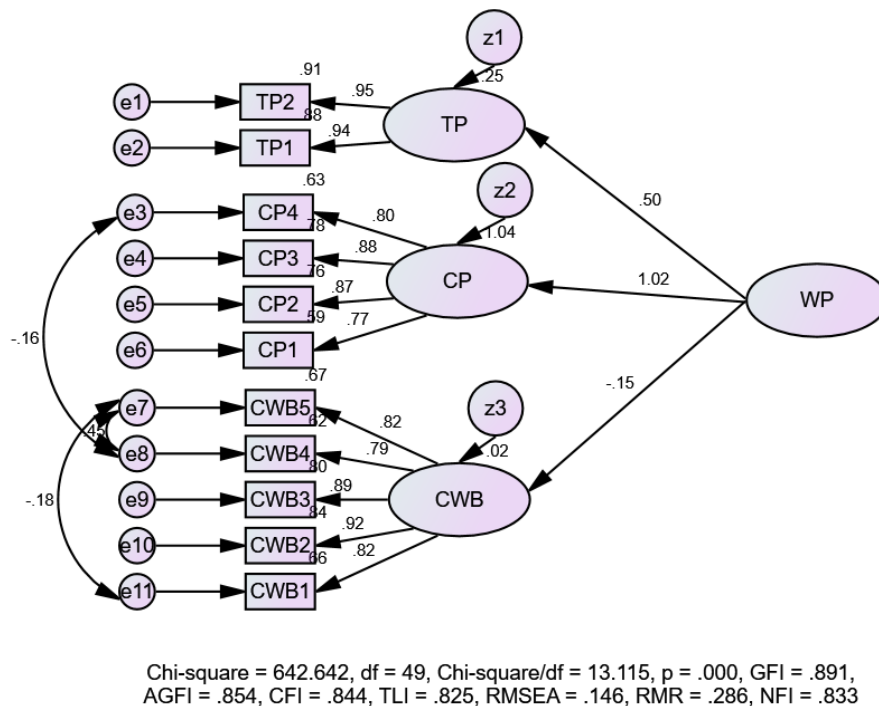


Figure 2 Revised CFA model

Table 6 illustrates the overall results of the Second Order Confirmatory Factor Analysis. The results of hypothesized CFA model and revised CFA model were compared. Even the authors modified the model suggested by modification indices, the model still no longer fit with the empirical data.

Table 6 The results of Second Order Confirmatory Factor Analysis

Fit indexes	Criteria	Hypothesized CFA model		Revised CFA model	
		Value	Description	Value	Description
p-value	> .05		Not pass	.000	Not pass
$\chi^2/df$	<2		Not pass	13.115	Not pass
GFI	> 0.95		Not pass	.891	Not pass
NFI	> 0.95		Not pass	.833	Not pass
CFI	> 0.95		Not pass	.844	Not pass
RMSEA	< 0.05		Not pass	.146	Not pass
TLI	> 0.95		Not pass	.825	Not pass



Figure 2 reveals that the three dimensions of work performance had factor loading of .50 for task performance, .1.02 for contextual performance, and -.15 for counterproductive work behavior. These indicate that counterproductive work behavior dimension contributed poorly to the work performance construct while the other two dimensions provided moderate and good contribution. The results revealed the standardized factor loadings, an average variance extracted, and the construct reliability as illustrated in Table 7.

Table 7 Standardized factor loadings, average variance extracted, and construct reliability.

Dimension/Item	Standardized factor loadings		
Task performance (TP)			
TP1	.94		
TP2	.95		
Contextual performance (CP)			
CP1		.77	
CP2		.87	
CP3		.88	
CP4		.80	
Counterproductive work behavior (CWB)			
CWB1			.82
CWB2			.92
CWB3			.89
CWB4			.79
CWB5			.82
Average variance extracted (AVE)	.8931	.6911	.72.15
Construct reliability (CR)	.9206	.9960	.9916

According to Table 7, the lowest loading obtained is .77 contextual performance (CP) to item 3 “CP1.” All factor loadings were greater than the .70 standard. The average variance extracted estimates (AVE) and the construct reliabilities (CR) are shown in the bottom of the table. The AVE estimates range from 69.11% for contextual performance (CP) to 89.31% for task performance (TP). All exceed 50% rule of thumb. The CR ranges from .9206 for the TP construct to .9960 for the CP construct. These exceed the .70 standard which indicates adequate reliability.

#### 4. Discussion

According to the analysis results, we concluded that the IWPQ scale showed unreasonable fit and could not be applied directly in the Thai context. Some items and dimensions should be revised prior to adopting this scale. These findings shown that the IWPQ provides sufficient convergent validity which is consistent with a previous study conducted by Koopmans et al. (2014). Some studies also found that IWPQ shows a good face of structural validity (Borman & Motowidlo, 1993; Koopmans et al., 2013). Ramdani et al. (2019) conducted research on the topic “The individual work performance scale: A psychometric study and its application for employee performance.” They also found that the IWPQ shows a good convergent validity with presenteeism and correlate with job burnout. However, the factor loadings of each dimension are questionable and need to be examined.

#### 5. Conclusion

This study addressed the work performance of police officers in Thailand. The study was designed to answer a fundamental question whether the IWPQ is suitable to be adopted in the Thai context. The findings revealed that the IWPQ CFA model does not fit with the

---

empirical data. Hence, researchers should validate the IWPQ scale prior to adopting it. Interestingly, counterproductive work behavior yielded low factor loadings (<0.30). This dimension could be eliminated from the analysis. Also, competing, or alternative model could be established for future research. However, this study helped us to understand the relationship direction between each dimension and work performance construct.

## 6. Conflict of Interest

The authors of this article declare no conflict of interest.

## References

1. Aguinis, H. (2009). *Performance management* (2<sup>nd</sup> ed.). Upper Saddle River, London: Prentice Hall/Pearson Education.
2. Ahmad, A., Ibrahim, R.Z.A.R., & Bakar, A.A. (2018). Factors influencing job performance among police personnel: An empirical study in Selangor. *Management Science Letters*, 8(2018), 939–950.
3. Borman, W. C., & Motowidlo, S. M. (1993). Expanding the criterion domain to include elements of contextual performance. In: Schmitt, N. and Borman, W.C., Eds., *Personnel Selection in Organizations*, Jossey-Bass, San Francisco, 71- 98.
4. Brennan, A., Chugh, J. S., & Kline, T. (2002). Traditional versus open office design: A longitudinal field study. *Environment and Behavior*, 34(3), 279-299.
5. Faul, F., Erdfelder, E., Lang, A.G., & Buchner, A. (2007). G\*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39, 175-191.
6. Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R.E. (2010). *Multivariate data analysis* (7<sup>th</sup> ed.). New York: Pearson.
7. Jöreskog, K. G., & Sorbom, D. (2012). *LISREL 9.1: LISREL syntax guide*. Chicago: Scientific Software International.
8. Koopmans, L., Bernaards, C., Hildebrandt, V., van Buuren, S., van der Beek, A.J. and de Vet, H.C.W. (2013). Development of an individual work performance questionnaire. *International Journal of Productivity and Performance Management*, 62(1), 6-28.
9. Koopmans, L., Bernaards, C.M., Hildebrandt, V.H., Vet, H.C.W. de, Beek, A.J. van der. (2014). Construct validity of the Individual Work Performance Questionnaire. *Journal of Occupational and Environmental Medicine*, 56(3), 331-337
10. McCloy, R. A., Campbell, J. P., & Cudeck, R. (1994). A confirmatory test of a model of performance determinants. *Journal of Applied Psychology*, 79(4), 493–505.
11. Ngah, R., Jusoff, K., & Rahman, Z. A. (2009). Emotional intelligence of Malaysian academia towards work performance. *International Education Studies*, 2(2), 103-112.
12. Pearce, J. L., & Porter, L. W. (1986). Employee responses to formal performance appraisal feedback. *Journal of Applied Psychology*, 71(2), 211–218.
13. Prasitrattasindh, S. (2003). *Methodology for social science research* (12<sup>th</sup> ed.). Bangkok: Fuengfah Printing.
14. Ramdani, Z., Marliani, R., & Rahman, A.A. (2019). The individual work performance scale: A psychometric study and its application for employee performance. *Humanities & Social Sciences Reviews*, 7(5), 405-414.
15. Rifa'i, A., Tannady, H., & Syah, T.Y.R. (2020). Determinants factors affecting performance of police officers in Tangerang City, Indonesia: Role of work experience and domicile as moderating variables. *International Journal of Research and Review*, 7(12), 168-177.

- 
16. Royal Thai Police. (2004). The evaluation of Thai royal police effectiveness rule B.E. 2547. Retrieved 10 May 2019 from <http://www.edupol.org/edp/edp1/LAW/POLICE14.PDF>
  17. Sarwar, S., & Abugre, J. (2013). The influence of rewards and job satisfaction on employees in the service industry. *The Business and Management Review*, 3(2), 23-32.
  18. Schermerhon, J. R., Hunt, J. G., & Osborn, R. N. (2000). *Organizational behavior* (7th ed.). New York: John Wiley and Sons Inc.
  19. Schumacker, R.E., & Lomax, R.G. (2010) *A beginner's guide to structural equation modeling*. New York: Routledge.
  20. Suksawang, P. (2013). *Structural equation modeling*. Bangkok: Thai Wattana Panich.
  21. Tengpongsthorn, W. (2017). Factors affecting the effectiveness of police performance in Metropolitan Police Bureau. *Kasetsart Journal of Social Sciences*, 38(1), 39-44.
  22. Tirakanan, S. (2006). *The use of statistics in social science research: A practical guide*. Bangkok: Chulalongkorn University Press.
  23. Zakarani, M.Z., & Noor, N.H. (2021). Workplace environment and job performance of police officer during the COVID-19 crisis. *Journal of Administrative Science*, 18(1), 249 – 267.