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**INTERNATIONAL JOURNAL OF BUSINESS, MANAGEMENT  
AND ALLIED SCIENCES (IJBMAS)**  
A Peer Reviewed International Research Journal

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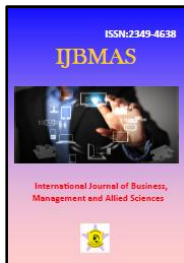
**Impact of Human Factors in Implementing Aviation Digital Systems**

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**ABSTRACT**

The purpose of this research is to understand the effect of human factors in multi-cultural, multi-ethnic and mixed gender work environments in the aviation industry, and with specific emphasis on the impact of specific human factors on large scale implementation of aviation digital systems projects, like the implementation of a new fleet of Boeing 777 or Airbus 320 fleets latest digital systems technologies. This study is important as it discusses how specific human factors identified from a group of multiple research factors identified by researcher earlier affects the management of projects in the aviation industry. This study will provide valuable insights for management to recognize the impact of human factors and evaluate its impact on project outcomes.

**Keywords:** aviation industry, HR, human factors, aviation projects, aviation project management

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**Introduction**

This research studies the impact of human resources practices on aviation software project outcomes. The implementation of any new aviation fleet related procurement projects is complicated and time consuming, and requires months of preparation, focus and readiness, although the outcome of the result is enhanced passenger and cargo services for the public. It is once in a decade, or even decades, event for many airlines and costly to implement. Since a number of years the airline sector has been steadily improving and thereby a great deal of advanced planning is required, in the type of aircraft to be procured, its sustainability and maintenance in the long run, its profitability to the airline, the various aircraft specs and features to be in place, training for the crew and pilots, and various licensing and approval processes that need to be completed before the aircraft can be delivered to the airline flight operations team for departure. The airline business is one of the most competitive industries in the economy (Jarach, 2002), and many of these aviation projects while not only being expensive are also high risk projects as there is a considerable strain on the finances of the airline, and its setup and execution must be carried out effectively so as not to affect the overall balance sheet of the airline during the implementation period. It is also difficult and tedious, while at

the same time very costly, to procure and release new aircraft due to the tremendously needed time and highly skilled human resources.

This study helps to understand and discusses how the human factor affects the airline procurement process in the Middle Eastern airline. This study will also help other related studies on the subject in the aviation industry. This study will also look into the readiness of the human resources in undertaking a project of this nature, and how it has been executed in the best possible manner, and thereby an overall success for the airline where the project had been implemented.

The airline is currently completed the procurement process of a new fleet of Airbus and Boeing aircraft, and is now in the early stages of setting up the aircraft for its final inclusion into the active fleet of the company. The last few months have been crucial to the project implementation and made it possible for the researcher to monitor and observe closely the human factors that were at play during the airline procurement and implementation of onboard avionics digital systems projects, and flight operations and flight planning systems projects. Further, this study can be used as a start for other future case studies and research regarding the airline procurement projects, its related digital systems implementation, and related human resource factors during the procurement and implementation phases of the project.

### **Airline profile**

The airline procurement project and the related human factors were studied at a middle east corporate airline whose main line of business is scheduled air passenger carriage. The airline has been in operation over 50 years, making it one of the oldest airlines in the world. Airline also provides the carriage of air cargo through its Cargo unit. One of its unique strengths is highly skilled and committed workforce. Every employee is given an equal opportunity to develop themselves and grow in their career. Continuous training, positive work environment, participative style of management have all ensured development of a committed and motivated workforce setting higher limits in terms of productivity and quality of project execution.

### **Review of Literature**

There are multiple human factors that come into play when a project is implemented. Some of the more critical factors that have been identified by researchers over a period of time are related to management support, skilled manpower or staff, change management and resistance to change, commitment, work pressure and stress, communication all of which are only some of the human factors at play during a project. Change management is one of the core issues facing any company. Resistance to change is one of the core issues faced by organizations when changes are proposed. There is both a psychological reaction, and a behavioural resistance that highlight the unwillingness to accept modifications, and consequently, a lack of commitment to support the changes, which limits the chances of success in the project (Chawla and Kelloway, 2004). Human factors were identified by Pasion (2011) in her examination of project management models, and was necessary to achieve reliable but flexible project management capability. Human factors were highlighted by Betts and Lansley (1995) in the review of the first ten years of international journal of project management. The aviation industry is faced with a lot of challenges and especially with references to the implementation of latest aircraft digital system human factors need to be considered. These digital systems require a faster turnaround than other ground based IT systems as aircraft come and go at a fast pace during the lifecycle of their operations, except for a short while for various maintenance checks on the ground, and thereby with workers being on high pressure in a complex environment with highly complex systems, management support and adequate training and monetary resources and all required support are necessary for the safety of the aircraft. Various events in the 80's and 90's have shown that human factors played a part in the crashes and accidents in the aviation sector, as shown in Fig. 1

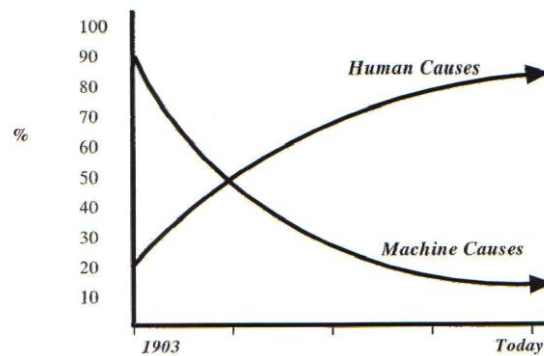


Figure 1: Human Causes in Aviation Incidents (IATA, 1975)

Management support during the implementation of complex digital systems in airlines, as individuals are emotionally affected by the organizational change experience (Kiefer, 2002). The purpose of IT systems in any organization is to improve the performance of its employees (McNurlin & Sprague, 2006). Another human factor critical to the implementation of complex aviation systems is adequate training. The purpose of training is to achieve the purposes of organizations and the employees (Stone R.J., 2002). Training increases the efficiency and the effectiveness of the airline engineers thus above all ensuring the safety of the aircraft and its passengers. Therefore it is necessary for the airline to design the training very carefully, and the design of the training should be as per the needs of the airline employees (Ginsberg, 1997). Thereby, training has to be on the job which will familiarize the ground engineers to get the knowledge of the job in a better way (Deming, 1982). It is clearly understood that trained employees perform well when compared to untrained employees (Partlow, 1996). To achieve the overall goals of the organization training has to be rightly given to its employees (Flynn et al., 1995). Training, especially in the airline industry, can be expensive, however, although training can be costly, in the long it can give back more than it took (Flynn et al., 1995). According to the need and at various stages of the organizations process, the organization should develop its employees so that they can compete with their competitors (Carlos Braga, 1995). However, any important training has to be designed very carefully (Michael Armstrong, 2000), and the training should be according to the needs of the staff (Ginsberg, 1997), and in this case airline engineers. It is also better to give on the job training as it reduces cost and saves time (Flynn et al., 1995), and on the job training because it is cost effective and time saving (Ruth Taylor et al., 2004). Human resource management practices are vital for development of organizations (Paul and Anantharaman, 2003). Training is provided to improve the performance of individuals and groups in a organization setting. (Vinesh, 2014). Training is done to gain a better advantage in order to enhance their effectiveness (Devi and Shaik, 2012). Training is defined as the planned learning experience that teach employees how to perform current and future jobs (Tahrir et al, 2014), and it increases the turnover of the organization, and helps with the development of the organization.

### OBJECTIVES

The main aim of this research is to identify predominant human resource factors and how it has impacted the implementation of the aviation digital systems projects for the newly purchased fleet of the airline. Some key projects include the e-enablement project, which provides a way for airlines to receive software digital parts for the aircraft, to the implementation of maintenance, repair and overhaul systems software for the maintenance of the aircraft. During various phases of the project, it was observed there were certain delays to the project, and the reference was often highlighted as lack of management support during the various project stages, or the lack of adequate training. The study hopes to ascertain if there is a correlation between the implementation of the system and management support for project management and training of the staff.

### Population and Sample

Research consists of both primary and secondary data, and the primary data was obtained through a structured questionnaire from the various cross sections of the airline, but with specific

emphasis on the ground engineering staff that closely worked on the implementation of the aircraft digital systems implementation projects. The estimated strength of the airline support staff was around 1800, and sample size of this population to achieve an acceptable size for the research and further analysis was 300 (Sekaran, 2006). About 550 questionnaires were distributed by email, survey sites and links, or by other means to the staff at the various buildings of the airline, and about 300 were considered valid for further analysis. The questionnaire was divided into 5 points according to Likert type scale, and was assigned level 5 for strongly agree, level 4 for agree, level 3 for neutral, level 2 for disagree, and level 1 for strongly disagree.

### Hypothesis

**Ha:** There exists a relation between systems implementation team and top management support in implementation of aviation digital systems.

**Hb:** There exists a relation between systems implementation team and adequate training in implementation of aviation digital systems.

### RESEARCH METHODOLOGY

Analysis of the statistics was done using SPSS (statistical package for social sciences) to analyze each item in the questionnaire. Cronbach's alpha was used to verify the reliability of the questionnaire. Pearson's correlation was used to test and find a correlation between the dependent and independent variables. A high correlation means that two or more variables have a strong relationship with each other while a low correlation means that the variables are hardly related. The range of correlation coefficients can range between -1.00 and +1.00. If the value is 0, it means that there is no relationship between the variable under testing.

For the questionnaire, cronbach's alpha for all the areas to be tested was taken to test the reliability of each area and alpha value was found to be .871. Cronbach's alpha ( $\alpha$ ) is 0.871, which indicates a high level of internal consistency, and, higher values of Cronbach's alpha show high reliability of the questionnaire.

### Analysis and Results

The demographic characteristics of the sample are highlighted below for a sample of 300:

#### Gender:

Variable	Frequency
Male	188
Female	112

#### Age:

20-30 years	88
31-40 years	126
41- 50 years	86

#### Occupation

Management	46
Aircraft Engineers	172
Other Ground Staff	82

#### Experience:

Less than 10 years	78
11-15 years	38
16-20 years	96
21 years +	88

First the hypothesis, Ha i.e. Ha: there exists a relation between systems implementation team and top management support in implementation of aviation digital systems, is tested.

To test the hypothesis, first calculated the means and standard deviation of each item, and then Pearson Correlation was calculated. Table 1 to 5 show the results of the analysis.

First, table 1 shows there is a general mean in the disagree level, although there is a standard deviation of .710 and above.

**Table 1: Descriptive statistics for project team and managerial support by senior management**

	Mean	Std. Deviation
did management provide project managers for e-enabling projects	2.48	.710
did management support the selected project managers	2.56	.805
did management support the project team	2.54	.781
did management provide money and travel resources for project	2.54	.794

**Table 2: Descriptive Statistics for top management support**

	Mean	Std. Deviation
did top management support in final decision making of project phases	2.53	.790
did top management encourage employee participation in the project	2.53	.794

**Table 3: Relation between systems implementation project team and management support**  
**Correlations**

		systems	management
systems	Pearson Correlation	1	.923**
	Sig. (2-tailed)		.000
	N	300	300
management	Pearson Correlation	.923**	1
	Sig. (2-tailed)	.000	
	N	300	300

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Referring to the table 3 above, the hypothesis  $H_a$  can be inferred as that there is a significant correlation between systems implementation project and management support, however, the lack of sufficient support of management to the project teams can result in considerable strain for the project team to successfully implement the digital systems projects.

Second the hypothesis,  $H_b$  i.e  $H_b$ :  $H_b$ : there exists a relation between systems implementation team and adequate training in implementation of aviation digital systems, is tested.

Here, table 4 shows there is a general mean in the disagree level, although there is a standard deviation of .747 and above.

**Table 4: Descriptive Statistics for training for the digital systems implementation**

	Mean	Std. Deviation
was training provided help end users and engineers	2.53	.782
was a proper plan in place for the complex training	2.52	.747

was the training done by qualified users	2.52	.747
was the training first done on test e-enabling systems	2.51	.752

**Table 5: Relation between systems implementation project team and adequate training Correlations**

		systems	training
systems	Pearson Correlation	1	.953**
	Sig. (2-tailed)		.000
	N	300	300
training	Pearson Correlation	.953**	1
	Sig. (2-tailed)	.000	
	N	300	300

\*\* Correlation is significant at the 0.01 level (2-tailed).

Referring to the table 5 above, the hypothesis H<sub>b</sub> can be inferred as that there is a significant correlation between systems implementation project and adequate training requirements, however, the lack of project team support to the end users in the training required to support the new digital systems can result in safety and other issues related to the airlines activity and this needs to be considered carefully.

#### FINDINGS AND CONCLUSION

The purpose of this study has been to highlight the correlation between management support to the project teams, and the project teams support to the end user training in the implementation of aviation digital systems. The success of the highly complex aviation systems, as seen by the study rests of the overall support of senior management to the teams involved, and ensuring adequate training is provided.

To resolve these issues, senior management should allocate sufficient time to oversee the right project teams are in place, and allocate sufficient funds for the middle management to undertake their tasks successfully. Training courses and seminars need to be conducted regularly to highlight to end users to be well equipped in undertaking their tasks once the digital systems have been implemented.

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