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MEASURING ORDINARY EMPLOYEE'S INNOVATION POTENTIALS

Petar Vrgovic
University of Novi Sad, Faculty of Technical Sciences, Novi Sad, Republic of Serbia

Abstract: *The employee workforce inside a company is often considered as a generous stream of relevant ideas for organizational improvement, yet little is known about means to harness this power and how to put it to good use. Since the first step of using something is to know it's power and limitations, this paper proposes a questionnaire that is intended to measure emploees' ideation and innovation potentials. The proposed questionnaire consists of sections that measure employees' willingness for company improvement, their ability to articulate ideas, their insight into company's problems and opportunities for improvement, their perception of idea management quality. Additional dimension was identified as one with a negative influence on the ideation process. The questionnaire was distributed to a sample of more than three hundred employees from an array of Serbian companies. The results, reliability and validity are discussed.*

Key Words: ***creative potential, ideation, questionnaire, idea management***

1. INTRODUCTION

While striving to innovate and searching for new ideas to innovate on, companies can look both inside and outside of their boundaries. And while in the last decade companies have been suggested to look for external partners, due to increasing insterest in open innovation strategies, inside every organization there are also workers who have relevant experience needed for generating new useful ideas. These employees, although being internally placed, may bring added value to the open innovation processes since their job description usually have little in common with R&D goals of their company, and are therefore sometimes ignored as sources of ideas for innovation. Acland notes that in many companies staff is an untapped creative potential [1], suggesting that companies often face serious cultural issues which get in the way of successful innovation.

2. EMPLOYEE POTENTIALS FOR IDEATION

Especially when large-scale companies are observed, idea quality, idea generation and idea management activities are shown to be important determinants of innovative capacities [2], since they allow a company to use a creative potential within it's own ranks. Companies that manage to utilize employees' creative potentials are found to build a competitive advantage by fostering continuous change, and they manage to do this by achieving a high level of involvement of the workforce in sustained incremental problem-solving [3], [4]. Unfortunately, companies who strive to improve their business in this way often unintentionally limit their employees' inputs by asking them only to help in continuous improvement, insisting on incremental ideas that will fit company's development strategy. In this situation, employees are discouraged to share any ideas that might brake the current frame of development, since those ideas are unacceptably radical and therefore the system doesn't know how to process them. Allowing these ideas to influence company will probably lead to a new value being created, since the demand for discontinuous innovation is getting higher and higher [5]; but for that to happen, the company needs to find a separate entry-point for these radical suggestions. A possible solution may be to embrace a dual idea management system, which is capable to deal with both continuous and discontinuous innovation by making a distinction between them and then treating the ideas differently by employing different processes and evaluation ccriteria [6].

The importance of regular-employee shop-floor activation in organizational innovation has been broadly discussed in the last decades, suggesting pooling ideas for more creative problem solving [7], identifying problems and improving customer service [8], and even using employee ideas to revitalize a company in big debts [9], but the question on how to incorporate workers (cultural element) in innovation activities (structural element) remained open. Since people are involved, with multitude of intertwined factors, this relationship between cultural and structural elements of an organization is considered to be mutual and multilateral [10]. Harnessing employees' creative potential for company innovation is a process that even helps itself, since it is shown that employees who share more ideas tend to create ideas of better quality, with factors like initiative at work, higher order need strength, self-efficacy and expected improvements enhancing the ideation activities [11].

3. QUESTIONNAIRE DESIGN AND TESTING

In order to measure employees' ideation and innovation potentials, a questionnaire was designed, following the previous findings in this specific area [12].

As the first step of questionnaire design, a number of relevant dimensions were defined:

1. Employees' insights into company's problems and opportunities for improvement;
2. Employees' ability to articulate ideas;
3. Employees' readiness to communicate their ideas to the company;
4. Employees' involvement in the innovation processes
5. Employees' perception of idea management quality and
6. Employees' expectations of feedback and rewards.

Each of these dimensions is known to be very important for the build-up of employees' ideation potentials and it's conversion to idea-sharing activities. Since these dimensions are not proven to be in correlation between themselves, separate items were suggested independently at this step.

In the next step, every dimension was described with a list of typical attitudes, observations or behaviours that employee may manifest in that area [13]. Some of the items were coded as negative statements, in order to reduce acquiescent bias and extreme response bias. It was important to list as many possible outcomes, while staying close to the relevant dimension. This step produced a test questionnaire that contained 48 items, grouped in 6 thematic fields. The items were then randomized and a 5-point Likert-type scale was attached to each of them, with a brief introductory section put above.

Since the questionnaire was intended to measure an internal state or a behavioural pattern of individual employee, another question was added separately in order to explore external construct validity of the questionnaire. This was achieved by asking employees how many ideas they have shared with their company during the last year. The total number of ideas that employees have shared since they were employed in the company was not taken into consideration, as it may be too unreliable, and is also heavily dependent of the number of years that the employee has worked in the company. In the later analysis, subjects were grouped into one of five groups regarding the number of ideas shared.

The questionnaire was distributed via various channels to a big number of companies in Serbia, after which the collected questionnaires were screened for any irregularities; after innitial screening 337 cases were kept for data analysis within the total sample, balanced for gender and education level, excluding any subjects that were formally included in their company's innovation processes. Certain items that have been negatively phrased were recoded.

4. QUESTIONNAIRE ANALYSIS

4.1. Factor analysis

The first step in the analysis was to check if the proposed dimensions defined during the questionnaire construction stage were observable in the subjects' answers. A principal component method was used within the factor analysis, with a promax rotation of factors (a non-orthogonal rotation method was chosen after the initial analysis, since the extracted factors showed significant inter-correlations). This analysis resulted in six interpretable factors, mostly identical to the proposed dimensions, but not completely: employees' readiness to communicate their ideas to the company and their involvement in the innovation processes converged into a single factor named "Willingness for company improvement", while some negative questions formed a separate factor named "Pesimistic unconcern for company improvement ". The factors presented in Table 1. were successfully interpreted, with 51% of total variance explained.

Table 1. *Extracted factors and variance explained*

	Variance	Cumulative
Willingness for company improvement	25.307%	25.307%
Awareness of situation inside the company	7.570%	32.877%
Pesimistic unconcern for company improvement	5.909%	38.786%
Perceived Idea management quality	4.830%	43.616%
Idea articulation	4.097%	47.713%
Feedback importance	3.483%	51.196%

Using pattern matrix and structure matrix, the individual items were ranked within their corresponding factors from the highest loading to the lowest one. The best six items from every factor were kept for further analysis, while the others were discarded.

4.2. Reliability analysis

The individual dimensions were then subjected to reliability analysis, which produced Cronbach's Alpha values as presented in Table 2. While all the other dimensions scored satisfactory coefficients, the "Feedback importance" dimension performed unacceptably and was therefore excluded from the further analysis.

Table 2. *Reliability analysis of separate dimensions*

	Cronbach's Alpha
Willingness for company improvement	.791
Awareness of situation inside the company	.787
Pesimistic unconcern for company improvement	.729
Perceived Idea management quality	.819
Idea articulation	.780
Feedback importance	*.284*

The complete questionnaire thus consists of 30 items separated in 5 dimensions, 6 items each, with acceptable total Cronbach's Alpha value of .781. A sample of items is presented in Table 3 (the complete questionnaire with recoding instructions is available from the author).

Table 3. *Questionnaire dimensions with sample of items*

Willingness for company improvement
I want my company to improve every day more and more. I want to share my ideas for improvement with the company. I want to improve business processes of my company.
Awareness of situation inside the company
I know how the company could use some business opportunities that are unused so far. When there is a problem in my company, I understand the cause of that problem. I am exactly aware of key problems that my company faces.
Pesimistic unconcern for company improvement
I wouldn't be happy to share my ideas for improvement with the company. I don't care if my company catches a good business opportunity. It is hard for me to identify what are the causes of problems inside my company.
Perceived Idea management quality
In my company a good idea would have big chance to be realised. My suggestions for improvements would often be seriously considered. Quality ideas are seriously discussed in our company.
Idea articulation
When I explain how something should be improved, it is hard for me to find the right words. I can easily explain ideas for improvement that I have. I think that others easily understand my ideas, whether they share my opinion.

4.3. Dimension intercorrelation

The dimensions were found to be significantly correlated at .01 level so that the "Pesimistic disconcern for company improvement" correlated moderately negative to other four dimensions, who correlated moderately positive between themselves, as shown in Table 4. These findings suggest that the observed dimensions have a common background and tend to behave like a system of second order. It is also interesting to observe that the highest correlation was found between dimensions "perception of Idea management quality" and "willingness for company improvement", which suggests that employees are more ready to participate in innovation processes when they perceive company's innovation management as more quality one.

Table 4. *Reliability analysis of separate dimensions*

	(1)	(2)	(3)	(4)
(1) Pesimistic unconcern for company improvement				
(2) Idea articulation	-.518			
(3) Awareness of situation inside the company	-.275	.388		
(4) Willingness for company improvement	-.387	.452	.468	
(5) Perception of Idea management quality	-.316	.408	.360	.521

4.4. Criterion validity

When the dimensions of the questionnaire were exactly determined, they were observed in relation to an external variable that was identified as the most appropriate one to check the external validity of the instrument. Since the "number of ideas shared with the company in the last year" was a variable that had a significant positive skew (3.03, standard error .133) and thus perceived as not normally distributed, this variable was demoted from a scale to an ordinal level, grouping subjects in one of 5 groups regarding number of ideas they have shared in the specified period, as seen on the X axis in Figures 1. and 2. A nonparametric independent-samples Kruskal-Wallis test was then used to test if these groups behaved differently on questionnaire dimensions. The results of this analysis showed that five groups of subjects differed significantly on all five dimensions, suggesting that there is a dependence between subject's score on questionnaire dimensions and his number of ideas shared with his company in the last year. Figure 1. clearly shows that the positive dimensions "Awareness of situation inside the company", "Perceived Idea management quality" and "Idea articulation" tend to be more present within subjects that have shared more ideas with the company. The "Willingness for company improvement" dimension seams to be following the same trend except for the subjects who share extremely large number of ideas, whose willingness for company improvement drops for a few points. Possible explanation for this anomaly is that people who share that many ideas maybe do that because of their personality traits or other personality factors, rather than because of their motivation to help the company improve.

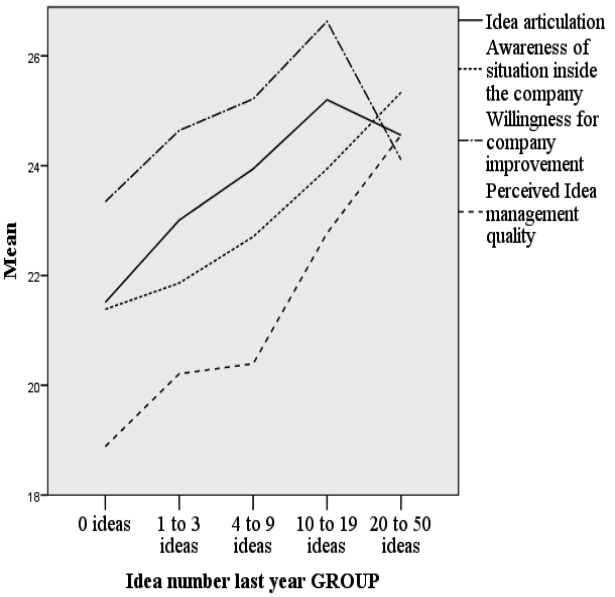

Fig. 1. *Dimension means compared to the idea sharing frequency*

Figure 2. shows that the dimension with a negative context, "Pessimistic unconcern for company improvement", tends to be more present within subjects who did not shared any ideas with their company, or only a few.

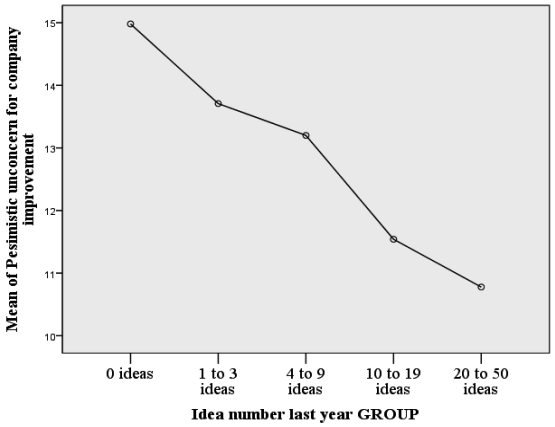

Fig. 2. A*verage score on pesimistic disconcern for company improvement dimension, relative to the idea sharing frequency*

5. DISCUSSION AND CONCLUSION

This paper proposed a questionnaire with an intention to measure employees' ideation and innovation potentials. This goal was set since there were not any appropriate measuring instruments already available in the literature, and current research does have a need to measure this aspect of organizational culture.

The suggested dimensions were confirmed as valid to a great extent, naming "awareness of situation inside the company", "willingness for company improvement", "perceived Idea management quality" and "idea articulation" as measurable constructs that could predict employees' idea sharing behaviour. Additionally, a negative factor named "pesimistic unconcern for company improvement" was identified as a separate construct that negatively correlated with the former dimensions and was identified as a negative factor for the idea sharing behavior, as depicted in Figure 3.

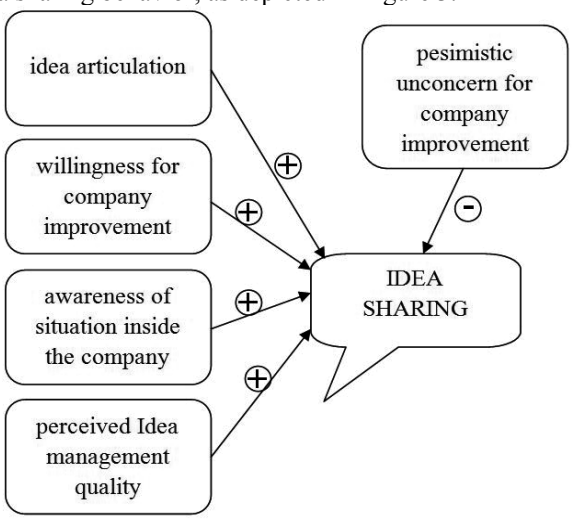

Fig. 3. *A proposed model of influence of measured dimensions on employee's idea sharing behaviour*

The proposed questionnaire offers a possible solution for the researchers and practitioners that are interested in ordinary employees' innovation potentials. The questionnaire is relatively short, easy to administer and easily interpretable. Possible future steps could include additional questionnaire validation on some other criteria, as well as interpretation of it's results related to other innovation parameters of the observed company, or organizational culture in observed companies.

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CORRESPONDENCE

Dr Petar Vrgovic, Assistant Prof.
University of Novi Sad
Faculty of Technical Sciences,
Trg Dositeja Obradovića 6
21000 Novi Sad, Serbia
vrgovic@uns.ac.rs