Project Risk Management – Perceptions and Attitudes in Space Projects

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Abstract

The research looks at identifying perceptions and attitudes on risk management in the delivery of space projects. The study was conducted via the use of online surveys in two different studies, a total of 89 respondents participated in both studies. The first study was looking at risk management and where it stood as compared to already established critical success factors derived from previous literature. Here 11 factors were identified and grouped into 13 categories including risk management. The second study was to examine the personalities and risk taking behaviour of people who deliver space projects. Here respondents were given risk scenarios and personality questions aimed at providing an insight into their attitudes towards risk and individual personality. The risk scenarios statements were generated based on documented projects however the statements were manually created to prevent the respondents from linking the statement and the real life project that the decision occurred, while the personality questions was derived from Carl Jung’s theory on personality traits. From this research it was concluded that project risk management should be considered as a critical success factor as the risks support the rejection of the null hypothesis. After the implementation of the relative importance index (RI) on the 13 categories identified, project risk management came in fifth place within an 80 of 1.0. The results also show that people who have experiences in the delivery of space projects have a high and long term view, are fair and pleasing, extroverted and logical decision takers, prefer to freeze scope and respect deadlines and to make sound consensus decisions. The results also show that the respondents are prepared to make risky decisions depending on the situation and case presented.

Keywords: Critical Success Factors; Project Risk Management; Risk Decisions; Space Projects.

Introduction

In the past year alone the space industry experienced a 9% growth reaching a total value of $130 billion worldwide (Space Foundation, 2015). Commercial projects dominate the industry, making up nearly 70% of investment and the remaining 26% consists of governmental investments.

The key participants in the industry by number of orbital launches as at 2015 are Russia (28), The United States (20), China (10) and Europe (5), including both successful and failed attempts (Space Foundation, 2015). According to Tsiga et al (2016) projects in the sector are classified into four key areas:

1. [1] Orbital Human space flight,
2. [2] Launch vehicles,
3. [3] Space stations,
4. [4] Satellites, and

The growth in the industry can be attributed to the growing demand for fixed service satellites and the developing market for mobile satellite services (Space Industry Association, 2015). To ensure industry growth, newer and bigger projects have to be constantly undertaken (Kerzner, 2010).

These projects come with a complex nature as there to be a different set of requirements to those of their predecessors. An example of such a project is the ExoMars orbit which was launched in 2016. Goldfarb is a collaboration between the European Space Agency (ESA) and the Russian Space Agency (Roscosmos) aimed at determining life on Mars. Monday, J. et al., (2011).

Space projects depend on the implementation of systems engineering principles to ensure project success (Sharon et al., 2011). The application of systems engineering in the delivery of projects encompasses aspects of traditional project management methods and principles. This practice integrates the technical domain knowledge and project management knowledge.

Understanding project participants in the industry can lead to the development of specific methodologies and frameworks that can tie the scales towards better successful delivery of projects in the industry. The first part of this study aims to determine the risk project risk management with regards to already established Critical Success Factors and the second part of the study looks at the personalities and risk taking behaviour of existing project participants in the space industry.

Both studies have been conducted based on past research on project success, critical success factors, Carl Jung personality types, and previous projects that have well documented.

Methodology

Both studies have been conducted with the aid of questionnaires. Here the first study contains 11 questions asking respondents to weigh each CSF and a section that also looks into a specific proposed CSFs which is project risk management. These were ranked with the aid of the Relative Importance Index. The second study contained decision scenarios derived from previous projects and the personality aspect was derived from Jung’s personality theory as adopted by Montequina et al (2015). Questionnaires used in both studies held sections aimed at collecting background information about the respondents. Details collected include experience, qualification etc.

The questionnaires were distributed online via email to project managers at various agencies such as the European Space Agency (ESA), Mullard Space Science Laboratory (MSSL), Surrey Space Technology (SSTL) and the National Space Research and Development Agency (NASARA). A total of 49 completed responses have been collected and analysed for the first study and 50 completed responses were collected for the second study and the geographical distribution range from the United Kingdom, Netherlands, United States of America, Germany, China and Nigeria. The data collected for this research was then exported using the Statistical Package for Social Sciences (SPSS) software and the data was subject to various statistical analyses such as regression and reliability tests to give further insight into the data.

Results

Study 1 Results:

- RI: Project Risk Management has a positive impact on Project Success was accepted.
- Results of the Relative importance are shown in Table 1 and 2.

<table>
<thead>
<tr>
<th>Category</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Risk Management</td>
<td>0.806</td>
</tr>
<tr>
<td>Project Risk Management</td>
<td>0.721</td>
</tr>
<tr>
<td>Project Risk Management</td>
<td>0.735</td>
</tr>
<tr>
<td>Project Risk Management</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Table 1: RI of Critical Success Factors.

Study 2 Results:

The results of this study suggest that people who have experience in space project delivery are people with:

- a high level and long term view,
- are fair and pleasing,
- extroverted and logical decision takers,
- prefer to freeze scope and respect deadlines and to make sound consensus decisions.

With respect to the personality traits of the respondents the below questions were asked which are linked to Carl Jung’s Preferences as shown in Table 1 and analysis of the results are shown in Table 4 and Table 5.

Table 4: Carl Jung Personality Results.

<table>
<thead>
<tr>
<th>Preference</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intuition</td>
<td>52</td>
</tr>
<tr>
<td>Feeling</td>
<td>39</td>
</tr>
<tr>
<td>Thinking</td>
<td>2</td>
</tr>
<tr>
<td>Sensing</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 5: Preferences Combination.

<table>
<thead>
<tr>
<th>Preference</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrovert</td>
<td>52</td>
</tr>
<tr>
<td>introvert</td>
<td>48</td>
</tr>
<tr>
<td>Thinking</td>
<td>52</td>
</tr>
<tr>
<td>Feeling</td>
<td>48</td>
</tr>
</tbody>
</table>

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References


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