

## The Significance of Theoretical Knowledge for Business Innovation

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### Abstract

The paper presents the results of study which was focused on the importance of knowledge in innovation management. Innovation is significant for many companies and it represents a complicated mechanism. Knowledge one could gain by education and education brings valuable knowledge. The paper is based on primary research due to the questionnaire research. The research was held in the year 2014 in the Czech Republic. The study involved two phases. The first one was secondary research based on review of relevant scientific literature. The second one was a primary research. The research was attended by 321 respondents. The questionnaire survey was evaluated by statistical methods. There were used Spearman rank correlation coefficient and Chi Square ( $\chi^2$ ) test. Various statistical tests have been used within the statistical analysis. The tests were performed by the statistical program. Various studies prove that there is a relationship between education and successful innovation. It was established that people with higher education are more creative in respect of new innovations. However, it is also important that the innovations are successful. According to the results of the research in this study it is possible to see a direct relationship between theoretical knowledge and successful innovation process.

**Keywords:** knowledge, small and medium enterprises, education

### 1. Introduction

One of the most important factors determining business growth is innovation which represents a complicated mechanism. In 1982, Nelson and Winter (1982) highlighted that the success and growth of SMEs is closely linked to the business innovation. In order to have successful innovation it is necessary to provide sufficient business support and incorporate human resources within the mechanism (Carland et al 1984). An individual can offer lots of experience, knowledge, new ideas and skills (such as technical knowledge and skills but also their own personality). In any case, each individual must be motivated and he/she needs to have a certain experience in management of business innovation. This article explores if knowledge in management of business innovation has synergetic effects on successful innovation.

#### 1.1 Knowledge as one of factors determining business growth

Already in 1998, Barringer and Greening expressed an idea that sooner or later businesses will face tasks how to motivate their employees and transfer knowledge & skills in order to support further business growth when the business is looking to expand or increase their profits and a number of employees. Knowledge is the starting point for innovation. Human capital brings knowledge into businesses. There are two types of knowledge – explicit and implicit.

- Explicit knowledge is stored in the company database and it can be useful if a company has efficient processes and management. It represents business capital.
- Implicit knowledge is created within a company by human capital (Ruppel-Harrington 2001). A company influences creation of implicit knowledge via its social environment. This could make the company unique and attractive for new high quality employees (Isabel 2011).

The main conditions for the formation of a suitable social environment that leads to successful business innovation are as follows (Pitra 2006):

1. It is necessary to involve all employees in the innovation process and keep a consistent approach between all departments and teams.
2. It is important that all employees know that they do not have to worry about mistakes and errors they make when they look for new solutions.

Both, explicit and implicit, knowledge is known as knowledge assets. It represents an intangible company asset, such as know-how, processes in production or intellectual property, which has the potential to create wealth and prosperity (Scheng-Tun Li et al 2007). This type of an asset belongs to a company; however it is important to remember

that this asset was created by an employee who contributes to the business growth and who is able to communicate, think and solve problems (Vaškovičová et al 2011). This type of an employee is usually known as a knowledge expert. Some authors believe that managers and directors should be considered as knowledge experts, i.e. Papadakis a Bourantas (1998). For example, the importance of knowledge highlights the article deals with connatural management by Koleňák et al (2013). However, some other authors suggest that all employees are knowledge experts (Rosen 2011). Rosen (2011) also believes that the terms "a knowledge worker" and "a worker" are no longer mutually exclusive. Manual workers can also contribute by their knowledge and experience to the business development. Key characteristic of a knowledge expert (Nečas 2006) are as Efficiency, Courage, Honesty, Trust, Manners and Justice.

Various economic articles and statistical studies show that knowledge and information are important factors for the product development and innovation. Such a research is provided by Eurostat and it divides information into the following 4 basic groups - internal resources, market resources, institutional resources and other resources

European companies mostly use internal and market resources. Between 40% and 50% of all information comes from the company internal environment. Cypriot companies have the largest share of internal innovation, approximately 86% and companies in Lithuania use only 32% in a form of internal innovation. With regard to the market information and knowledge, the largest share of this knowledge comes from customers and suppliers. We can see this trend in all European countries. Entrepreneurs in the Czech Republic receive information mainly from their own business environment (approximately 39%) or from the market, particularly from their customers (32%). Institutional resources represent about 4% and 5% is information received from other resources (Parvan, 2007). Although various government and EU institutions offer a wide choice of useful information it seems that entrepreneurs make a small use of this option.

Knowledge is closely connected with the knowledge management. For some authors firm knowledge can be viewed as tantamount to information (Koudelkova-Svobodova, 2014). Knowledge management was created as a response to the increasing importance of knowledge for the organization. The knowledge determines the success or failure in business and it is a major source of wealth (previously it was land and capital). KM in the organization increases productivity, profits and flexibility and leads to more innovative organization (Higgins 2008; Bylokova 2010).

Knowledge supports innovative ideas at any stage of the development and in any department. In other words, not only the Science & Research department should be responsible for innovative business development (Pitra 2006). This activity should be part of all employees' day-to-day job.

Education results in having knowledge. Education is important for entrepreneurs, business owners, top managers and other relevant employees. It is always sensible to remember the following points (Vodak-Kucharcikova 2011):

2. Education is essential for employees' efficiency and their improvement
3. Education is important for the business competitiveness
4. Education supports motivation of employees
5. Education helps people to understand changes in dynamic market and business environment

As the top and senior management is responsible for commercial success of their company it is important that they make sure that they co-ordinate unique and creative ideas, which lead to successful innovation, efficiently in a long term view (Pitra 2006). It is also necessary to bear in mind that development of innovation and its introduction to the market must be part of normal day-to-day business activities.

## **2. Methodology**

The study involved two phases. First, it was secondary research based on relevant scientific literature from national and international sources. Second, was held a primary research.

There was used a questionnaire survey in the second phase. A questionnaire was sent to small and medium-sized companies operating in South Moravia. The selected companies belong to the section C under NACE (Czech list of companies according their field of business). The following sectors have been selected for the purposes of the research:

6. 15 – manufacture & sale of products from abalone shells
7. 26 – manufacture & sale of computers, electronics and optical devices
8. 31 – manufacture & sale of furniture

According to the Czech Statistical Office's records the research sample included 3,389 companies. Based on the estimated degree of reliability of 95% and the relative permissible error of 5% it was calculated that the required number of returned questionnaires should be at least 321.16. Research questionnaires were sent to 2,105 companies in summer 2013.

## 2.1 Questionnaire survey

A questionnaire survey is a type of a quantitative research method. The aim of the questionnaire is to collect respondents' opinions about specified subjects. The questionnaire survey was evaluated by statistical methods. Both open-ended and close-ended questions were used in the questionnaire. Closed-ended questions were divided into alternative questions (two possible options) and selective questions (more than two possible options), (Rezankova 2010).

Various statistical tests have been used within the statistical analysis. The tests were performed by the statistical program IBM SPS Statistics 20.

The Single Sample Chi Square test and the Spearman Rank Correlation Coefficient were used for the statistical analyses.

The Chi Square test ( $\chi^2$ ) test is one of the most used statistical tests. It is employed to test the difference between an actual sample and another hypothetical or previously established distribution which may be expected due to chance or probability.

The Single Sample Chi Square is used when a researcher is interested in the number of responses, objects, or people that fall in two or more categories. This procedure is sometimes called a goodness-of-fit-statistic. It refers to whether a significant difference exists between an observed number and an expected number of responses, people or objects falling in each category designated by the researcher. The expected number is what the researcher expects by chance or according to a null hypothesis (Rezankova 2010; Anděl 2011).

It tests hypothesis  $H_0: \pi_i = \pi_{i,0}$  where  $i = 1, 2, \dots, K$  ( $K$  is a number of categories) against an alternative hypothesis  $H_1: H_0$ . The basic computational equation is as follows:-

$$\chi^2 = \sum_{i=1}^k \frac{(X_i - Np_i)^2}{Np_i} \quad (1)$$

In the above formula  $n_{ii,0}$  is an expected variable  $i$ - category in the selection of range  $n$ .

The Spearman Rank Correlation Coefficient is a number that shows how closely two sets of data are linked. It can only be done on data that can be put in order, highest to lowest. Each element  $X$  has its ranking  $a_i$ , which means:  $\sum a_i = n \left( \frac{n+1}{2} \right)$ , and each element  $Y$  has its ranking  $b_i$ , which means  $\sum b_i = n \left( \frac{n+1}{2} \right)$ . The formula is as follows:-

$$r_s = \frac{2T_{xy} - D^2}{2\sqrt{T_x^2 T_y^2}} \quad (2)$$

Spearman coefficient always gives an answer between  $<-1, 1>$ .

There are other nonparametric statistical analyses such as Kendall's tau ( $\tau$ ) coefficient, Goodman and Kruskal's gamma and asymmetric Somers' D (Anděl, 2011)

Program IBM SPSS Statistics 20 automatically calculates all of the above statistical tests. The Spearman and Kendall's coefficients can also show how strong the link is.

## 3. Results of the Research

The research survey was carried out in the Czech Republic from April to November 2014. The following hypotheses have been established for the purposes of the research:

H1: *Businessmen with higher education in innovation management are more successful than businessmen with some or no education in innovation management.*

H2: *Theoretical knowledge in innovation management is important for the successful innovation.*

Testing H1: *Businessmen with higher education in innovation management are more successful than businessmen with some or no education in innovation management.*

From the questionnaire the following questions were selected to test H1:

1. Question 1 (Q1) – *Were your innovations that you introduced to the market successful?*

2. Question 2 (Q2) – *Do you, as the business owners, have any knowledge in innovation management?*

Two sets of data were used for calculation purposes. This includes the Spearman rank correlation coefficient, Kendall's tau ( $\tau_b$  a  $\tau_c$ ) coefficient, Goodman-Kruskalov  $\gamma$  and Kruskal's gamma and asymmetric Somers' d.

The following table shows respondents' answers to Q1 and Q2.

**Table 1:** Respondents' answers to Q1 & Q2

		Do you have any knowledge in innovation management?				Total
		Definitely yes	Rather yes	Rather not	Definitely not	
Were your innovations that you introduced to the market successful?	All of my innovations were successful	86	23	2	0	111
	More than a half of my innovations was successful	36	51	6	1	94
	A half of my innovations was successful	9	18	46	6	79
	Less than a half of my innovations was successful	3	4	10	17	34
	None of my innovations were successful	0	1	0	1	2
Total		134	97	64	25	

**Source:** Own estimation

Then, two other sub-hypotheses have been set out:

H<sub>0</sub>: There is no statistical correlation (zero coefficient) between the two sets of data.

H<sub>1</sub>: There is a statistical correlation (non-zero coefficient) between the two sets of data.

Analyses are shown in the following two tables. The first table illustrates symmetric analyses and the second one shows asymmetric analyses.

**Table 2:** Symmetric Analysis of H1

		Value	Asymp. Std. Errora	Approx. Tb
Table for two sets of data	Kendall's tau-b	.630	.034	17.065
	Kendall's tau-c	.590	.035	17.065
	Gamma	.802	.033	17.065
	Spearman correlation coefficient	.690	.035	16.989
Interval	Pearson's R	.709	.034	17.923
Total of valid cases		320		

**Source:** Own estimation

The above table (table 2) shows that sub-hypothesis H<sub>0</sub> was not confirmed; therefore, the alternative sub-hypothesis H<sub>1</sub> is applicable. This means that there is a relationship between successful innovations and businessmen's education in innovation management.

**Table 3:** Asymmetric Analysis of H1

		Value	Asymp. Std. Errora	Approx. Tb
Table for two sets of data	Somers' d			
	Symmetric Analysis	.630	.034	17.065
	Were the innovations that you introduced to the market successful? Dependent	.645	.034	17.065
	Director's level of theoretical knowledge about innovations? Dependent	.615	.035	17.065

**Source:** Own estimation

The correlation coefficients also show a type of correlation. Pearson's coefficient is 0.709 and the other product-moment correlation coefficients (Kendall's tau-c and gamma) are between 0.590 and 0.805. The rank correlation coefficients (Kendall's tau-b and Spearman's coefficient) are very similar, approximately 0.63. Values are shown in table 3.

As all values are positive and close to 1 the correlation is positive. The correlation is direct. In all case, the sub-hypothesis H<sub>0</sub> does not exist. This means that alternative hypothesis H<sub>1</sub> is applicable.

*Therefore, successful innovations and directors' education in innovation management are correlated.*

*Testing H2: Theoretical knowledge in innovation management is important for successful innovations.*

In the case of the second hypothesis subjective businessmen' opinions and views are tested. The test should

provide an answer to whether or not businessmen consider theoretical knowledge in innovation management being important for successful innovations.

A question 'In your opinion, does theoretical knowledge influence success of innovations?' was given to the respondents.

**Table 4:** Responds' answer

In your opinion, does theoretical knowledge influence success of innovations?	A number of answers	Relative %	Valid %
Definitely yes	107	33.3	35.8
Rather yes	126	39.2	42.1
Rather not	53	16.5	17.7
Definitely not	13	4.0	4.3
Total	299	93.0	100.0
No answer	22	7.0	
Total	321	100.0	

**Source:** Own estimation

Table 4 shows businessmen's answers and it is already obvious that businessmen believe/assume that theoretical knowledge of innovation management is important for successful innovations. In order to finalise the test it was also necessary to apply the Chi Square ( $\chi^2$ ) test.

For the test purposes we formulate an assumption that theoretical knowledge of innovation management influences successful innovations.

**Table 5:** Frequencies of respondents' answers - using the Chi Square Test  $\chi^2$

In your opinion, does theoretical knowledge influence success of innovations?	A number of answers	A number of expected answers	Difference
Definitely yes	107	74.8	32.3
Rather yes	126	74.8	51.3
Rather no	53	74.8	-21.8
Definitely no	13	74.8	-61.8
Total	299		

**Source:** Own estimation

Taking into account all answers it is possible to re-formulate the assumption – if there is no significant difference between the answers, then theoretical knowledge in innovation management doesn't support successful innovation; however, if there is a significant difference between the answers, then theoretical knowledge in innovation management supports successful innovation.

The Chi Square test  $\chi^2$  was applied to verify the hypothesis and the following two sub-hypotheses have been set out:

H<sub>0</sub> – there is no significant difference between the answers

H<sub>1</sub>– (alternative hypothesis) – there is a significant difference between the answers

**Table 6:** Test  $\chi^2$  for hypothesis H2

	Theoretical knowledge in innovations
Chi Square	106.391
Df	3
Asymp. Sig. $\alpha'$	.000

**Source:** Own estimation

The level of importance was defined at 0.01%. The first row shows a value, *df* represents a degree of freedom and the

minimum value is shown in the last row (Asymp. sig. =  $\alpha$ ). The null hypothesis is ignored therefore, the alternative hypothesis is accepted. The relationship is as follows:-

$\alpha' \leq \alpha$   $H_0$  is ignored

$\alpha' > \alpha$   $H_0$  is accepted

If the level of importance is 1% the null hypothesis is ignored (this means that there is no significant difference in the answers) and the alternative hypothesis is accepted (this means that there is a significant difference in the answers). Therefore, we can say that theoretical knowledge in innovation management is important for successful innovations.

#### 4. Outcome and Discussion of Main Results

Various studies prove that there is a relationship between knowledge and successful innovation. It was established that people with higher education have more knowledge are more creative in respect of new innovations. However, it is also important that the innovations are successful.

In his book Pitra (2006) states that it is necessary to have appropriate education to create successful innovations. However, he does not say what type of education/knowledge it is. Therefore, this study focused on the relationship between knowledge in innovation management and successful innovations. This research was also based on another study that was carried out in Salerno in Italy. This study provided interesting results in the relationship between education and successful innovations. Authors of this study focused on a comparison of education and innovations. The results of the research were surprising as they revealed that there a positive relationship between education and innovations; however the relationship between education and successful innovations is negative. In other words, more innovations were produced by employees with higher education. However, employees who generate successful and profitable innovations did not have necessarily higher education (Farace - Mazzotta 2011).

However, according to the results of the research in this study it is possible to see a direct relationship between theoretical knowledge in innovation management and successful innovations. People who have theoretical knowledge in innovation management are not only able to generate innovations but they are also able to make the innovations profitable and successful. This is not the case for people who do not have this knowledge. Businessmen understand this relationship and they look for new information in the area of innovations actively.

Active involvement in the process of education in innovation management is increasing and this has a positive effect on business innovations. Businessmen can attend private courses that are offered by various educational agencies. These courses could be face to face or in a group. Sometimes, it is also possible to use e-learning. However, there is a lack of specialist educational programmes provided by well-known agencies. It is necessary to look at web pages of specialist institutions or social networking sites.

If a businessman cannot find any suitable courses provided by educational agencies he/she can study on their own. The educational process should be divided into the following steps:-

- Set a target (what do I want to study?)
- Find a suitable form of learning (agency, e-learning, self-study, university, etc)
- Assessment of new knowledge and its use in a real life
- Continuous development (new information can be found in specialist/professional/technical magazines and journals, web pages and seminars).

It is sensible to pass new knowledge onto other colleagues and partners in the business. If necessary, it is possible to pay for an educational course for relevant employees. Each business owner/director can decide what types of courses are suitable for their employees. The decision should be based on their experience with the innovation process.

#### 5. Conclusion

Education in innovation management is a key element for a successful introduction of the business innovation to the market. Pitra (2006) highlights the importance of education. The results of this research show that theoretical knowledge in innovation management is important for creating of successful innovations and those who have this knowledge are able to generate successful innovations more often. Businessmen also understand that education in innovation management is significant point.

It is important that businessmen also provide education for their employees and that new knowledge is shared within the company, so it does not get lost. In this case is important to choose the best kind of courses or education, because not all courses are suitable, effective and necessary for their employees. Information should be a key element for business plans and strategies.

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