

KEYWORDS ■ personality profile ■ space industry ■ space projects ■ risk decision ■ risk management

# ATTITUDES TO RISK MANAGEMENT IN SPACE PROJECTS

## ABSTRACT

This paper aims to examine the personalities of people currently working in the delivery of space projects. The study employed an online survey which included twenty-five Likert scale questions based on risk decision scenarios and personality questions. A total of 50 responses were collected from people with experience in the delivery of space projects. The results of this study suggest that people who have experience in space project delivery have 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 team consensus decisions. The results also show that the respondents are prepared to make risky decisions depending on the situation and case.

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## 1. Introduction

It has been more than 40 years since the end of the space race and research in this area has not slowed down, instead it experienced steady growth (*Space Foundation, 2015*). Space research

has provided us with a step towards better understanding on how the universe works. Research in this sector has led to the creation and adoption of new technologies that have transformed the way we live today (*United Nations Office for Outer Space Affairs, 2011*).

In the past year alone the space industry experienced a 9% growth reaching a total value of \$330

billion worldwide (*Space Foundation, 2015*). Commercial projects dominate the industry, making up nearly 76% of investment and the remaining 24% consists of governmental investments. The key participants in the industry by number of orbital launches as at 2015 are Russia (29), The United States (20), China (19) and Europe (9), including both successful and failed attempts (*Space Foundation, 2015*). According to Tsiga et al (2016) projects in the sector are classified into five key areas; (1) orbital human space flight, (2) launch vehicles, (3) space stations, (4) satellites, and (5) ground stations. The growth in the industry can be attributed to the growing demand for fixed service satellites and the developing market for mobile satellite services (*Satellite Industry Association, 2015*).

To ensure industry growth, newer and bigger projects have to be constantly undertaken (*Kerzner, 2002*). These new projects come with a sense of complexity as they tend to have a different set of requirements to those of their predecessors. An example of such a project is the ExoMars orbiter which was launched in 2016. ExoMars is a collaboration between the European Space Agency (ESA) and the Russian Space Agency (*Roscosmos*) aimed at determining if life ever existed on Mars (*Korablev, et al., 2014*).

As project success is the ultimate goal for every project (*Chan & Chan, 2004*), projects in the space industry are no exception. There is little previous research on project management in the space industry. Project managers have had to rely on their experience and implement generic project management approaches as established by bodies such as the Project Management Institute and the Association for Project Management.

Understanding project participants in the industry can lead to the development of specific methodologies and frameworks that can tip the scales towards better successful delivery of projects in the industry. This paper aims to determine the personalities and risk taking

behaviour of existing project participants in the space industry.

This research paper is focused in identifying the current personalities of people in the space sector and takes a step towards identifying risk-based decision takers. The paper identifies the current competences and behavioral traits of people in the industry as well as risk taking behavior.

The decision section of this research was developed by the authors by closely examining well documented projects. Details of the questions in this section and the project each individual question was derived from is discussed in the methods section of this paper.

## 2. Background

There are various factors that can contribute to the success of space projects apart from the usual time, cost and quality (*Tsiga, Emes, & Smith, 2016*). Tsiga et al (2016) highlight the importance of risk management in projects. Improving the success rate of projects has been one of the most researched and controversial areas in project management. Researchers such as Munns & Bjeirmi (1996) have emphasized the role of the project managers as key to project delivery, professional bodies such as the Association of Project Managers (APM) support this notion, they even go a step further by examining project managers and identifying key skills each project manager should possess (*Association for Project Management, 2012*). Meanwhile, researchers such as Muller & Turner (2010) emphasized the competence of project managers. It is interesting to note that there is no clear definition for competence and skills in project management as both are commonly used interchangeably.

The Association for Project Management (2012) have categorized the skills needed by every project manager into 7 key areas: communication, conflict management, delegation,

influencing, leadership, negotiation and teamwork. This skill set has been agreed by most researchers and other such as Meredith & Mantel (1989) go one step further adding technological skills. Katz (1991) suggests that to ensure effective management, human, conceptual and technical skills have to be developed. Fisher (2011) identifies what practitioners in the industry consider to be the skills of an effective project manager, finding that some skills are more fit for certain sectors. El-Sabaa (2001) provides a framework that can be used in the selection of project managers and enhancing their performance. Stevenson & Starkweather (2010) conducted a survey of recruiters (executives) and came up with a set of skills that are preferred for project managers. The results of their research highlight the importance of soft skills which have also been highlighted by the Association for Project Management (2012).

The personality aspects of this research was adopted from Carl G. Jung's work on psychological theory (1988). The same approach has been used in project management to identify the desired behavior of successful project managers by Montehuina et al. (2015). The results of this study can be used to draw conclusions on the current personality and risk taking behavior of project participants in the space sector.

Jung's work looks at human behavior and the effect of mental reasoning. The differences showcase how indi-

viduals use their minds in making judgments and how information is perceived. Table 1 shows the Jung personality preferences.

There are various psychometrics questionnaires that have been developed based on Jung's theory, most notably the Myers-Briggs Type Indicator (MBTI) and Temperament Sorter II (KTS II).

KTS II is a configuration of observable personal traits. To some extent it encompasses personal needs and the kind of contribution an individual makes in the workplace and roles they play in a society (Keirse & Bates, 1984).

The MBTI is used to measure psychological preferences in the way people perceive the world and make decisions. It also encompasses key attributes of behavior such as communication, decision making and problem solving (Briggs & Myers, 1977). Some researchers have described how team performance and effectiveness relate to the MBTI tool (Varvel, Adams, Pridie, & Ruiz Ulloa, 2004; Bradley & Hebert, 1997), while others have discussed and suggested how the tool can improve teams (Church & Wacławski, 1998; McCaulley, 1990).

Even though MBTI and KTS II are closely related, there are some significant practical differences between the two personality tools. The difference is that KTS II is mainly focused on behavior which can easily be observed while the MBTI deals with how people think and feel. The MBTI emphasizes the extraversion/introversion contrast

1. Focus of attention	
Extraversion (E)	Those set of people who tend to focus their attention on the outer world of people and things.
Introversion (I)	Those who tend to focus their attention on the inner world of ideas and impressions.
2. Seeking of information	
Sensing (S)	People who prefer to take information through the five senses and focus on the here and now.
Intuition (N)	People who prefer to take information from patterns and the big picture and focus on future possibilities.
3. Decision making	
Thinking (T)	People who prefer to make decisions primarily based on logic and on objective analysis of cause and effect.
Feeling (F)	People who prefer to make decisions primarily based on values and on subjective evaluation of person centered concerns.
4. Relationship with the world	
Judging (J)	People who prefer a planned and organised approach to life and prefer to have things settled.
Perceiving (P)	People who prefer a flexible and spontaneous approach to life and prefer to keep their options open.

TABLE 1: Carl G. Jung's Preferences.

while KTS II places more importance on the sensing/intuition aspect of the Jung preferences.

In the aspect of behavioural roles of people in projects, the belbin team inventory is a noteworthy mention. It is designed to measure a person's preference to a set of team roles already identified by the tool (Belbin, 2013). There is a common misconception by project managers that considers Belbin as a psychometric tool (Belbin, 2013). This is not the case as team roles are different from personality types and as such cannot be used as a psychometric tool.

Psychometric questionnaires have been used in determining personnel behavior in a variety of fields within the project management context, including for generic project management (Montequina, Nieto, Ortega, & Villanueva, 2015), in construction projects (Love, 2002), information technology and software engineering projects (Capretz, 2003; Peslak, 2006; Karn & Cowling, 2004) and engineering design projects (Shen, Prior, White, & Karamanoglu, 2007).

The main objective of this paper is to categorize the personalities of people in space projects and see if there is a correlation between personality and behavior in that context. The personality section of this study was developed based on Jung's personality theory, which was similarly adopted by Montequina et al (2015) to determine managerial preferences for successful project managers and it does not aim to provide further in-depth connections between psychometric theories and project managers.

### 3. Methods

In this study, a questionnaire was first developed. The questionnaire was divided into four sections. The first section was designed to collect generic information about the respondents, details collected are: country, highest educational qualification, years of project experience, year

Number	Question	Related Project
1	It is common for there to be tension between the need to get something right and the need to make progress. I would prefer to accept an imperfect solution and make progress, than to wait to improve the solution.	NASA Space Shuttle Challenger Disaster
2	I find face-to-face meetings a more effective way of communicating than email.	NASA Space Shuttle Challenger Disaster
3	Projects often start without an adequate amount of time spent on planning.	NASA X-Planes project, Sydney Opera House
4	My customer introduces challenging new requirements after the project has kicked off and offers to pay for any costs incurred. In this situation I would happily accept the new requirements.	Sydney Opera House
5	Often customers don't really know what they want, so rather than going to the expense of making models such as prototypes and asking them, I usually find the project team is better off making assumptions by itself.	Sydney Opera House
6	In a very risky project, I expect to spend more of the risk budget in the latter part of the project.	London Olympic Stadium
7	For project managers, specialist domain knowledge is more important than understanding generic project management good practice.	Sydney Opera House
8	My 2-year project is running 3 months late with a year to go. I have discovered that by overlapping two tasks I should save 4 months, but there is a 10% chance of rework being needed, which would delay the project by 12 months. I would consider this a risk worth taking, and would therefore overlap the two tasks.	Deepwater Horizon
9	All stakeholders should be able to see a project risk register.	London Olympic Stadium
10	There should be two versions of a risk register – one for internal use and one for external stakeholders.	London Olympic Stadium
11	Very little effort should be spent on a project until there is a contract in place.	ESA Don Quijote project
12	I would rather develop a close relationship with a single preferred supplier for each element of a system, than have multiple suppliers competing for business.	NASA James Webb Space Telescope, Ford-Firestone Case
13	As a proportion of the total project budget, how much would you be willing to pay to guarantee on time and good quality delivery.	ESA Galileo Project

TABLE 2: Decision scenarios

of project management experience, number of projects participated, number of projects managed, percentage of successful project delivery.

The second section contained decision scenarios. Here the authors analyzed previous project reports and gathered a set of decisions taken in the projects, the decisions selected had a high impact on the outcome of the project. The decisions were individually simplified so it would not be obvious to respondents which project they related to. **Table 2** shows each question in this section and the name of the project it was derived from.

The third section of the questionnaire contained the personality aspect of the study. Questions here were developed based on Jung's personality theory as adopted by Montequina et al (2015). The questions were designed using simple language after over ten years of study by the researcher

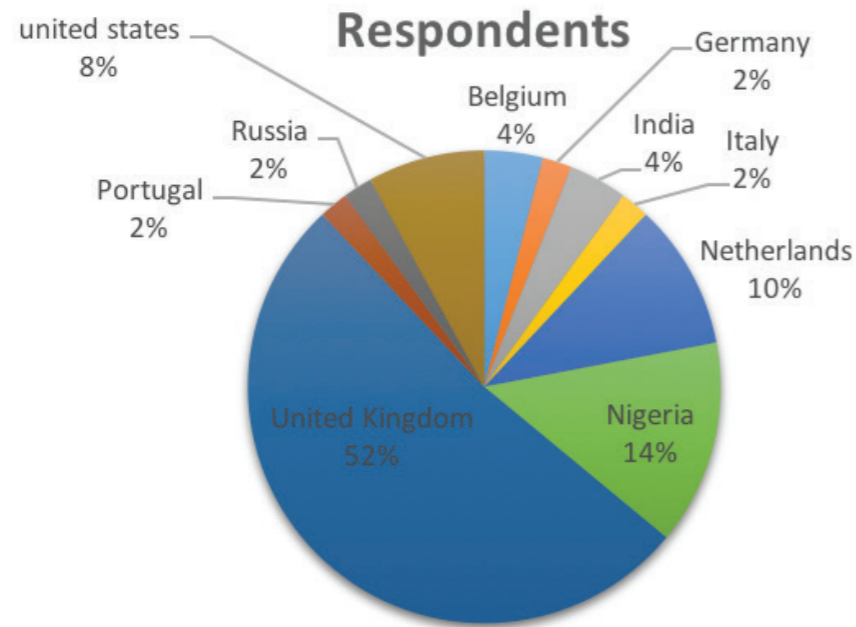


FIGURE 1: Geographical location of respondents

#	Question	Carl Jung's Preference
14	I have a low level view more than a high level view?	Seeking information
15	I prefer to make decisions based on logical rather than emotional arguments?	Decision making
16	I am more sociable than reserved?	Focus of attention
17	I prefer a structured organization rather than a flexible organization?	Relationship with the world
18	I am more of a pleasing than firm person?	Decision making
19	I have a long-term view rather than short-term view?	Seeking information
20	I prefer having control rather than flexibility?	Relationship with the world
21	I am pragmatic more than creative?	Seeking information
22	I prefer to make a consensus team decision more than objective decisions?	Decision making
23	I prefer to freeze the scope rather than leave it open for additional requirements?	Relationship with the world
24	I prefer to respect deadlines more that adapt them to new circumstances?	Relationship with the world
25	I prefer to show fairness to empathy?	Decision making
26	I am more of an introvert than extrovert?	Focus of attention

TABLE 3: Personality Questions

Characteristics of Respondents			
Background Question	Characteristics	Space	
		Number	%
Education	Bachelor's	13	26
	Master's	19	38
	Doctorate	14	28
	Other	4	8
Project Experience	0 to 2 years	7	14
	2 to 5 years	10	20
	5 to 10 years	3	6
	10 to 15 years	5	10
	More than 15 years	25	50
Project management experience	None	9	18
	Less than 2 years	7	14
	2 to 5 years	11	22
	5 to 10 years	5	10
	10 to 15 years	5	10
No of projects participated	Fewer than 5 projects	13	26
	5 to 10 projects	21	42
	10 to 15 projects	3	6
	More than 15 projects	13	26
% of successful project	0 to 20	4	8
	20 to 40	9	18
	40 to 60	4	8
	60 to 80	14	28
	80 to 100	19	38
Projects Managed	None	7	14
	Fewer than 5 projects	27	54
	5 to 10 projects	8	16
	10 to 15 projects	3	6
% of managed successful projects	0 to 20	3	6
	20 to 40	12	24
	40 to 60	6	12
	60 to 80	7	14
	80 to 100	22	44

TABLE 4: Characteristics of respondents

(Montequina, Nieto, Ortega, & Villanueva, 2015). **Table 3** shows all the questions used in this section and their relation to the Jungian preference.

In the decision section of the survey, participants were provided with a statements and then asked to specify how strongly they agreed or disagreed while in the personality section the respondents were asked directly about their own preferences based on their project experiences. The questions in the second and third sections were implemented with a 5-point Likert scale to enable respondents express their individual level of agreement for each

Question	Median	Mode	Freq (1)	Freq (2)	Freq (3)	Freq (4)	Freq (5)
1	3	4	7	9	15	16	3
2	4	5	2	3	8	13	24
3	4	5	8	5	11	11	15
4	4	3	2	0	20	17	11
5	3	3	8	12	15	11	4
6	4	4	3	3	15	18	11
7	3	4	2	10	16	17	5
8	3	4	3	7	16	22	2
9	4.5	5	0	3	8	14	25
10	3	4	8	12	12	13	5
11	3	3	7	7	18	9	9
12	3	2	5	14	9	13	9
14	2.5	3	11	14	19	5	1
15	5	5	0	0	5	15	30
16	3	4	12	2	14	15	7
17	3	2	1	14	13	14	8
18	3	4	4	9	15	20	2
19	4.5	5	0	1	14	10	25
20	3	4	0	13	14	15	8
21	3	3	13	6	18	10	3
22	4	4	3	3	16	17	11
23	4	4	8	4	9	21	8
24	4	4	2	8	11	20	9
25	4	3	0	0	22	15	13
26	2	2	10	16	14	6	4

TABLE 5: Cumulative frequencies.

No	Question	Disagree	Neutral	Agree	Dominant view
1	It is common for there to be tension between the need to get something right and the need to make progress. I would prefer to accept an imperfect solution and make progress, than to wait to improve the solution.	16	15	19	No clear preference
2	I find face-to-face meetings a more effective way of communicating than email.	5	8	27	Agree
3	Projects often start without an adequate amount of time spent on planning.	13	11	26	Agree
4	My customer introduces challenging new requirements after the project has kicked off and offers to pay for any costs incurred. In this situation I would happily accept the new requirements.	2	20	28	Agree
5	Often customers don't really know what they want, so rather than going to the expense of making models such as prototypes and asking them, I usually find the project team is better off making assumptions by itself.	20	15	15	No clear preference
6	In a very risky project, I expect to spend more of the risk budget in the latter part of the project.	6	15	29	Agree
7	For project managers, specialist domain knowledge is more important than understanding generic project management good practice.	12	16	22	Agree
8	My 2-year project is running 3 months late with a year to go. I have discovered that by overlapping two tasks I should save 4 months, but there is a 10% chance of rework being needed, which would delay the project by 12 months. I would consider this a risk worth taking, and would therefore overlap the two tasks.	10	16	24	Agree
9	All stakeholders should be able to see a project risk register.	3	8	39	Agree
10	There should be two versions of a risk register – one for internal use and one for external stakeholders.	20	12	18	No clear preference
11	Very little effort should be spent on a project until there is a contract in place.	14	18	18	No clear preference
12	I would rather develop a close relationship with a single preferred supplier for each element of a system, than have multiple suppliers competing for business.	19	9	22	No clear preference

TABLE 6: Decision scenarios results

No	Question	Disagree	Neutral	Agree	Preference	Jung's Type
14	I have a low level view more than a high level view?	25	19	6	High Level View	Intuitive
15	I prefer to make decisions based on logical rather than emotional arguments?	0	5	45	Logical decisions	Thinkers
16	I am more sociable than reserved?	14	14	22	No clear preference	Extrovert
17	I prefer a structured organization rather than a flexible organization?	15	13	22	No clear preference	Judging
18	I am more of a pleasing than firm person?	13	15	22	Pleasing	Feeling
19	I have a long-term view rather than short-term view?	1	14	35	Long term view	Intuitive
20	I prefer having control rather than flexibility?	13	14	23	Control preferred	Judging
21	I am pragmatic more than creative?	19	18	13	No clear preference	Intuitive
22	I prefer to make a consensus team decision more than objective decisions?	6	16	28	Team decision	Feeling
23	I prefer to freeze the scope rather than leave it open for additional requirements?	12	9	29	Freeze scope	Judging
24	I prefer to respect deadlines more than adapt them to new circumstances?	10	11	29	Respect deadlines	Judging
25	I prefer to show fairness to empathy?	0	22	28	Fairness	Thinkers
26	I am more of an introvert than extrovert?	26	14	10	Extrovert	Extrovert

TABLE 7: Personality section results

Quadrant	Preference	Percentage (%)
Focus on attention	Extraversion (E)	46
	Introversion (I)	12
	No clear preference	42
Seeking of information	Sensing (S)	6
	Intuition (N)	68
	No clear preference	26
Decision making	Thinking (T)	56
	Feeling (F)	8
	No clear preference	34
Relationship with the world	Judging (J)	56
	Perceiving (P)	22
	No clear preference	22

TABLE 8: Carl G Jung Personality Results.

question with the option of having a neutral option (except Question 13 in Table 2). The reason for this would be discussed in the discussion section.

The final section consists of only two (optional) questions asking for contact information of respondents who wished to be contacted for further study or to be notified of the results of the study. At the end of the data collection, the data was analyzed with the Statistical Package for Social Sciences (SPSS) software, where various statistical analyses were carried out to give further insight on the data.

### 3.1 Study Sample

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) and the National Space Research and Development Agency (NASRDA). The questionnaire was also published online on business-oriented social networking site LinkedIn. A total of 50 completed responses have been collected and analyzed for this study and the geographical distribution of the respondents is shown in Figure 1.

Further information on the characteristics of the respondents collected in the background section of this study is depicted in Table 4, information such as educational background, project experience, project management experience, number of participated projects,

percentage of successful projects, no of projects managed and percentage of successful projects that have been managed by the respondents.

## 4. Results

The data collected from the respondents are presented in Table 5. The five point Likert scale options adopted in this study are (1- Strongly disagree, 2- Disagree, 3- Neither agree or disagree, 4- Agree, 5-Strongly agree).

Preference Combination	Percentage (%)
IJ	14
IP	0
EP	12
EJ	26
NT	40
NF	6
SF	2
ST	0

TABLE 9: Preference combination

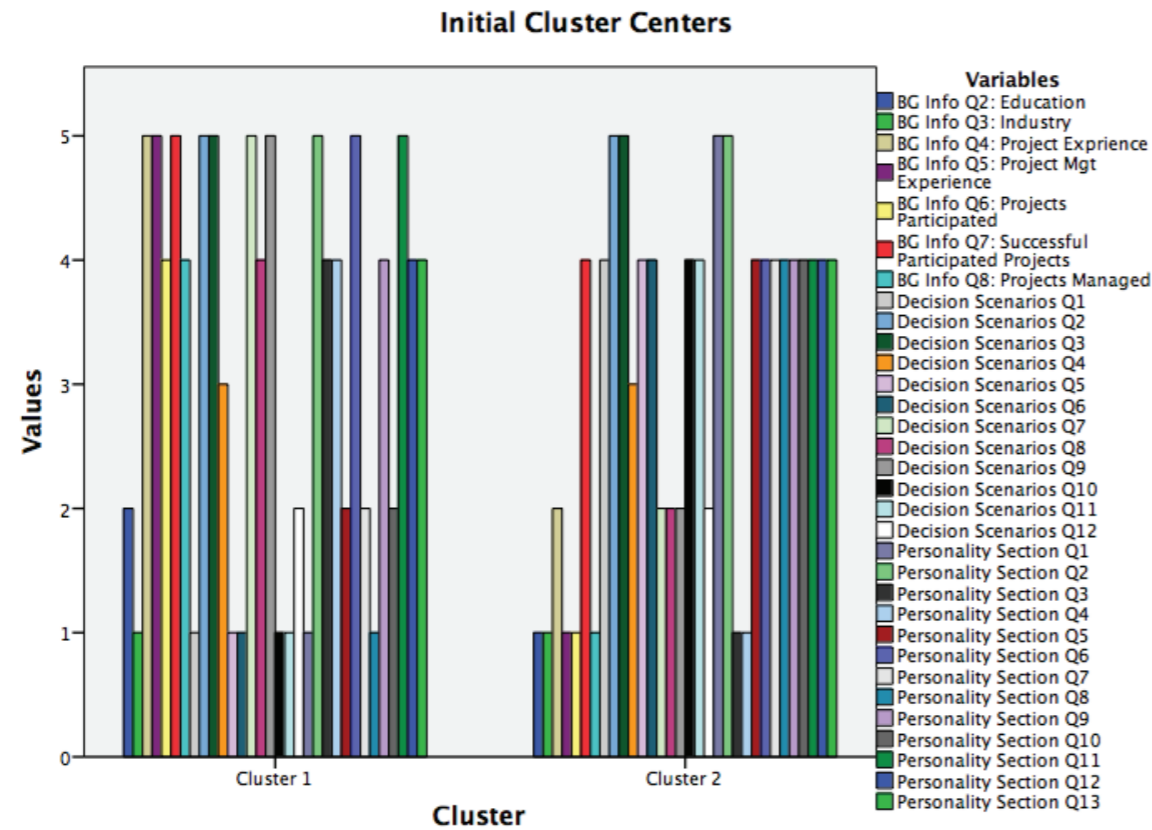


FIGURE 2: K-Means cluster analysis results

The decisions and personalities of the respondents can easily be drawn from **Table 5**. The 5-point Likert scale can be converted into a 3-point scale by combining Strongly Agree and Agree as just 'Agree' and by combining Strongly Disagree and Disagree as just 'Disagree'. The cumulative frequencies of each option can then be established. **Table 7** shows the results of the personality of active respondents in the field with reference to Jung's behavior type and **Table 6** shows the results of the decisions profiles of the analyzed respondents. The results of question 13 in the survey is not displayed in this section as it is an open numerical question; its results are presented and discussed in the next section.

**Table 8** shows the results of the data of **Table 7** linked to Jung's type and the percentage of the respondents that belong to each subsection. Further analysis of the data on **Table 8** by combining personality traits is shown in **Table 9**.

The data obtained from the respondents was further analyzed using K-means clustering. The complete data set was analyzed using the number of successfully managed projects as the label case and the remaining data set as variables. **Figure 2** depicts the results of the cluster analysis, where the data was divided into two clusters, defined by the number of successful projects (*Cluster 1 has more successful projects, Cluster 2 has fewer*). Cluster 1 has 26 respondents while Cluster 2 has 24 respondents.

## 5. Discussion

When considering the decision scenarios, we can say that the answers from Questions 2 and 9 are quite straightforward and we can conclude that the respondents prefer face to face communication than email this can be due to the fact that feelings can easily be communi-

cated via face to face than email even though its less time efficient and all stakeholders should be able to see the risk register. This means that the respondents are not risk takers in the aspect of communicating and informing the stakeholders about the project, talking face to face makes the environment more personal and provides a chance to pick up on non-verbal clues and having just one risk register creates a situation that enables all stakeholders to be more open and willing to admit to possible risk in a project. This can be a sign of a very open culture in a project but can also suggest that not all risk that could occur will be shared.

From the results of question 3 in **Table 6**, one can conclude that the respondents believe that projects do start without an adequate amount of planning and hence project managers should spend more time planning. The results for Question 10 suggest the use of one risk register, even though the distribution is flat with many respondents who neither agree nor disagree.

In the aspect of Question 11, an inconclusive answer was determined because the number of respondents who agreed that little time should be spent on a project until a contract is in place is the same as those who decided to remain neutral, the result of those that disagree with this question is also slightly lower than the agree and neutral.

If you look from Question 5 and 12 from **Table 6**, one can infer that the respondents generally disagree with making assumptions to anticipate what customers might want, generally preferring to have a close relationship with a single supplier than to have multiple suppliers, however in both cases the difference between those who agree and disagree is not very much and hence the result is not clear cut and can be debatable.

In the analyzed results in **Table 6**, Questions 4 and 6, the respondents believe that they can accept new requirements from the customer with conditions and believe they will generally spend more in the later stages of a risky project. This could be because a risk might occur, but would not get adequately resolved until the later stages. A relatively high proportion (*40 and 30 percent of respondents respectively*) neither agree nor disagree with these questions.

The respondents believe that specialist domain knowledge is more important for project management than generic knowledge and they are willing to take on more risk on delayed projects with the possibility to save more time even though there is a slight chance that the risk can lead to more delays. This can be seen in the results of Questions 7 and 8 in **Table 6**. When tension arises between getting things right and delivery on schedule, respondents show a very weak preference for proceeding with an imperfect solution over delaying the project.

The results of Question 13 have not been displayed in the result section as this was a numerical open ended question and respondents were asked to state a percentage of the proportion of the total project budget that they would be willing to pay to guarantee on time and quality delivery. The data we got for this question was interesting, 60 percent of the respondents gave a figure below 20 percent, another 16 percent gave a figure above 20 percent and below 50 percent while 24 percent gave a figure over 50 percent which is very high and suggests that the 24 percent might have interpreted the question differently or else they believe that projects generally end up being very late and over budget.

Based on the personality data obtained from the respondents as shown in **Table 7**, the generic personality of the respondents are people with a high level and long term view, are fair and pleasing rather than firm, extroverted and logical decision takers, prefer to freeze scope and respect deadlines and finally they prefer to make team consensus decisions.

The personalities of the respondents can be derived based on the identified preferences, from the four dimensions as identified by Jung (see **Table 1** and **Table 8**). We can say that the respondents in the space sector are extrovert (*focus of attention*), intuitive (*seeking of information*), more judging than perceiving (*relationship with the world*) and are more thinkers than feelers (*decision making*).

When interpreting the cluster analysis in **Figure 2**, one can denote that the Cluster 1 respondents – those who have managed and successfully delivered more projects – generally have higher educational qualifications, more

project management experience and have participated in more projects than Cluster 2 respondents.

In the decision scenarios the respondents in Cluster 1 preferred to wait for a solution before making progress than to proceed with an imperfect solution. This can be due to the respondents in Cluster 1 having more experience with risk which would cause them to prefer delaying projects to adding additional risk to the project especially with space projects as once risk occurs it becomes very difficult to correct or to reduce its impact. The respondents in this cluster are also of the notion that risk does and can occur in any part of the project lifecycle not only in the latter stages of a project.

In the aspect of the personality section the respondents of Cluster 1

are more firm than pleasing, prefer flexibility to having control and prefer to leave scope open than freeze it. The results depicted for cluster two do not mean that they have not been able to deliver successful projects, just that Cluster 1 respondents have delivered and managed more successful space projects.

## 6. Conclusion

Improving the success rate of projects has been the main area of discussion in project management for decades. This has led to the development of various frameworks that will help in selecting the appropriate project team. This paper has identified the current personalities and

risk-taking behavior of people who participate in the delivery of space projects. Based on existing literature, a set of questions on risk decisions and personality types were tested in the space industry. Further research should be carried out to see if there are any correlation in behavior and personality with other sectors or whether this set of skills applies only for space projects.

The results of this research have theoretical and practical implications. In the aspect of theoretical implications this study has identified the current personalities and behaviors of current project managers. This can now be used as a basis for further research to understand the characteristics of project managers and to provide tools to help them to improve their performance. The

study could also be compared to other studies that suggest ideal styles and behavior of project managers. In the aspect of practical implications, the study provides a better understanding of the behavior and personalities of current project managers in the space industry.

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