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A Review of the Second Order Construct of Public Service Motivation: Reflective or Formative?

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Abstract

The Public Service Motivation construct in different cultural contexts might differ in terms of the cause of formation. This paper attempts to reveal whether the second-order construct of public service motivation is reflective or formative. Based on the data of" Taiwan Government Bureaucratic Survey (TGBS)", we apply four algorithms to test and compare various indicators of the model to judge whether public service motivation is a second-order formative construct or a second-order reflective construct. Results showed that: the goodness of fit of the first-order reflective and second-order reflective construct were higher than the first-order reflective and second-order construct.

Keywords: Public service motivation, second-order construct, reflective construct, formative construct

1. Introduction: Debate on the Formative Model Versus the Reflective Model

Empirical studies have shown that using a reflective model to operationalize attributes that "should have been formatively modeled" (Chen, 2019)has serious consequences in terms of estimating the structural relationships between different theoretical constructs, which is common in the fields of management, marketing, consumer research, and information science and leads to type 1 and type 2 errors, resulting in excessive parameter estimation errors (Nianxin Wang, Weijun Zhong, & Shu E Mei, 2011; Peter, Straub, & Rai, 2007; Kim, Shin, & Grover, 2010). Over the past 20 years, public service motivation (PSM) has become a hot topic in academic research and an important field in personnel management and behavior science (Gailmard, 2010；Meng & Wu,2017), offering a new perspective to study the motivation of civil servants that differs from public choice theory. PSM refers to the act of doing good for others and shaping the welfare of society (Esteve, Urbig, Witteloostuijn, & Boyne, 2016: 178), which is intrinsic motivation (Du, Qian, & Feng,2014). Since the development of the concept of public service motivation and the measurement scale, as a second-order construct, public service motivation is widely used in structural equation modeling and confirmatory factor analysis in public administration research over the past 30 years (Zhezhe, 2018). Currently, academics believe that the first-order construct of public service motivation is a reflective construct. This understanding also affects the explanatory power of the public service motivation model and the reliability and validity of the conclusions drawn based on the model.

However, scholars are still debating whether public service motivation is formative or reflective. Some scholars have put forward the concept that public service motivation is a "first-order reflective and second-order formative" construct (Wright, 2008; Wright & Pandey, 2008), which is supported in some empirical studies (Kim, 2011; Haosheng & Ming, 2014). Other academics still believe that public service motivation is a "first-order reflective and second-order reflective" construct (Coursey, Perry, Brudney, & Littlepage, 2008). Many empirical studies believe that in the modeling of structural equation, public service motivation is a kind of construction of "first-order reflection and second-order reflection", and the fit of the models were found to be good (Lee & Choi,

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2016; Steijn, 2008). The question then becomes whether the second-order construct of public service motivation is reflective or formative. The answer can be found through theoretical discussions or empirical data analyses (Peter, Straub, & Rai, 2007). This paper uses AMOS 21.0 and SmartPLS 3.0 to analyze the indicators of the model of public service motivation by using data from Taiwan. Focusing on Taiwan, where Confucian cultural traditions are prevalent and newly emerging democracy grows vigorously, this article uses data of a large sample questionnaire survey on Taiwan's civil service system that is noted for its accountability. In addition, this article discusses the role of values in the making of red tape construct within the Confucian cultural context, with several algorithms including structural equation model (SEM) and second-order confirmatory factor analysis (CFA).

2. Literature Review: Debate on the Construct of Public Service Motivation

Constructs are also called latent variables, hidden latent variables, or unobserved variables in empirical scientific research, As a term denoting an abstract concept that is used to describe a phenomenon of theoretical importance (Cronbach & Meehl, 1956), a construct is often impossible to directly measure and observe, but some observable variables (observed variables, measured variables, or manifest variables) can be identified as its substitute indicators. According to the direction of the causal relationship between the construct and the index, the entire model in structural equation modeling (SEM) can be divided into reflective or formative (Jarvis, MacKenzie, & Podsakoff, 2003). From a conceptual perspective, the reflective model infrastructure exists; the basic structure of the construct in the formative model is formed. From the causal direction, the direction in the reflective model is from constructs to measurement; the direction in the formative model is from measurement to constructs. (Edwards, 2011). The potential construction of public service motivation and the nature of the relationship between its dimensions should be clearly defined theoretically.

However, when the theory was put forward and the scales were developed, it was not clearly stated whether public service motivation should be defined as a formative or a reflective construct because the nature of the multidimensional and high-order constructs was hardly noticed in the field of public administration at that time (Perry, 1996). Therefore, there is mixed use of formative and reflective constructs in empirical research (Kim, 2009; Kim, 2011). The second-order constructive nature of public service motivation is still controversial.

(1) Measurement scales of public service motivation and the number of first-order dimensions

As mentioned above, the measurement scale of public service motivation and the first-order subdimension are controversial in their design. At present, Perry's four-dimensional public service(Perry, 1996) motivation scale after verification is most widely used: attraction to public policy making (APM), compassion (COM), commitment to the public interest (CPI), and self-sacrifice (SS). This study also adopted these four dimensions, and then translated the scale into Chinese and designed 14 topics through discussion with relevant experts. Some scholars have applied the public service motivation to various models and analyzed differences in the number of subdimensions of public service motivation (Kim, 2012; Yuanjie & Chaoping, 2016). Others have considered the problem from theoretical analysis and statistical indicators (mainly the reliability and validity of a one-dimensional measurement scale) (Kim, 2011; Haosheng & Ming, 2014). There are mainly four-dimensional (Camilleri, 2006), three-dimensional (Dehart-Davis & Pandey, 2010), two-dimensional (Leisink & Steijn, 2009), and one-dimensional (Moynihan & Pandey, 2007) . The indicators used in the empirical study of public service motivation and the indicators of various models proposed by researchers have good explanatory power and applicability of the models in China.

However, if we regard the second-order construct of public service motivation as a reflective construct, we can decompose it into one, two, three, or four dimensions to analyze public service motivation, because omitting scales or dimensions will not change the essence of public service motivation. However, if public service motivation is seen as a formative construct, this practice is unacceptable, because dimension omission may change the meaning of public service motivation. In a formative model, many empirical studies confirm that the formative construct dimension is being scaled down which may have quite serious consequences and produce numerous estimation errors (Peter, Straub, & Rai, 2007). Although empirical studies on public service motivation have achieved remarkable results, previous studies have not identified the nature of public service motivation. The results of different samples and different countries have consi-

derable similarities and differences in the models of public service motivation (Wright, 2008; Wright & Pandey, 2008; Coursey, Perry, Brudney, & Littlepage, 2008), leading to differences and conflicts in research results. Obviously, Obviously, some of the changes may be just sampling errors or differences between samples, differences between countries or regions, but some inconsistencies may be caused by misspecifying the models of public service motivation. Therefore, we need to determine whether it is proper to use a formative and r eflective model with public service motivation. it is more appropriate to use reflective or models of public service.

(2) Reflective and formative models

The discussion on the relationship between dimensions and measurement scales and between dimensions and higher-order constructs is still insufficient (Pandey & Scott, 2002). In the past 10 years or so, the difference between reflective models and formative models has begun to attract academic attention(Jarvis, MacKenzie, & Podsakoff, 2003; Esteve, M., Urbig, D., van Witteloostuijn, A., & Boyne, G. 2016). According to the direction of causality flows between the index and the construct in the models, the measurement models in structural equation modeling can be divided into reflective models and formative models (Jarvis, MacKenzie, & Podsakoff, 2003). Generally speaking, different models that use potential constructs to reflect multiple indicators have been mentioned in the structural equation modeling literature: a formative model and a reflective model. In addition to the theoretical distinction, in empirical research, if the relationship between constructs and measurement indicators meets the following conditions, the structural equation should be modeled as a formative model: (a) items are regarded as the characteristics of constructs, (b) changes will lead to the change of the constructs, (c) the change of the constructs will not lead to changes in the project, (d) do not necessarily share a common theme, (e) delete items may change structure, (f) the change of the value of a project is expected to not necessarily with all other changes of the project, and (g) the premise and the results are not expected to have the same project. If the indicators are the opposite, then the construct model should be modeled as a reflective model (Jarvis, MacKenzie, & Podsakoff, 2003; Peter , Straub, & Rai, 2007). More importantly, constructs are usually designated to include multiple layers and multiple dimensions at a more abstract level. For example, second-order constructs sometimes includes multiple first-order dimensions of formation or reflection. The relationship between first-order dimensions and second-order constructs may also be formative or reflective. The indicators of the judgment are as mentioned above. These standards provide researchers with a practical method to determine the appropriate measurement model to be used in the study and to avoid model setting errors.

The relationship between reflective constructs and first-order dimensions is similar to reflective measurement. The relationship between formative constructs and first-order dimensions is similar to formative measurement (Edwards, 2011). Reflective models have a long tradition in the social sciences, and the formation of models was first introduced more than 40 years ago. But it is still rarely used (Diamantopoulos, Riefler, & Roth, 2008). If the causal relationship between the construct and measurement is not established in the right direction, it will cause serious deviations in the parameter estimation (Jarvis, MacKenzie, & Podsakoff, 2003). Public service motivation has been considered as a multidimensional second-order structure since it was proposed. It is also called a second-order construct with different numbers of potential first-order dimensions(Chen, C. A., Chen, D. Y., Liao, Z. P., & Kuo, M. F. (2019).). On the one hand, in order to avoid estimation errors, we need to understand whether public service motivation leads to first-order dimensions such as attraction to policy making, commitment to the common good, compassion, or self-sacrifice (reflective construct) or if all first-order dimensions lead to public service motivation (formative construct), which determines the nature of the model in the result equation applying public service motivation. On the other hand, according to the previous judgment criteria, the indicators of reflective construct are basically interchangeable. Thus, adding or removing metrics may affect the reliability of the construct, but it does not change the basic nature of the construct. On the contrary, omitting an indicator of a construct means removing a part of the construct that forms the model, and the change in formative index leads to a change in the nature of the construct, which will definitely affect its other indices. Based on this view, some scholars believe that the motivation for public service is a completely reflective second-order model (Perry, 1996; Coursey & Pandey, 2007a). But some scholars also believe that public service motivation is a first-order and second-order reflective construct should be constructed as formative models (Wright,2008; Wright &

Pandey, 2008; Kim, 2011; Haosheng & Ming, 2014). From the above analysis, it can be seen that there is no debate on the reflective nature between the first-order construct and the measurement index (items) of public service motivation. However, However, there is a contrary view of the nature of the relationship between first-order construct and second-order construct. A large number of empirical studies have shown that misspecification of the measurement model will lead to a serious deviation in the estimation of the model parameters and may lead to incorrect conclusions on the relationship between the constructs. In the Monte Carlo simulation model, irregularities may inflate the non-standardized structural parameter estimates by up to 400% or shrink them by up to 80% (Jarvis, MacKenzie, & Podsakoff, 2003; MacKenzie et al., 2005), which means that previous empirical models of public service motivation may have contained incorrect estimation.

In order to obtain the necessary conditions to determine the formation of constructs, in this study we draw on the existing research methods (Jarvis, MacKenzie, & Podsakoff, 2003;Coursey & Pandey, 2007a, 2007b), and establish a structural equation model between public service motivation and two reflective constructs: job involvement (JI) and organizational commitment (OC). Previous studies have shown that the relationship between public service motivation and job engagement(Perry, 2008) and organizational commitment (Kim, 2005; Kim, 2007) have positive causal relationships. Based on this finding, we have established two models: a reflective model and a formative model. The only difference between the two models lies in the causal relationship between public service motivation and its first dimension, as shown in Figure 1 and Figure 2. The key parameter to solve the debate on the formative or reflective nature of public service motivation is the relationship between the first-order potential variables and the second-order potential variable. The quality of the model can be judged by the difference between its predictive ability for other variables and the goodness of fit of the overall model (Coursey & Pandey, 2007a, 2007b), and then the conclusion that the nature of public service motivation is either formative or reflective can be drawn. Therefore, based on the above analysis, hypothesis 1 and hypothesis 2 are proposed.

Hypothesis 1: The predictive ability of "first-order reflection and second-order reflection" public service motivation is higher than that of "first-order reflection and second-order formation" public service motivation.

Hypothesis 2: The goodness of fit of public service motivation is higher for the constructs of "first-order reflection and second-order reflection" than for the constructs of "first-order reflection and second-order formation".

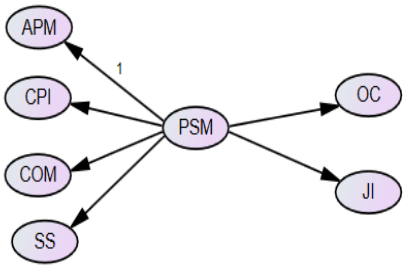

Figure 1. Reflective Model

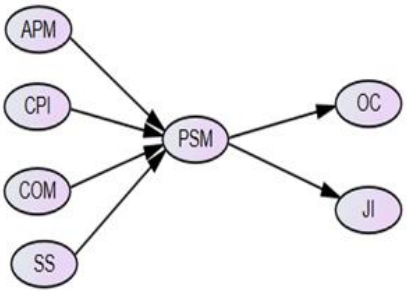

Figure 2. Formative Model

3. Data sources, research methods and evaluation criteria

(1) Data sources and variable descriptions

The data for this study is from the program "Research on The Performance of Democratic Governance in Taiwan 2011 TGBS Civil Servant Opinion Research Questionnaire" (NSC-98-2410-H-004-035-MY2, hereinafter referred to as the 2011 Taiwan Civil Servant Survey). " implemented by the Department of Public Administration of Taiwan Chengchi University. The research takes civil servants (excluding government officials) of 39 government departments (excluding local governments) including the Ministry of the Interior" and the Ministry of Finance under Taiwan's Executive Yuan system as the research object and adopts a stratified random sampling method, which covers positions in charge and non-charge positions, 14-grade officials such as the Committee for Recommendation, etc., and 1,646

questionnaires are collected. The respondents filled out the questionnaire themselves. The population list was provided by the Central Office of Personnel Administration. The demographic information of the data can been seen at Table 1. According to the AMOS and PLS algorithm, the missing items (not systematic omissions) need to be deleted, and the missing values are processed by checking and excluding individual cases, leaving 1,430 valid samples that can be used for structural equation model analysis.

Table 1. Demographic information of the data

Position	Supervisor		Non supervisor	gender	male		Female	
	23.80%		76.20%		48.6%		51.4%	
Grade	Directed	recommended	appointed	Birthplace	southern Fujian	Hakka	other provinces	inhabitants
	14.10%	64.10%	21.70%		64.30%	9.5%	24.7%	0.9%
Age	Average	Entering public sector time(year)	Average	Education Background	Specialist	undergraduate	master	doctoral
	44.64		16.97		17.4%	31.6%	47.9%	3.1%

(*Source: Department of Public Administration, Taiwan University of Political Science, "Research on Taiwan's Democratic Governance Performance 2011 TGBS Civilian Opinion Survey Questionnaire."*)

(2) Research methods and model evaluation criteria

In keeping with the existing four algorithms for distinguishing the formative model from the reflective model, we applied the AMOS 21.0 and SmartPLS 3.0 analysis tools.

On the one hand, AMOS is used to deal with the traditional maximum likelihood method (MLE), unweighted least squares (UWLS), and asymptotically distribution-free (ADF). These three algorithms reflect the recommendations of Diamantopoulos and Winklhofer (2001), Law, Wong, and Mobley (1998), MacCallum and Browne (1993), and Jarvis, Mackenzie, and Podsakoff (2003). The MLE and UWLS mainly draw on the algorithm and distinguishing criteria of Coursey et al. (2007) on the distinction of red tape constructs, while ADF draws on Kim's (2010) algorithm and criteria for distinguishing public service motivation dimensions, mainly using the traditional MLE and UWLS methods. To compare the reflective and the formative models in the three algorithms in AMOS, the chi-square value, the goodness-of-fit index (NFI, GFI, and AGFI) and the approximate root mean square error (RMSEA) are generally used: the smaller the chi-square value, the better, the smaller the χ^2/df value, the better. Generally speaking, it is considered that a value below 5 is acceptable and a value below 3 is excellent. In previous empirical studies, the Monte Carlo simulation showed that RMSEA and GFI have good recognition effect on model errors under various goodness of fit indexes (Jarvis, MacKenzie, & Podsakoff,2003; MacKenzie, Podsakoff & Jarvis, 2005). When GFI (NFI, AGFI) is equal to or greater than 0.90 and the RMSEA value is less than 0.08, the data of this model has a good fit (Hu & Bentler, 1999). Generally speaking, the larger the GFI value, the smaller the RMSEA value, the better the model fitting (Bollen, 1989). The correct direction of causality between public service motivation and its dimensions can make the model more consistent (MacCallum & Browne, 1993).

On the other hand, SmartPLS can be used to deal with the partial least squares regression algorithm (PLS). The PLS method that has been chosen in recent years is to define a principal component structure through linear integration; we used the regression principle to interpret the relationship between the principal components. Therefore, it is called component-based SEM. Pattern setting in PLS has two forms: formative and reflective. Compared with AMOS and lisrel software, PLS has advantages in dealing with formative models: It can output the goodness of fit of the model, which can be used to judge the formative or reflective nature of public service motivation. In the PLS model, the potential variable can be set as the source of variation affecting the measured variable (reflective model), or the variation of the potential variable can be set as determined by the measured variable (formative model) (Haozheng, 2011). Many scholars believe the PLS method has particular advantages in analyzing formative models (Kim, 2011; Haosheng & Ming, 2014). The advantages and disadvantages of the MODEL are reflected in the overall goodness of fit of the PLS model, which is the geometric mean of average common factor variance and average measure coefficient of endogenous potential variables (Tenenhaus, Vinzi, Chatelin, & Lauro, 2005), with a value range of 0 ~ 1, the greater is better. At present, there is no consensus in the academics on

the judgment standard, and some scholars propose that GoF should be greater than 0.25 (Pauwels & Patterson, 2009). In order to distinguish the formative and reflective nature of public service motivation, this paper adopt the latest SmartPLS 3.0 to conduct an exploratory empirical research on the nature of public service motivation.

4. Research Results

To determine the nature of a formative or reflective construct, we analyzed a formative model and a reflective model of public service motivation, and compared the difference between the predictive ability and the goodness of fit of the overall model (Davis & Stazyk, 2017; Perry & Wise, 1990; Kim & Vandenabeele, 2010). Tables 2 and 3 list the judging criteria of the four algorithms. Below, we compare and analyze the predictive ability and goodness of fit of the models.

Table 2. Reliability Index of Measurement Scale

Dimensions	Topic	N	Mean value	Standard deviation	Factor load	Factor reliability	Factor load	Factor reliability (after deletion)
OC	I am very happy to stay in the present service agency. (rev)	1430	4.17	1.21	0.84	0.81	0.84	0.81
	I don't think I have any feelings for the current service agency.	1430	2.53	1.11	0.85		0.85	
	I feel that I am a member of the big family of the government.	1430	4.56	1.06	0.89		0.89	
JI	It's hard for me to get very involved in my current job. (rev)	1430	4.37	1.01	0.82	0.80	0.82	0.80
	At the end of the day, I feel good about the work I do in this organization.	1430	3.88	1.05	0.83		0.83	
	Time seems to drag while I am on the job. (rev)	1430	4.47	1.01	0.88		0.88	
APM	"Politics" is a dirty word to me. (rev)	1430	3.60	1.29	0.80	0.70	0.80	0.70
	I don't care much for politicians. (rev)	1430	3.65	1.25	0.84		0.84	
	The give and take of public policy making doesn't appeal to me. (rev)	1430	4.11	1.08	0.74		0.74	
CPI	It is hard for me to get interested in what is going on in my community. (rev)	1430	4.41	0.94	0.42	0.67		0.75
	I unselfishly contribute to my community.	1430	3.85	0.92	0.75		0.80	
	I consider public service my civic duty.	1430	4.51	0.77	0.83		0.84	
	I want to know more about what people in my hometown need.	1430	4.38	0.85	0.94		0.85	
COM	I am often moved by the plight of the underprivileged.	1430	5.05	0.69	0.85	0.78	0.85	0.78
	I am often reminded of how dependent we are on one another.	1430	4.85	0.75	0.84		0.84	
	Many public welfare programs are indispensable.	1430	5.07	0.72	0.84		0.84	

SS	Making a difference in society means more to me than personal achievement.	1430	4.57	0.91	0.84	0.89	0.84	0.89
	I would risk my career for the public good of society.	1430	4.36	1.00	0.83		0.83	
	Contributing to society is my obligation.	1430	4.67	0.79	0.86		0.86	
	Contributing to society is more important than taking from society.	1430	4.73	0.80	0.85		0.85	
	I can accept a policy that benefits society but harms my interests.	1430	4.36	0.88	0.77		0.77	

Table 3. Aggregation Validity AVE and CR Values of Measurement Scale

	JI	OC	APM	CPI	COM	SS
AVE	0.588	0.548	0.488	0.518	0.553	0.621
CR	0.81	0.78	0.71	0.76	0.79	0.89

(1) Data quality analysis

The reliability values of each measurement dimension of the Public Service Motivation Scale are shown in Table 2. In addition to a public interest commitment (CPI) Cronbach's alpha value of less than 0.7 (0.67), public service motivation is higher than 0.7 in other dimensions, indicating that the public interest commitment (CPI) reliability is not ideal. The item needs to be adjusted, so the standard factor load value is used as the standard, and the factor load below 0.7 is deleted to optimize the model, and the reliability of internal consistency of the scale was improved; that is, the item "I am not interested in the community and people I serve" is deleted. After deleting this item, the public interest commitment (CPI) reached 0.75, which met the reliability standard (Qianyu & JunTian, 2013; Shichen et al., 2014). After revision, Cronbach's alpha value of all dimensions of the scale was greater than 0.7 (see Table 1 for details), KMO is 0.89 (i.e., > 0.7), Bartlett sphericity test is 12,857, and p-value is .000 ($p < .05$), which indicates that the revised scale has good reliability (Haozheng, 2018). Hence, subsequent structural equation models are analyzed based on the revised scale. In addition, in the revised scale, the factor loads corresponding to different measurement variables are greater than 0.5, indicating the measured variables in the scale have good consistency and high reliability.

The aggregate validity of the scale is shown in Table 3. In the factor structure, the average variance extracted (AVE) of the public policy attraction (APP) dimension is 0.488<0.5, which indicates that the aggregation effect of this dimension is not good and the aggregation validity of the scale is not ideal. For the other potential variables (JI, CPI, COM, and SS), all the AVEs were greater than 0.5, with significant aggregation effect, so the aggregation validity of the scale is up to standard. The composite reliability (CR) values of all potential variables are between 0.71 and 0.89, which are all greater than 0.7, indicating that the composite reliability meets the standard and the aggregate validity index meets the requirement (Haozheng, 2018). Overall, these results show that Taiwan's civil servants' motivational structure of public service may only fit into three of the four dimensions proposed by Perry, and public policy appeal (APM) may not be suitable for the civil service system in Taiwan. Generally speaking, the scale has good reliability and validity and can be used for structural equation modeling.

(2) Comparison of model prediction validity

The predictive validity of the model is reflected by the path coefficients of a reflective model or a formative model (Diamantopoulos & Siguaw, 2006; Jarvis, MacKenzie, & Podsakoff, 2003). Among the four algorithms, the formative model does not converge in MLE and ADF, while some indices of the reflective model achieve better results in these two

algorithms, and the predictive ability of the reflective model is higher than that of the formative model. With the UWLS algorithm, in the formative model, the coefficients of public service motivation and "OC" and "JI" are 0.81 and 0.87 respectively, which are higher than 0.76 and 0.82 in the reflective model, thus indicating that the predictive ability of the formative model under this algorithm is better than that of the reflective model. With the PLS algorithm, in the reflective model, the coefficients between public service motivation and "OC" and "JI" are 0.362 and 0.367 respectively, which are higher than 0.343 and 0.347 in the formative model. The results show that the predictive ability of the reflective model under this algorithm is better than that of the formative model. As for the predictive ability of the model, one of the four algorithms shows that the formation is better than the reflection, and the other three algorithms show that the reflection is better than the formation. In the PLS algorithm in particular, which specifically distinguishes the advantages and disadvantages of the reflection and formation models, the public service motivation model supporting the first-order reflection and the second-order reflection is better than the first-order reflection and the second-order formation. Therefore, it can be preliminarily judged that the path coefficient between the public service motivation and the two structures is more explanatory in the reflective model than in the formative model. Therefore, on the whole, we can conclude that reflective models are superior to formative models in predictive validity, and the reflective model of public service motivation provides better predictive ability for the two constructs of "organizational commitment" and "work engagement," and hypothesis 1 is supported empirically.

(3) Comparison of overall goodness of fit of models

Another important indicator to measure the quality of a model is its goodness of fit. The indicators of fitness are analyzed as follows. First, the aspect of chi-square test: As shown in Table 4, from the chi-square value test of the three algorithms of AMOS 21.0, only χ^2/df in the ADF algorithm in the reflective model is less than 5, and the other two algorithms do not meet the standard in different models. However, chi-square values indicate that the model is not suitable (the model is suitable for zero). The chi-square model fitting test commonly used in existing studies is a poor indicator because it almost always rejects the fitting of the model (Gerbing & Anderson, 1992). In MLE and ADF algorithms, the formative model does not converge. In the UWLS algorithm, the chi-square value and χ^2/df of the reflective model are smaller than the formative model.

Table 4. AMOS 21 List of Results of Calculating Fitting Index of Public Service Motivation Model

Fitting index	maximum likelihood method		Asymptotic freedom distribution method		Unweighted least squares method	
	reflective	formative	reflective	formative	reflective	formative
χ^2	1475.56		819.77		2083.435	4955.757
χ^2/df	8.997		4.999		12.704	27.081
PGFI	< 0.050.905	The model does not converge.	< 0.050.839	The model does not converge.	< 0.050.942	< 0.050.871
AGFI	0.879		0.791		0.927	0.837
NFI	0.886		0.626		0.905	0.793
REMEA	0.075		0.053			
PSM-OC	0.48		0.81		0.76	0.81
PSM-JI	0.47		0.92		0.82	0.88

(*Source: Department of Public Administration, Taiwan University of Political Science, "Research on Taiwan's Democratic Governance Performance 2011 TGBS Civilian Opinion Survey Questionnaire." PSM-OC and PSM-JI refer to the standardized path coefficients of PSM to OC and JI, respectively, using MLE, ADF, and UWLS. We used AMOS to calculate the results.*)

Second, the direct index of fitness: As shown in Table 4, in the UWLS algorithm, the values of GFI, AGFI, and NFI of the reflective model are 0.942, 0.907, and 0.905, respectively, which are not only higher than the

values of the formative model (0.873, 0.837, and 0.793, all lower than 0.9 of the judgment standard), but also higher than the judgment standard of 0.9, and the overall model shows good fitness. As shown in Table 5, under the PLS algorithm, the reflective model is 0.31 in terms of the GoF of the model-fitting degree, which is not only higher than the 0.25 of the model's pros and cons, but also higher than the formative model of 0.294. The reflective model has a higher degree of fit under this algorithm. As mentioned earlier, GFI has a better recognition degree for the model errors presented by AMOS (MacKenzie, Podsakoff, & Jarvis, 2005). GoF is the core index of the overall goodness of fit index of PLS structural equation model (Tenenhaus, Vinzi, Chatelin, & Lauro, 2005). We can judge that hypothesis 2 is supported empirically, and the reflective model has a better goodness of fit than the formative model in this structural equation model.

Table 5. SmartPLS 3.0 List of Results for Calculating Fitting Index of Public Service Motivation Model

Fitting index	Reflective model			Formative model		
	OC	JI		OC	JI	
R^2	0.13	0.135		0.118	0.120	
AVE	0.737	0.712		0.736	0.712	
GoF			0.31			0.294
Spc	0.362	0.367		0.343	0.347	

(*Source: Department of Public Administration, Taiwan University of Political Science, "Research on Taiwan's Democratic Governance Performance, 2011 TGBS Civilian Opinion Survey Questionnaire." SPC refers to the standardized path coefficient, calculated using the partial least squares (PLS) regression algorithm in SmartPLS 3.0.*)

In general, as far as public service motivation is concerned, from the perspective of model predictive validity and goodness of fit, the structural equation model with a first-order reflective and second-order reflective construct of public service motivation shows more statistical indicators than the structural equation model with a first-order reflective and second-order formative construct, since the former model has higher predictive ability and goodness of fit. The empirical data provides appropriate evidence that the relationship between public service motivation and its first-order latent variables is reflective, which means that the direction of causality flow is from public service motivation to first-order latent variables, and public service motivation should be described as a "first-order reflective and second-order reflective" construct. Therefore, our hypothesis 1 and hypothesis 2 are supported by the empirical data.

5. Discussion and Further Research Suggestions

There are two ways to specify a structural equation model and a construct: one is determined by theoretical basis (Bagozzi, 1984) and the other is determined by empirical tests (Peter, Straub & Rai, 2007). The empirical results show that the reflective model of public service motivation is superior to the formative model.. Firstly, multiple fitting indexes show that the reflective model has better goodness of fit than the formative model. The poor fitness in the structural equation model under the same data may indicate that the wrong model type is running (Diamantopoulos & Winklhofer, 2001). Secondly, the reflective model is significantly better than the formative model in predicting validity. Causality test (predictive validity) can provide evidence that an applied construct is correctly measured (Wright, 2008; Wright & Pandey, 2008). This study contributes to empirical tests of the formative or reflective nature of public service motivation, which is inconsistent with the findings of South Korean firefighters' public service motivation and empirical data made by Chinese scholars using the College Students Scale (Nianxin et al., 2011; Peter, Straub, & Rai, 2007; Kim, Shin, & Grover, 2010). After analyzing all dimensions of public service motivation, we have provided empirical evidence that public service motivation is a second-order reflective construct. On the one hand, since democratization in Taiwan, political forces have destroyed the existing decision-making system of civil servants and the value system of administrative neutrality. The blue-green political forces in Taiwan have all sabotaged the decision-making system of civil servants, resulting in the attraction of public policies that may not be the motivation of civil servants. On the other hand, it may be that, in the Taiwanese environment, the three topics selected in the dimension of public policy attraction cannot measure

the connotation of this dimension. The three topics used in the 2011 Taiwan Civil Servant Survey are "Politics is a dirty word to me", "I don't care much for politicians," and "The give and take of public policy making doesn't appeal to me." Two of the three topics involve political issues and one involves public policies. Since democratization, the word "politics" has become stigmatized on the island and is often interpreted as power distribution and political struggle, Concepts that are difficult to associate with public policy decisions. Therefore, in the future, we may replace political items in this dimension and re-measure it.

Therefore, it is more appropriate to define the motivation of public service as a reflection structure, and some scholars also draw the conclusion that PSM is a first-order reflection construct and a second-order formative construct.（Lee & Choi，2016；Steijn，2008;Wright，2008）It also means that, in the early empirical studies, some scholars may have been correct to default public service motivation as a first-order reflective and second-order reflective construct in different models (Camilleri, 2006; Kim, 2009), and there may be no mistakes in various structural equation models of public service motivation. Therefore, when applying other constructs in the field of personnel management and behavior science, the influence of formative or reflective assumptions on the nature of the constructs needs to be considered more systematically.

The study has some limitations. First of all, this study used exactly the same items and dimensions to compare reflective and formative models. The difference of the goodness of fit and predictive ability of the hypothesis forming model and the reflective model in this study is related to the direction of causal flow between the public service motivation and its dimensions. (Diamantopoulos & Siguaw, 2006). However, defining public service motivation as a formative construct is not sufficient to judge that public service motivation is formative from empirical tests. Secondly, this study used the abbreviated version of Perry (1996). Although 14 topics in Taiwan were discussed by experts and were found to be a reliable and valid scale in the study, our scale is still not identical to the original scale of 24 topics developed by Perry (1996), and some information may be missing, which may lead to errors in our evaluation. Thirdly, the sample used in this study was civil servants under the "Executive Yuan"system in Taiwan. Instead, it is necessary to use samples of civil servants from different countries or regions and from diverse cultural backgrounds to test the second-order reflective model of public service motivation. In particular, the empirical data of South Korean firefighters and those of civil servants in Taiwan are inconsistent under the same algorithm. Therefore, it is necessary to further expand the research area and conduct more rigorous and consistent comparative research.

6. Compliance with Ethical Standards:

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study.

No Conflict of Interest: Cheche Duan declares that he has no conflict of interest. Yicheng Zhou declares that he has no conflict of interest. Yuan-qing Cai declares that she has no conflict of interest.

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References

[1] Bagozzi, R. P. (1984). A prospectus for theory construction in marketing. The Journal of Marketing, 48 (1),11-29. https://doi.org/10.1177/002224298404800102

[2] Bollen, Kenneth A. (1989). Structural equations with latent variables. New York: Wiley.

[3] Camilleri, E(2006). Towards developing an organizational commitment—public service motivation model for maltese public service employees. Public Policy & Administration, 21(1), 63-83. https://doi.org/10.1177/095207670602100105

[4] Chen, C. A., Chen, D. Y., Liao, Z. P., & Kuo, M. F. (2019). Winnowing out high-PSM candidates: The adverse selection effect of competitive public service exams. International Public Management Journal, 9,1-22. http://doi.org/10.1080/10967494.2019.1658663

[5] Coursey, D. H., & Pandey, S. K. (2007a). Content domain, measurement, and validity of the red tape concept: A second-order confirmatory factor analysis. The American Review of Public Administration, 37(3),342-361. https://doi.org/10.1177/1049731506290269

[6] Coursey, D. H., & Pandey, S. K. (2007b). Public service motivation measurement: testing an abridged version of perry's scale. Administration & Society,39(5) ,547-568 . https://doi.org/10.1177/0095399707303634

[7] Coursey, D. H., Perry, J. L., Brudney, J. L., & Littlepage, L. (2008).Psychometric verification of Perry's public service motivation instrument: Results for volunteer exemplars. Review of public personnel administration, 28(1),79-90 . https://doi.org/10.1177/0734371X07309523

[8] Cronbach, L. J., & Meehl, P. E. (1955). Construct validity in psychological tests. Psychological Bulletin, 52(4), 281-302. http://dx.doi.org/10.1037/h0040957

[9] Davis, R. S., & Stazyk, E. C. (2017).Putting the Methodological Cart Before the Theoretical Horse?Examining the Application of SEM to Connect Theory and Method in Public Administration Research. Review of Public Personnel Administration, 37(2) , 202-218 . https://doi.org/10.1177/0734371X17704268

[10] Dehart-Davis, L., & Pandey, S. K.(2010).Gender dimensions of public service motivation. Public Administration Review, 66(6),873-887 . https://doi.org/10.1111/j.15406210.2006.00655.x

[11] Diamantopoulos, A. Riefler, P. & Roth, K. P. (2008).Advancing formative measurement models. Journal of Business Research, 61(12),1203-1218 . https://doi.org/10.1016/j.jbusres.2008.01.009

[12] Diamantopoulos, A., & Siguaw, J. A. (2006).Formative versus reflective indicators in organizational measure development: A comparison and empirical illustration. British Journal of Management, 17(4) ,263-282 . https://doi.org/10.1111/j.14678551.2006.00500.x

[13] Diamantopoulos, A., & Winklhofer, H. M. (2001).Index construction with formative indicators: an alternative to scale development. Journal of Marketing Research, 38(2) , 269-277 . https://doi.org/10.1509/jmkr.38.2.269.18845

[14] Edwards, J. R. (2011). The fallacy of formative measurement. Organizational Research Methods, 14(2),370-388 . https://doi.org/10.1177/1094428110378369

[15] Esteve, M., Urbig, D., van Witteloostuijn, A., & Boyne, G. (2016).Prosocial behavior and public service motivation. Public Administration Review, 76(1),177-187 . https://doi.org/10.1111/puar.12480

[16] Gailmard, S. (2010).Politics, principal–agent problems, and public service motivation. International Public Management Journal , 13(1),35-45 . https://doi.org/10.1080/10967490903547225

[17] Gerbing, D. W., & Anderson, J. C. (1992). Monte Carlo evaluations of goodness of fit indices for structural equation models. Sociological Methods & Research, 21(2),132-160. https://doi.org/10.1177/0049124192021002002

[18] Haosheng, Y.， & Ming,L. (2014). Reflection or Formation?Parallel or hierarchical?PSM Model Construction and Testing [In Chinese]. New Exploration of Psychology, 3: 265 - 271.

[19] Haozheng, Q. (2011). When PLS Meets SEM: Issues and Dialogue [In Chinese]. Journal of α β γ Quantitative Research, (1), 20 - 53.

[20] Haozheng, Q. (2018). Quantitative research and statistical analysis [In Chinese]. Taipei: wunan book publishing co., ltd.

[21] Hu, L. T., & Bentler, P. M. (1999).Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural equation modeling: a multidisciplinary journal, 6(1) , 1-55 . https://doi.org/10.1080/10705519909540118

[22] Jarvis, C. B., MacKenzie, S. B., & Podsakoff, P. M. (2003). A critical review of construct indicators and measurement model misspecification in marketing and consumer research. Journal of consumer research, 30(2),199-218 . https://doi.org/10.1086/376806

[23] Jihong, S., & Xiaojiang, Y. (2009). Several Problems in PLS Path Model Application[In Chinese]. Statistical Education,(11), 3 - 10.

[24] Kim, G., Shin, B., & Grover, V. (2010).Research Note: Investigating Two Contradictory Views of Formative Measurement in Information Systems Research. MIS quarterly, 32(2), 345-365 .

[25] Kim, S. (2012).Does person-organization fit matter in the public-sector?Testing the mediating effect of person-organization fit in the

relationship between public service motivation and work attitudes. Public Administration Review, 72(6) , 830-840 . https://doi.org/10.1111/j.15406210.2012.02572.x

[26] Kim，S． (2009) ． Testing the structure of public service motivation in Korea: A research note ． Journal of Public Administration Research and Theory,19, 839－851． https://doi.org/10.1093/jopart/mup019

[27] Kim, S. (2007). Individual-level factors and organizational performance in government organizations. Journal of Public Administration Research and Theory: J-PART, 2005, 14(2),245-261. https://doi.org/10.1093/jopart/mui013

[28] Kim, S. (2006).Public service motivation and organizational citizenship behavior in Korea. International Journal of Manpower, 27(8), 722-740 . https://doi.org/10.1108/01437720610713521

[29] Kim, S. (2011).Testing a revised measure of public service motivation: Reflective versus formative specification. Journal of Public Administration Research and Theory, 21(3) , 521-546 . https://doi.org/10.1093/jopart/muq048

[30] Kim, S., & Vandenabeele, W. (2010).A strategy for building public service motivation research internationally. Public administration review, 70(5) : 701-709 . https://doi.org/10.1111/j.15406210.2010.02198.x

[31] Law, K. S., Wong, C. S., & Mobley, W. H. (1998). Toward a taxonomy of multidimensional constructs. Academy of Management Review, 23(4), 741-755. https://doi.org/10.5465/amr.1998.1255636

[32] Lee, G., & Choi, D. L. (2016).Does Public Service Motivation Influence the College Students' Intention to Work in the Public Sector?Evidence From Korea. Review of Public Personnel Administration, 36(2) ,145-163 . https://doi.org/10.1177/0734371X13511974

[33] Leisink, P. L. M., & Steijn, A. J. (2009).Public service motivation and job performance of public sector employees in the Netherlands. International Review of Administrative Sciences, 75(1),35-52 . https://doi.org/10.1177/0020852308099505

[34] MacCallum, R. C., & Browne, M. W. (1993).The use of causal indicators in covariance structure models: some practical issues. Psychological bulletin, 114(3) ,533-541 . http://dx.doi.org/10.1037/00332909.114.3.533

[35] MacKenzie, S. B., Podsakoff, P. M., & Jarvis, C. B. (2005).The problem of measurement model misspecification in behavioral and organizational research and some recommended solutions. Journal of Applied Psychology, 90(4), 710-730 . http://dx.doi.org/10.1037/0021-9010.90.4.710

[36] Moynihan, D. P., & Pandey, S. K. (2007). Finding workable levers over work motivation: Comparing job satisfaction, job involvement, and organizational commitment. Administration & Society, 39(7), 803-832. https://doi.org/10.1177/0095399707305546

[37] Nianxin, W., Weijun, Z. & Shue , M.(2011). Misplacement and Simulation Analysis of Measurement Models in China's Management Science Research[In Chinese]. Journal of Management Engineering, (2),109 - 117.

[38] Meng, F., & Wu, J. (2017). Policy expectation moderates the relationship between merit pay policy effectiveness and public service motivation. Social Behavior and Personality: an international journal, 45(8), 1305-1318. http://DOI:10.2224/sbp.4917

[39] Pauwels, P., Patterson, P. G., de Ruyter, K., & Wetzels, M. (2009).The propensity to continue internationalization: A study of entrepreneurial decision-making in Australian service firms. In New Challenges to International Marketing. Emerald Group Publishing Limited.

[40] Perry, J. L. (1997).Antecedents of public service motivation. Journal of public administration research and theory, 7(2), 181-197. https://doi.org/10.1093/oxfordjournals.jpart.a024345

[41] Perry, J. L. (1996).Measuring public service motivation: An assessment of construct reliability and validity. Journal of Public Administration Research and Theory: J-PART,6(1) , 5-22 . https://doi.org/10.1093/oxfordjournals.jpart.a024303

[42] Perry, J. L., & Hondeghem, A. (2008).Building theory and empirical evidence about public service motivation. International public management journal, 11(1) , 3-12 . https://doi.org/10.1080/10967490801887673

[43] Perry, J. L., & Wise, L. R. (1990).The motivational bases of public service. Public administration review,50 (3),367-373 . https://doi.org/10.2307/976618

[44] Peter, S., Straub, D., & Rai, A. (2007).Specifying formative constructs in information systems research. MIS quarterly, 31 (4), 623-656 .

[45] Qianyu, N. & Jun, T. (2013). Evaluation and Application of Reliability and Validity of Resilience Scale[In Chinese]. China Public Health, (10), 1524 - 1527.

[46] Du, L., Qian, L., & Feng, Y. (2014). Influences of altruistic motivation, shared vision, and perceived accessibility on microcharity behavior. Social Behavior and Personality: an international journal, 42(10), 1639-1650. https://doi.org/10.2224/sbp.2014.42.10.1639

[47] Tenenhaus, M., Vinzi, V. E., Chatelin, Y. M., & Lauro, C. (2005).PLS path modeling. Computational statistics & data analysis,48(1) ,159-205 . https://doi.org/10.1016/j.csda.2004.03.005

[48] Shichen, Z., Yuhui, W., & Shuman,T., Chen Jing,C., Fangbiao,T. (2014). Reliability and structural validity of the Chinese Youth Interactive Health Literacy Questionnaire[In Chinese]. Chinese School Hygiene, (3), 332 - 336.

[49] Steijn, B. (2008).Person-environment fit and public service motivation. International public management journal, 11(1), 13-27 . https://doi.org/10.1080/10967490801887863

[50] Wright, B. E. (2008).Methodological challenges associated with public service motivation research. In J. L. Perry & A. Hondeghem (Eds.)， Motivation in public management: The call of public service， Oxford, UK: Oxford University Press.

[51] Wright, B. E., & Pandey, S. K. (2008).Public service motivation and the assumption of person—Organization fit: Testing the mediating effect of value congruence. Administration & Society,40(5),80-98. https://doi.org/10.1177/0095399708320187

[52] Yuanjie,B., & Chaoping,L. (2016). Measurement of Public Service Motivation: Theoretical Structure and Scale Revision [In Chinese]. Human Resource Development in China, (7), 83 - 91.

[53] Zhezhe, D. (2018). Public Service Motivation of Civil Servants in Taiwan, China,since 2000 and Its Impact on work engagement [In Chinese]. Public Management Review, (2), 77 - 97.