

An investigation of the effect of extroverted and introverted personalities on knowledge acquisition techniques

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Abstract

Purpose – This paper aims to explore the relationship between personality traits (introversion versus extroversion) and knowledge acquisition (KA) techniques.

Design/methodology/approach – The major methodology of the current study is survey. Results are based on 152 usable responses provided by experts in different industries including electronic, communication, information technology, computer and biology. The major analytical technique used is Pearson correlation analysis.

Findings – According to the results, there are significant relationships between personality traits (i.e. introversion versus extroversion) and KA techniques.

Research limitations/implications – This study was conducted on data from 152 Iranian experts which limits the generalizability of the results. This limitation can be addressed by future studies conducting similar studies on cross-country samples. Further, due to the analytical technique adopted in this study, causality implications cannot be drawn from the results.

Originality/value – This study reveals linkages between personality traits (i.e. introversion versus extroversion) and KA techniques. Results shed light on the KA process for both scholars and practitioners involved in KA programs in the organizations.

Keywords Knowledge, Tacit knowledge, Applied knowledge management, Knowledge workers

Paper type Research paper



1. Introduction

The main purpose of knowledge management initiatives is to reveal intangible assets and especially intellectual capital and to apply them to create competitive advantage (Jafari *et al.*, 2007) for the companies (Akhavan and Jafari, 2008) to survive and outperform the competitors (Akhavan *et al.*, 2009). As a result, knowledge acquisition (KA) has drawn much scholarly attention over the past few years (Cooke, 1994; Shadbolt and Burton, 1995). However, prior studies have introduced different KA techniques which make selecting the best approach under any specific circumstances difficult. Therefore, previous researches have tried to recognize factors that may impact the KA process and consequently help identify the most effective techniques in different

situations. For instance, [Adelman \(1989\)](#) identified five major factors influencing the KA process: domain experts, knowledge engineers, knowledge representation schemes, KA techniques and problem domains.

This study focuses on the impact of two of the factors identified above, namely, the KA techniques and the domain experts chosen, and explores the impact of the personality traits (introversion versus extroversion) on nine major KA techniques. In the next section, a snapshot of the relevant literature is provided. Then, the methodology of the study is explained. Finally, the results and their implications are discussed.

2. Literature review

2.1 Knowledge acquisition

KA is a crucial process in knowledge management due to its role in grasping the new knowledge and retaining that within the organization. [He *et al.* \(2013\)](#) describe KA as the process of knowledge elicitation (accessing and absorbing) through direct or indirect interaction. Elicitation of tacit knowledge is problematic in the process of KA because tacit knowledge is inside the employees' mind and difficult to extract ([Jafari *et al.*, \(2013\)](#)). Prior research has described tacit knowledge as "what a person needs to know to succeed in an endeavor that is often not explicitly taught and is not even verbalized" ([Grigorenko and Sternberg, 2006](#)).

In recent years, various categories of KA techniques have been proposed by researchers for tacit knowledge elicitation; some of these categories are summarized in [Table I](#) with a brief description of the techniques.

The following provides a brief overview of the techniques studied in this paper:

- *Interview*: An interview is a conversation between the expert and the knowledge engineer. The expert will answer the questions about the domain of expertise including how certain tasks are being done. There are different forms of interviews from completely unstructured to fully structured question ([Heatherton, 1990](#)).
- *Commentary*: The foundation of this technique is based on self-report, in which the expert provides an ongoing commentary of his or her thought processes as she faces different problems and solves them ([Milton, 2007](#)).
- *Limited-information and constrained-processing tasks*: This technique is used when information and/or time available for performing tasks are confined. Twenty Questions technique is an example of this technique ([Milton, 2007](#)).
- *Critical decision method (CDM)*: CDM is a common method used to extract knowledge from a task that an expert has routinely performed. As such, due to the redundancy of the experience and the number of times that the expert has performed the task, she has developed a considerable amount of tacit knowledge which can be utilized through this method ([Milton, 2007](#)).
- *Scenarios*: A scenario is a detailed narration of a status or set of duties ([Yu and Abidi, 2000](#)). Scenarios can be based on real situations having happened in the past or situations that are likely to happen in the future.
- *Concept sorting*: Sorting techniques are an efficient method of capturing the way an expert compares and orders concepts. Thus, the ultimate result can lead to the revelation of knowledge about classes, properties and priorities ([Milton, 2007](#)).

Table I.
Categories of
knowledge
acquisition
techniques

Researchers	Class of techniques	Techniques
Milton (2003)	Protocol-generation techniques	Interviews, commentary or think aloud problem-solving, questionnaires, observation . . .
	Protocol analysis techniques	Laddering
	Matrix-based techniques	Repertory grid technique, matrix, timeline, K-pages
	Sorting techniques	Card sorting, triadic elicitation, Q sorting
	Diagram-based techniques	Concept maps, state transition networks and process maps
	Limited-information and constrained-processing tasks	Twenty Questions, repertory grid analysis
	Direct	Interviews, questionnaires, interruption analysis, drawing closed curve
	Indirect	Multidimensional scaling, general weighted networks, Johnson Hierarchical Clustering
	Natural	Interviews, questionnaires, observation
	Contrived	Twenty Questions, repertory grid
Shadbolt and Burton (1995)	Analyst-leading	Interviews, questionnaires, laddering
	Expert-leading	Individual (observation, storytelling), collective (round table, brainstorming)
Gavrilova and Andreeva (2012)	Expert–Analyst collaborating	Role games, verbal protocol
	Knowledge unit elicitation	Interviewing, observations
Payne <i>et al.</i> (2007)	Knowledge relationship elicitation	Categorical sorting, repertory grid analysis
	Combined elicitation	Protocol analysis, discourse analysis, laddering, sub-language analysis
	Interview techniques	Unstructured and semi-structured interview
Milton (2007)	Modeling techniques	Trees, matrices, maps, timeline
	Specialized techniques	Twenty Questions, repertory grid, critical decision method, scenarios

- *Repertory grid*: Similar to concept sorting, this technique allows experts to score and rate different attributes. Then, according to the rating and scores, different clusters in the data are identified (Boose, 1988; Gaines and Shaw, 1993).
- *Mapping techniques*: This technique is a graphical method of KA (Heatherton, 1990). There are different techniques in this category including concept maps, state transition networks and process maps (Milton, 2003).
- *Laddering techniques*: Rooted in George Kelly's personal construct theory, the laddering technique includes creation, revision and validation of hierarchical knowledge (Veludo-de-Oliveira *et al.*, 2006). The structure of the data is often in the form of ladder due to its hierarchical nature (e.g. tree diagrams).

2.2 Personality type

Personality refers to all traits and attributes of behavior such as feelings, self-perception, viewpoints, thinking styles and many habits. There are other definitions of personality in the literature that are pointed out in this paper. For instance, Eysenck (1967) and Gray (1972) have defined personality as a long-lasting fundamental characteristic of individual behavior. Several theories have linked personality to biology and brain functions. Also, personality could be defined as an individual's psychological dynamics that determine behavior and thought indicators (Schultz and Schultz, 1994). Pervin (1996) believes that personality indicates characteristics of the person(s) that represent consistent patterns of behavior. Personality is made up of various dimensions. To provide a focused parsimonious framework, we just focus on introversion and extroversion. Jung defines the introversion and extraversion as two dimensions of personality and believes that people can be mentally placed in these two categories (Ross, 1992).

Introversion is a trait that is associated with subjective inner vision. In general, introverts are more prepared for restraint and composure. These individuals are less likely to attend community and spend most of their time on mental and individual activities (Eysenck, 1947). Introverts are cautious, relaxed, reliable and partially pessimistic; they are rarely aggressive and often control their emotions. Also they do not like excitement (Gyngell, 2000).

Extraversion is a behavioral trait that is associated with objective vision and focused on external perspective. Extroverts are less prepared for restraint (Eysenck, 1947). Individuals with such characteristics are social, impulsive, upbeat and carefree. They have the power of repartee and like to have many friends and participate in meetings, assemblies and ceremonies. They cannot control their emotions and are more in search of novelty and variety (Gyngell, 2000). "Extraversion has been found to be beneficial for social relations, because extraverted individuals are socially skilled and have a preference for interaction" (Doeven-Eggens *et al.*, 2008). Some features of introverts and extroverts are shown in Table II.

2.3 Relationship between personality traits and KA techniques

Although both various personality traits and KA techniques have been extensively studies in the literature, there are only few studies attempting to bridge these two streams and explore the impact of personality traits on KA technique effectiveness. Dhaliwal and Benbasat (1990) maintain that one of specifications of experts that impact KA process is personality characteristics. Burton *et al.* (1987) studied the impact of

personality traits on effectiveness of four elicitation techniques: structured interview, protocol analysis, ladder grid and card sort. Their study was based on an experiment on 32 experts. Each subject participated in two sessions. The time taken to elicit the knowledge and code the transcripts into pseudo rules, the number of rules (whether correct or not) and the number of clauses was recorded as a measure of the dependent variable – efficacy of technique. A rule set provided by an expert was used as the “gold standard” to compare and evaluate the subjects’ rule sets. The percentage of rules that overlapped the gold standard was used as a measure of the “coverage” provided by the KA method. Using these measures, they concluded that protocol analysis is the “least efficient” technique.

To explore the impact of personality traits (introversion versus extroversion), these researcher used two sets of psychometric tests. The result showed that an interview takes longer for introverts than for extroverts.

3. Methodology

To explore the relationship between personality traits (i.e. introversion/extroversion) and KA techniques, nine major techniques were selected (interview, commentary, laddering, repertory grid, concept sorting, limited-information and constrained-processing tasks, mapping, CDM and scenarios). Then, according to the research question and the purpose of the study, a questionnaire was designed. The questionnaire included four main parts: the first section briefly described selected KA techniques. The second section included questions on the demographic profile of the respondents. The third section of questionnaire captured the respondents’ opinions on nine KA techniques. In this part, Likert’s five-item scale was used. The scores ranged from 5 (absolutely agree) to 1 (absolutely disagree). Finally, the last section of questionnaire contained Eysenck Personality Questionnaire (Eysenck and Eysenck, 1975) that determines whether each respondent was an extrovert or introvert.

The validity of the questionnaire was examined and confirmed by experts’ opinions. Cronbach’s alpha was used to test the reliability. The Cronbach’s alpha was 0.87 which was greater than the threshold of 0.75 and confirmed the reliability of the responses.

The data obtained from questionnaire were analyzed by SPSS17. To examine whether there was a significant relationship between personality traits and KA techniques, Pearson correlation was used. The main stages of this study are shown in Figure 1.

Table II.
Some of features of
introverts and
extroverts

Introvert	Extrovert
Internal	External
Protection of opinions	Divulge out opinions
Profundity	Width
Centralized	Action and reaction
Interested in/thoughts	Involved with people, things
Inside pull	Outside thrust
Think-do-think	Do-think-do

Source: Adapted from Bradley and Hebert (1997)

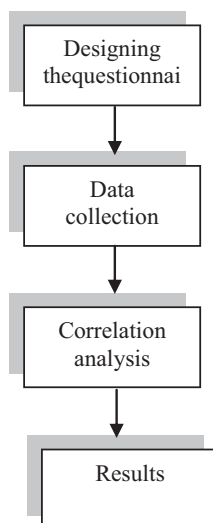


Figure 1.
Research structure

In total, 152 experts of the information and communication technology industry took part in the experiment. The knowledge intensity of this industry and managerial perception of knowledge as the most important capital, make this industry an appropriate context to examine the research question of this study.

A demographic profile of the respondents is summarized in [Table III](#).

4. Data analysis

In the first step, the statistical data distribution was examined through Kolmogorov – Smirnov test. This technique is appropriate for normal, steady, Poisson and exponential distributions. It shows whether observations follow a certain distribution. In this test, p -value greater than 0.05 shows that observed distribution is compatible with theory distribution. The results of this test for major variables are reported in [Table IV](#).

As illustrated in variables have normal distribution. Therefore, Pearson's correlation coefficient was used to examine the relationship between personality traits (i.e. introversion/extroversion) and KA techniques. [Table V](#) summarizes the results.

According to the following are the major results:

- There is a strong, significant positive relationship between *interview* technique and *extroversion*.
- There is a strong, significant positive relationship between *commentary* technique and *extroversion*.
- There is a strong, significant positive relationship between *laddering* technique and *introversion*.
- There is no significant relationship between *repertory grid* technique and either introversion or extroversion.

Table III.
Demographic profile
of respondents

Participants' demography	(%)
<i>Job position</i>	
Expert	34.73
Supervisor	19.89
Deputy	34.47
Manager	21.19
<i>Education</i>	
Bachelor	47.83
Master	34.75
PhD	17.42
<i>Job experience (years)</i>	
0-5	5.29
5-10	15.43
10-15	28.61
More than 15	50.67
<i>Age (years)</i>	
25-30	8.93
30-35	21.57
35-40	28.34
More than 40	41.16
<i>Gender</i>	
Male	57.24
Female	42.76

- There is a strong, significant positive relationship between *concept sorting* technique and *introversion*.
- There is a strong, significant positive relationship between *limited-information and constrained-processing tasks* technique and *extroversion*.
- There is a strong, significant positive relationship between *mapping* technique and introversion.
- There is a strong, significant positive relationship between *CDM* technique and introversion.
- There is a strong, significant positive relationship between *scenarios* technique and extroversion.

A summary of findings is shown in [Table VI](#). Findings confirmed some association between introversion/extroversion and KA techniques.

Also, it was interesting to explore the priority of using different techniques by introverts versus extroverts. The Friedman test was adopted to investigate individuals' priorities, and it was found that introverts and extroverts have different preferences and priorities. [Tables VII](#) and [VIII](#) show the results for introverts and extroverts, respectively.

Table V.
Correlation analysis
of KA and
extroversion –
introversion values

KA techniques		Introversion	Extroversion
Interview	Pearson correlation	−0.831	0.831**
	Significance (two-tailed)	0.00	0.00
	n	152	152
Commentary	Pearson correlation	−0.699	0.699**
	Significance (two-tailed)	0.01	0.01
	n	152	152
Laddering	Pearson correlation	0.516*	−0.516
	Significance (two-tailed)	0.020	0.020
	n	152	152
Repertory grid	Pearson correlation	−0.058	0.058
	Significance (two-tailed)	0.809	0.809
	n	152	152
Concept sorting	Pearson correlation	0.495*	−0.495
	Significance (two-tailed)	0.027	0.027
	n	152	152
Limited-information and constrained- processing tasks	Pearson correlation	−0.477	0.477*
	Significance (two-tailed)	0.033	0.033
	n	152	152
Mapping	Pearson correlation	0.450*	−0.450
	Significance (two-tailed)	0.046	0.046
	n	152	152
CDM	Spearman correlation	0.459*	−0.459
	Significance (two-tailed)	0.042	0.042
	n	152	152
Scenarios	Pearson correlation	−0.500	0.500*
	Significance (two-tailed)	0.025	0.025
	n	152	152

Notes: *Correlation is significant at the 0.05 level (2-tailed); **correlation is significant at the 0.01 level (2-tailed)

Table VI.
Positive relationships
between an introvert/
extrovert type of
personality and KA
techniques

KA techniques	Introversion	Extroversion
Interview	–	✓
Commentary	–	✓
Laddering	✓	–
Repertory grid	–	–
Concept sorting	✓	–
Limited-information and constrained-processing tasks	–	✓
Mapping	✓	–
CDM	✓	–
Scenarios	–	✓

5. Discussion and conclusion

The main purpose of this research was to explore the relationship between different personality traits – namely, introversion and extroversion – and KA techniques. Findings confirmed some associations between introversion/extroversion and KA techniques.

Particularly, extraversion was positively correlated with interview, scenarios, commentary and limited-information and constrained-processing tasks. Because extroverts tend to express their ideas, they communicate with others more comfortably than introverts do. Extroverts express their personal feelings freely and are energetic when they interact with other people. Hence, they prefer techniques which require more energy and interaction with others (interview, scenarios and commentary).

On the other hand, extroverts are more sensitive to timing and scheduling than introverts and their irritability to restrictions is also more than that of introverts. Thus, tasks with limitation in time and information might be more appropriate for extroverts.

Introversion was positively correlated with CDM, laddering, concept sorting and mapping.

Because introverts enjoy more mental activities than others, they spend most of their time on studying and prefer to be alone rather than spending time with other people. They would prefer limited social interactions and do not want to be the center of attention. They are more cautious and closed than extroverts. As a result, they prefer those techniques which require more concentration and lower communications, particularly verbal ones (e.g. laddering and mapping).

When the introverts face anxiety disorders, they have the ability to concentrate on their problems and solve them more successfully (Aron and Aron, 1980). According to the results, the ability of introverts to examine the incident in critical situations is revealed by probing these questions:

The subtle cues that the expert relies upon but that can be missed by novices; The inferences and strategies that the expert used during the incident; The options that were selected and those rejected (Milton, 2007).

Table VII.
Results of Friedman
test to prioritize
introverts techniques

Introverts techniques	Average rank
CDM	2.85
Laddering	2.55
Concept sorting	2.40
Mapping	2.20

Table VIII.
Results of Friedman
test to prioritize
extroverts'
techniques

Extroverts techniques	Average rank
Scenarios	2.73
Interview	2.68
Commentary	2.45
Limited-information and constrained-processing tasks	2.15

That is why, the CDM is one of the most desired techniques for introverts.

The findings of this study confirm that personality traits can significantly impact the KA techniques that individuals use and the effectiveness of the KA process. This opens a viable venue for future studies. Future research can expand this work by including other personality traits. Also, there are other KA techniques and other stages in the knowledge management cycle (Akhavan and Pezeshkan, 2014) that can be studied by scholars to explore how the personality traits of individuals at different organizational levels can influence their performance in each stage of knowledge management initiatives.

References

- Adelman, L. (1989), "Measurement issues in knowledge engineering", *IEEE Transactions on Systems, Man and Cybernetics*, Vol. 19 No. 3, pp. 483-488.
- Akhavan, P., Hosnavi, R. and Sanjaghi, M. (2009), "Towards knowledge management: an exploratory study for developing a KM framework in Iran", *International Journal of Industrial Engineering and Production Research*, Vol. 20 No. 3, pp. 113-120.
- Akhavan, P. and Jafari, M. (2008), "Towards learning in SMEs: an empirical study in Iran", *Development and Learning in Organizations*, Vol. 22 No. 1, pp. 17-19.
- Akhavan, P. and Pezeshkan, A. (2014), "Knowledge management critical failure factors: a multi-case study", *Vine: The Journal of Information and Knowledge Management Systems*, Vol. 44 No. 1, pp. 22-41.
- Aron, A. and Aron, E.N. (1980), "The transcendental meditation program's effect on addictive behavior", *Addictive Behaviors*, Vol. 5 No. 1, pp. 3-12.
- Boose, J. (1988), "Uses of repertory grid-centered knowledge acquisition tools for knowledge-based systems", *International Journal of Man-Machine Studies*, Vol. 29 No. 3, pp. 287-310.
- Bradley, J.H. and Hebert, F.J. (1997), "The effect of personality type on team performance", *Journal of Management Development*, Vol. 16 No. 5, pp. 337-353.
- Burton, A.M., Stadlbolt, N.R., Hedgecock, A.P. and Rugg, G. (1987), "A formal evaluation of knowledge elicitation techniques for expert system, domain 1", *Proceedings of Expert Systems '87 on Research and Development in Expert Systems IV*, Cambridge University Press, New York, NY, pp. 136-145.
- Cooke, N.J. (1994), "Varieties of knowledge elicitation techniques", *International Journal of Human-Computer Studies*, Vol. 41 No. 6, pp. 801-849.
- Dhaliwal, J.S. and Benbasat, I. (1990), "A framework for the comparative evaluation of knowledge acquisition tools and techniques", *Knowledge Acquisition*, Vol. 2 No. 2, pp. 145-166.
- Eysenck, H. (1947), *Dimensions of Personality*, Transaction Publishers, New Jersey.
- Eysenck, H. (1967), *The Biological Basis of Personality*, Transaction Publishers, New Jersey.
- Eysenck, H.J. and Eysenck, S.B.G. (1975), *Manual of the Eysenck Personality Questionnaire (Adult and Junior)*, Hodder & Stoughton, London.
- Gaines, B.R. and Shaw, M.L.G. (1993), "Basing knowledge acquisition tools in personal construct psychology", *Knowledge Engineering Review*, Vol. 8, pp. 49-85.
- Gavrilova, T. and Andreeva, T. (2012), "Knowledge elicitation techniques in a knowledge management context", *Journal of Knowledge Management*, Vol. 16 No. 4, pp. 523-537.
- Gray, J.A. (1972), "The psychophysiological nature of introversion-extraversion: a modification of Eysenck's theory", *Biological Bases of Individual Behavior*, New York Academic Press, pp. 182-205.

- Grigorenko, E.L. and Sternberg, R.J. (2006), "Practical intelligence and elementary-school teacher effectiveness in the United States and Israel: measuring the predictive power of tacit knowledge", *Sidney Strauss Thinking Skills and Creativity*, Vol. 1 No. 1, pp. 4-33.
- Gyngell, E. (2000), *HSE Publishes New Research on Occupational Stress*, available at: www.stress-ip.co.uk/news.html
- He, Q., Ghobadian, A. and Gallea, D. (2013), "Knowledge acquisition in supply chain partnerships: the role of power", *International Journal of Production Economics*, Vol. 141 No. 2, pp. 107-132.
- Heatherton, J.R. (1990), "A comparison of knowledge acquisition techniques used in the development of expert system", MS thesis, Faculty of the School of Systems and Logistics of the Air Force Institute of Technology Air University, USA.
- Jafari, M., Akhavan, P., Fesharaki, M. and Mohammad, F. (2007), "Iran aerospace industries' KM approach based on a comparative study: a benchmarking on successful practices", *Aircraft Engineering and Aerospace Technology: An International Journal*, Vol. 79 No. 1, pp. 69-78.
- Jafari, M., Akhavan, P. and Nourizadeh, M. (2013), "Classification of human resources based on measurement of tacit knowledge: an empirical study in Iran", *Journal of Management Development*, Vol. 32 No. 4, pp. 376-403.
- Doeven-Eggen, L., De Fruyt, F., Hendriks, J., Bosker, R. and Van der Werf, M.P.C. (2008), "Personality and personal network type", *Personality and Individual Differences*, Vol. 45 No. 7, pp. 689-693.
- Milton, N. (2003), "Personal knowledge techniques", *PhD thesis*, School of Psychology, University of Nottingham, Nottingham.
- Milton, N.R. (2007), *Knowledge Acquisition in Practice: A Step-by-step Guide*, British Library Cataloguing in Publication Data, London.
- Payne, P.R.O., Mendonca, E.A., Johnson, S.B. and Starren, J.B. (2007), "Conceptual knowledge acquisition in biomedical: a methodological review", *Biomedical Information*, Vol. 40 No. 5, pp. 582-602.
- Pervin, L. (1996), *The Science of Personality*, 1st ed., John Wiley & Sons, New York, NY.
- Ross, A.O. (1992), *Personality Psychology (Theories and Processes)*, Harper, NY.
- Schultz, D.P. and Schultz, S.E. (1994), *Theories of Personality*, Brook Cole, Pacific Grove.
- Shadbolt, N.R. and Burton, A.M. (1995), "Knowledge elicitation: a systematic approach", in Wilson, J.R. and Corlett, E. (Eds), *Evaluation of Human Work: A Practical Ergonomics Methodology*, 2nd and Revised Edition, Taylor and Francis, London.
- Veludo-de-Oliveira, T.M., Ikeda, A.A. and Campomar, M.C. (2006), "Discussing laddering application by the means-end chain theory", *The Qualitative Report*, Vol. 11 No. 4, pp. 107-132.
- Waterman, D.A. (1985), *A Guide to Expert Systems*, Addison-Wesley Publishing, Reading, MA.
- Yu, N.C. and Abidi, S.S.R. (2000), "A scenarios mediated approach for tacit knowledge acquisition and crystallisation: towards higher return-on-knowledge and experience", *Third International Conference on Practical Aspects of Knowledge Management (PAKM2000)*, 30-31 October, Basel.

Further reading

- Belkin, N.J., Brooks, H.M. and Daniels, P.J. (1987), "Knowledge elicitation using discourse analysis", *International Journal of Man-Machine Studies*, Vol. 27 No. 2, pp. 127-144.

- Benziger, K. (1999), *The Physiology of Type: Introversion and Extraversion*, Benziger Thinking Styles Assessment, available at: www.benziger.org/articlesIng/?p=30
- Carrizo, D, Dieste, O. and Juristo, N. (2008), "Study of elicitation techniques adequacy", 11th Workshop on Requirements Engineering, WER 2008, Barcelona, Catalonia, pp. 104-114.
- Ericsson, K.A. and Simon, H.A. (1980), *A Silver Bullet for Knowledge Management and Electronic Commerce*, Springer-Verlag, Berlin Heidelberg, New York, NY.
- Funder, D.C. (2001), "Personality", *Annual Review of Psychology*, Vol. 52 No. 1, pp. 197-221.
- Jafari, M., Akhavan, P. and Akhtari, M. (2011), "Exploration of knowledge acquisition techniques in Tunnel industry: the case study of Iran Tunnel association", *International Journal of Business and Management*, Vol. 6 No. 8, pp. 245-255.
- Matzler, K., Renzl, B., Muller, J., Herting, S. and Mooradian, T.A. (2008), "Personality traits and knowledge sharing", *Journal of Economic Psychology*, Vol. 29 No. 3, pp. 301-313.
- Milton, N., Clarke, D. and Shadbolt, N. (2006), "Knowledge engineering and psychology: towards a closer relationship", *International Journal of Human-Computer Studies*, Vol. 64 No. 12, pp. 1214-1229.
- Namvar, M., Fathian, M., Akhavan, P. and Gholamian, M. (2010), "Exploring the impacts of intellectual property on intellectual capital and company performance", *Management Decision*, Vol. 48 No. 5, pp. 676-697.
- Shadbolt, N. (2005), *Eliciting Expertise*, Taylor and Francis, London.
- Voinov, A.A. (2008), "Cognitive reengineering of expert's knowledge by the implicit semantics elicitation", *Proceedings of 16th International Conference on Knowledge Engineering and Knowledge Management*, Knowledge Patterns, Catania, pp. 69-71.
- Wagner, W.P., Chung, Q.B. and Najdawi, M.K. (2003), "The impact of problem domains and knowledge acquisition techniques: a content analysis of P/OM expert system case studies", *Expert Systems with Applications*, Vol. 24, pp. 79-86.
- Wiggins, J.S. (1968), "Personality structure", *Annual Review of Psychology*, Vol. 19 No. 1, pp. 293-350.
- Yesil, S., Koska, A. and Buyukbese, T. (2013), "Knowledge sharing process, innovation capability and innovation performance: an empirical study", *Procedia: Social and Behavioral Sciences*, Vol. 75 No. 1, pp. 217-225.
- Zuckerman, M. (2005), *Psychobiology of Personality*, Cambridge University Press, New York, NY.

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