



**Expertons and uncertain averaging operators versus correlational approaches: A case study on Corporate Social Responsibility and effectiveness**

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3 **Expertons and uncertain averaging operators versus correlational approaches: A case**  
4 **study on Corporate Social Responsibility and effectiveness**  
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9 **ABSTRACT**

10 **Purpose**

11 Our purpose is to explore the relationship between Corporate Social Responsibility (CSR), work-life  
12 balance (WLB) and effectiveness comparing (a) a correlational approach, (b) expertons method, and (c)  
13 uncertain averaging operators (UA, UWA, UPA, and UPWA).  
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16 **Design/methodology/approach**

17 Participants were 814 employees from two Chilean companies with different levels of development on  
18 CSR policies. The Survey Work-Home Interaction – NijmeGen (SWING -SSC) and the Balanced  
19 Scorecard (BSC) were used. Results showed differences between companies with different levels of CSR  
20 development on individual effectiveness, and relations between WLB and individual effectiveness.  
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23 **Findings**

24 Expertons methodology and uncertain averaging operators allows more accurate results than correlational  
25 statistics.  
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27 **Originality/value**

28 Expertons method and uncertain averaging operators (UA, UWA, UPA, and UPWA) are common in the  
29 field of economics and engineering, but very innovative in the human resources research, allowing more  
30 accurate analyses of workers' perceptions.  
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35 **Key words:** Expertons, uncertain averaging operators, Corporate Social Responsibility, effectiveness.

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37 **JEL code:** D81: Criteria for Decision-Making under Risk and Uncertainty; M14: Corporate Culture •  
38 Diversity • Social Responsibility; C18: Methodological Issues: General  
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## INTRODUCTION

In organizations, when dealing with management decision making processes, as those related to the relationship between Corporate Social Responsibility (CSR) and effectiveness, we can assume that all the information we have is clear and can be assessed with aggregation operators based on exact numbers. Therefore, there exists a wide range of aggregation operators, as weighted average (Beliakov *et al.*, 2007), the probabilistic aggregation, the OWA operator (Emrouznejad and Amin, 2010; Kacprzyk and Zadrozny, 2009; Merigó, 2011a; Merigó and Gil-Lafuente, 2009; Yager, 1988, 1993; Yager and Kacprzyk, 1997), the Choquet integral (Tan and Chen, 2010), distance measures (Merigó and Casanovas, 2011), norms (Yager, 2010), logarithm aggregations (Zhou and Chen, 2010), heavy aggregations (Merigó and Casanova, 2010) or induced aggregator operators (Merigó and Gil-Lafuente, 2009).

The most used aggregation operators based on exact numbers are weighted average and the probabilistic aggregation. The first operator aggregates the information by giving different levels of importance to each argument in the problem. On the other hand, the probabilistic aggregation uses probabilities to aggregate the data. Merigó (2009) proposed a combination of both previous operators, the probabilistic weighted average (PWA) that considers the degree of importance of each concept in the analysis including the objective and the subjective information of the environment.

However, organizations are complex realities where information is not always so clear. To deal with this reality, Moore (1966) proposed interval numbers as a useful technique for representing uncertainty because it considers the minimum and the maximum results that may occur. When using interval numbers to aggregate the available information we form uncertain aggregation operators. One operator based on interval numbers is the experton methodology. It enhances scientific rigor by measuring subjectivity and pooling the opinion of several experts to establish a single valuation (Gámez-González *et al.*, 2010). It is regarded as a major step forward in the development of fuzzy subsets, given that it seeks objectivity, thanks to the use of aggregation as a solution (Gil Lafuente, 1997). This methodology has shown its suitability as an analysis tool in such different fields as quality assessment (Barreiro *et al.*, 2007; Levrat *et al.*, 1997), monitoring of stocks management (Reig and González, 2002), marketing (Zalila *et al.*, 2005) and business ethics (Gámez-González *et al.*, 2010).

Other operators based on interval numbers are the uncertain average (UA), the uncertain weighted average (UWA) and the uncertain probabilistic aggregation (UPA). Several studies use this kind of aggregation operators, such as the interval grey linguistic variables (Jin and Liu, 2010), the linguistic aggregation operators such as the linguistic probabilistic weighted average (LPWA) (Merigó *et al.*, 2016), decision making under risk, interval vague set and the TOPSIS method (Liu, 2009, 2010; Zeng and Xiao, 2016), the induced and uncertain heavy OWA operators (Merigó and Casanovas, 2011), the Hungarian algorithm with the induced ordered

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3 weighted averaging distance (HAIOWAD) (Vizuite-Luciano *et al.*, 2015), the uncertain  
4 linguistic hybrid geometric mean operator (Wei, 2009), or the uncertain induced Minkowski  
5 ordered weighted average distance (UIMOWAD) operator (Zeng, 2013).  
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7 Merigó (2011b) proposed a new decision making approach based on an operator that is the  
8 result of the union between the uncertain weighted average (UWA) and the uncertain  
9 probabilistic aggregation (UPA) operators. This result considers not only the subjective part of  
10 the assessment of the individual but also the objective of the subject being treated, and it is  
11 called the uncertain probabilistic weighted averaging (UPWA) or the interval probabilistic  
12 weighted average (IPWA).  
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14 The purpose of this study is to explore the relationship between CSR, work-life balance  
15 (WLB) and effectiveness comparing (a) the correlational approach, (b) expertons method  
16 (Kaufmann and Gil-Aluja, 1993), and (c) uncertain averaging operators (UA, UWA, UPA, and  
17 UPWA) (Merigó, 2011b).  
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#### 24 **Theoretical background: CSR and effectiveness**

25 The Corporate Social Responsibility (CSR) approach has grown in importance and has become  
26 a possible answer to the necessity of developing a world class culture of responsible businesses,  
27 accompanied by more government regulation and the claim that every company must take into  
28 account all its stakeholders (Bolton *et al.*, 2011). It seems that the era of world economic crisis  
29 and recessions may be a favourable scene to develop a business concept in which not only  
30 financial improvement is important, but also sustainable growth (Ali *et al.*, 2010).  
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35 The use of CSR and its focus inside the organization generates competitive advantages in  
36 order to improve the organizational effectiveness. There exists theoretical and empirical  
37 evidence to accept that this affirmation is valid (Aharon *et al.*, 2011; Ali *et al.*, 2010; Brammer  
38 *et al.*, 2007; Galbreath, 2010; Kim *et al.*, 2010; Skudiene and Auruskeviciene, 2012; Turker,  
39 2009; Vitaliano, 2010); however, in the opinion of some authors, there is little evidence  
40 regarding the internal impact of CSR (Bolton *et al.*, 2011; Rodrigo and Arenas, 2008; Wolf,  
41 2013).  
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45 The empirical research has been related with external aspects such as social licence and tax  
46 advantages (Weber, 2008), customer satisfaction (Galbreath, 2010), customer loyalty (Maignan  
47 *et al.*, 1999), purchase intention (David *et al.*, 2005), recruitment (Greening and Turban, 2000),  
48 financial performance (Orlitzky *et al.*, 2003; Prado-Lorenzo *et al.*, 2008; Wood, 2010),  
49 company reputation (Bear *et al.*, 2010; Fernández and Luna, 2007; Galbreath, 2010; KPMG  
50 International, 2011; Lai *et al.*, 2010; Stuebs and Sun, 2010), and brand value and performance  
51 (Lai *et al.*, 2010).  
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56 In contrast, academic interest in the internal impact of CSR is recent and has been related  
57 with variables such as employee satisfaction (Aharon *et al.*, 2011), organizational commitment  
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3 (Ali *et al.*, 2010; Brammer *et al.*, 2007; Turker, 2009), organizational identification (Kim *et al.*,  
4 2010), turnover (Galbreath, 2010; Vitaliano, 2010), and job motivation (Skudiene and  
5 Auruskeviciene, 2012).  
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8 The CSR addresses the strategic level of the organization, which in turn includes the  
9 development of different policies. In this paper we will focus on the analysis of family-  
10 responsible policies and their effect on perceived balance between the personal and work areas  
11 (WLB). The analysis of this relationship has scarcely been studied from the scientific literature  
12 and some of the research has limitations in measuring the perception of WLB from the negative  
13 and one-dimensional side (Yuile *et al.*, 2012). In order to overcome this weakness, in this paper  
14 we propose the Geurts and Demerouti model of WLB (2003, in Geurts *et al.*, 2005). The authors  
15 defined WLB as a process in which an employee is affected positively or negatively by the  
16 interaction of both labour and non-labour ambits. In addition, this definition may be complete  
17 because it considers the interactions of both the labour and non-labour aspects in four different  
18 directions: negative work-home and home-work interaction, positive work-home and positive  
19 home-work interaction.  
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26 Related to effectiveness, Matthews (2011) indicates that there are several ways to understand  
27 it, however, this can be understood in terms of accomplishment of objectives, while  
28 performance is the measure by which organizations know if they are or not effective. In this  
29 way, a measure of effectiveness assesses the capacity of an organization to achieve its planned  
30 goals (Keh *et al.*, 2006).  
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34 One of the most influential frameworks to assess effectiveness is the Balanced Scorecard  
35 (BSC) (Evans, 2004). The BSC is designed to provide companies with a measureable roadmap  
36 with so that they may know if they are achieving their goals (Kang and Fredin, 2012). Thus,  
37 with the use of the BSC companies define their strategic objectives and arrange them on a map  
38 according to the four perspectives: financial, customers, internal processes, and growth and  
39 learning (Kaplan and Norton, 1992; 2004).  
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## 44 **METHOD**

### 45 **Procedure and sample**

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47 Two Chilean companies were chosen according to their external CSR reputation and family  
48 friendly policies using the following criteria: (1) National CSR rankings, (2) National CSR  
49 awards, (3) International CSR awards, and (4) IFREI level (Carlier *et al.*, 2012; Chinchilla and  
50 Torres, 2006; 2007). As a result, companies were classified according to CSR policy  
51 development.  
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56 Company 1 is a company in the lumber industry with 1,712 employees in total. It has a high-  
57 level CSR policies development because it appears in the first 25 positions in a CSR national  
58 ranking and has several national and international awards and a B level on IFREI (Company has  
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some family friendly policies and practices). Company 2 is involved in resorts & casinos industry with 6,284 employees in total. It has a low-level CSR policy development because it does not appear in any CSR national ranking and does not have any national or international awards. This company obtained a C level on IFREI (Company has some policies but their use is limited).

A non-probability for convenience sampling method was used. Instruments were sent to employees from both companies by the online platform QuestionPro in June and July 2012.

In company 1, 114 employees answered the survey of which 21.1% were women ( $n = 24$ ) and 78.9% men ( $n = 90$ ) with 43.8 average age ( $SD = 7.8$ ). Of them 99.1% were permanent employees ( $n = 113$ ) and 0.9% temporary ( $n = 1$ ); all full-time workers (100%,  $n = 114$ ) with an average of 13.1 years working for the same company ( $SD = 8.5$ ). 84.2% participants worked extra time the last 3 months and 4.4% live alone ( $n = 5$ ), 87.7% live with a partner ( $n = 100$ ), 4.4% live with parents ( $n = 5$ ), and 87.7% have children ( $n = 100$ ).

In company 2, 700 employees answered the survey of which 44.4% were women ( $n = 290$ ) and 58.6% men ( $n = 410$ ) with 33.8 average age ( $SD = 8.2$ ). Of them 95.7% were permanent employees ( $n = 670$ ) and 4.2% temporary ( $n = 30$ ); working full-time (92%,  $n = 644$ ) or part-time (8.0%,  $n = 56$ ) with an average of 4.9 years working for the same company ( $SD = 5.6$ ). 80.3% participants worked extra time the last 3 months and 14.9% live alone ( $n = 104$ ), 64.1% live with a partner ( $n = 449$ ), 16.3% live with parents ( $n = 114$ ), and 61.3% have children ( $n = 429$ ).

### Instruments

- Work-life Balance. *Survey Work-Home Interaction - Nijmegen for Spanish Speaking Countries (SWING-SSC)* (Romeo *et al.*, 2014). A 27 item survey using a five points Likert's scale (1 = *Strongly disagree* to 5 = *Strongly agree*). This instrument evaluates perceived WLB through four possible interactions: Negative work-home interaction (NWHI), Negative home-work interaction (NHWI), Positive work-home interaction (PWHI), and Positive home-work interaction (PHWI) (Geurts *et al.*, 2005).

The reliability of the original version has reported a good internal consistency ( $\alpha = .80$ ) (Geurts *et al.*, 2005). The version used in this study obtained a good internal consistency with a general  $\alpha$  coefficient of .84, and similar levels of internal consistency for all dimensions ( $\alpha = .90$  for NWHI;  $\alpha = .88$  for NHWI;  $\alpha = .87$  for PWHI;  $\alpha = .85$  for PHWI) (Romeo *et al.*, 2014).

- Effectiveness. *Balanced Scorecard (BSC)* (Kaplan and Norton, 1992, 2004; Becker *et al.*, 2001). The Balanced Scorecard is a business management model to help organizations to translate their strategy into measurable objectives. This model allows companies to design a performance appraisal based on their own key performance indicators to measure objectives accomplishment and strategic competencies development at the employee level (Becker *et*

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3 *al.*, 2001). In this study, in order to know this indicator the following question was added:  
4 “Please, report the result of the performance appraisal you obtained in 2011”. Participants  
5 answered according to a five points scale (1= *Critical* to 5= *Excellent*).  
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### 9 **Data analyses**

10 A three data analysis strategy was employed: (a) correlational approach by t-test and  
11 correlations, (b) data analysis based on expertons method developed by Kaufmann and Gil-  
12 Aluja (1993), and (c) uncertain averaging operators (UA, UPA, UWA, and UPWA).  
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15 From expertons methodology the WLB scale establishes confidence intervals based on five  
16 anchors (Zalila *et al.*, 2005). In this study, a group of ten academic and professional experts,  
17 with a minimum of 10 years’ experience in the field of CSR, was asked to establish confidence  
18 intervals based on the five anchors. To do this, they used a 11-point scale (11 values between 0 -  
19 *Null* and 1- *Totally*) and considered confidence levels as [0,1]. They allocated the *Strongly*  
20 *agree* response the value of 1, the value of 0 to *Strongly disagree*. Likewise, the responses  
21 *Disagree*, *Neither agree nor disagree* and *Agree*, being an uncertain level, were ascribed the  
22 values of [0.1, 0.4], [0.5, 0.5] and [0.6, 0.9] respectively. In this way, the imprecision in the  
23 validation corresponds to a specific situation that is semantically acceptable (Kaufmann *et al.*,  
24 1994, p. 45).  
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30 Finally, we considered the UA (uncertain average), as the basis for using the UPA, UWA  
31 and the UPWA operators, because they can analyse situations with subjective and objective  
32 information in the same formulation. For the UPA and UWA weights, each expert gives their  
33 own opinions. These opinions are consensuated in order to form the collective weights to be  
34 used in the aggregation process. The UPA operator use de following vector  $P = (0.2, 0.1, 0.4,$   
35  $0.3)$  and for UWA  $V = (0.1, 0.1, 0.4, 0.4)$ . It is important to note that the experts consensuated,  
36 on one hand, higher coefficients for the interaction Work-Home versus the interaction Home-  
37 Work. On the other hand, they consensuated higher coefficients for the positive interactions  
38 than for the negative ones. The UPWA operator uses UPA vector with a 40% of importance  
39 and the UWA vector with a 60%.  
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## 47 **RESULTS**

### 48 **Correlational analyses**

49 The t-test analyses, shown in Table 1, evidence that there is no statistical difference between  
50 both companies in any dimension of work-life balance (WLB). However, there is significant  
51 statistical evidence to support company differences in individual effectiveness which is  
52 favourable for company 1 with high-level in CSR and better level in family-friendly policies.  
53 Although, the effect size is small ( $\eta^2 = .03$ ).  
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58 INSERT TABLE 1 NEAR HERE

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With regard to the relation between WLB and individual effectiveness, Table 2 shows the results obtained with the Pearson's correlation coefficient. As it is possible to see, coefficients for each dimension and individual effectiveness are close to zero with values between  $r = -.09$  ( $p = .01$ ) and  $r = .004$  ( $p = .46$ ). Only one of the four dimensions (negative HWI) has significant and negative correlation with individual effectiveness, however, the effect size calculated through the explained variance is small ( $r^2 = .008$ ).

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INSERT TABLE 2 NEAR HERE

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### Expertons methodology

Table 3 shows the expected value of the expertons for each company related to individual effectiveness for WLB dimensions: NWHI, NHWI, PWHI and PHWI.

Results indicate that in the company with high levels of CSR policy development and family-friendly policies (Company 1) there is a positive relationship between the perception of balance and employee effectiveness. Thus, employees who obtain higher levels of effectiveness are those evaluated by experts as with lower NWHI ([0.22, 0.39]) and NHWI ([0.12, 0.30]) and with higher PWHI ([0.68, 0.83]) and PHWI ([0.70, 0.90]).

Instead, in the company with lower development of policies (Company 2) the results do not show a clear relationship between the perception of WLB and effectiveness. Thus, contrary to expectations, it was observed that high levels of PWHI ([0.53, 0.73]) and PHWI ([0.57, 0.71]) are related to lower levels of effectiveness (levels 1 and 2). Likewise, low levels of NWHI ([0.36, 0.5]) and NHWI ([0.13, 0.24]) are related to intermediate levels of effectiveness (do not take into account missing and non evaluated cases).

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INSERT TABLE 3 NEAR HERE

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### Uncertain operators

The results obtained in Table 3 can be aggregated in order to find a single result than permits us to know how the perceived balance between work and home domains is related with effectiveness (Table 4).

As previously, in Company 1, with high levels of CSR and family-friendly policy development, the higher the perceived levels of WLB, the higher the effectiveness (do not taking into account missing cases). By contrast, in Company 2, with lower levels of CSR and family-friendly policy development, the higher perceived levels of WLB, the lower the effectiveness.

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INSERT TABLE 4 NEAR HERE

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## CONCLUSIONS

The present study had as a purpose to go deeper in to the influence of CSR within the organization, particularly, on WLB and individual effectiveness using three methodological approaches: (a) the correlational approach, (b) expertons method (Kaufmann and Gil-Aluja, 1993), and (c) uncertain averaging operators (UA, UWA, UPA, and UPWA) (Merigó, 2011b).

It was expected to find differences in WLB and effectiveness between companies but this was not confirmed for WLB from the correlational approach. Our results point out that in spite of the fact that one company shows a better level in family-friendly policy development than another company, there are no differences between both companies on WLB. These findings are different from Yuile *et al.* (2012) who using different measures and method, found a significant relationship.

Knowing to what extent employees' WLB has an impact on their individual effectiveness, results showed a significant negative relationship, although small, for the negative home-work interaction (NHWI) which is consistent with other previous studies showing negative relationships between WLB and other measures of effectiveness such as productivity (Wallace and Young, 2008) or intention to quit (Parkes and Langford, 2008). Additionally, the low relation in this study could be explained because of the difficulties of giving a nominal and operational definition of this variable (Cameron, 1986; Richard *et al.*, 2009). In this sense, the use of Balanced Scorecard could not only assume the weaknesses related with its capacity to compare companies with each other (Richard *et al.*, 2009), but also could be affected by the difficulty of what is evaluated at the individual level as a performance appraisal (Kang and Fredin, 2012). Another plausible explanation could be found in the methodology based on the correlational approach, which assumes that the data are unambiguous and clearly known (Merigó, 2011b).

However, the methodologies based on the uncertain aggregation operators, namely expertons, UA, UPA, UWA and UPWA have allowed us a better approach to a complex reality from the multi-person evaluation. Following Merigó (2011b) we can affirm that these operators allows us to “unify decision-making problems under objective risk and under subjective risk in the same formulation and considering the degree of importance that each concept has in the analysis” (p. 6101).

For the UPA and UWA weights, each expert of our selected group gives their own opinions, and these had been consensuated in order to form the collective weights to be used in the aggregation process. They decided higher coefficients for the interaction Work-Home versus the interaction Home-Work. On the other hand, they consensuated higher coefficients for the positive interactions than for the negative ones. This is aligned with the perspective related to the optimal functioning of individuals and groups in organizations, as well as the effective management of wellbeing at work and the development of healthy organizations (Seligman,

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3 1999). In this sense, our work gives priority to management decisions oriented to the  
4 improvement of WLB against those directed towards reducing the negative effects of  
5 imbalance.  
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7 We applied common methodologies in the fields of economics and engineering, but very  
8 innovative in the field of human resources research, facilitating the analysis of the perception of  
9 workers. In the future, we should include organizations from other sectors, sizes and countries  
10 in order to get a deeper insight into the explored relationships.  
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12 Additionally, we should test new and recent operators that have been used in the fields of  
13 finance and investment decision making. For example, the probabilistic weighted averaging  
14 distance (PWAD) operator that combines probabilities, weighted averages and distance  
15 measures (Merigó, 2013), or the Hungarian algorithm with the induced ordered weighted  
16 averaging distance (HAIOWAD) which allows information to be “represented in a more  
17 complex way” (Vizuite-Luciano *et al.*, 2015, p. 684).  
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Variable	Company	n	Range	Mean	SD	t (p)
Negative WHI	1	114	1 - 4.78	2.91	.93	.58 (.56)
	2	700	1 - 5	2.97	1.03	
Negative HWI	1	114	1 - 4	1.93	.68	.95 (.34)
	2	700	1 - 5	2.00	.81	
Positive WHI	1	114	1 - 5	3.24	.80	-2.1 (.84)
	2	700	1 - 5	3.22	.80	
Positive HWI	1	114	1 - 5	3.72	.85	-1.0 (.32)
	2	700	1 - 5	3.64	.79	
Effectiveness	1	89	3 - 5	3.72	.54	-2.8 (.005)
	2	488	1 - 5	3.53	.77	

**Table 1.** Descriptive statistics for SWING-SSC and effectiveness in both companies

Kybernetes



<i>Variable</i>	<i>Mean (SD)</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
1. Effectiveness	3.56 (.74)				
2. Negative WHI	2.96 (.02)	-.01			
3. Negative HWI	1.99 (.79)	-.09*	.53**		
4. Positive WHI	3.22 (.80)	-.04	-.30**	-.14**	
5. Positive HWI	3.66 (.80)	.004	-.12**	-.04	.54**

**Table 2.** Descriptive statistics for dimensions and Pearson's correlation coefficients

Kybernetes

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COMPANY 1				
	NWHI	NHWI	PWHI	PHWI
Missing*	[ 0.41 , 0.59 ]	[ 0.30 , 0.46 ]	[ 0.47 , 0.64 ]	[ 0.61 , 0.78 ]
Effectiveness 3	[ 0.38 , 0.58 ]	[ 0.21 , 0.38 ]	[ 0.37 , 0.60 ]	[ 0.45 , 0.73 ]
Effectiveness 4	[ 0.44 , 0.58 ]	[ 0.20 , 0.34 ]	[ 0.46 , 0.60 ]	[ 0.56 , 0.70 ]
Effectiveness 5	[ 0.22 , 0.39 ]	[ 0.12 , 0.30 ]	[ 0.68 , 0.83 ]	[ 0.70 , 0.90 ]
Not evaluated**	[ 0.32 , 0.47 ]	[ 0.21 , 0.35 ]	[ 0.48 , 0.63 ]	[ 0.55 , 0.70 ]
COMPANY 2				
	NWH	NHW	PWH	PHW
Missing*	[ 0.38 , 0.52 ]	[ 0.21 , 0.35 ]	[ 0.48 , 0.62 ]	[ 0.57 , 0.71 ]
Effectiveness 1	[ 0.51 , 0.71 ]	[ 0.43 , 0.63 ]	[ 0.53 , 0.73 ]	[ 0.53 , 0.73 ]
Effectiveness 2	[ 0.44 , 0.58 ]	[ 0.25 , 0.39 ]	[ 0.48 , 0.63 ]	[ 0.57 , 0.71 ]
Effectiveness 3	[ 0.36 , 0.50 ]	[ 0.13 , 0.24 ]	[ 0.39 , 0.52 ]	[ 0.50 , 0.64 ]
Effectiveness 4	[ 0.42 , 0.56 ]	[ 0.23 , 0.37 ]	[ 0.47 , 0.61 ]	[ 0.57 , 0.70 ]
Effectiveness 5	[ 0.39 , 0.50 ]	[ 0.15 , 0.27 ]	[ 0.33 , 0.44 ]	[ 0.41 , 0.52 ]
Not evaluated**	[ 0.41 , 0.55 ]	[ 0.21 , 0.35 ]	[ 0.49 , 0.62 ]	[ 0.57 , 0.71 ]

**Table 3.** Expected value of experts for Company 1 and Company 2. *Note:* \* corresponds to employees who failed indicating their performance appraisal. \*\* corresponds to employees not evaluated in the 2011 performance appraisal.

COMPANY 1				
	UA	UPA	UWA	UPWA
Missing*	[ 0,45 , 0,62 ]	[ 0,48 , 0,65 ]	[ 0,50 , 0,67 ]	[ 0,50 , 0,66 ]
Effectiveness 3	[ 0,35 , 0,58 ]	[ 0,38 , 0,62 ]	[ 0,39 , 0,63 ]	[ 0,38 , 0,63 ]
Effectiveness 4	[ 0,41 , 0,55 ]	[ 0,46 , 0,60 ]	[ 0,47 , 0,61 ]	[ 0,47 , 0,60 ]
Effectiveness 5	[ 0,43 , 0,61 ]	[ 0,54 , 0,71 ]	[ 0,59 , 0,76 ]	[ 0,57 , 0,74 ]
Not evaluated**	[ 0,39 , 0,54 ]	[ 0,44 , 0,59 ]	[ 0,46 , 0,61 ]	[ 0,45 , 0,61 ]
COMPANY 2				
	UA	UPA	UWA	UPWA
Missing*	[ 0,41 , 0,55 ]	[ 0,46 , 0,60 ]	[ 0,48 , 0,62 ]	[ 0,47 , 0,61 ]
Effectiveness 1	[ 0,50 , 0,70 ]	[ 0,52 , 0,72 ]	[ 0,52 , 0,72 ]	[ 0,52 , 0,72 ]
Effectiveness 2	[ 0,44 , 0,58 ]	[ 0,48 , 0,62 ]	[ 0,49 , 0,63 ]	[ 0,49 , 0,63 ]
Effectiveness 3	[ 0,35 , 0,47 ]	[ 0,39 , 0,52 ]	[ 0,41 , 0,54 ]	[ 0,40 , 0,53 ]
Effectiveness 4	[ 0,42 , 0,56 ]	[ 0,47 , 0,60 ]	[ 0,48 , 0,62 ]	[ 0,48 , 0,61 ]
Effectiveness 5	[ 0,32 , 0,43 ]	[ 0,35 , 0,46 ]	[ 0,35 , 0,46 ]	[ 0,35 , 0,46 ]
Not evaluated**	[ 0,42 , 0,56 ]	[ 0,47 , 0,61 ]	[ 0,49 , 0,62 ]	[ 0,48 , 0,61 ]

**Table 4.** Aggregated operators for Company 1 and 2. *Note:* \* corresponds to employees who failed indicating their performance appraisal. \*\* corresponds to employees not evaluated in the 2011 performance appraisal.