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# A Best evidence synthesis on the link between budgetary participation and managerial performance

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## **Abstract**

By using the best evidence synthesis (Slavin, 1995), we want to find out an accurate synthesis on the budgetary participation -BP- and managerial performance-PM- link. The use of criteria of selection has allowed to decrease the heterogeneity. The results explain the presence of the heterogeneity by cultural and industrial contingencies. The best evidence synthesis based on an homogeneous subgroup (managers in publicly traded firms in Taiwan Stock Exchange) shows a time dependency of BP-PM link and some recommendations for further research:

1/to continue the study of the traded firms in Taiwan Stock Exchange to analyse the causal BP-PM link with a Granger test,

2/to study the evolution of this link over time in other countries.

## 1. Introduction

« A few writers refer to comparing or combining apples and oranges, but the meta-analytic mixtures are usually too heterogeneous to be described with only two fruits. Other writers, with lower levels of enthusiasm or reverence, talk about rotten fruits or even less savory substances. » (Feinstein, 1995: 72). Feinstein's citation is helpful to understand that the selectivity is much more attractive than combining heterogeneous articles into a standard meta-analysis that lacks the scientific precautions offered by individual results from randomised trials.

Meta-analysis is a quantitative method of combining the results of independent studies and synthesizing all the summaries and the conclusions usable to evaluate notably effectiveness of a managerial practice. This type of syntheses differs from traditional reviews of literature using a narrative format to summarise the results of studies on a topic to draw conclusions or inform theory.

In accounting literature, the meta-analysis has been used to aggregate results in numerous fields (Ahmed and Courtis, 1999; Hay et al, 2006; Trotman and Wood, 1991, among others). To the best of our knowledge, two meta-analyses (Derfuss, 2009, Greenberg et al., 1994) and many reviews of literature have been written about the link between budgetary participation and managerial performance (see for exemple: Chalos and Poon, 2001; Shields and Shields, 1998).

*Budgetary participation* -BP- is usually defined as « a process in which a manager is involved with, and has influence on, the determination of his or her budget » (Shields and Shields, 1998: 49). A *budget* is an expression of expectations of a company presented in economic terms for a futur time period (Samuelson, 1973: 31). An usual budgetary participation assessment is Milani's scale which measures the perceived influence of a budgetee on a budget (Milani, 1975).

Employee's *performance* has been defined as «the degree to which successful role achievement is accomplished» (Ferris, 1977: 610). The usual managerial performance -MP- questionnaire is based on the results of a survey conducted by Mahoney et al. (1963) that measures eight performance dimensions (planning, investigating, coordinating, evaluating, supervising, staffing, negotiating, representing) which provides an overall measure of performance. Mahoney's and Milani's scales have been used by most of studies investigating the link between BP and PM.

Derfuss (2009) has found that BP and PM are significantly and positively linked. Nevertheless, Derfuss' meta-analysis on this link include heterogeneous results and only published english articles. Following Feinstein (1995), it could be interesting to combine only the quantitative randomised-sample results.

The objective of this article is to answer to the following research question: **Is Derfuss' meta-analysis result valid when the only trials based on randomised samples are combined?** By selecting studies with «randomised-sample» criterion, we have done a «best evidence synthesis» (Slavin, 1995).

Best evidence synthesis is «a response to concerns about misleading conclusions from meta-analyses» (Slavin, 1995: 11). Following Slavin, if a literature contains some studies high in internal and external validity, thus lower quality studies had to be excluded from the combination of the results. According to Feinstein (1995), studies using randomised sample are more homogeneous and could be aggregated in a meta-analysis.

The rest of the paper is organised as follows. Section 2 describes the data and the method used. Section 3 presents the empirical results. Section 4 discusses them and the last one concludes.

## 2. Data and method

### ***2.1. Process of studies collection***

Firstly, we have collected the articles from existing reviews of literature and meta-analyses (Banovic, 2005; Shields and Shields, 1998; Chalos and Poon, 2001; Derfuss, 2009). Then, the first draft has been published in the *Muenchen repec* base of working papers. Thus, our article has been appeared in *scholar.google.com* and related articles have been collected. The new articles have been included in the first draft. This procedure has been iterated until stability of our base of papers on the link between BP and MP.

Finally, we have based our synthesis on the list of articles which appears in [appendix](#). Some articles have not statistical results and others have unusable results in a meta-analysis because of the lack of precisions. Seventy-three results have been gathered. Our meta-analysis considers *a priori*

more articles than the one by Derfuss (2009) and our method differs.

## 2.2. Methods and criteria

To ensure its reproducibility, our best evidence synthesis has used fixed-effect procedure of Hedges and Olkin (1985). Their statistical procedure is recognised in many scientific fields. The result of our first draft has been computed with MS Excel. Then, a triangulation of the results has been realised by using « rmeta »: an R package for meta-analysis.

The criteria of selection to exclude articles from the best evidence synthesis are the following:

- the non-using of Milani's and Mahoney's measurement scales. This criterion avoid the combination of articles which use different measure scales.
- Articles which are based on laboratory experiment and thus having low in external validity have been excluded.

After filtering with this two criteria, the article base encompasses forty-eight trials. For the best evidence synthesis, following Feinstein (1995), we have used a criterion to exclude the studies which are not based on randomised sample. Thus, the best evidence synthesis is only based on 20 randomised trial results ([Table 1](#)). but some of these randomised-sample results do not use Milani's and Mahoney's scales (Kobory, 2006; Dunk, 1995; Chong, Eggleton and Leong, 2006) or the presentation of the results is not enough clear to be used (Chong and Chong, 2002). Therefore, we have excluded these results.

**Table 1**  
**Papers used for the best evidence synthesis**

Randomised trial papers	Countries	Use Milani and Mahoney's scales	Firms/sectors
Kren 1992	USA	x	manufactures
Chong Chong 2002	Australia	x	manufactures
Lau low Engelton 1995	Singapour	x	manufactures
Dunk 1990	USA	x	cost centers
Abdullah 1998	Australia-Sydney	x	metropolitan
Kobory 2006	Taiwan		Large compagnies
Ni and Su 2001	Taiwan	x	Large compagnies
Subramanian Ashkanasy 2001	Australia	x	agribusiness firms
Su Lin WP 2007	Taiwan	x	Large compagnies
Dunk 1993	Australie	x	manufactures
Brosnan Hoque 2007	Australia	x	Mining sector
Dunk 1995	Australia-Sydney		manufactures
Dunk 1995	Australia-Sydney		manufactures
Chong eggleton Leong 2006	Australia		business directory
Quirin, O'Bryan Donnelly 2004	USA	x	Large compagnies
Chalos Poon 2001	USA	x	Marketing managers
Chong Bateman 2000	Australie	x	industrial sector
Lau buckland 2000	Norvège	x	Mining sector
Ni, Su, Zhongshao Zheng 2005	Taiwan	x	Large compagnies
Breaux 2004	USA		Certified Public Accountant

Sometimes, the use of criteria of selection cannot eliminate heterogeneity between individuals studies. If the heterogeneity test rejects the homogeneity null hypothesis, one will use

subgroup analysis or will assess the quality of trials. Nevertheless, evaluation of the methodological quality of a study is a difficult burden (Cho and Bero, 1994). Moreover, the use of quality score is highly criticized in literature (Moher et al., 1995, among many others). Thus, subgroup analysis seems to be a better research strategy.

The presence of cultural contingencies has been studied in the literature (Frucot and Shearon, 1991; Lau, low and Eggleton, 1997; Tsui, 2001). The link between BP and MP depends on cultural variables. Thus, if the homogeneity null hypothesis is rejected, it will be useful to make cultural subgroup differences analysis in order to study the causes of the heterogeneity.

The heterogeneity reduction could be useful to see the impact of other variables on the relationship between BP and MP and to make some recommendations for further research.

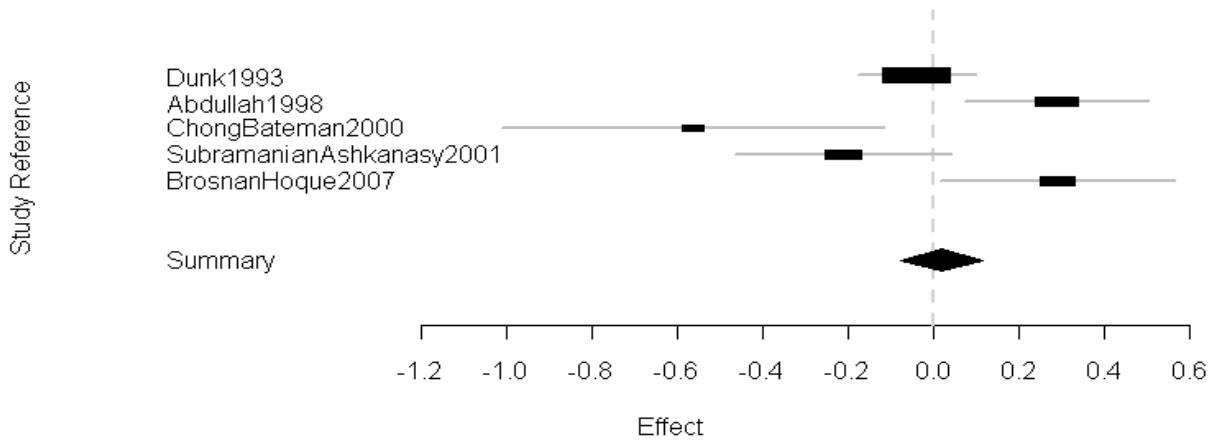
### 3. Results

Among the twenty randomised-sample results, it has been excluded the ones which does not use the Milani's and Mahoney's et al. measurement scales. The summary effect is about 0.00563 (95% confidence interval=[-0.00856, 0.0198]). One cannot rely on this result because of the presence of heterogeneity among results (estimated heterogeneity variance: 0.0055 , P= 0; test for heterogeneity:  $X^2(13) = 74.91$ , P=0). The result of these heterogeneity tests has to be compared with the ones not using Milani's and Mahoney's scales (estimated heterogeneity variance=0.0029, P= 0; Test for heterogeneity:  $X^2(18) = 83.5$ , P=0). This criterion has decreased the heterogeneity, but the null homogeneity hypothesis is still rejected.

Following Frucot and Shearon (1991), Lau, Low and Eggleton (1997) and Tsui (2001), a cultural subgroup analysis could be computed to reduce the heterogeneity. The subgroups are the following: Australian managers (5 randomised-sample results using Milani's and Mahoney's et al. scales), Taiwanese ones (3) and American ones (4). The studies based on survey of managers from others countries have been excluded from the subgroups analysis, because of the lack of study from some political territories.

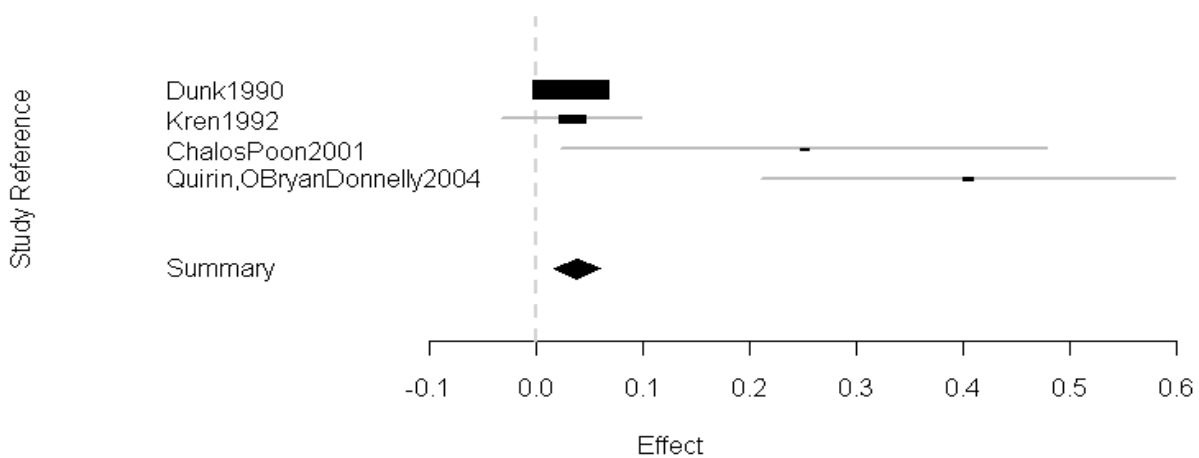
From the Australian subgroup synthesis, it appears a non-significant positive link between BP and MP (summary effect=0.02 with 95% CI=[-0.08,0.11]). One cannot rely on this subgroup synthesis because of the reject of the homogeneity null hypothesis (estimated heterogeneity variance=0.057,P= 0; test for heterogeneity:  $\chi^2(4) = 20.07$ , P=5e-04). Nevertheless, the result seems to be more homogeneous. Chong and Bateman's article and, to a lesser extent, Abdullah's one increase the heterogeneity (Figure 1).

**Figure 1**  
**Best evidence synthesis of the australian results**



From the american subgroup synthesis, it appears a significant positive link between managerial performance and budgetary participation (summary effect=0.039, 95% CI =[0.0173, 0.0607]). One cannot rely on this subgroup best evidence synthesis because of the reject of the homogeneity null hypothesis (estimated heterogeneity variance=0.0075, P=0.001; test for heterogeneity:  $\chi^2(4) = 17.42$ , P=6e-04). The synthesis plot shows a tendency (Figure 2). But because of the lack of homogeneity between these individual results, one cannot infer something about this temporal tendency.

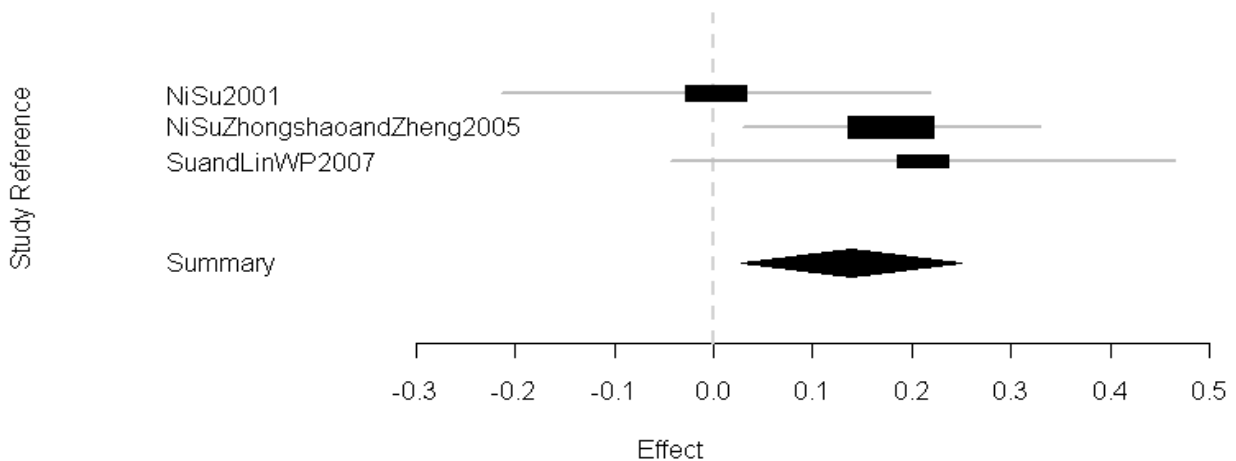
**Figure 2**  
**Best evidence synthesis of the american results**



From the taiwanese subgroup synthesis, it appears a significant positive link between the studied variables (Summary effect=0.139, 95% CI= [0.028, 0.249]). One can rely on this subgroup result because of the acceptance of the homogeneity null hypothesis (estimated heterogeneity

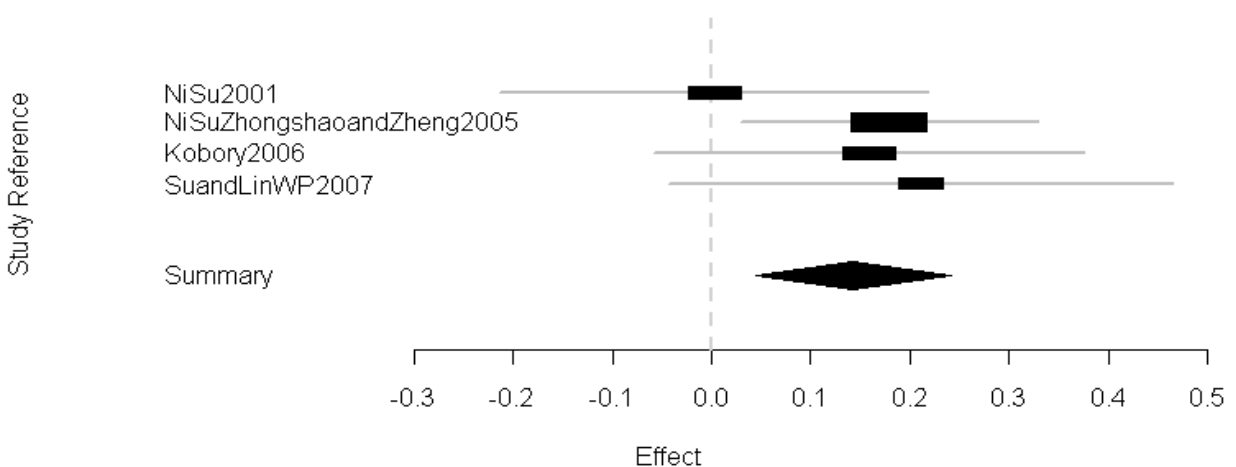
variance: 0.00059, P= 0.348; test for heterogeneity:  $\chi^2( 2 ) = 2.11$ , P=0.3483). The synthesis plot shows the same tendency (Figure 3) as the american subgroup one. The relation between BP and MP evolves positively over time.

**Figure 3**  
**Best evidence synthesis of the Taiwanese results**



The same tendency appears when Kobory's article, which does not use the Milani's budgetary participation scale, is added in the subgroup analysis (Figure 4; summary effect=0.143, 95% CI=[0.0443, 0.242]; estimated heterogeneity variance=0, P= 0.545; test for heterogeneity:  $\chi^2( 3 ) = 2.14$ , P=0.5446). These results deserve some comments, which appears in section 4.

**Figure 4**  
**Best evidence synthesis of the Taiwanese results without Milani's & Mahoney's scales criterion**



#### 4. Comments and further research

From these results, it seems possible to highlight and to comment two of them. Firstly, the taiwanese subgroup synthesis is really interesting because the sample is the same through the studies: publicly traded firms in the Taiwan Stock Exchange. Thus, the time dependency of the link between BP and MP is shown when the effects of cultural and industrial contingencies are under control. Secondly, Derfuss' meta-analysis results cannot be rejected following our results. In fact, in the best evidence syntheses of american and australian subgroups, the lack of control on industrials contingencies could be linked to higher heterogeneity than in the taiwanese one.

Based on these comments, it seems possible to give a recommandation for further research. The time dependency of the link between BP and MP has been infered from a limited field: the publicly traded firms in Taiwan Stock Exchange from 2001 to 2007. One should examine the robustness of this result:

- In the long-run, by surveying annually traded firms in the Taiwan Stock Exchange during twenty years or more. With a causality Granger test on this base of results, one will allow to show the evolution over time of the causal link between budgetary participation and managerial performance.
- Through countries, by studying, in different political territories, the same populations of firms over time.

#### 5. Conclusion

Finally, after having seen that meta-analysis based on the selection of homogeneous individual results is better than « meta-analytic mixtures (...) usually too heterogeneous » (Feinstein, 1995: 72), we have justified the use of some criteria of selection. Moreover, if the combined results are still significantly heterogeneous, it will be justified to combine articles by cultural subgroups.

The best evidence synthesis using « randomised-sample » and « same measurement scales » criteria is heterogeneous. Thus, we have analysed cultural subgroup syntheses. On the base of our subgroup syntheses, it seems that cultural and industrial contingencies are highly plausible.

The synthesis, based on survey of managers of publicly traded firms in Taiwan Stock Exchange from 2001 to 2007, is significantly positive and homogeneous. From this subgroup synthesis, it appears that the link between BP and BP is time dependent.

This time dependency has to be confirmed with further research. One could use the Taiwanese Stock Exchange as a basis to observe the long-run evolution and to test the causal link between the BP and MP with Granger's causality test or, if expectations play a rôle, Sims' one (Granger, 1969; Sims, 1980). One could replicate the Taiwanese synthesis result by studying this link, in different political territories, on the same populations of compagnies over time.

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## Appendix

<i>Studies</i>	<i>Nationalities</i>	<i>Randomised trials</i>	<i>Budgetary participation measures</i>	<i>Managerial performance measures</i>
<i>Abdullah, 1998</i>	62 australian managers	Yes	Milani (1975)	Mahoney <i>et al.</i> (1963)
<i>Agbejule and Saarikoski, 2006</i>	83 finnish managers	No	Milani (1975)	Mahoney <i>et al.</i> (1963)
<i>Alam, Mia et Gnepa, WP</i>	113 bangladeshi NGO managers	No	Milani (1975)	Mahoney <i>et al.</i> (1963)
<i>Aranya, 1990</i>	223 canadian managers	No	Personal scale	Personal scale
<i>Arifin, 2007</i>	44 indonesian managers	No	Personal scale	Personal scale
<i>Bass and Leavitt, 1963</i>	3 experiments on 36 managers	No	Personal scale	Personal scale
<i>Bento and White, 2006</i>	64 american managers	No	Adapted from Milani (1975) by Chow (1999)	Mahoney <i>et al.</i> (1963)
<i>Breaux, 2004</i>	197 AICPA members (USA)	Yes	Clinton eand Hunton (2001)	Mahoney <i>et al.</i> (1963)
<i>Brownell, 1981</i>	Experiment on 46 students and 48 managers (USA)	No	Personal scale	Personal scale
<i>Brownell, 1982</i>	48 managers (USA)	No	Hofstede (1967) and Milani (1975)	Mahoney <i>et al.</i> (1963)
<i>Brownell, 1982</i>	48 managers (USA)	No	Hofstede (1967) and Milani (1975)	Mahoney <i>et al.</i> (1963)
<i>Brownell, 1985</i>	61 managers (USA)	No	Milani (1975)	Mahoney <i>et al.</i> (1963)

<i>Brownell and Dunk, 1991</i>	79 managers (USA)	No	Milani (1975)	Mahoney <i>et al.</i> (1963)
<i>Brownell and Hirst, 1986</i>	76 managers (USA)	No	Hofstede (1967) and Milani (1975)	Mahoney <i>et al.</i> (1963)
<i>Brownell and Mc Innes, 1991</i>	224 managers (USA)	No	Milani (1975)	Mahoney <i>et al.</i> (1963)
<i>Brownell and Merchant, 1990</i>	146 american production managers	No	Personal scales	Personal scales
<i>Chalos and Poon, 2001</i>	93 american marketing managers in publicly traded firms	Yes	Milani (1975)	Mahoney <i>et al.</i> (1963)
<i>Chenhall and Brownell, 1988</i>	33 managers of a large compagny	No	Milani (1975)	Personal scale
<i>Cherrington and Cherrington, 1973</i>	Experiments on 230 students	No	Personal scale	Objectives achievements
<i>Chong and Bateman 2000</i>	79 american managers in industrial sector	Yes	Milani (1975)	Mahoney <i>et al.</i> (1963)
<i>Chong and Chong, 2002</i>	79 australian managers	Yes	Milani (1975)	Mahoney <i>et al.</i> (1963)
<i>Chong, Eggleton and Leong, 2006</i>	141 australian managers	Yes	Milani (1975)	Merchant <i>et al.</i> (1981)
<i>Dunk, 1990</i>	26 american managers	Yes	Milani (1975)	Mahoney <i>et al.</i> (1963)
<i>Dunk, 1993</i>	79 american managers	Yes	Milani (1975)	Mahoney <i>et al.</i> (1963)
<i>Dunk, 1995</i>	78 australian managers (two sample of 44 and 34 managers)	Yes	Milani (1975)	Merchant <i>et al.</i> (1981)
<i>Eker, WP</i>	150 managers in the top 500 firms in Turkey	No	Milani (1975)	Mahoney <i>et al.</i> (1963)
<i>Frucot and Shearon, 1991</i>	83 mexican managers	No	Milani (1975)	Mahoney <i>et al.</i> (1963)
<i>Frucot and White, 2006</i>	178 managers (nationality unknown)	No	Milani (1975)	Mahoney <i>et al.</i> (1963)
<i>Godene and Fornerino, 2009</i>	155 french managers	No	Two personal scales	Govindarajan and Gupta (1985)
<i>Govindarajan 1986</i>	77 american managers in responsibility centers	No	Personal scale	Personal scale
<i>Gul, Tsui, Fong and Kwok, 1995</i>	54 managers in Hong Kong	No	Milani (1975)	Mahoney <i>et al.</i> (1963)
<i>Hassel and Cunningham, 1996</i>	36 finnish manager and 31 foreign managers	No	Milani (1975)	Govindarajan (1984)
<i>Heath and Brown, 2007</i>	171 employees in Oklahoma	No	Milani (1975)	Fraser (1995)
<i>Hirst, 1987</i>	44 australian managers	No	Milani (1975)	Mahoney <i>et al.</i> (1963)
<i>Hoque and</i>	55 australian	Yes	Milani (1975)	Mahoney <i>et al.</i> (1963)

<i>Brosnan, 2007</i>	managers				
<i>Jermias and Setiawan, 2008</i>	204 indonesian public managers	No	Vroom and Mann (1960)		Mahoney <i>et al.</i> (1963)
<i>Kenis, 1979</i>	169 american managers	No	Personal scale		Personal scale
<i>Kobori, 2006</i>	86 taiwanese managers (toyo Kenzai)	Yes	Hofstede (1967)		Mahoney <i>et al.</i> (1963)
<i>Kren, 1990</i>	Experiments on 44 students	No	Personal scale		Personal scale
<i>Kren, 1992</i>	80 american managers (Fortune 500)	Yes	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Lau and Buckland, 2000</i>	71 norwegian managers in mining firms	Yes	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Lau and Lim, 2002</i>	83 australian managers	No	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Lau, Low and Eggleton, 1995</i>	112 singapourean managers in industrial firms	Yes	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Lau and Tan, 1998</i>	104 australian managers & 85 singapourean managers	No	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Leach-López, Stammerjohan and Lee, 2009</i>	71 korean managers	No	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Leach-López, Stammerjohan and McNair, 2007</i>	143 mexican and american managers in maquiladoras	No	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Merchant, 1981</i>	19 american managers in electronics	No	Three personal scales		Managers self-evaluation in relation to the average performance
<i>Merchant, 1984</i>	170 american managers	No	Influence on budget plan		Personal scale
<i>Mia, 1988</i>	83 american managers	No	Milani (1975)		Supervisors' evaluation
<i>Mia, 1989</i>	62 american managers	No	Milani (1975) and Brownell (1979)		Supervisors' evaluation
<i>Mia, 2001</i>	52 australian managers	No	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Mia and Patiar, 2002</i>	52 australian managers in hotel sector	No	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Milani, 1975</i>	82 foremen	No	Personal scale		Two Personal scale
<i>Ni and Su, 2001</i>	205 taiwanese managers in publicly traded firms	Yes	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Ni, Su, Zhongshao and Zheng, 2005</i>	155 taiwanese managers in publicly traded firms	Yes	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Ni, Su and Su, 2003, published version of Ni and Su, 2001</i>	194 japanese managers	Yes	Hofstede (1967)		Mahoney <i>et al.</i> (1963)
<i>Ni, Su, Zhongshao and Zheng, 2005</i>	155 taiwanese managers in	Yes	Milani (1975)		Mahoney <i>et al.</i> (1963)

	publicly traded firms				
<i>Nouri and Parker, 1998</i>	135 managers (unknown)	No	Milani (1975)		Govindarajan and Gupta (1985)
<i>Orpen, 1992</i>	133 australian managers	No	Milani (1975)		Personal scale
<i>Otley and Pollanen, 2000</i>	121 managers in canadian universities	No	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Parker and Kyj, 2006</i>	70 managers in bank and insurance sector	No	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Patiar and Mia, 2008</i>	52 australian managers in hotel sector	No	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Quirin, O'Bryan and Donnelly 2004</i>	98 american employees in large compagnies	Yes	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Shields, Deng and Kato, 2000</i>	358 japanese engineers in a car manufacture	No	Shields et Young (1993)		Personal scale
<i>Shields and Young 1993</i>	98 controlers in S&P 500 firms	No	Milani (1975)		Four personal scale
<i>Soobaroyen, 2007</i>	130 australian managers	No	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Su and Lin, Working Paper</i>	168 taiwanese managers in publicly traded firms	Yes	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Subramaniam and Ashkanasy, 2001</i>	114 australian managers in agribusiness	Yes	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Taylor, Abdul-Hamid and Mohd-Sanusi, 2008</i>	81 malaysian managers in public local administration	No	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Tiller, 1983</i>	Experiments on 150 students	No	Personal scale		Personal scale
<i>Tintri, 2002</i>	53 malaysian managers	No	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Tsui, 2001</i>	89 chinese managers in a large compagny	No	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Wentzel, 2002</i>	74 american managers in a large hospital	No	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Winata and Mia, 2005</i>	74 australian managers in hotel sector	No	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Yahya, Ahmad and Fatima, 2008</i>	111 malaysian managers in defense minister	No	Milani (1975)		Mahoney <i>et al.</i> (1963)
<i>Yuen, 2007</i>	216 public managers in Macau	No	Milani (1975)		Mahoney <i>et al.</i> (1963)