A Spanish Knowledge Sharing Instrument Validation

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Abstract: Knowledge sharing research is growing in Latin America. Most instruments used to measure employees' knowledge sharing activities have been developed in the Anglo-American language (English). Currently there is no instrument available to measure the knowledge-sharing construct in Spanish. The purpose of this paper is to present the results of the research process adopted to design, construct and validate such an instrument in the Spanish language. The validation process was conducted with 228 knowledge workers in Colombia. The instrument has two components. The first part (32 items) evaluates the different ways in which knowledge is shared in an organization. The second part (24 items) evaluates the different tools used in an organization to share knowledge. The validation process is structured in three steps: the construction of the items following a review of the literature, psychometric validation, and the statistical verification of the instrument's sub-scales. Four categories of types of knowledge and four categories of knowledge sharing techniques are identified. The results of this research contribute to the understanding of a broader perspective of the measurement of knowledge sharing behaviour and enable the measurement of this construct in Spanish. Many of the current instruments are very short and do not consider categories of knowledge sharing, neither tools people use to share knowledge. It is expected that the instrument will become a referent to the measurement of knowledge sharing in Spanish speaking countries. It is recommended the translation into English and the validation process of the instrument with an English speaking sample.

Keywords: knowledge sharing, instrument validation, knowledge management

1. Introduction

In the current era of knowledge, the achievement of strategic objectives of an organization is linked to the creation, organization and distribution of knowledge (Lin, 2014). Knowledge sharing is a key behaviour in these processes, therefore, knowledge sharing activities are a fundamental element in organizational learning and knowledge management processes (Castaneda, 2002a; Castaneda & Toulson, 2013; Delgado y Castaneda, 2011; Castaneda & Fernandez, 2007; Hendriks, 2004; Huysman & De Wit, 2002). Knowledge sharing is associated with organizational competitiveness (Liao, 2008). In order to create and apply knowledge, it is not enough for an organization just to have large information repositories. There is a need for their employees to be able to take this knowledge from the repositories and share with each other to create and modify their outputs in the achievement of the organization's strategy. It is only through the behaviour of employees that such inputs are converted into new outputs.

Helmstadter (2003) defines knowledge sharing as voluntary interactions between people based on knowledge. The study of knowledge sharing is part of the behavioural perspective of knowledge management (Castaneda, 2002; Dingsoyr, Bjornson & Shull, 2009; Earl, 2001). Knowledge sharing is an activity that contributes to the collective knowledge of the organization (Castaneda & Toulson, 2013a; Cabrera & Cabrera, 2002; Villamizar & Castaneda, 2014). People share ideas, experience, expertise, beliefs, expectations, technical specifications, and other documents (Cummings, 2001; Lin & Lee, 2004). This activity is not automatic, but is highly dependant on human will and motivation (Dougherty, 1999; Helmstadter, 2003; Lagerstrom & Andersson, 2003; Scarbrough & Carter, 2000). Some of the reasons why employees share knowledge are: to gain and improve their reputations; to obtain reciprocal actions from those with whom they share their knowledge in the future; and, in some cases, to demonstrate themselves as exemplars of organizational commitment (Taylor & Murthy, 2009). When an individual has the option to share or not to share knowledge, the most common reason above is the second that is associated with anticipated reciprocity from their colleagues (Müller, Spiliopoulou & Lenz, 2005).

There are many instruments designed to measure knowledge sharing in English. Some are popular, like the one developed and tested by Bock & Kim (2002). However, so far none have been developed in Spanish. This has been a limitation in conducting research in this topic in Latin America, where Spanish is the predominant language, with the exception of Brazil, where the language spoken there is Portuguese. The objective of this paper is to present results of a research process conducted in Colombia that consists of the design and validation of a knowledge sharing instrument in Spanish.

Evaluation is as old as civilization itself (Buyske, 2005); however, the design and construction of standardized tests has a century of history, starting with the work of Binet & Simon in 1905 (Pardo, 1999). Today, there are some models about how to process data and obtain information from such standardized test instruments. In the construction of instruments there are two predominant psychometric approaches: classic test theory and item response theory.

Classic test theory proposes a linear model that describes the influence of the measurement error in observed scores. While this model has well developed and robust psychometric properties it has some limitations. The most important of these is that it is not possible to separate characteristics of those who respond to the test from the characteristics of the test items based on the assumptions and prejudices of the designers themselves. Additionally, the metric characteristics of the test, like reliability and validity indices, are defined based on a determined group or sample of respondents, which makes it difficult to compare individuals who take different tests. Finally, with this method it is not possible to have precise information on the performance of each participant, because the error variance is the same for all respondents who are evaluated on the test.

Item response theory, as an alternative to the classic approach, gives a probabilistic approach to the problem of unobservable constructs, and considers an item as the basic unit of measurement. The classic theory of test estimation of an attribute is measured by the simple arithmetical or some weighted sum of answers to individual items according to a predetermined factor or dimension. Item response theory estimates the level of an attribute (or construct) by measuring the answer pattern of the evaluated respondent.

So there are some variations in the design of knowledge sharing instruments. Hambleton (cited by Buysque, 2005) suggests that the design of such instruments should be considered as a collection of short experiments (items), where data comes from the answers given by the individual respondents to each item. Buyske (2005) recommends building instruments from the perspective of optimal design, which is based in the use of statistical information in response to particular needs.

To develop the instrument previous studies cited in the literature like those of Bock & Kim (2002) and Rahman (2011) were considered. Bock & Kim (2002) identified some types of knowledge to be shared and tools that employees use in the knowledge sharing process. The types of knowledge shared included: reports, official documents, methodologies, models, experience and expert knowledge. The tools used included: electronic repositories and mails. Rahman (2011) identified tools used to share knowledge in the sharing process like: storytelling, knowledge sites, chats and knowledge cafes.

So the purpose of this study is twofold, and that is to develop a knowledge sharing instrument that is based on Spanish speaking employees, and an instrument that is based on measuring knowledge sharing behaviours of individual respondents, rather than simply asking them for their perceptions relating to knowledge sharing activity.

2. Method

This research is a psychometric study with the analysis of descriptive data (Chow, 2002). The sample consists of 228 knowledge workers in Colombia. All of them are employed at a professional level, for example: university professors, administrators, consultants and engineers.

2.1 Instrument

The instrument is designed and validated by the authors of this paper, following the guidelines of DeMartino (2010). According to this author, the design of an instrument should include: an objective, the writing of items, the administration of the instrument, the analysis of items and instrument and the reporting of results.

The design of instruments of psychological evaluation is framed within the psychometric discipline, which is linked to central concepts like validity and reliability. In the first instance it is to establish the framework that guides the design of instruments and the interpretation of the results from an administration of the instrument. This is the moment where the cognitive and disciplinary domains of the evaluation are expressed, which is directly related to the validity of the instrument itself (Pardo, 2006).

In the second instance, there is the process of instrument requirements that are of two kinds. These are: structure and psychometric specifications (Pardo, 2010). The instrument's structure is about information related to the purpose of

measurement. The psychometric specifications refer to characteristics like the number of items, their format, and time requirements to complete the instrument. The elaboration of its items is the main aspect of the design of an instrument. After this process, the items are consolidated as an instrument in the established format for its application.

The present instrument is designed in two components. The first component asks questions about different kinds of knowledge that are shared in organizations. The final version of this component has 32 items. The second component explores the different tools used in organizations to share knowledge. The final version of this component has 24 items (Exhibit 1).

2.2 Procedure

The procedure followed for the validation of the instrument is structured in three central elements: the construction of items (Mislevy, 2010), the psychometric validation using the model of Rasch (1980) and the verification of subscales of the construct through the identification of the dimensions of the instrument.

3. Results

The two components of the instrument: kinds of shared knowledge and tools used to share knowledge were analyzed technically using the model of Rasch and the item response theory, using Winsteps version 3.75 (Linacre, 2012).

According to Aiken (1996), such instruments are ways through which a participant assesses the information of each item using a prestructured criterion. The first component called type of shared knowledge used the levels (response categories) of answer: not at all; very little; sufficient; and, very much. The second component called tools used to share knowledge utilized the levels (response categories) of answer: applicable, but I don´t use it at all; I rarely use it; I use it fairly often; and, I use it a lot. In both cases a further category included as an alternative is named “does not apply in my organization”. This is included to avoid a forced answer.

The scale of this instrument is ordinal (Serle, 1996), where the distance between each response category is not identical or equal interval. In this case the model of Rasch allows the obtaining of objective and additive measures from stochastic answers using the model for polytomous answers expressed: log (Pnij / Pni(j-1)) = Bn – Di – Fj

Where Pnij is the probability that the relationship evaluated n and item i belong to the category j. Bn is the evaluated construct. Di is the difficulty of an item i. Fj is the measure of calibration of category j in relation to the others.

This model produces results about participants and items in a scale named logit, characterized by having a mean score of zero (0) and standard deviation of one (1). Results range from minus infinity to plus infinity and are built based on Napierian logarithms.

Indicators for the technical analysis of the items and the instrument can be distributed in two categories: those of first order associated to the decision to maintain or not to maintain an item, and those of second order that relate to improving the quality of an item. The fundamental criterion of analysis of an item is the model of adjustment value. An item is adjusted when it is in a range between 0.5 and 1.5 (Linacre, 2012).

After looking at the responses of participants, it was found that the first component, types of shared knowledge were answered by 228 participants, and the second component, tools for sharing knowledge were answered by 221 people. In table 1 the descriptive values of the test are given.

Table 1: Descriptive values of the instrument

Test	Average	Standard deviation	Measurement error
Kinds of shared knowledge	1.0029	1.001	0.2721
Tools for sharing knowledge	0.0896	0.8646	0.3110

For the analysis of the instrument as a whole, the reliability value is used in three indices: Cronbach’s alpha, Rasch, and the separation index. Table 2 shows the three reliability values. The obtained values were higher than 0.80, which are considered suitable. The separation index was higher than 1.5, which is appropriate according to Linacre (2012).

Table 2: Reliability of the instrument

Test	Alpha	Rasch	Separation
Kinds of shared knowledge	0.94	0.9	2.98
Tools for sharing knowledge	0.95	0.82	2.15

Table 3 presents the technical information of items relating to kinds of shared knowledge and in table 4 the technical information of items relating to tools for sharing knowledge.

Table 3: Technical information of kinds of shared knowledge items

ITEM	Difficulty	Error	Infit	Outfit	Correlation
1	0.29	0.10	1.35	1.48	0.31
2	0.32	0.10	1.21	1.26	0.37
3	-1.13	0.11	0.91	0.89	0.53
4	-0.62	0.11	1.02	1.31	0.46
5	-0.40	0.10	1.15	1.19	0.43
6	0.12	0.10	1.09	1.12	0.45
7	-0.79	0.11	0.90	0.90	0.55
8	-0.67	0.10	0.93	0.90	0.53
9	-0.16	0.10	0.97	0.96	0.55
10	-0.60	0.11	0.98	0.98	0.51
11	0.32	0.09	1.10	1.11	0.50
12	-0.49	0.10	0.85	0.84	0.60
13	-0.83	0.10	0.89	0.87	0.56
14	0.55	0.09	1.12	1.13	0.50
15	-0.69	0.11	0.95	0.91	0.52
16	-0.73	0.10	1.08	1.02	0.46
17	-0.63	0.10	0.90	0.93	0.56
18	-0.23	0.09	1.09	1.15	0.47
19	-0.57	0.10	0.91	0.90	0.56
20	-0.46	0.10	0.85	0.83	0.60
21	-0.04	0.10	0.90	0.87	0.58
22	0.25	0.09	0.97	0.95	0.56
23	1.22	0.10	0.93	0.95	0.59
24	1.25	0.09	1.01	1.00	0.56
25	0.72	0.09	0.88	0.87	0.63
26	0.89	0.09	0.94	0.94	0.60
27	0.14	0.09	0.85	0.83	0.62
28	0.68	0.09	1.02	1.02	0.54
29	0.66	0.10	0.94	0.93	0.58
30	0.42	0.09	1.07	1.06	0.52
31	0.45	0.09	1.01	1.00	0.55
32	0.74	0.09	1.27	1.25	0.44

According to the data presented in Tables 3 and 4, it is observed that they fulfil the established criteria for each indicator. From this it is possible to conclude that the quality of the instrument is adequate.

Table 4: Technical information of tools to share knowledge items

ITEM	Difficulty	Error	Infit	Outfit	Correlation
1	0.03	0.10	1.24	1.22	0.34
2	-0.74	0.10	1.14	1.22	0.31
3	0.96	0.11	1.16	1.14	0.38
4	0.14	0.09	0.99	1.00	0.49
5	0.79	0.10	0.86	0.84	0.59
6	0.69	0.10	0.91	0.91	0.56
7	0.11	0.09	0.98	0.98	0.51
8	0.70	0.10	0.96	0.94	0.53
9	0.95	0.11	1.05	1.04	0.47
10	-0.85	0.10	0.90	0.93	0.51
11	0.21	0.09	1.10	1.14	0.44
12	0.65	0.11	1.08	1.08	0.45
13	0.13	0.09	1.14	1.18	0.41
14	0.84	0.11	1.10	1.19	0.42
15	-1.27	0.10	0.84	0.83	0.53
16	-0.83	0.10	0.96	0.95	0.53
17	-0.81	0.09	1.00	0.99	0.47
18	0.12	0.08	0.89	0.88	0.60
19	0.00	0.08	0.90	0.88	0.59
20	-1.60	0.11	0.88	0.85	0.48
21	-0.08	0.09	1.07	1.09	0.45
22	-0.15	0.08	0.95	0.94	0.56
23	0.64	0.10	1.00	0.94	0.52
24	-0.61	0.09	1.00	1.00	0.48

4. Discussion

Knowledge sharing is considered a fundamental behaviour in the creation and application of knowledge. Although there are some instruments in English designed to measure this behaviour, there is not a validated instrument to measure this construct in Spanish. The research on knowledge sharing in Latin America is growing and it is relevant for the building and validation of instruments in this direction. Besides, some of the instruments that are highly used in English have a limited number of items and do not identify the constituent dimensions. Also many English speaking versions of knowledge sharing are based on assumed equal interval scales, such as five point or seven point Likert scales. The instrument presented in this paper is built based on two dimensions: types of shared knowledge and tools to share knowledge, and the scales developed are ordinal, without assuming equal intervals between response categories.

The items of the knowledge sharing instrument were designed following from the directions identified in the review of the literature. In order to identify some dimensions in the instrument, factor analysis was undertaken using Winsteps statistical package. In relation to kinds of shared knowledge four dimensions were formed, having the criterion load greater than 0.20.

- Items of Dimension 1: 16, 17, 18, 19, 20 21 and 22 (explicit organizational knowledge)
- Items of Dimension 2: 6, 7, 8, 9, 10, 11, 12, 14 and 15 (tacit organizational knowledge)
- Items of Dimension 3: 1, 2, 3, 4 and 5 (experiential knowledge)
- Items of Dimension 4: 23, 24 and 29 (bibliographic knowledge)

Dimension 1 was formed by items related to organizational explicit knowledge (Nonaka & Takeuchi, 1999): work reports, norms, policies, manuals and documented technical concepts. Dimension 2 included items of tacit knowledge: intuitions applied to work, knowledge on why to do an action, ideas to improve the team work, beliefs and values applied to work. Dimension 3 was formed by items related to experiential knowledge: experience on dealing with conflictive situations, experience on the meaning of an action in a particular context, experience on the use of procedures and technical experiences. Dimension 4 included items of bibliographic documented knowledge: recent and novel bibliographic material, knowledge on sources of knowledge.

In relation to tools to share knowledge there a further four dimensions were found as follows:

- Items of Dimension 1: 15, 16, 17, 18, 19, 20 21, 22, 23 and 24 (technological tools)
- Items of Dimension 2: 4, 5, 6, 7 and 8 (structured dialogical tools)
- Items of Dimension 3: 1, 2, 3 and 10 (no structure dialogue)
- Items of Dimension 4: 11 and 13 (organizational tools)

Dimension 1 was formed by technological tools to share knowledge: internet, intranet, telephone, audio conference, video conference, electronic mail, text messages, chats, blogs, and data bases. Dimension 2 considered structured tools based of dialogue: communities of practice, focal groups, workshops, study groups. Dimension 3 comprised no structured dialogue: informal conversation face to face, storytelling, dialogue in work meetings, knowledge cafes. Dimension 4 was formed by tools used for assessment and training: peers review, induction.

Knowledge sharing is an indispensable behaviour in the creation and application of organizational knowledge. Therefore, knowledge sharing is the heart of knowledge management. Knowledge sharing has been one of the growing subjects of research in knowledge management in this millennium. However, there are not many instruments to measure the relevant behaviours associated with knowledge sharing. There are some instruments to measure knowledge sharing in the English language frequently used, like the one developed by Bock & Kim (2002). However, there is a lack of instruments that are designed and validated right from the beginning in the Spanish language. In this paper, then, the process of construction and validation of an instrument on knowledge sharing in Spanish has been presented.

The design and validation of this instrument has contributed to the understanding and the measurement of knowledge sharing among people at work, as reported through the perceptions of knowledge workers who actively engage in knowledge sharing behaviours. This will facilitate the study of this relevant behaviour in Latin American countries where the common language is Spanish. Secondly, the identification of dimensions of knowledge sharing from the validation of items may broaden the scope of research in international contexts where the language of measurement of the topic is English. This is the reason why the next step of this research will be the translation-back-translation process of the instrument from Spanish to English and its validation in an English speaking sample. Currently at the writing of this paper, an English translation of the questionnaire is being administered to a sample of knowledge workers employed in New Zealand. The results of a pilot study of 68 completed responses to the English version of the questionnaire are encouraging, and are indicative of a high degree of alignment on both the types of knowledge sharing items and the tools of knowledge sharing items between the Spanish speaking and English speaking versions. However it is too early to present any robust conclusions till the main English speaking survey is completed.

Looking to the immediate future, if alignment between translations of this questionnaire can be demonstrated, then the possibilities are that a knowledge sharing tool that has global reach has been developed. A tool that is not just dependent on particular languages is a very encouraging possibility. One of the practical applications of developing this knowledge sharing instrument that focuses on reported behaviours rather than perceptions of knowledge workers employed in global environments, is that we have developed a tool that may be used as a measure of knowledge-sharing behaviour as a key means to the leveraging of pools of human capital potential that is available in international organizations (Castaneda & Toulson, 2013).

This has consequences for the managing of human resources (HRM), and linked with this is another question proposed by Castaneda & Toulson (2013a), and that is to what extent is organizational culture a mediator between human resource (HR) practices and knowledge sharing behaviour? The argument here is that while certain HR practices may encourage knowledge sharing behaviour, others may actually inhibit such behaviour because of competitive pressures among knowledge workers. The conceptual model proposed by Castaneda and Toulson

(2013a) suggests that it is the culture itself that mediates the success of knowledge sharing, not the HR practices themselves. There is general empirical support that certain HR practices do foster cultures that in turn foster knowledge sharing behaviours among employees. There is also evidence to suggest that the opposite may occur as a result of the predominant work cultures in particular organizations. So the relationship between HR practices and knowledge sharing is complex, and is concluded that the development of a multi-lingual knowledge sharing instrument will assist in increasing our understanding of this important relationship within 21st Century business organizations.

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Exhibit 1

Knowledge sharing instrument

PREGUNTA	Nada	Poco	Bastante	Mucho	No aplica
1. Experiencia sobre el manejo de situaciones conflictivas					
2. Experiencia sobre la diferencia de significado de un concepto o acción según el contexto					
3. Experiencia sobre el uso de procedimientos					
4. Experticia técnica					
5. Historias que tienen una enseñanza					
6. Intuiciones aplicables al trabajo					
7. Conocimiento sobre el por qué se debe realizar una acción					
8. Conocimiento sobre cómo realizar una acción					
9. Ideas para la organización del trabajo de otra persona					
10. Ideas para mejorar el trabajo de su grupo					
11. Ideas para mejorar el trabajo de otro grupo					
12. Formas exitosas de hacer una tarea					
13. Conocimiento para resolver problemas					
14. Creencias aplicables al trabajo					
15. Valores aplicables al trabajo					
16. Informes de trabajo					
17. Normas organizacionales					
18. Normas externas aplicables a la organización					
19. Políticas institucionales					
20. Objetivos organizacionales					
21. Conceptos técnicos documentados					
22. Manuales laborales					
23. Material bibliográfico novedoso					

24. Material bibliográfico reciente					
25. Metodologías de trabajo documentadas					
26. Lecciones aprendidas documentadas					
27. Prácticas exitosas en la organización					
28. Prácticas exitosas de otras organizaciones					
29. Conocimiento sobre fuentes de conocimiento					
30. Información documentada de clientes o usuarios					
31. Evaluaciones de proyectos o de iniciativas					
32. Información sobre eventos académicos o profesionales futuros					

¿Cuáles de las siguientes herramientas usted utiliza para compartir conocimiento en su organización o trabajo? Si alguna o algunas de ellas no se utilizan, marque una X en la casilla "no aplica en mi organización".

Herramienta	**No aplica en mi organización**	**Aplica, pero no la uso**	**La uso poco**	**La uso bastante**	**La uso mucho**
1. Contar historias					
2. Diálogos informales cara a cara					
3. Cafés del conocimiento					
4. Sesiones de lluvias de ideas					
5. Comunidades de práctica					
6. Grupos Focales					
7. Talleres (prácticos)					
8. Grupos de studio					
9. Ejercicios de simulación					
10. Reuniones grupales					
11. Revisión de pares					
12. Coaching o mentoring					
13. Inducción y reinducción					
14. Ferias del conocimiento					
15. Internet					
16. Intranet					
17. Teléfono					
18. Audio conferencias					

19. Video conferencias					
20. Correos electrónicos					
21. Mensajes de texto					
22. Chats					
23. Blogs					
24. Bases de datos					

