Project management and the importance of crises in the sectors of the national economy

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1. Introduction

Organizations of national economy need project management to manage their innovativeness in a focused manner, and to achieve growth and satisfy their strategic objectives in a way that minimizes the high-inherent risk (Owens, 2006). There is a growing need for the management of projects in various business organizations (Hyvari, 2006).

Project management can be defined as the process of controlling the achievement of the project objectives (Mohammadjafari et al., 2011). Project management theoreticians need to recognize that different versions of project management are required in different circumstances (Thomas and Mullaly, 2008). Some of the tools of project management, such as earned value management and agile methods, while very powerful, are presented in ways that are very bureaucratic (Turner et al., 2010).

Project management is a well-established discipline defining in considerable detail the tools and techniques that are required to define, plan and implement any project. However, while many researchers have to addressed the issues surrounding the management of projects within large firms (White and Fortune, 2002; Bryde, 2003). Tidd et al. (2001) support the importance of organisational project management competencies and view them as highly correlated with an organisation’s ability to innovate their systems successfully.

The methodologies and components of project management are well documented (Meredith and Mantel, 2002, Turner, 2009, Kerzner, 2013,), and so we do not plan to repeat them here. In Czech Republic has not been a lot published to date about the management of projects in organizations.

However, as nowadays there is the time of turbulent changes of the environment, the organizations need to deal with the crisis management as well (Rolínek et al., 2016). Generally speaking, the crisis it described as a decisive moment. This is the time when the organization develops adverse performance and unless the situation is resolved in time, its existence is at risk (Řehoř, 2016; Kurschus, Sarapovas, Cvilikas, 2015).

Rais (2007) defines a crisis as such stage the company life when after a long period of time there is a negative development of its productive potential and decline in sales. Spillan and Hough (2003) found that SMEs focus predominantly on those types of crises they have experienced before, underestimating the risk of events they have no prior experience of. One of the greatest deterrents to more effective crisis management is denial (Pollard and Hotho 2006).

2. Aim and methodology

The objective is to evaluate the effect of the use of project management and evaluation of crises in the sectors of the national economy. In the interviews, the managers evaluated and discussed the crisis in their organizations in past years, and consequently, their rating was summarized under the five-point rating scale, where 1 represented the crisis, that was not seen as an important in terms of the business and 5 represented the crisis seen as very important. The research questions were: whether companies, that use project management, perceive less the crisis than companies without project management. This hypothesis was subsequently asked for each area of business according to the OECD (OECD, 2014) Partial objective of this paper is to description of the occurrence of project management in SMEs, divided by number of employees and ownership.

The data were collected from 183 companies in the Czech Republic in 2014. Research sample was selected using non-probable random selection, with regard to circumstances of the data collection. The data necessary for conducting the research were collected by a questionnaire survey and they were supplemented by qualitative data, obtained through in-depth interviews as well as case studies, which are described in detail in a monograph on SMEs (Rolínek, 2016).

Representatives of different companies responded to questions concerning mainly crises that they had to solve during their operation on the market. Each of the selected companies identified at least 3 crises they had to deal with trying to minimize the impact on their business activities. Crises that were defined this way were consequently divided into 19 categories. The total number of crisis occurrence was 753.

Data were tested using two-sample Wilcoxon test and his asymptotic variant. This test is a non-parametrical two-sample test, which is most frequently used, when the condition of data normality is not met.
Let $X_1, \ldots, X_n$ and $Y_1, \ldots, Y_m$ be two independent random samples from two continuous distributions, whose distribution functions can only differ in displacement. $x_{0.50}, y_{0.50}$ states for the median of the first and second distribution. The hypothesis that the distribution functions of the two distributions are the same is always tested, in other words, the medians are tested for equality. The result of test is compared to the alternative hypothesis (the first of medians $x_{0.50}$ of companies which have strategies, is greater than the latter) (Freund, Wilson et al. 2010; Friedrich and Majovská 2010).

$H_0 = x_{0.50} - y_{0.50} = 0$ proti $H_A = x_{0.50} > y_{0.50}$

(2)

3. Results and discussion

Subjects were initially monitored in groups classified by sections. A methodology presented by OECD was used to classify companies with respect to their business activities. This methodology defines 5 groups of companies (OECD, 2014, Novotná and Volek, 2014):

- $A_1 =$ Industry: High and Medium High Technology (sections 24, 29 - 35)
- $A_2 =$ Industry: Medium Low and Low Technology (sections 15- 23, 25 - 28, 36 - 37)
- $B_1 =$ Knowledge-intensive market services (sections 61, 62, 64 - 67, 70 - 74, 80, 85, 92)
- $B_2 =$ Less knowledge-intensive market services (sections 50 - 52, 55, 60, 63, 75, 90 and 91, 93, 95, 99)
- $C =$ Agriculture, construction and utilities (sections 01 - 05, 10 - 14, 40 and 41, 45)

In the research group, industry group $B_2$ was the most common (about 1/3), followed by group $B_1$ (more than 1/5). Conversely, as shown in Table 1, group $A_1$ was the least common (8%). However, the most often use of project management (up to 1/3 SMEs) was reported for $A_1$. After all, it is necessary to implement more projects that will streamline production in high-tech industry. The least common project management was reported in groups $C$ and $B_2$ (over 80%). The services and agriculture industry managers do not implement projects much. In the agricultural sector, it is mainly due to the crises of natural disaster (weather) as they cannot prepare in advance. The services sector, by contrast, has to deal with customer crises whose needs and changing preferences also cannot be predicted and implemented to a project in advance.

Classified by a number of workers, there were almost 1/3 of organizations with 2-5 employees. In about 1/5 of organization 6-10 of employees were reported.

It is not surprising that project management is mostly reported in enterprises meet with the highest numbers of employees (where almost half of these organizations are associated with project management). On the other hand, it is least common in organizations with one employee (over 90%).

It is clear that there are project teams in larger organizations that deal with designing and implementation of projects. Managers of larger organizations not only work with high-quality human resources, but they also use sufficient financial resources to implement projects. The micro-enterprise with one employee has neither time nor the manager specialized to deal with the project process. Moreover, it is affected by a shortage of staff and funds.

In the last issue of our identification with SMEs, we interested in ownership, i.e. whether it is a family business or not. According to the answers about 43% of organizations can be categorized as a family business. Use of project management is the same for both types of businesses. More than 1/5 of them deal with project management.

<table>
<thead>
<tr>
<th>OECD</th>
<th>NO</th>
<th>%</th>
<th>YES</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>10</td>
<td>66,7</td>
<td>5</td>
<td>33,3</td>
<td>15</td>
<td>8,2</td>
</tr>
<tr>
<td>A2</td>
<td>23</td>
<td>76,7</td>
<td>7</td>
<td>23,3</td>
<td>30</td>
<td>16,4</td>
</tr>
<tr>
<td>B1</td>
<td>33</td>
<td>75,0</td>
<td>11</td>
<td>25,0</td>
<td>44</td>
<td>24,0</td>
</tr>
<tr>
<td>B2</td>
<td>48</td>
<td>80,0</td>
<td>12</td>
<td>20,0</td>
<td>60</td>
<td>32,8</td>
</tr>
<tr>
<td>C</td>
<td>29</td>
<td>85,3</td>
<td>5</td>
<td>14,7</td>
<td>34</td>
<td>18,6</td>
</tr>
</tbody>
</table>
Subsequently, enterprises were divided according to the OECD methodology and enterprises in all 5 groups were tested by two-sample Wilcoxon test (Mann-Whitney U test) at the level of importance of $\alpha = 0.05$ to test the $H_0$ hypothesis $H_0 = x_{0.50} - y_{0.50} = 0$ supposing that the importance of crises is the same in both groups and the $H_A = x_{0.50} > y_{0.50}$ supposing that crises in organizations that are not managed by projects are more important. For both hypotheses, $X$ stands for organizations that are not managed by projects and $Y$ stands for organizations managed by projects. The resulting data is summarized in Table 2.

<table>
<thead>
<tr>
<th>Number of employees</th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>-</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 employee</td>
<td>22</td>
<td>91,7</td>
<td>2</td>
<td>8,3</td>
<td>24</td>
<td>13,1</td>
</tr>
<tr>
<td>2-5</td>
<td>44</td>
<td>74,6</td>
<td>15</td>
<td>25,4</td>
<td>59</td>
<td>32,2</td>
</tr>
<tr>
<td>6-10</td>
<td>29</td>
<td>87,9</td>
<td>4</td>
<td>12,1</td>
<td>33</td>
<td>18,0</td>
</tr>
<tr>
<td>11-20</td>
<td>14</td>
<td>77,8</td>
<td>4</td>
<td>22,2</td>
<td>18</td>
<td>9,9</td>
</tr>
<tr>
<td>21-50</td>
<td>17</td>
<td>85,0</td>
<td>3</td>
<td>15,0</td>
<td>20</td>
<td>10,9</td>
</tr>
<tr>
<td>51-100</td>
<td>10</td>
<td>62,5</td>
<td>6</td>
<td>37,5</td>
<td>16</td>
<td>8,8</td>
</tr>
<tr>
<td>101-250</td>
<td>7</td>
<td>53,8</td>
<td>6</td>
<td>46,2</td>
<td>13</td>
<td>7,1</td>
</tr>
</tbody>
</table>

Table 2 Mann-Whitney U test

<table>
<thead>
<tr>
<th>OECD</th>
<th>Non-projectly managed</th>
<th>Projectly managed</th>
<th>U</th>
<th>Z</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Statistics has not been made because of their low representation in the sample</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>A2</td>
<td>273,5</td>
<td>191,5</td>
<td>20,5</td>
<td>-3,1422</td>
<td>0.0017</td>
</tr>
<tr>
<td>B1</td>
<td>730,5</td>
<td>259,5</td>
<td>106,5</td>
<td>2,9527</td>
<td>0.0032</td>
</tr>
<tr>
<td>B2</td>
<td>1437</td>
<td>393</td>
<td>273</td>
<td>1,0926</td>
<td>0.2746</td>
</tr>
<tr>
<td>C</td>
<td>548</td>
<td>47</td>
<td>32</td>
<td>1,9451</td>
<td>0.0518</td>
</tr>
</tbody>
</table>

Table 2 reported p-value close to zero in three cases for groups A2 (0.0017), B1 (0.0032) and C (0.0518). P-value of group C (0.0518) is slightly higher than the chosen $\alpha = 0.05$, therefore we cannot reject the null hypothesis as in group B2 (0.2746), which reported greater p-value. At the same time, negative value $Z$ (-3.1422) was found in group A2 therefore it is necessary to confirm the left-sided alternative, which argues that crises are more important in organizations with project management compared to organizations that are not managed by projects, as seen in the graphs below. For B1 enterprises, we were able to demonstrate a right-sided alternative ($Z = 2.9527$), saying that the companies that are managed by projects, have less important crises. Data was not examined for A1 category, due to the low representation of data in the sample. The following box plots confirmed the statistical results.

The left figure 1 showing box plots of A2 enterprises (Industry: Low Medium and Low Technology) revealed that the group of project managed enterprises reached much higher values of the median (4.0 points) and data values between 25% - 75% are more above (3.6- 4.4) than in non-project managed organizations. Organizations that are not managed by projects, reported higher variability, where the minimum value is at 1.4 points and the maximum at 4.0 points, but it is apparent from the values were at a lower level of the scale than project managed organizations as demonstrated by the Wilcoxon test with p-value of 0.0017.

The right box plot shows B1enterprises (Knowledge-intensive market services), which are not managed by projects, with a median value of 3.4 points scattered between 2.0 points to 4.4 points, while the most values of 25% - 75% is found in the interval from 3.0 to 4.0 points. In contrast, project managed organizations reported the median
by 0.8 points below the value of 2.6 points and achieve a wider distribution of data values from 1.4 to 4.4 points where the median quantile value is between 2.0 - 3.4 points. The graph shows that the project managed organizations see the crisis better than those that are not managed by projects.

![Fig. 1 Median and interval of data layout in projectly and no-projectly managed companies from sector A2 (left) and B1 (right)](image)

The left part of figure 2 shows B2 enterprises. It is seen that the medians of both categories are similar 3.7 and 3.4. Similarly, a minimum value was in both cases equal to 1.4 points. The maximum value is higher for non-project managed enterprise by 0.3 points. Medium fractile is, for this category of a narrower range from 3.0 to 4.0. Compared to a wider range in the quantile of 25% -75% from 2.0 points to 4.0 points. Graphically, it is now confirmed that there are no differences between the categories as demonstrated by statistical data.

The right part of figure 2 has data from C enterprises (Agriculture, construction and utilities. The graph shows that the non-project managed enterprises have a wider range of data from 1.4 to 5 points compared to project controlled businesses, where the variance values is the same medium quantile of the lower limit at 1.4 points. A variance exceeds the upper middle quantile of just 0.3 points. The median is the level of 2.6 points for project-managed companies compared to the median level of 3.6 points for non-project-managed organizations. Visually we can believe that there is a difference between the two groups enterprises in the perception of the crisis, although it was not confirmed by the Wilcoxon test at the level of $\alpha = 0.05$ significance.

![Fig.2. Median and interval of data layout in projectly and no-projectly managed companies from sector B2 (left) and C (right)](image)
4. Conclusion

As reported by the results of different sectors, it depends on the business in terms of project management and the importance of the crisis. The A2 enterprises (Industry: Low Medium and Low Technology) demonstrated a reversed trend compared to other sectors. Better perception of crisis in non-project managed enterprises may be caused by several factors. One of them may be the conflicts in the dual superiority of employees at manufacturing companies that use functional organizational structure, as described Butler (1973). Another factor may be the frequent overspending on projects in this area of business in medium and large companies (Ackermann, 2007).

On the other hand, B1 enterprises (Knowledge-intensive market services) reported a positive influence of project management to crises. Huchzermeier (2001) describes that business in the service sector according to short-term planning gain market advantage in payoffs, project budgets, performance, market requirements, and project schedules. Knowledge-intensive market services use project management in the areas of transport, marketing, research and development. All of these areas are characterized by technological sophistication and high dependence on information. Winjnhoven’s study (2003) focused on the difficult application of processing typical for project management into enterprises of knowledge to, which is contradictive to the results.

The C enterprises (Agriculture, construction and utilities) also almost reported the positive influence of project management to crises. The p-value was reported at the level of 0.0518. The threshold of disproving the null hypothesis of agreement between the two samples was set under the level of $\alpha = 0.05$. We can also believe that project managed enterprises better perceive the crisis in this category. Irani (2010) and Abdel-Hamid (1999) says that this effect is very often associated with the use of sophisticated software products, primarily supporting the management of construction projects.

Overall, the small and medium enterprises confirmed the assumption that companies without project management perceive a crisis worse than project-managed enterprises. These businesses have the advantage that they process the crisis plans (Cioffi, 2009; Pich, 2002) and they plan for a shorter period. For this reason, their ability to predict the crisis is more accurate. In the context of available scientific databases were unable to find an identical research conducted in other countries for SMEs.

Managers of organizations in the Czech Republic should be more interested in the issue of project management and start creating projects and seek to implement them successfully. Each university focused on economics offers lots of courses and seminars, where the students and managers should learn basic principles and skills of project management. Successful manager can search for opportunities and challenges of the environment and the project as a tool of a change can help with developing the necessary steps to achieve this occasion. It is necessary that the projects dealt with the possibilities of the occurrence of crises and their removal. These recommendations we can according the research to relate mainly to companies in the construction, agriculture and services, where project management has a mostly positive effect for significance of the crisis.

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References