On the importance of conducting construct-level analysis for multidimensional constructs in theory development and testing

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The use of multidimensional constructs in conceptual frameworks has become increasingly popular as management theories become more advanced and precise. A construct is multidimensional "when it consists of a number of interrelated attributes or dimensions and exists in multidimensional domains" (Law, Wong & Mobley, 1998, p. 741). For instance, job satisfaction is a multidimensional construct as it consists of interrelated dimensions such as satisfaction with pay, promotion, co-workers, the supervisor, and the work itself (Locke, 1969). Contextual performance is also a multidimensional construct that consists of the two interrelated dimensions of interpersonal facilitation and job dedication (Van, Scotter & Motiwidlo, 1996). Law et al. (1998) proposed a taxonomy of multidimensional constructs in an attempt to illustrate the conceptual and practical issues involved. After defining three types of multidimensional constructs, they concluded that whenever a multidimensional construct is involved in a conceptual framework, researchers should specify the relations between the overall construct and its dimensions. Such specification has profound effects on theory development and testing, which involves the relationships between other constructs and the multidimensional construct of interest. In an empirical study, Law and Wong (1999) demonstrated that different conclusions might be reached when the relationship between the overall construct and its dimensions was defined differently.

Law et al. (1998) further suggested that when multidimensional constructs are studied at the construct level, both the development of research hypotheses and empirical

analyses should be conducted at the construct level (Note 1). Unfortunately, they fell short of explaining the potential consequences of not following this suggestion, which is why their work has not had a great impact. We have observed two problematic phenomena in the literature regardless of recent discussions of multidimensional constructs (Law et al., 1998; Law & Wong, 1999; Edwards, 2001; Williams, Edwards & Vandenberg, 2003). The first problem is that many researchers still do not explicitly define the relationship between the overall multidimensional constructs and their dimensions. They use a general label or umbrella to refer to a group of inter-related constructs and assume that the label is a multidimensional construct. We refer to these labels as "pseudo-multidimensional constructs." Although we agree that these labels may be powerful conceptualizations of management phenomena, we argue against this practice of using these labels as scientific constructs.

The second problem is that many researchers make conceptual arguments and hypotheses at the dimension level and assume that their arguments can be applied automatically to the overall construct. For example, many studies involving the construct of organizational citizenship behavior (OCB) make their conceptual arguments at the dimension level, but make specific hypotheses at the construct level. The empirical analyses are conducted at the dimension level, and conclusions are drawn for the construct of OCB (e.g., Moorman, Blakely and Niehoff, 1998; VanYperen, Van Den Berg & Willering, 1999). Similar assumptions can be found in studies that involve other multidimensional constructs such as team performance (e.g., Mohammed, Mathieu & Bartlett, 2002), organizational justice (e.g., Judge & Colquitt, 2004), organizational performance (e.g., Gelade & Ivery, 2003; Peterson, Smith, Martorana & Owens, 2003)

leader-member exchange (Liden & Maslyn, 1998), psychological contract (e.g., Dabos & Rousseau, 2004; Hui, Lee & Rousseau, 2004), psychological empowerment (e.g., Huang, Shi, Zhang & Cheung, 2006), contextual performance (e.g., Witt, Kacmar, Carlson & Zivnuska, 2002), and perceived diversity among team members (e.g., Harrison, Price, Gavin & Florey, 2002). When a researcher finds support for, say, two out of five dimensions of a multidimensional construct in a hypothesized relationship between this multidimensional construct and another construct, can s/he claim that the hypothesized relationship between that construct and the multidimensional construct is *partially* supported? We argue that whether or not researchers can generalize results from the dimension level to the construct level depends on how the multidimensional construct is defined and the problem is most serious when the multidimensional construct is defined under a latent model.

There are at least two important contributions of this article. First, we discuss in more detail the implications of not defining the relationship between the multidimensional construct and its dimensions. Second, Law and Wong (1999) only showed that the results of a hypothesis test would be different when the same set of dimensions was defined under different types of multidimensional constructs. We address a different problem related to the analysis of multidimensional constructs. We examine the potential differences in conclusions at the construct level when the data analyses are conducted only at the dimension level for different types of multidimensional constructs. From this examination, we point out that for some types of multidimensional constructs, researchers can infer their results from dimensional-level analyses to the overall multidimensional construct. However, for a particular type of multidimensional

constructs, researchers have to conduct analyses at the construct level if the conclusions drawn are about the overall multidimensional construct instead of its dimensions.

In the following discussion, the taxonomy and major characteristics of multidimensional constructs are reviewed. Based on the characteristics of multidimensional constructs, we address issues related to under-specification of multidimensional constructs, i.e., when the relationship between the constructs and their dimensions are not specified. We then examine the potential discrepancy that may occur when data are analyzed at the dimension instead of the construct level for different types of multidimensional constructs. We use two examples to illustrate these potential discrepancies for a particular type of multidimensional constructs. Finally, we discuss the implications of our investigation.

Taxonomy and Characteristics of Multidimensional Constructs

Multidimensional constructs are more complicated than unidimensional constructs because, in addition to defining the nature of the construct, researchers need to specify the relationship between the constructs and their dimensions. Law et al. (1998) proposed three models or types of multidimensional constructs that are based on two classification rules. The first of these is the "relational-level" rule, which asks whether the multidimensional construct exists at a deeper and more embedded level than its dimensions. If a multidimensional construct is a higher-level construct underlying its dimensions, or in other words the dimensions are simply different forms that are manifested by the construct, the construct is called a latent model. For example, civic virtue, altruism, and sportsmanship may simply be different manifestations of the same

construct of OCB. Figure 1(a) illustrates the latent model of multidimensional constructs. We use the letter U to denote the unique domain of individual dimensions and the letter C to denote the common domain between dimensions. For example, U_1 represents the unique domain of dimension one, and C_{12} represents the common domain of dimensions one and two. Because individual dimensions are just different manifestations of the same overall construct, only the common part of all the dimensions, i.e., C_{123}, is the true domain of the multidimensional construct. The rest, U_1, U_2, U_3, C_{12}, C_{13}, C_{23}, are dimension-specific components that are not considered to be part of the overall multidimensional construct.

Insert Figures 1a, 1b, and 1c about here.

If the answer to the "relational-level" question is negative, the second rule of "relational form" applies. This rule asks whether dimensions can be algebraically combined to form an overall representation of the construct. If the answer is yes, then the multidimensional construct is under the aggregate model. In this model, the overall multidimensional construct is formed as an aggregate of its dimensions. The dimensions are therefore components of the overall multidimensional construct. For example, Locke (1969) clearly defined overall job satisfaction as the sum of such factors as satisfaction with pay, promotion, coworkers, the supervisor and the work itself. Figure 1(b) illustrates this type of model. Because the overall construct is an aggregate of its dimensions, it will cover all of the domains of its dimensions. In Figure 1(b), all of the

parts that are shown, i.e., U_1, U_2, U_3, C_{12}, C_{13}, C_{23}, and C_{123}, are considered to be true domains of the multidimensional construct.

If the answer to the question of "relational form" is negative, it would be more logical to define the multidimensional construct under the profile model. Based on their theoretical nature, profile multidimensional constructs are specified as profiles or discrete combinations of various levels of their dimensions because "the dimensions of these multidimensional constructs cannot be combined algebraically" (Law et al., p. 746). In other words, the nature of a profile multidimensional construct precludes the overall construct from being defined as an algebraic function of its dimensions. Consequently, the usual treatment is to dichotomize each dimension as high or low and state the overall construct as a combination profile of the levels of its dimensions. For example, the psychological types proposed by Carl Jung and measured by the Myers-Brigg Type Indicator (MBTI) is clearly a multidimensional construct defined under the profile model. Jung (1971) proposed a model to define the personality of an individual using four personality dimensions (extraversion-introversion, intuitive-sensing, thinking-feeling, judgmental-perceptual). He then used all possible combinations of the four personality dimensions to form 16 different personality profiles. According to Jung, individuals in each personality profile have totally different orientations and behavioral tendencies in their daily lives. Figure 1(c) illustrates the concept of this model. In Figure 1(c), the multidimensional construct has three dimensions. One possible profile of this multidimensional construct is to have a high level of dimensions one and two and to have a low level of dimension three.

From the above discussions, we can infer two important characteristics of multidimensional constructs. First, to be classified as a multidimensional construct, the dimensions and the overall construct must be clearly defined as constructs, and they must coexist for theory building and empirical investigation to take place. Thus, the relationship between multidimensional constructs and their dimensions should not be confused with the issue of cause and effect indicators of unidimensional constructs (MacCallum & Browne, 1993). The dimensions of a multidimensional construct are unobservable abstract *constructs* instead of directly observable measurement items or indicators of a construct. If they are merely observable measurement items or indicators, then the construct is unidimensional rather than multidimensional. A construct is an abstraction formed by generalization from particulars that cannot be observed directly and thus has to be inferred from directly observable indicators (Kerlinger, 1986, p. 26-27). For example, pay satisfaction is a construct measured by the responses in a survey questionnaire. Thus, pay satisfaction is a unidimensional construct. However, overall job satisfaction is a multidimensional construct if pay satisfaction is defined as one of its dimensions.

Second, the relationship between the overall construct and its dimensions must be specified. Using this specified relationship, the overall construct can be inferred from its dimensions. In other words, if the dimensions can be measured, the overall construct can be operationalized from its dimensions. Under the latent model, the multidimensional construct may be operationalized as the common factor behind its dimensions. Under the aggregate model, the multidimensional construct may be operationalized as a composite of its dimensions according to a specific algebraic formula. Under the profile model, the

multidimensional construct may be operationalized as a combination of different characteristics of each and every dimension. On top of the conceptual meaning of the relationship between a multidimensional construct and its dimensions, the validity of this relationship may be tested empirically. According to Schwab (1980), construct validity means "the correspondence between a construct (the conceptual definition of a variable) and the operational procedure to measure or manipulate that construct". If the specific operationalization does not correspond to the underlying conceptual definition of the particular type of multidimensional construct, then the multidimensional construct may not be valid.

Unfortunately, there is still a lot of under-specified constructs in the management literature. That is, some seemingly interrelated constructs are discussed under an overall label but it is not clear whether this overall label is a truly multidimensional construct. Because of this phenomenon, there are two remaining questions on how researchers should deal with multidimensional constructs. These two questions are (a) can researchers treat the dimensions as a group of inter-related constructs and treat them under a general label instead of a multidimensional construct? For example, can one treat distributive justice, procedural justice, interactive justice and informational justice (Colquitt, 2001; Greenberg, 1993) as a group of inter-related constructs without defining an overall organizational justice construct? (b) If the answer to the first question is negative, how should researchers determine the model or form of the multidimensional construct? We will answer these two questions in turn.

With respect to the first question, it is possible that some concepts may only be a general idea or label behind a group of related constructs. National culture is a good

example of this kind of concept. Theoretically, there is no clear relationship among Hofstede's (1984) four cultural dimensions (individualism, power distance, uncertainty avoidance and masculinity). We simply group these four variables together and label them as national culture in a general sense. This loose consolidation of an umbrella of constructs has two major problems. First, the constructs do not coexist with their dimensions and there is no clear definition of the relationship between the overall construct and its dimensions. Second, since these general labels cannot be operationalized as scientific constructs, rigorous theory building and testing on the construct is hindered. We refer to these labels as "pseudo-multidimensional constructs".

We do not agree with this approach of grouping constructs using labels and working on these constructs as a group because the labels are not scientifically rigorous constructs. Following our discussion with national culture as an example, while each of the four dimensions may be sound and valid scientific constructs, the overall label or umbrella called national culture is loose and unscientific unless the construct-dimension relationships are specified so that the overall multidimensional construct can be measured. Researchers should not develop any hypothesis on the relationship of *culture* with any other constructs because *culture* is not defined. As a result, researchers should only conduct scientific research at the dimension level and draw no conclusions about the overall construct of national culture.

Another possible example of pseudo-multidimensional constructs is the widely used label of "organizational performance" or "firm performance". For example, Gelade and Ivery (2003) used the generic term "organizational performance" in their study, which included sales, customer satisfaction, staff retention, and "clerical accuracy" (a

special performance indicator of the industry). There are two weaknesses of this generic term. First, some of these seemingly "dimensions" are directly observable indicators (e.g., sales), whereas others are unobservable constructs (e.g., customer satisfaction). Second, Gelade and Ivery test their hypothesis that the general climate on the human resource management (HRM)-organizational performance relationship. However, this mediation hypothesis was supported for the HRM-sales relationship but not the HRM-customer satisfaction relationship. Without a clear picture of the definition and components of "organizational performance", there can be no objective criteria for interpreting the inconsistent results obtained for the sales and customer satisfaction "dimensions". Therefore, we cannot draw any conclusion about the HRM-firm performance relationship.

In fact, some researchers have already noticed the problem of using "organizational performance" as a general label in conceptualizing its relationships with other constructs. For examples, He, Tian and Chen (2007) defined two distinct firm performance constructs, namely economic and social performance in order to explain organizations' nonmarket strategy in emerging economies. Shaw, Gupta and Delery (2005) defined two distinct "performance" constructs in order to conceptualize and examine the voluntary turnover-organizational performance relationship among staff members. The two constructs used were workforce performance (organization level of outcomes of behaviors, i.e., productivity and safety) and financial performance (i.e., operating ratio and return on equity). They argued that the effect of voluntary turnover on financial performance will be mediated by workforce performance. Both a conceptual argument and empirical tests were developed and conducted according to the definitions

and domains of the constructs involved. According to this study, it is clear that "organizational performance" is not a multidimensional construct comprising the two dimensions identified by Shaw et al. (2005) paper, and there is no confusion in the communication with other researchers.

Our position is that using the term *firm performance*, or similar generic references such as *national culture* to refer to a group of inter-related constructs is perfectly legitimate. However, these pseudo-multidimensional constructs are not real scientific constructs and should not be treated as constructs when relationships with other constructs are stated in the hypotheses. In other words, we posit that financial performance (a construct) can be considered as one form of firm performance (a pseudo-multidimensional construct). However, researchers should not state that firm performance is related to another construct in a scientific hypothesis testing process because "firm performance" is not a construct. Similarly, other researchers should not conclude that firm performance (an scientifically undefined term) is related to another construct when drawing conclusions in a research study. Only when the theoretical relationships between firm performance and its dimensions are established can one conduct scientific tests on the resulting true multidimensional construct of firm performance.

Thus, researchers should specify the relationship between the dimensions and the overall multidimensional construct if they are really studying the relationship between the multidimensional construct and other constructs. This specification should start with the conceptual meaning of the multidimensional construct. For example, it does not make any conceptual sense to define a latent or aggregate multidimensional personality

construct that coexist with the four MBTI personality dimensions. On top of the conceptual meaning of the overall multidimensional construct, some researchers suggested that the appropriateness of a particular specification may be examined empirically. For example, Edwards (2001) suggested empirically testing the aggregate model versus the latent model with structural equation modeling (SEM) analyses. That is, researchers may test whether the aggregate or latent model will be more appropriate for defining the multidimensional construct by comparing statistics such as fit indices and criterion-related validities. However, there are limitations to such analyses. The comparison of fit indices in SEM analyses cannot provide a formal statistical test because the latent and aggregate models are not nested. In fact, Law and Wong (1999) found that in SEM analyses that involved the multidimensional construct of job perception, the fit indices were acceptable for both the latent and aggregate model. It is difficult to accept one of the models and reject the other unless one model has completely unacceptable fit indices or criterion validity and the other fits very well. Thus, in the two examples provided by Edwards neither model was rejected using the criterion of model fit indices. Instead, Edwards relied on comparing criterion-related validities in coming up with a model choice decision.

Using criterion-related validities also has limitations because it is necessary to publish prior theoretical grounds concerning the relationships between the multidimensional construct and other constructs. Unfortunately, this may not be a realistic option in some cases and the theoretical relationship between a multidimensional construct and other constructs may depend on how we define the multidimensional construct. Following the example we used in our previous discussion, pay level should

be related to overall job satisfaction if we define job satisfaction under the aggregate model. However, pay level may be related only to the unique variance of the pay satisfaction dimension and thus has no relationship with overall job satisfaction when we define job satisfaction under the latent model. As a result, although empirical testing is one possible way to help to define a multidimensional construct under different models, the conceptual meaning and the theoretical foundation of the multidimensional construct are at least equally important.

With the above understanding of the taxonomy and characteristics of multidimensional constructs, in the next section we turn to the main theme of this paper. That is, the potential inappropriate generalization of results from analyses conducted at the dimension level to the construct level for multidimensional constructs.

Construct- versus Dimensional-Level Analyses of Multidimensional Constructs

After Law et al. (1998) defined different types of multidimensional constructs, many researchers continued to make conceptual arguments and develop hypotheses at the dimension level, as well as to conduct data analyses at the dimension level, while drawing conclusions at the construct level. These researchers assume that their arguments and findings can be applied to the overall multidimensional construct. This is understandable because conceptual arguments at the dimension level are more direct and easier to make than conceptual arguments at the construct level, as dimensions may be more concrete and proximal to reality. For example, in developing a theory of how leader-member exchange (LMX) (Graen, Novak & Sommerkamp, 1982) is related to OCB, it is much easier to build an argument for how LMX affects altruism or compliance

than to build an argument for how LMX affects OCB as an overall abstract construct. Similarly, skill variety, task significance, task identity, autonomy, and feedback are much more specific than the construct of overall job scope (Stone, 1976), and it is much easier to make arguments and propose hypotheses on how they are related to employees' attitudinal and behavioral outcomes.

Although it is reasonable that researchers usually make conceptual arguments at the dimension level, does this automatically imply that the theory developed is applicable to the overall multidimensional construct? Does this mean that the theory can be tested at the dimension level? We argue that the answers to these questions depend on the model of multidimensional construct under investigation. Let us illustrate our arguments using the simple case of the relationship between a unidimensional predictor, X, and a multidimensional dependent variable, Y, with three dimensions, D_1, D_2 and D_3. For ease of illustration, assume that X is only related to one dimension (D_1) of Y, and not to the other dimensions (D_2 and D_3). This means that whenever X changes, D_1 changes accordingly.

Under the profile model, when D_1 changes, the whole profile of Y automatically changes. In other words, any change in X leads to an overall change in the multidimensional construct, Y. Thus, using the profile model, conceptual arguments and empirical analyses conducted at the dimension level can be applied to the construct level for multidimensional constructs. We use the relationship between dramatic experience such as serious emotional trauma (X) and the profile of MBTI (Y). Suppose X is only related to one of the four dimensions of MBTI (e.g., extraversion-introversion), we can conclude that X is related to Y. This is because so far as extraversion-introversion is

changed while the other three MBTI dimensions (intuitive-sensing, thinking-feeling, judgmental-perceptual) remain the same, the profile of MBTI (Y) will be different.

If Y is a multidimensional construct under the aggregate model, then Y's domain would include the uniqueness of D_1, D_2 and D_3 as well as the common variances (C_{12}, C_{13}, C_{23}, and C_{123}) of these three dimensions. If X is only related to D_1, then X would be related to the overall multidimensional construct, Y, because Y is a function of *all* of its three dimensions. Thus, conceptual arguments and empirical analyses conducted at the dimension level can be applicable to the construct level for multidimensional constructs under the aggregate model. For example, because overall job satisfaction is the sum of all satisfaction dimensions, any changes in satisfaction with the supervisor (one dimension) would imply changes in the overall job satisfaction construct.

There is, however, one complication in this case. If X has opposing relationships with different dimensions of the multidimensional construct, Y, then it is possible that the effects of X on one dimension may be offset by another dimension. In the end, X may not have any net effect on Y. For example, although a performance-based reward system (X) may have a positive effect on satisfaction with pay (D_1), it may induce a competitive working environment and lead to a negative effect on satisfaction with co-workers (D_2). The overall relationship between a performance-based reward system and multidimensional job satisfaction is therefore unknown. This overall effect of X on multidimensional job satisfaction is affected by (1) the relative impact of X on D_1 and D_2, and (2) the functional form of multidimensional job satisfaction as a function of its dimensions. In sum, the theoretical relationship between X and D_1, D_2 and D_3 can be applied to the overall construct, Y, only when X-D_1, X-D_2, and X-D_3 are related in the

same direction. Similarly, empirical tests can be conducted at the dimension level and conclusions drawn at the construct level only when X-D_1, X-D_2, and X-D_3 are theoretically related in the same direction. If opposing relationships between the overall construct and different dimensions are possible, then the net effect of X on the overall multidimensional construct, Y, has to be examined through empirical analysis at the construct level.

If Y is a multidimensional construct under the latent model and Y's domain covers only the common variances of D_1, D_2 and D_3, then X may not be related to the overall construct, Y, even when it is closely related to D_1, D_2, and D_3. This would happen if X is only related to the unique domain of each dimension in Figure 1(c) (i.e., U_1, U_2, and U_3 or the commonality of two dimensions C_{12}, C_{13}, and C_{23}). Conceptual arguments and empirical analyses conducted at the dimension level may, therefore, not be valid at the construct level for multidimensional constructs under the latent model. For example, if General Mental Ability (GMA or the g-factor) is only related to the unique variance of task performance, and if performance is defined as the common domain of task performance and contextual performance, GMA may not be related to the overall performance construct. In sum, a construct, X, is related to a latent multidimensional construct, Y, only if X is related to the common variances of all the dimensions of Y (i.e., C_{123} in Figure 1(c)). Under the latent model, it is not possible to deduce a theoretical relationship at the construct level simply from relationships at the dimension level. Even if conceptual arguments concerning the relationships between X and all the dimensions of Y can be established, this does not necessarily mean that X is related to the overall latent construct, Y. The reason is that X may only be related to the unique variances of each

dimension of Y (i.e., U_1, U_2, and U_3) and these unique variances are not in the domain of the overall latent construct, Y.

It should be noted that although we use the multidimensional construct (Y) as the dependent variable in our discussion above, the same argument should be generalizable when Y is the predictor or mediator of a causal relationship. This is because our discussion uses the concept of common variance between constructs, which is the basic statistical component in testing relationships among constructs. Whether Y is the predictor or a criterion variable, the conclusions will be the same. To summarize the discussion so far, the assumption that "relationships at the construct level can be deduced directly from relationships at the dimension level" may be valid for multidimensional constructs under the profile model. Researchers need to examine whether the relationship is strong enough to change the level of at least one dimension of the profile model of multidimensional constructs. The same assumption may be valid for multidimensional constructs under the aggregate model unless there are opposing relationships between the predictor and different dimensions. Finally, the assumption may *not* be valid for multidimensional constructs under the latent model. If a researcher wants to draw conclusions at the construct level under the latent model, empirical tests *must* be conducted at the construct level instead of at the dimension level.

From the above analyses, it appears that the chance of drawing the wrong conclusion at the construct level based on dimensional-level results may be largest for multidimensional constructs under the latent model. Also, multidimensional constructs under the latent model are probably the most common type of multidimensional constructs in the management literature. Thus, to illustrate that analyses must be

conducted at the construct level under the latent model of multidimensional constructs, in the following sections, we demonstrate the possibility of drawing different conclusions when analyses are conducted at the construct rather than at the dimension level in two cases.

Case 1: Organizational citizenship behavior as a dependent variable

When a multidimensional construct under the latent model is studied as the dependent variable, analyses conducted at the dimension level and the construct level may lead to different conclusions about the effects of the independent variable. This is because we do not know whether the relationship between the predictor variable and one dimension of the dependent variable (e.g., D_1) is under the domain of the uniqueness of this dimension (i.e., U_1), the common variances of two dimensions (i.e., C_{12} or C_{13}), or the common variances of all dimensions (i.e., C_{123}). Thus, the relationship found at the dimension level may be unique only to a few dimension(s) but not valid to the overall multidimensional construct. The possibility of coming to a conclusion about a different relationship when a multidimensional construct is studied at the dimension level is illustrated in the following example in a study of OCB.

OCB is a multidimensional construct that is commonly conceptualized as a dependent variable. Although original proponents of OCB did not explicitly specify the relations between its dimensions and the overall construct, they implied that it should be defined under the latent model (see, e.g., Organ, 1988, 1990). Some early management researchers (e.g., Barnard, 1938; Katz & Kahn, 1966; Roethlisberger & Dickson, 1939) discussed a possible psychological construct that represents employees' overall

willingness to cooperate and to exert extra effort for the organization. Organ (1988, 1990) related this general conceptualization of "willingness to cooperate" to OCB. Under this conceptualization, different types (dimensions) of citizenship behaviors are merely different manifestations of an employee's general willingness to exert extra effort for the organization. In other words, OCB is a multidimensional construct that may be specified under the latent model. Recently, LePine, Erez and Johnson (2002) concluded that OCB may be defined under the latent model after analyzing the data in a meta-analysis. They suggested that "scholars should begin to explicitly think of Organ's OCB as a latent construct. Given that the five dimensions seem to be behavioral manifestations of positive cooperativeness at work, perhaps this latent OCB construct should be redefined as a general tendency to be cooperative and helpful in organizational settings" (p. 61).

Although we are not arguing that OCB must be defined under the latent model, it appears both conceptually and empirically reasonable to define such a multidimensional construct. Thus, we try to show that relationships between OCB dimensions and other constructs may *not* be generalized to the construct level when the multidimensional OCB construct is defined under the latent model. Bagozzi, Verbeke and Gavino (2003) investigated the effects of experienced shame, protective actions, and adaptive resource utilization on performance and OCB in salespeople. They argued that salespeople would be shamed by customers and have feelings of personal failure through a variety of sources, such as "when a salesperson makes a mistake in a presentation, neglects to fulfill a previous request by a customer, voices a racist or sexist comment, uses improper diction, or commits and error of etiquette" (p.220). This "experienced shame" would lead

to both "protective actions" (i.e., self-regulatory behaviors such as moving away from the unpleasant situation) and "adaptive resource utilization" (i.e., a refocus of resources from the customers to other productive activities), which would, in turn, affect both in-role performance and OCB. Based on the cultural difference in individualism between Dutch and Filipino salespeople, Bagozzi et al. hypothesized that for Dutch salespeople, protective actions and adaptive resource utilization fully mediate the effects of experiencing shame on performance and OCB. For Filipino salespeople, however, experienced shame will have direct effects on their performance and OCB.

Empirically, Bogozzi et al. (2003) measured OCB using four dimensions (i.e., courtesy, helping, sportsmanship and civic virtue). They conducted their analyses at the dimension level and used nested model testing procedures to compare the models by adding direct paths from experiencing shame to each of the OCB dimensions. Figure 2a shows the structural model for the Bogozzi et al.'s analyses. We have replicated the results of the Bogozzi study based on the covariance matrix reported. As we did not have the original items, we conducted the analyses using the single indicator method by specifying the loading and error of the measurement model using previously reported reliability estimates (James, Mulaik and Brett, 1982; Kenny, 1979). If the reliability estimates are reasonable, the results obtained from the nested model testing should be similar to the results obtained from both the measurement and structural models. Table 1 shows the results of our reanalyses.

Insert Figures 2a and 2b, and Table 1 about here.

M_1 to M_5 are the replications of the analyses reported by Bogozzi et al. for the Dutch sample, while M_8 to M_{12} are the replications for the Filipino sample. The only difference between our analyses and the original analyses is that we used the single item indicator method to specify the measurement model. M_1 is the fully mediated model when protective actions and adaptive resource utilization fully mediated the relationship between experienced shame and courtesy, helping, sportsmanship and civic virtue. Most of the hypothesized paths (i.e., from experienced shame to protective actions and adaptive resource utilization, and experienced shame to the performance and OCB dimensions) of M_1 are statistically significant. M_2 to M_5 are the four partially mediated models when a direct path is added from experienced shame to each of the four OCB dimensions. As a result, M_2 to M_5 are nested within M_1 and the changes in χ^2 between them can serve as a formal test for the significance of the added path. Similarly, M_8 to M_{12} are the replication of the analyses reported by Bogozzi et al. for the Filipino sample. M_8 is the fully mediated model and we also found that most of the hypothesized paths are statistically significant. M_9 to M_{12} are the four partially mediated models when a direct path is added.

As expected, we were able to replicate Bagozzi et al.'s (2003) results even though we used the single indicator method in specifying the measurement model. M_1 to M_5 and M_8 to M_{12} show that none of the direct paths from experienced shame to the OCB dimensions is significant in the Dutch sample. In the Filipino sample, the direct path from experienced shame to civic virtue is highly significant ($\Delta\chi^2=11.67$, $p<.01$). Similarly to Bagozzi et al. (2003), we concluded that there was some evidence that

experienced shame had a direct effect on OCB for the Filipino sample, but not for the Dutch sample.

However, when the analyses were conducted by defining OCB as a latent factor underlying its four dimensions, the partially mediated model was rejected for both the Dutch and Filipino samples. The results of these analyses are also shown in Table 1. In these analyses, all of the specifications are the same as for the previous analyses except that a latent OCB construct is specified as the underlying factor behind the four OCB dimensions. Figure 2b shows this model diagrammatically. Under this specification, for the Dutch sample, M_6 is the fully meditated model. Most of the hypothesized paths (i.e., from experienced shame to protective actions and adaptive resource utilization, and experienced shame to the performance and overall OCB construct) are statistically significant. When the direct path from experienced shame to the overall OCB construct is added to form the partially mediated model (i.e., M_7), no significant improvement in model fit is observed ($\Delta\chi^2$=3.23, n.s.). For the Filipino sample, M_{13} is the fully mediated model under this specification. Most of the hypothesized paths are also statistically significant. When the direct path from experienced shame to the overall OCB construct is added to form the partially mediated model (i.e., M_{14}), no significant improvement in model fit is observed ($\Delta\chi^2$=1.09, n.s.). For the Filipino sample, M13 is the fully mediated model under this specification. Most of the hypothesized paths are also statistically significant. When the direct path from experienced shame to the overall OCB construct is added to form the partially mediated model (i.e., M14), no significant improvement in model fit is observed ($\Delta\chi2 = 1.09$, *ns*).

Thus, there was no evidence to support the hypothesis that the experienced shame of Filipino salespeople has direct effects on their OCB when OCB is specified as an underlying construct of its four dimensions. Our reanalysis showed that Bagozzi et al. (2003) may have drawn a different conclusion if the data were analyzed at the OCB construct level. The major reason for this difference in result is that OCB is a multidimensional construct defined under the latent model. Thus, under the latent model, relationships found at the dimensional level may not be generalizable to the multidimensional construct level.

Case 2: Loyalty to supervisor as a predictor

In the last example, the multidimensional construct is the dependent variable of a structural relationship. In this example, we show that the results would be the same when the multidimensional construct is the predictor variable. When multidimensional constructs under the latent model are studied as predictor variables, analyses conducted at the dimension level may also lead to different conclusions. This is because the domains of the dimensions are much broader than the underlying multidimensional constructs. There is a strong chance of including irrelevant variances of the dimensions (anything outside C_{123} in Figure 1c) as true variances of the multidimensional construct. The possibility of concluding that different relationships exist is illustrated using a study by Chen, Tsui and Farh (2002) where "loyalty to supervisor" and "organizational commitment" are the independent variables and the OCB dimensions and performance are the dependent variables.

In the last two decades, organizational commitment researchers have turned their attention to the multiple foci of commitment. In addition to the organization as a focus of commitment, occupations, top management, supervisors, co-workers, work-units, and customers have been suggested as other important foci of commitment (e.g., Becker, 1992; Beck & Billings, 1993; Becker, Billings, Eveleth & Gilbert, 1996; Gregersen, 1993; Knippenberg & Schie, 2000). The relative importance of various foci of commitment on job outcomes, such as in-role performance and OCB, has become an important theoretical and empirical question.

Chen et al. (2002) used the term loyalty to supervisor instead of commitment to supervisor (they acknowledged that the two terms are synonymous) to avoid confusion with organizational commitment. Original proponents of the concept of commitment to supervisor argued that this concept should have two dimensions: identification with the supervisor and internalization of the supervisor's values. Chen et al. further argued that this construct is "psychological attachment" to the supervisor that "may be manifested in more ways than mere identification with the individual (i.e., supervisor), or internalization of the other's (supervisor's) values" (p. 340-341). Thus, Chen et al. defined their loyalty to supervisor construct as a five-dimensional instead of a two-, dimensional construct. These five dimensions are identification, internalization, dedication, extra effort and attachment. Although the authors did not define the relationship between the overall construct of loyalty to supervisor and its five dimensions, they explicitly argued that the dimensions are "manifestations" of the overall construct. Furthermore, as a psychological construct representing the attachment towards the supervisor, it is difficult to argue that the five dimensions are exhaustive and cover the

entire domain of a subordinates' commitment. Thus, loyalty to supervisor should be a multidimensional construct under the latent model.

Chen et al. (2002) collected data from 333 supervisor-subordinate dyads and conducted their analyses at the dimension level to test the loyalty to supervisor construct. Supervisors rated the in-role performance and OCB of their subordinates. OCB was measured using three dimensions, namely boosterism, altruism, and conscientiousness. The subordinates reported their loyalty to their supervisors, organizational commitment, and five controlling variables including age, gender, education, position, and company tenure. Loyalty to supervisor was measured using five dimensions, namely dedication to the supervisor, extra effort for the supervisor, attachment to the supervisor, identification with the supervisor, and internalization of the supervisor's values. Organizational commitment was measured using two dimensions, namely value commitment and commitment to stay. The authors analyzed all the data at the dimension level. Separate regression analyses were conducted with boosterism, altruism, conscientiousness, and in-role performance as the dependent variables. In each regression analysis, the dimensions of organizational commitment and loyalty to supervisor were entered as a group into the regression equation with the controlling variables.

Table 2 reports Chen et al.'s (2002) original results and our reanalyses. M_{1a}, M_{2a}, M_{3a}, and M_{4a} were the original dimensions in Chen et al.'s (2002) study. They found that none of the organizational commitment dimensions showed significant effects while one of the loyalty to supervisor dimensions (dedication) was a significant predictor of boosterism and conscientiousness (M_{1a} and M_{3a}). Extra effort, another dimension of loyalty to supervisor, significantly predicted in-role performance (M_{4a}). Based on these

findings, Chen et al. (2002) concluded that loyalty to supervisor was "more important than organizational commitment in accounting for an employee's in-role and extra-role performance" (p. 352).

However, when we treated the dimensions of "loyalty to supervisor" as the indicators of their respective latent construct and reanalyzed the data, there was no support for this conclusion. In these analyses, we specified an "overall loyalty to supervisor construct" as an underlying construct with the five dimensions as indicators. As a latent construct was involved, we used the LISREL software to conduct the analyses. To be comparable to ordinary least squares (OLS) regression analyses, we specified the error of all other variables involved in the regression equation as zero. To make sure that this specification resembled OLS regression analysis, we replicated the analyses of M_{1a}, M_{2a}, M_{3a}, and M_{4a} with the LISREL software by specifying the error of all variables, including the five dimensions of loyalty to supervisor as zero. As the results were very similar, we continued to conduct our analyses at the construct level of loyalty to supervisor. The results of our analyses are shown as M_{1b}, M_{2b}, M_{3b} and M_{4b} of Table 2. Both organizational commitment and loyalty to supervisor failed to show a significant effect on boosterism, altruism, conscientiousness and in-role performance. Thus, in contrast to the conclusion drawn by Chen et al. (2002) based on dimension-level analyses, both overall organizational commitment and loyalty to supervisor became nonsignificant predictors of in-role performance and OCB dimensions in this sample in our reanalyses. Our results clearly indicate that when some but not all dimensions of loyalty to supervisor (i.e., dedication and extra effort) are related to the dependent variables (i.e., OCB an in-role performance), these relationship may have involved only

the unique variance of these dimensions. The common variance among all the dimensions of loyalty to supervisor may not necessarily be related to the dependent variables. In additiona, our conclusion may raise two issues for further research. First, Chen et al. may have added inappropriate dimensions to the loyalty to supervisor construct. That is, psychological attachment may be different from loyalty to supervisor. Second, the latent construct of loyalty to supervisor may not be related to in-role performance and OCB dimensions although some of their dimensions do. Unfortunately, these interesting issues will not be raised if analyses are only conducted at dimension level.

Insert Table 2 about here.

Discussion and Conclusion

We point out that some management researchers do not explicitly define the relationship between the overall multidimensional construct and their dimensions. We argue that, in rigorous scientific research, this should be avoided. Not defining the relationship may lead to miscommunication and inconsistency in data analyses among studies. Even worse, general terms may be perceived as multidimensional constructs when such a perception is not necessarily the case. This will hinder the work of theory testing and development.

On top of the common phenomenon of not explicitly defining the multidimensional construct, some researchers who use multidimensional constructs in their studies offer conceptual arguments and conduct empirical tests at the dimension

level. Using the partition of variances among constructs, we deduce that conclusions drawn from analyses conducted at the dimension level may not be valid at the construct level. This is particularly true for multidimensional constructs under the latent model. Using data from two published reports that may have involved a latent multidimensional construct, we showed that conclusions that are drawn from analyses at the dimension level could be different from those based on the construct level analyses.

There are several important implications of our discussion. First, when multidimensional constructs are involved, researchers should clearly define the relations between the constructs and their dimensions. This should be regarded as the first step in theory building so that we can avoid the misleading labels of pseudo-multidimensional constructs. Furthermore, researchers who are aggregating findings from different studies in order to examine the validity of theories across samples should be more careful about the definition of the multidimensional construct involved. The underlying assumption for the aggregation is that the domains of the constructs being summarized are the same across various studies. The existence of "pseudo-multidimensional constructs" may create a problem in the communication of results and increase the possibility of combining pieces of evidence that are not truly comparable.

Second, for constructs that appear to be multidimensional but the relationship between the construct and its dimensions is not clear, researchers should examine the meaning of the construct carefully. If the meaning makes conceptual sense, validation studies should be conducted to examine its construct validity.

Third, if construct-level research hypotheses are involved, then the data analysis should be conducted at the appropriate level. This is particularly important for

multidimensional constructs under the latent model. Furthermore, whenever possible, this recommendation should also be followed for the profile and aggregate models of multidimensional constructs. At least, the strength of the relationship between a particular construct and the dimensions of a multidimensional construct should be examined and discussed if the multidimensional construct is under the profile model. For the aggregate model, potential opposing relationships between a particular construct and the dimensions of the multidimensional construct must be ruled out or identified. Without this research step, the assumption that dimension-level analyses can be applied to the construct level may be highly questionable.

Finally, journal editors and reviewers should take a much tougher position in requesting that researchers use appropriate and precise terms to describe their constructs. They should ask researchers to conduct their analyses at the appropriate construct level, especially when latent multidimensional constructs are involved. Otherwise, confusing or even incorrect information will continue to appear in the literature and this will cause problems in management theory development and testing.

Endnote:

1. We use the terms “level” and “level of analysis” to denote the differences between the overall multidimensional construct and its dimensions. This should not be confused with the terminology used in cross-level analysis (e.g., individual versus group level) such as in the hierarchical linear modeling technique.

References

Bagozzi, R.P., Verbeke, W., & Gavino, J.C., Jr. 2003. Culture moderates the self-regulation of shame and its effects on performance: The case of sales persons in the Netherlands and the Philippines. Journal of Applied Psychology, 88(2): 219-233.

Barnard, C.I. 1938. The Functions of the Executive. Cambridge, Mass.: Harvard University Press.

Becker, T. E., & Billings, R. S. 1993. Profiles of commitment: An empirical test. *Journal of Organizational Behavior,* 14: 177-190.

Becker, T. E., Billings, R. S., Eveleth, D. M., & Gilbert, N. L. 1996. Foci and bases of employee commitment: Implications for job performance. *Academy of Management Journal*, 39: 464-482.

Chen, Z.X., Tsui, A.S., & Farh, J. 2002. Loyalty to supervisor vs. organizational commitment: Relationships to employee performance in China. Journal of Occupational and Organizational Psychology, 75, 339-356.

Colquitt, J.A. (2001). On the dimensionality of organizational justice: A construct validation of a measure. Journal of Applied Psychology, 86, 386-400.

Dabos, G.E., & Rousseau, D.M. 2004. Mutuality and reciprocity in psychological contracts of employees and employers. Journal of Applied Psychology, 89(1): 52-72.

Edwards, J.R. (2001). Multidimensional constructs in organizational behavior research: An integrative analytical framework. Organizational Research Methods, 4(2): 144-192.

Gelade, G.A., & Ivery, M. 2003. The impact of human resource management and work climate on organizational performance. Personnel Psychology, 56, 383-404.

Graen, G. B., Novak, M., & Sommerkamp, P. 1982. The effects of leader-member exchange and job design on productivity and satisfaction: Testing a dual attachment model. *Organizational Behavior and Human Performance*, 30: 109-131.

Greenberg, J. (1993). The social side of fairness: Interpersonal and informational classes of organizational justice. In R. Cropanzano (Ed.), Justice in the workplace: Approaching fairness in human resource management, Hillsdale, NJ:Erlbaum, 79-103.

Harrison, D.A., Price, K.H., Gavin, J.H., & Florey, A.T. 2002. Time, teams, and task performance: Changing effects of surface- and deep-level diversity on group functioning. Academy of Management Journal, 45(5): 1029-1045.

He, Y., Tian, Z., & Chen, Y. 2007. Performance inmplications of nonmarket strategy in China. Asia Pacific Journal of Management, 24(2): 151-169.

Hofstede, G. 1984. Culture's consequences: International differences in work-related values. Newbury Park: CA: Sage.

Huang, X., Shi, K., Zhang, Z., & Cheung, Y.L. 2006. The impact of participative leadership behavior and psychological empowerment and organizational commitment in Chinese state-owned enterprises: The moderating role of organizational tenure. Asia Pacific Journal of Management, 23(3): 345-367.

Hui, C., Lee, C., & Rousseau, D.M. 2004. Psychological contract and organizational citizenship behavior in China: Investigating generalizability and instrumentality. Journal of Applied Psychology, 89(2): 311-321.

James, L.R., Mulaik, S.S., & Brett, J.M. 1982. Causal analysis: Assumptions, models, and data. Beverly Hills, CA: Sage.

Judge, T.A., & Colquitt, J.A. 2004. Organizational justice and stress: The mediating role of work-family conflict. Journal of Applied Psychology, 89(3): 395-404.

Jung, C. (1971). Psychological Types, Princeton, NJ:Princeton University Press.

Katz, D., & Kahn, R.L. 1966. The social psychology of organizations. New York: Wiley.

Kenny, D.A. 1979. Correlation and causality. New York: Wiley.

Kerlinger, F.N. (1986). Foundations of behavioral research. 3rd edition. New York: CBS College Publishing, Holt, Rinehart and Winston.

Law, K.S., & Wong, C.S. 1999. Multidimensional constructs in structural equation analysis: An illustration using the job perception and job satisfaction constructs. Journal of Management, 25(2): 143-160.

Law, K.S., Wong, C.S., & Mobley, W.H. 1998. Toward a taxonomy of multidimensional constructs. Academy of Management Review, 23(4): 741-755.

LePine, J.A., Erez, A., & Johnson, D.E. 2002. The nature and dimensionality of organizational citizenship behavior: A critical review and meta-analysis. Journal of Applied Psychology, 87(1), 52-65.

Liden, R.C., & Maslyn, J.M. 1998. Multidimensionality of leader-member exchange: An empirical assessment through scale development. Journal of Management, 24(1): 43-72.

Locke, E.A. 1969. What is job satisfaction? Organizational Behavior and Human Performance, 4, 309-336.

MacCallum, R.C. and Browne, M.W. (1993). The use of causal indicators in covariance structure models: Some practical issues. Psychological Bulletin, 114(3):533-541.

Mohammed, S., Mathieu, J.E., & Bartlett, A.L. 2002. Technical-administrative task performance, leadership task performance, and contextual performance: Considering the influence of team- and task-related composition variables. Journal of Organizational Behavior, 23, 795-814.

Moorman, R.H., Blakely, G.L., & Niehoff, B.P. 1998. Does perceived organizational support mediate the relationship between procedural justice and organizational citizenship behavior? Academy of Management Journal, 41(3): 351-357.

Organ, D.W. 1988. Organizational citizenship behavior. Lexington, MA: Lexington Books.

Organ, D.W. 1990. The motivational basis of organizational citizenship behavior, Research in Organizational Behavior, 12, 43-72.

Peterson, R.S., Smith, D.B., Martorana, P.V., & Owens, P.D. 2003. The impact of chief executive officer personality on top management team dynamics: One mechanism by which leadership affects organizational performance. Journal of Applied Psychology, 88(5): 795-808.

Roethlisberger, F.J., & Dickson, W.J. 1939. Management and the worker. New York: Wiley.

Schwab, D.P. (1980). Construct validity in organizational behavior. Research in Organizational Behavior, 2, 3-43.

Shaw, J.D., Gupta, N., & Delery, J.E. 2005. Alternative conceptualizations of the relationship between voluntary turnover and organizational performance. Academy of Management Journal, 48(1), 50-68.

Stone, E.F. (1976). The moderating effect of work-related values on the job scope-job satisfaction relationship. Organizational Behavior and Human Performance, 15, 147-167.

Van Scotter, J. R., & Motowidlo, S. J. 1996. Interpersonal Facilitation and Job Dedication as Separate Facets of Contextual Performance. Journal of Applied Psychology, 81, 525-531.

VanYperen, N.W., van den Berg, A., & Willering, M.C. 1999. Towards a better understanding of the link between participation in decision-making and organizational

citizenship behavior: A multilevel analysis. Journal of Occupational and Organizational Psychology, 72, 377-392.

Williams, L.J., Edwards, J.R., Vandenberg, R.J. (2001). Recent advances in causal modeling methods for organizational and management research. Journal of Management, 29(6), 903-936.

Witt, L.A., Kacmar, K.M., Carlson, D.S., & Zivnuska, S. 2002. Interactive effects of personality and organizational politics on contextual performance. Journal of Organizational Behavior, 23, 911-926.

Table 1. Results for Case 1: OCB as a dependent variable

		χ^2 (d.f.)	$\Delta\chi^2$	Significance of the added path
	Dutch Sample			
OCB analyzed at the Dimension Level				
M_1	No direct effect of shame on OCB	307.47 (47)	--	--
M_2	Adding: shame → courtesy	307.47 (46)	0.00	n.s.
M_3	Adding: shame → helping	305.88 (46)	1.59	n.s.
M_4	Adding: shame → sportsmanship	305.13 (46)	2.34	n.s.
M_5	Adding: shame → civic virtue	304.46 (46)	3.01	n.s.
OCB analyzed at the Construct Level				
M_6	No direct effect of shame on OCB	235.13 (49)	--	--
M_7	Adding: shame → OCB	231.90 (48)	3.23	n.s.
	Filipino Sample			
OCB analyzed at the Dimension Level				
M_8	No direct effect of shame on OCB	363.13 (47)	--	--
M_9	Adding: shame → courtesy	363.10 (46)	0.03	n.s.
M_{10}	Adding: shame → helping	359.98 (46)	3.15	n.s.
M_{11}	Adding: shame → sportsmanship	362.57 (46)	0.56	n.s.
M_{12}	Adding: shame → civic virtue	351.46 (46)	11.67	$p<.01$
OCB analyzed at the Construct Level				
M_{13}	No direct effect of shame on OCB	323.82 (49)	--	--
M_{14}	Adding: shame → OCB	322.73 (48)	1.09	n.s.

Note:
N = 218 for Dutch sample; N = 288 for Filipino sample;
M_1, M_6, M_8, and M_{13} are the four baseline models of full mediation: that is, there is no direct path from experienced shame to OCB. M_1 and M_6 do not have any paths from experienced shame to any OCB dimensions. M_6 and M_{13} do not have any paths from experienced shame to the overall OCB construct.

Table 2. Results for Case 2: Loyalty to Supervisor as the Independent Variable

	Boosterism		Altruism		Conscientiousness		In-role Performance	
	M_{1a}	M_{1b}	M_{2a}	M_{2b}	M_{3a}	M_{3b}	M_{4a}	M_{4b}
Age	.16*	.17*	.11	.09	.13	.10	.01	-.02
Gender	.10	.06	-.03	.11	.05	.06	.16**	.27*
Education	.17**	.06**	.02	.01	-.07	-.01	-.03	.02
Position	.14*	.24**	-.05	-.05	-.02	.00	.00	.04
Tenure	-.07	-.02	-.04	-.01	-.07	-.03	-.02	.00
Organizational Commitment Dimensions:								
1. Value Commitment	-.06	-.08	.14	.16	-.09	-.05	.04	.10
2. Commitment to Stay	-.00	.02	-.06	-.04	.13	.11	.02	.01
Loyalty to the Supervisor Dimensions:								
1. Identification	-.04	--	-.08	--	.04	--	-.04	--
2. Internationalization	-.07	--	-.07	--	-.12	--	-.03	--
3. Dedication	.18**	--	.10	--	.26**	--	.16	--
4. Extra Effort	.05	--	.12	--	.07	--	.18**	--
5. Attachment	.06	--	.04	--	-.12	--	-.06	--
Overall Loyalty to the Supervisor Construct	--	.17	--	.37	--	.16	--	.08
R^2	.17**	.16**	.07*	.05**	.08**	.04**	.09**	.05**

Note:
M_{1a}, M_{2a}, M_{3a}, and M_{4a} are the results of the Chen et al.(2002) analyses at the dimension level for loyalty to supervisor;
M_{1b}, M_{2b}, M_{3b}, and M_{4b} are our reanalyses of loyalty to supervisor at the construct level;
Coefficients reported are standardized beta weights.
* $p < .05$; ** $p < .01$.

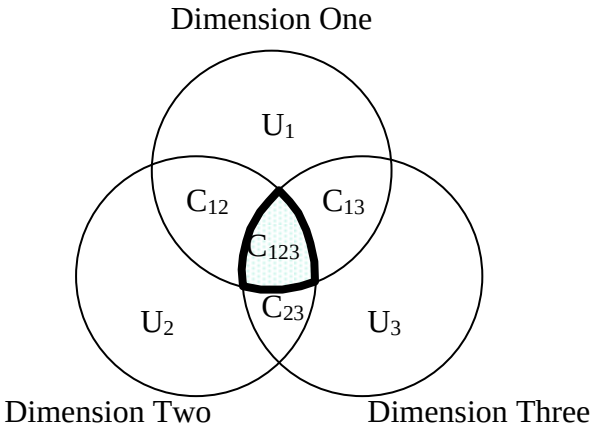

Figure 1(a). Latent Model of a Multidimensional Construct

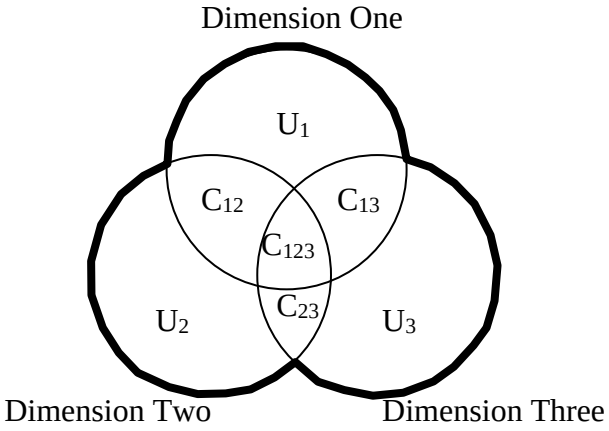

Figure 1(b). Aggregate Model of a Multidimensional Construct

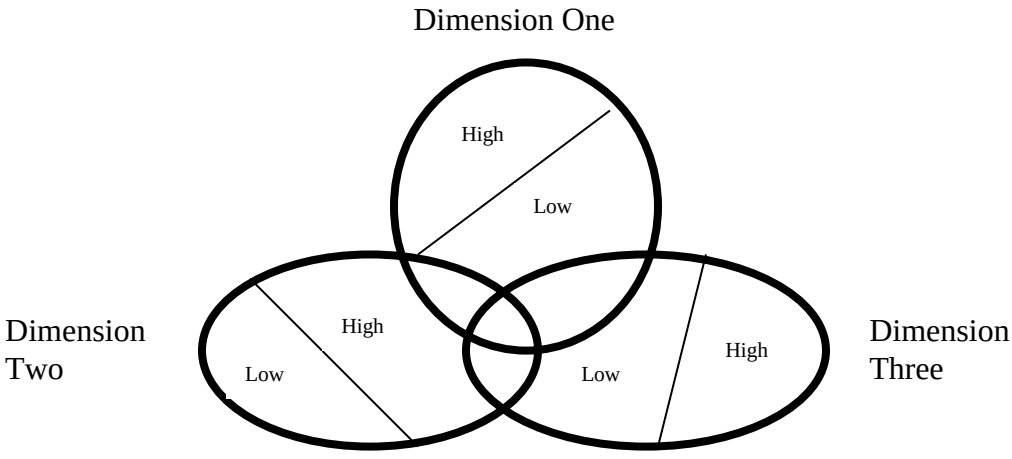

Figure 1(c). Profile Model of a Multidimensional Construct

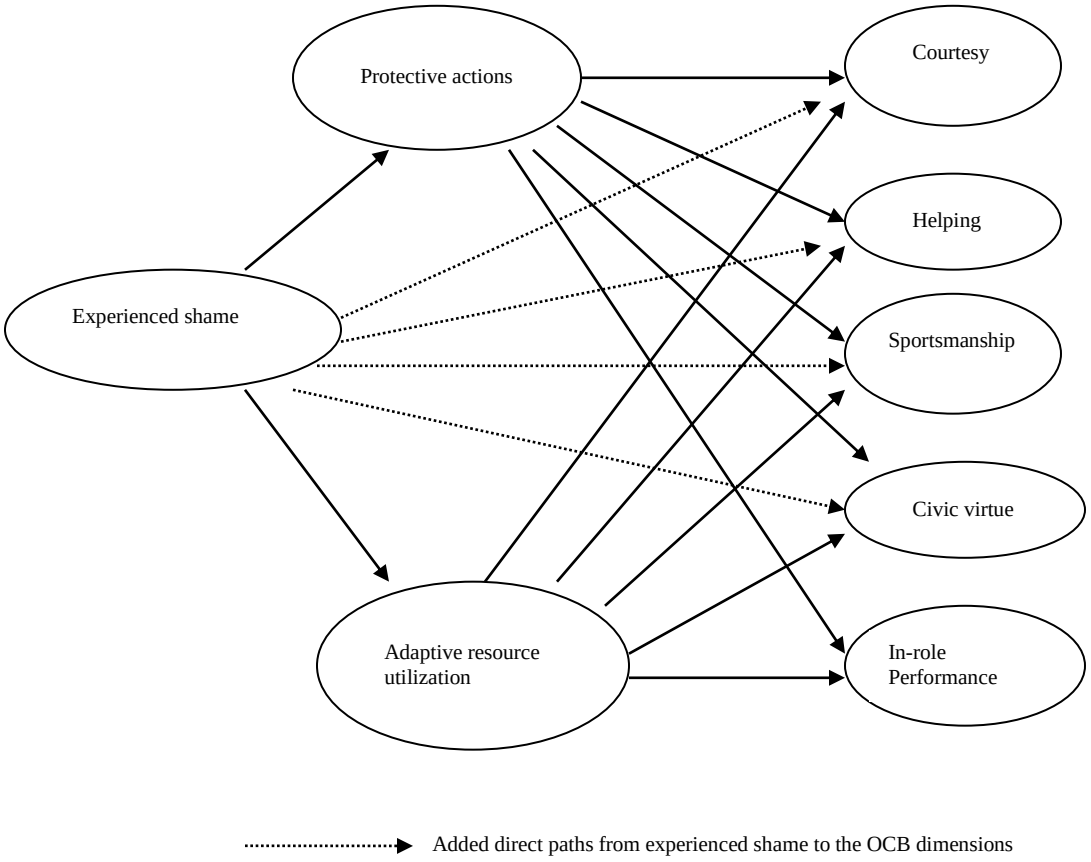

Figure 2a. The Original Bagozzi et al. (2003) Conceptual Model with OCB at the dimension level

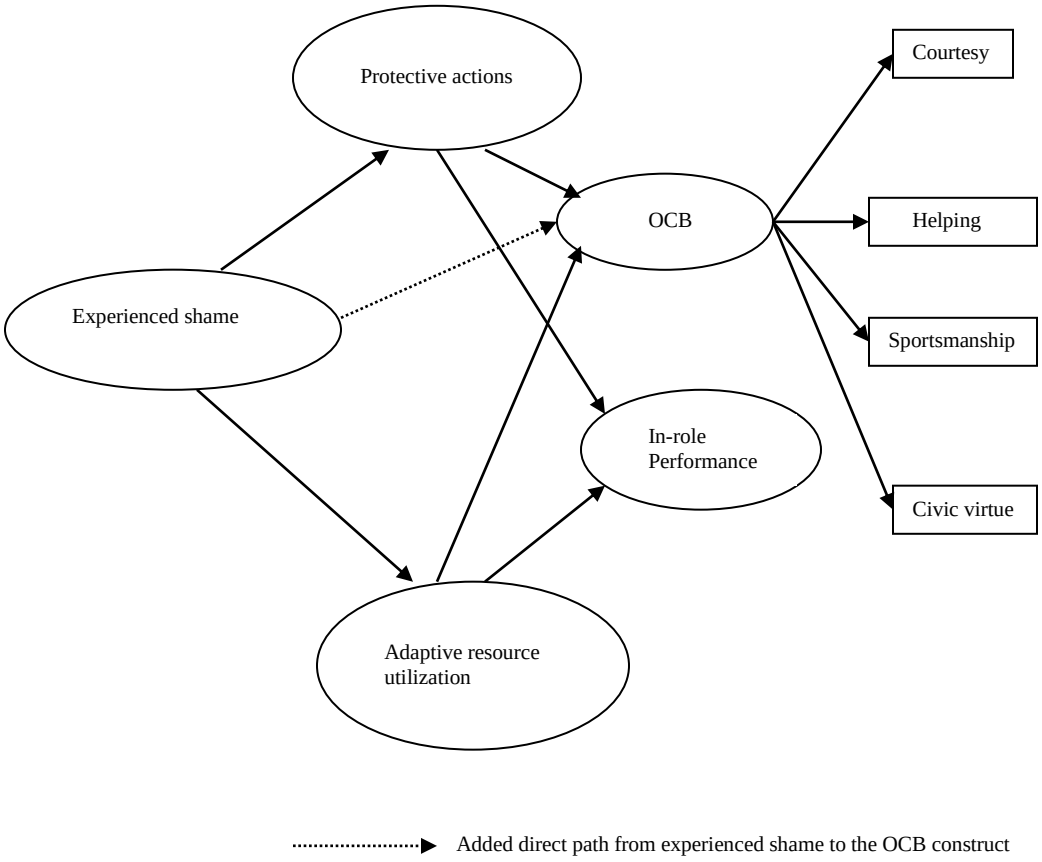

Figure 2b. The Bagozzi et al. (2003) Conceptual Model when OCB is at the construct level