Tacit Knowledge Sharing and Creativity. Project Management and Innovation.pdf

Wioleta Kucharska, Gdańsk University of Technology

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Tacit Knowledge Sharing and Creativity. How to Derive Innovation From Project Teams?
Wioleta Kucharska, Rafał Kowalczyk
Gdansk University of Technology, Gdańsk, Poland
wkucharska@zie.pg.gda.pl
rkowalczyk@zie.pg.gda.pl

Abstract: The way tacit knowledge is viewed these days places strong emphasis on its significance within the organisation. As opposed to explicit, tacit knowledge is absolutely novel and, because of it, beneficial for organisations. This form of knowledge is specific: it is produced and stored in people’s minds and being an intangible asset it is closely related to social capital. Intangible assets become increasingly likely to decide about a competitive advantage of companies. Other key factors which fall into this group and affect competitive advantage in the network economy are innovation, relationships, cooperation, and knowledge. The network is used these days to coordinate market processes, hence the networked economy, a concept discussed in the idea of prosumerism, is based on mutual relationships and processes which take place between individuals in a horizontal rather than hierarchical configuration of dependencies. The arrangement of relationships in a company switches from “one to many” to “many to many” (networking), thus involving business partners and customers, who constitute an external network, as well as all employees (internal network) in the process of building the company’s network of values. There are other factors which significantly contribute to creating a network of values by innovation, such as knowledge and relationships. In order to identify worthwhile innovations, members of a purposefully designed value network must work together. Project teams designed according to the methodology of project management (e.g. PRINCE, PMI, SCRUM) constitute short-term organisations which reflect the temporary nature of networking of knowledge workers. Modern companies are increasingly likely to work in a project management environment, which ensures their success in the implementation of innovation. The aim of the study is to prove that tacit knowledge is a mediator for creativity and project performance. Creativity as one of the crucial sources of innovation is stimulated by tacit knowledge. Bearing this fact in mind, the authors studied relations between tacit knowledge, creativity and the outcome of a project. For this purpose, they conducted a study of 514 Polish professionals with different functions and experience in managing projects in construction industry. The results indicate that the direct effect of tacit knowledge on project performance is rather minor but indirect effects mediated by creativity affect the final project performance. That situation also emphasises the specific nature of tacit knowledge. It is not easily noticeable and hard to measure, however its indirect influence proves its crucial role in value creation. The data collected during the study has been analysed using the equal structural modelling method. The results point out to a new context of tacit knowledge sharing as a key factor in the process of creating innovation. Nowadays tacit knowledge sharing is crucial for creation of innovation in project teams. The presented model highlights the essence of these relations.

Keywords: tacit knowledge, creativity, project performance, knowledge management, project management

Introduction.
Knowledge management, the process of creating new knowledge, involves identifying sources of knowledge, its elicitation, and distribution as it is claimed by McInterney (2002). Next to knowledge, innovation, relationships, and cooperation are key factors which decide about an organisation’s competitive advantage in the network economy as was pointed out by Tapscott (1989), Perechuda (2007) and Mazurek (2012). The role of the network these days is to coordinate market processes. According to the Toffler’s idea of prosumerism (1981), the foundation of the network economy is cooperation of individual creators which results from the shared network of values and not a hierarchical ladder of dependencies. The weight of relationships and knowledge in the process of creating a network of values by innovation is tremendous. In light of the foregoing, in order to identify worthwhile innovations, members of a purposefully designed value network must work together. Innovation involves implementing a new or notably improved good, service, process, marketing
method, or organisational method, into a business practice, work place organisation or a relationship with the ambient world (Eurostat, 2005). An organisation can create innovations within an internal, as well as external network because these are the places where ideas are born. Analogously, innovations may refer to the internal and external values of the network. The network is the beneficiary of the benefits generated by the said innovations. Innovation equals change. In pursuance of an efficient implementation of changes, organisations decide to do it through the means of a project. Project teams are often called temporarily for the purpose of a specific goal or a business product. Such teams frequently include workers with different set of skills and knowledge who on everyday basis work in various functional divisions of the organisation. Sometimes they even come from different organisations. Organisation as a network of activities was pointed out by Czarniawska (2010). The authors claim that project management is a methodology which allows changes to be implemented in an efficient way, taking into consideration the complexity of numerous internal and external network connections. According to this principle we can make an assumption that functional management and process management are necessary, however not sufficient in the network economy. Project organisations seem to be the answer to the question of how to approach change implementation. Effective companies when planning a project which focuses on bringing change into the organisation take into account time and resources needed in order to achieve the desired results, as observed by Portny (2010). There is a wide range of approaches successfully used by companies now to carry out project implementation including the best know project management methodologies promoted by Project Management Institute (PMI) and Organisation of Government Commerce (OGC), such as PRINCE2, Project Management Body of Knowledge (PMBoK), OPMA Competence Baseline, „agile” methodologies, Project Cycle Management (PCM). It is even more probable to implement change (innovation) effectively in an organisation when we apply a project approach, since all of the above listed methodologies demand that the team members involved in the implementation process maintain the enterprise continuum of business justification (PRINCE2). By keeping the information complete and well organised, and by securing a free flow of knowledge thanks to the project approach of change implementation, companies will surely meet their goals not only in relation to a single innovation but on a more global scale, by creating a knowledge sharing culture in a learning organisation which will secure their long-term success in the future.

2. Creativity as a source of innovation

It is generally believed that creativity enhances innovative activities, as indicated by Sarooghi et al (2015). Thus, organisations increasingly expect creativity and innovation of their employees. Scientists tend to view creativity as a complex concept partly due to its interdisciplinary character based on coupling of arts and sciences as Pearson and Ingleton claimed (1994). To give just a few examples, creativity deals with fields such as business, management and industry, mathematics, physics, engineering and many more. Creativity applies to all realms of industrial organisation and business. Despite its common nature, various companies and industries will find a different way for creativity to manifest itself. For the sake of this article, in the context of project teams and accepted project management methodologies, it has been assumed that creativity constitutes a significant element of problem solving abilities of a project team, which in effect influences project performance, and also is reflected in Kirton’s A-I (Adaption Innovation) theory (Kirton, 1984), which attempts to explain differences in creativity and, in this understanding, create more cohesion and collaboration among team members to problem solving and decision making.

Innovation, according to Maier et al (2015), can be seen to be the development invention and application of new ideas, processes and products which are beneficial to individuals, groups or organizations. This definition, as Meier et al pointed out, suggests that creating ideas alone does not mean an innovation. Furthermore, it suggests that new ideas are useful and can be applied. Thus, an innovation process consists of two main activities: creativity and innovation. Creativity involves a generation of novel and useful ideas while innovation entails their implementation. As such, creativity, understood as the ability to generate new ideas is a key factor for innovation processes. Since creativity is the root of all innovation, it is crucial to determine the relationship between creativity and tacit knowledge sharing and their influence on project performance, especially taking into account the specific nature of tacit knowledge which is an intangible asset.

3. Tacit knowledge sharing as a source of creativity.

Combining the existing knowledge in new ways and the contextuality of knowledge determine the meaning of tacit knowledge. The way tacit knowledge is viewed these days places strong emphasis on its significance within the organisation. As opposed to explicit, tacit knowledge is absolutely novel and because of it beneficial
for companies. Tacit knowledge is specific: it is produced and stored in people’s minds and being an intangible asset it is closely related to social capital. Knowledge workers are the main source of know-how and experience. With reference to Mladkova, Zouharova, and Novy (2015), knowledge is their major work tool and resource. Modern network organisations which desire to be innovative and want to create market advantage must find a way to harness this resource, which as a matter of fact is not in their possession, and transform tacit into explicit. Explicit knowledge is easy to transfer because it can be codified. Tacit knowledge is hard to codify or record, hence it is acquired through a practical experience in a relevant context, which as pointed out by Lindström, Delsing, and Gustafsson (2015). Because tacit knowledge to a great extent relies on its context it cannot be codified. Any modifications to the context nullify this codified knowledge, provided the codification is even possible with the dynamics of the present day work environment. Where lies the key to tacit knowledge management then? How to deal with independent knowledge creators? How to transfer tacit knowledge? What is the way to transform tacit into explicit. These questions are still open as pointed out by Lindström, Delsing, and Gustafsson (2015). How to share tacit knowledge in order to expand an organisation, strengthen its innovation, and gain market advantage? Experts such as Murns, (1995), Park and Lee (2014), Buvik and Rolfsen (2015) suggest that the way to approach this problem is by establishing an organisational culture which encourages knowledge sharing, and where relationships between participants are built on mutual trust and collaboration. Knowledge creation takes form of a dynamic social process abounding in human interactions. Sharing informal knowledge happens only when the knowledge owner makes a voluntary decision about this act. This act of commitment cannot be formalised because it is the result of free will, which was pointed out by Polanyi (1966). The skills of forming, storing and articulating tacit knowledge also rely on the owner’s personality, dexterity, explicit knowledge, or the ability to take advantage of external resources of formal knowledge. Moreover, they also depend on the ability to build upon one’s own, as well as other people’s experiences. Other factors which affect tacit knowledge sharing are environmental conditions and organisational culture, as stated by Walczak (2012). The aim of this article is to study the relationship between the construct of creativity of knowledge workers and tacit knowledge sharing as determinants of innovation in a project environment.

4. Innovation as an input and an output of the project
In order to ensure their success in the implementation of change, and change always means innovation, modern companies are increasingly likely to work in a project management environment. What is more, an innovative idea constitutes a foundation for each project and, in a way, inspires its coming to life. Referring to PMBoK (2004) definition, a project is a temporary endeavor undertaken to create a unique product, service or result. Figure 1 presents the graphical illustration of the essence of the connection between project management and innovation.

![Figure 1: Innovation as an input and an output of a project](source: authors’ own study based on PMBoK)

Project management as a temporary organisational form makes it possible to coordinate complex undertakings by involving numerous processes. This methodology allows changes to be implemented in an efficient way, taking into account the complexity of numerous internal and external network connections. The internal network of operations within an organisation requires a careful coordination while undertaking activities going beyond the company’s routine. The external network on the other hand constitutes an invaluable source of inspiration based on the knowledge and experience of partners (so called best practices). A carefully configured network of values and wide ranging cooperation going beyond a homogenous environment enhance generation of innovations as well as solving problems in an innovative way. Tacit knowledge seems to be the key to a fluent exchange of knowledge and reciprocal inspiration for members of project teams in a network environment.
5. Conceptual Framework
The goal of this research is to highlight the specific nature of tacit knowledge which also affects final project performance, namely: the aim of the study is to point out that tacit knowledge is a mediator for creativity and project performance relation. In order to prove it, a research model has been designed, where a theoretical assumption was made related to the Creativity's influence on Project Performance, with Tacit Knowledge Sharing playing the significant intermediary role. Figure 2 illustrates the assumed conceptual framework. In relation to the above hypotheses, as well as the research of Hau et al (2013) related to the influence of Tacit Knowledge Sharing on explicit knowledge, which according to the quoted research of Gemino et al (2015) and also Park and Lee (2014) and Yang and Farn (2009) affects project performance, following a logical inference, it has been assumed that analogically to knowledge sharing, tacit knowledge sharing has a positive influence on project performance, which is reflected in hypothesis 1:

H1: Tacit Knowledge Sharing has a direct positive influence on Project Performance

Based on the researches cited above and the idea of team creativity presented by Maier et al (2015), Bouncken (2009) and Rego et al (2007), Muller (1993) and Kirton, (1984) a hypothesis has been developed which talks about tacit knowledge sharing in reference to building Team Creativity, namely: Tacit Knowledge sharing has a positive influence on Creativity of the team members:

H2: Tacit Knowledge sharing has a positive influence on Team Creativity

Regarding Project Performance, and as a consequence of the idea of Creativity and Innovation by Sarooghi et al (2015) and Team Creativity idea presented by Maier, Hülsheger and Anderson (2015), Bouncken (2009) and Rego et al (2007), Muller (1993) and Kirton (1984), referenced earlier in this article, the assumption has been made that Team Creativity creates project performance, hence the hypothesis below:

H3: Team Creativity has a positive influence on Project Performance

Figure 2 below presents the theoretical model.

6. Methodology
The study was conducted based on the data originally collected among Polish professionals with different roles and experience in managing projects in construction industry. The sample comprised 61% of project managers, 16% of team members, 21% of team leaders, 1% of steering committee, 1% of project sponsors, 98% of the respondents were male and 2% were female. The questionnaire’s design was based on measurement scales
and their sources presented in Appendix 1. The respondents reacted to statements based on a 7-point Likert scale, which goes from 1 – definitely NOT, through 4 – neither YES nor NOT, until 7 – definitely YES. The questionnaire was preceded by a short introduction explaining the purpose and subject matter of the study. The first qualifying question directly referred to the subject matter of the study and regarded the respondent’s affiliation to any project whose performance was assessed. The subsequent part of the structure of the questionnaire led from general to detailed questions which required more precise answers. The proper study was preceded by a pilot study (32 persons). The pilot study made it possible to optimize statements. In effect, for the benefit of the study reliability, problematic statements have been eliminated. Data collection took place electronically, using mainly the “snowball method”, and started with managers who were then willing to recommend our study to their acquaintances. The data was collected from February to April 2016 among Polish professional project members.

The sample size was 600 respondents, 514 cases were accepted for further analysis, after rejecting faulty and incomplete questionnaires. The analysis was conducted using the structural equation modelling method. For the theoretical model presented in Figure 2, a measurement and later a structural Confirmatory Factor Analysis (CFA) models have been developed. The model was then estimated and assessed. Estimation was conducted according to a maximum likelihood method (ML). The evaluation of the model quality was conducted based on tests such as: Root Mean Square Error of Approximation (RMSEA), CMIN/DF, Comparative Fit Index (CFI), and HOELTER with the use of SPSS AMOS 23 software. Table 1 presents test results of the model’s goodness of fit.

Table 1: Test results of the model’s goodness of fit.

<table>
<thead>
<tr>
<th>CMIN/DF</th>
<th>RMSEA</th>
<th>NFI</th>
<th>RFI</th>
<th>IFI</th>
<th>TLI</th>
<th>CFI</th>
<th>HOELTER 0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.89</td>
<td>0.075</td>
<td>0.98</td>
<td>0.96</td>
<td>0.98</td>
<td>0.97</td>
<td>0.98</td>
<td>236</td>
</tr>
</tbody>
</table>

Source: authors’ own study developed with SPSS AMOS 23

Based on the readings, CFA model presented in Figure 3 may be considered as well fit in relation to the data. Model reliability level 3.89 can be viewed as high, with the reference ≤5 (Wheaton, 1977). Model fit to the data based on approximation average error RMSEA at 0.075 also meets the reference values, referring to Stieger and Lind (1980), below 0.08. Measurements of goodness of fit came close to 1 referring to Bollen (1986, 1989), which confirms the mentioned above quality. Hoelter’s coefficient exceeded 200, which also corroborates the above statements (Hoelter, 1983). A positive evaluation of the model allows us to proceed to the presentation of test results.

7. Results

The results indicate that the direct effects of tacit knowledge on project performance are rather minor but the indirect effects mediated by creativity affect final project performance. As a result, there is not a direct influence of tacit knowledge sharing on project performance but the influence is indirect, it is strongly mediated by Team Creativity.

Figure 3. Graphical presentation of achieved results.
Below in Table 2 we present a summary of the hypothesis tests referring to the theoretical model presented in Figure 2.

Table 2 Summary of the hypothesis tests.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>B</th>
<th>C.R</th>
<th>p</th>
<th>supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1 Tacit Knowledge Sharing has a direct positive influence on Project Performance</td>
<td>0.261</td>
<td>2.82</td>
<td>0.005</td>
<td>NO</td>
</tr>
<tr>
<td>H2 Tacit Knowledge Sharing has a positive influence on Team Creativity</td>
<td>0.86</td>
<td>19.87</td>
<td>&lt;0.001</td>
<td>YES</td>
</tr>
<tr>
<td>H3 Team Creativity has a positive influence on Project Performance</td>
<td>0.51</td>
<td>5.43</td>
<td>&lt;0.001</td>
<td>YES</td>
</tr>
</tbody>
</table>

Table 3 Estimations of the total standardised effects of the model

<table>
<thead>
<tr>
<th>Team Creativity</th>
<th>Standardised effects</th>
<th>Tacit Knowledge Sharing</th>
<th>Team Creativity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td>0.859</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indirect</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>0.859</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Performance</td>
<td>Direct</td>
<td>0.261</td>
<td>0.514</td>
</tr>
<tr>
<td></td>
<td>Indirect</td>
<td>0.441</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>0.702</td>
<td>0.514</td>
</tr>
</tbody>
</table>

The analysis of the direct and indirect estimations, and the total effects presented in Table 3 show that tacit knowledge has a low significance for project performance, which is surprising in light of the theoretical assumptions made and described in the Introduction and Conceptual Framework sections. Only in the case of Team Creativity construct the presented model notes a statistically significant influence on Project Performance. However, it is possible that the presented situation reflects the specific nature of tacit knowledge which is not easily noticeable and hard to measure, however its indirect influence proves its crucial role in innovation creation processes in project teams.

8. Discussion and Conclusions

The aim of this study, which has been successfully achieved, reflects the specific nature of tacit knowledge and its role in the process of innovation creation. The results indicate that the direct effects of tacit knowledge on project performance are rather minor but the indirect effects mediated by creativity affect the final project performance. A surprising result of the presented study is the lack of statistically significant influence of tacit knowledge on project performance - a fact which denies our theoretical assumptions. This fact makes as ponder the specific nature of tacit knowledge, which is not easily noticeable and hard to measure, however its indirect influence proves its crucial role in the process of value creation. Similar results for the relationship between Tacit Knowledge Sharing and Project Performance were achieved by Kucharska and Dąbrowski in their publication “Tacit Knowledge Sharing and Personal Branding. How to Derive Innovation From Project Teams?” which was also prepared for ECIE 2016. The results achieved in the study and published in the said article led the authors to pose a thesis statement about the specific nature of tacit knowledge sharing and repeat the study related to tacit knowledge sharing and project performance in project teams with a bigger
sample participation including also the Team Creativity factor. The results of the study presented in this publication have confirmed the relevance of the assumption.

The presented model (Figure 3) explains the construct of the Team Creativity in 74%, whereas Project Performance in 56%, has been presented in Appendix 2, Squared Multiple Correlations. The situation gives basis to thinking that Tacit Knowledge Sharing is a crucial source of Team Creativity, which has a great intermediary significance for the Project Performance and Team Creativity relationship. This result confirms the relevance of the assumption regarding the great significance and special nature of Tacit Knowledge Sharing as an intangible asset. The specific nature of Tacit Knowledge Sharing is reflected in the subtle direct influence as opposed to the strong indirect influence on the innovation process. Bearing in mind the question posed in the title of the paper: “How to derive innovation from project teams?” in light of the research it may be stated that it is crucial to create conditions which will make it possible for team members to freely share tacit knowledge as it strongly affects creativity of project teams. Another condition enhancing tacit knowledge sharing is culture sharing which can only take place if there is trust between team members. Creating an atmosphere of collaboration and trust is the domain of team leaders. They may be considered the critical element for deriving innovation from project teams. Their effectiveness in this area increases with the freedom to choose other team members independently and having access to appropriate management tools. Personality and skills of team leaders significantly affect tacit knowledge sharing and consequently have a significant impact on deriving innovation from project teams.

9. Limitations and Practical Implications
The studies presented in the article were carried out based on a sample comprising members of project organisations in the construction industry, predominantly men occupying the position of a Project Manager (61% respondents). Carrying out a similar study on a sample group of women, including greater participation of project team members than in the case of this study, perhaps would allow us to learn more of the nature of Tacit Knowledge Sharing in the context of innovation creation. In light of the studies of Woolley et al (2010), pointing to, e.g. greater aptitude of women for cooperation, it may be assumed that the direct dependence between Tacit Knowledge Sharing and Project Performance would be stronger, however not necessarily statistically significant. (A thesis which should obviously be verified). Practical implications in light of the presented results show that since Tacit Knowledge Sharing significantly affects innovation processes, it is important to support this act by creating favourable conditions. In reference to Polanyi (1966), sharing informal knowledge happens only when the knowledge owner makes a voluntary decision to do it. This act of commitment cannot be formalised because it is the result of free will as was pointed out by Polanyi (1966). The skills of forming, storing and articulating tacit knowledge also rely on the knowledge owner’s personality, dexterity, explicit knowledge, or the ability to take advantage of external resources of formal knowledge. Additionally they also depend on the ability to build upon one’s own as well as other people’s experiences. Other factors which affect tacit knowledge sharing are environment conditions and organisational culture, as noted by Walczak (2012). This form of knowledge imposes special care and attention when forming project groups, not only when it comes to the competences of the project members but also their personal features, a fact which has already been pointed out by Maier et al (2015), Woolley et al (2010), Bouncken (2009) and Rego et al (2007), Muller (1993) and Kirton, (1984). A practical implication for project managers is to point out the significant role of team leaders in deriving innovation. Their skills of teambuilding and other soft skills are as important as their professional skills. Thus diligence in the process of recruitment and then developing competences of team leaders are reflected in deriving innovation from project teams and consequently in project performance. Innovation in each area of business, just next to relationships, is a key point of competitive advantage in the network economy.

References


### Appendix 1 Constructs and scales

<table>
<thead>
<tr>
<th>Construct</th>
<th>Scale</th>
<th>Adapted from</th>
</tr>
</thead>
</table>
| Tacit Knowledge Sharing (TKS) | • I shared my experience and know-how with team members of the project  
                                 • I shared my experience and know-how with my functional co-workers in my organisation  
                                 • I extracted new knowledge from the project team members based on their experience and know-how that helped me follow up the project  
                                 • I extracted new knowledge and know-how from experts and functional co-workers in my organisation that helped me follow up the project  
                                 • Overall, members of the project team shared their experience and know-how | Gemino et al (2015); Park, J. G., Lee, J. (2014); Hau et al (2013) |
| Team Creativity (creativity) | • My team members suggest new ways to achieve goals or objectives  
                                 • My team members come up with new and practical ideas to improve performance  
                                 • My team members suggest new ways to increase quality  
                                 • My team members promote and champion ideas to others  
                                 • My team members exhibit creativity when given the opportunity to  
                                 • My team members develop adequate plans and schedules for the implementation of new ideas  
                                 • My team members have new and innovative ideas  
                                 • My team members come up with creative solutions to problems | Rego et al., (2007) |
| Project Performance (PP)    | • Sponsor of the project was satisfied with the project results  
                                 • Sponsor of the project was satisfied with the project benefits  
                                 • Sponsor of the project assessed the project positively | Gemino et al (2015), Babbie (2013) |
Appendix 2

**Squared Multiple Correlations: (Group number 1 - Default model)**

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>TKS</td>
<td>.000</td>
</tr>
<tr>
<td>creativity</td>
<td>.737</td>
</tr>
<tr>
<td>PP</td>
<td>.562</td>
</tr>
</tbody>
</table>

Source: authors' own study with the use of SPSS AMOS 23

**Regression Weights: (Group number 1 - Default model)**

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>creativ &lt;--- TKS</td>
<td>.938</td>
<td>.047</td>
<td>19.877</td>
<td>***</td>
</tr>
<tr>
<td>PP &lt;--- TKS</td>
<td>.185</td>
<td>.066</td>
<td>2.823</td>
<td>.005</td>
</tr>
<tr>
<td>PP &lt;--- creativity</td>
<td>.334</td>
<td>.062</td>
<td>5.432</td>
<td>***</td>
</tr>
</tbody>
</table>

Source: authors' own study with the use of SPSS AMOS 23

**Standardized Regression Weights: (Group number 1 - Default model)**

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>creativ &lt;--- TKS</td>
<td>.859</td>
</tr>
<tr>
<td>PP &lt;--- TKS</td>
<td>.261</td>
</tr>
<tr>
<td>PP &lt;--- creativity</td>
<td>.514</td>
</tr>
</tbody>
</table>

Source: authors' own study with the use of SPSS AMOS 23