



جامعة الجميع الذكية
EVERYONE'S SMART UNIVERSITY

Everyone's Smart University

Project (Spring 2021)

Student Name	Mohammed Abdulaziz Basloom	اسم الطالب
Students I.D	2021202416	الرقم الجامعي

Section

Master

Date

Thursday

18 / 03 / 2021.

Course Code

(PMG510)

Project Risk Management

Instructions:

- آخر موعد للتسليم هو يوم السبت 2021-05-08 في تمام الساعة ٩ مساءً.
- الإجابة متاحة باللغة الإنجليزية أو اللغة العربية مع مراعاة أن تكون المصطلحات العلمية باللغة الإنجليزية.
- يتم تسليم المشروع في صيغة ملف . pdf مع الالتزام نموذج الجامعة ولن تقبل أي مستندات أخرى.
- يجب مراعاة أقسام البحث الرئيسية (مقدمة Introduction، دراسات علمية سابقة Literature Review، طريقة البحث Methodology، النتائج والمناقشة Results and Discussion، وأخيراً المراجع References. وان كان هناك ملحقات Appendices يتم إضافتها)
- يجب الالتزام بـ Theme موحد كما يلي:
- حجم الخط 12.
- نوع الخط Arial.
- لون الخط أسود.
- المسافة بين الأسطر 1.5 line spacing
- عدد صفحات البحث (لا يقل عن ثلاث صفحات ولا يزيد عن ست صفحات).

Instructor's Name: Eng. Mosaab M. Hamed

Project:

Risk Identification and Analysis (Based on the project you chose in APM)

The objective of this report is to identify project risks, prepare a risk probability matrix, and carry out an analysis of selected risks. Referring to the project you select in **Advanced projects management APM course**, your task is to prepare a risk management plan that identifies potential risks in **the selected stage of the project** and identify risk management strategies.

From the course content and readings, you know that the overall purpose of risk planning is to anticipate possible risk events and be ready to take appropriate action when risk events occur—to eliminate or reduce negative impacts on the project.

You may wish to begin this exercise with a brainstorming about potential risks to get candidate risks “on the table” for consideration. And then identify and refine that wording for risks that have some realistic chance of occurring in this stage. For example, potential weather problems present a real obstacle to completing field data collection by the planned completion date. It is also an issue that the project manager will ultimately have to plan for, as opposed to other issues such as a major disaster (e.g., your office burning down), is not a high-enough probability event that requires much time in planning. As described below, you will select several of the identified risks and carry out a risk analysis. You will use the distilled list of risks to make a risk probability/impact matrix. The matrix will have at least three categories (high/medium/low) for probability and impact.

Remember that it is important to name risks effectively—use words that describe the risk event and point to the impact on the project (e.g., “injury of field technician disrupts data installation work”).

After completion of the risk matrix, document a risk analysis for the selected risks. This detailed documentation for that selected risk will include:

- a description of the risk and potential impacts (schedule, quality of work, cost, etc.) on the project.
- indicators or triggers that would be monitored to help identify the risk as early as possible.
- specific risk response strategies to take.

Using probability and impact matrix calculate the **Expected Monetary Value (EMV)** for all risks that have the impact in terms of cost \$\$.

Best of luck...

المشروع:

التعرف على المخاطر وتحليلها (بحث مبني على مشروعك الذي اخترته في مادة ادارة المشاريع المتقدمة)
الغرض من هذا التقرير هو التعرف على المخاطر المحيطة بال**مرحلة** التي تختارها المرحلة من مراحل مشروعك **(نفس المرحلة التي اخترت التطرق لها في مشروعك لمادة إدارة المشاريع المتقدمة Advanced project management)** حيث أن مهمتك هي تحضير خطة متكاملة لإدارة المخاطر تشمل التعريف بالمخاطر المحتملة التي تحيط بتلك المرحلة وتحضير مصفوفة احتمالية المخاطر ومن ثم القيام بالتحليل لهذه المخاطر المختارة وتحديد استراتيجيات ادارة المخاطر المناسبة لكل خطر على حدة.

من محتويات المقرر والمصادر الأخرى المتاحة أصبحت تعلم الآن أن الغرض العام لمرحلة التخطيط للمخاطر هي توقع أحداث المخاطر المحتملة والتجهز لاتخاذ ردة الفعل المناسبة عند وقوع الخطر – لمنع أو تقليل الآثار السلبية على المشروع. قد تحبذ بداية هذا البحث بعصف ذهني عن ماهية المخاطر التي قد تحيط بتلك المرحلة من مراحل مشروعك, وذلك للحصول على قائمة بتلك المخاطر. ومن ثم تحديد وتصفية هذه القائمة للوصول إلى قائمة مختصرة بالمخاطر التي لها فرصة واقعية أكبر في الحدوث. على سبيل المثال: المشاكل الجوية المتوقعة والتي تمثل عقبة حقيقية أمام اكتمال جمع البيانات من المواقع في أو قبل الوقت المحدد، هذه تعتبر مشكلة على مدير المشاريع أن يضعها في الحسبان. من ناحية أخرى، فإن المخاطر غير الواقعية مثل الكوارث الطبيعية والأعاصير (تلك التي تسبب حريقاً بمكتبك وفقدان الأوراق المهمة) ليست لها احتمالية وقوع عالية وبالتالي لا تستدعي تضيق الكثير من الوقت في التخطيط لها. كما سيتبين لك، ستقوم باختيار عدة مخاطر من تلك التي قمت بالتعرف عليها لتحليلها.

ستقوم باستخدام هذه القائمة المختصرة لعمل مصفوفة المخاطر (الاحتمالية/الأثر). المصفوفة ستحتوي على الأقل على ثلاث تصنيفات (عالي/متوسط/منخفض) للإحتمالية والأثر.

لا تنس استخدام أسماء تصف طبيعة المخاطر بصورة فعالة – قم باستخدام كلمات تصف الحادثة الخطرة وتشير إلى أثرها على المشروع (مثل: إصابة أحد الفنيين في الموقع مما يؤثر على أعمال التركيب). بعد انتهاءك من مصفوفة المخاطر، قم بتوثيق تحليلك للمخاطر المختارة. هذا التسجيل المفصل للمخاطر يجب أن يتضمن:

- وصف للخطر واثاره المحتملة (الجدولة، جودة العمل، التكلفة، الخ)
- المؤشرات والمحفزات التي يجب مراقبتها للمساعدة في التعرف على هذا الخطر قبل وقوعه
- تفصيل للاستجابة المقترحة للتصدي لهذا الخطر

باستخدام مصفوفة الاحتمالات والتأثير ، احسب **القيمة النقدية المتوقعة (EMV)** لجميع المخاطر التي لها تأثير من حيث التكلفة \$\$.

مع تمنياتي بالتوفيق..

THE RISKS OF THE BUDGET FOR A D-CHECK MAJOR VISIT PROJECT

1. INTRODUCTION

In the aviation industry, the projects of aircraft operators are divided into two types; the first type is correlated with a newly purchased aircraft, this type of projects is known for “Completion Project”, which carries a complete interior building that includes aircraft cabin and cabin systems, as new aircrafts are delivered as an empty tube also known as “green aircraft”, while the other type of the projects is known for “Checks Project”, which carries the performance of regular checks for an aircraft that is in-operation, but has reached the due of the scheduled tasks interval. As a project manager the main goal in either types of the projects is to complete the project successfully (i.e. on-time, within budget, and meets the scope).

The period and cost of the Completion project for VIP aircraft depends on aircraft size and customer requirements. On the other hand, the period and cost of the Checks project depends on aircraft size, type of checks and scope of the modification if exist. There are four (4) types of aircraft maintenance checks as follows; A-Check, B-Check, C-Check, and D-Check.

The nature of project is the uncertainties of outcomes, yet in aviation industry it is known that Checks projects is full of uncertainties, as you can never anticipate the findings that will be reported during the performance of the scheduled maintenance task. The findings differ based on the root cause of each findings, the major findings are usually on aircraft's structure (i.e. corrosion), on the engines (i.e. defects of the engines), or even in aircraft's cabin (i.e. deteriorated fabrics). The repair of the findings is proposed to the project manager by the contracted repair station also known as Maintenance, Repair, and Overhaul (MRO) center in a change request form. Hence, the driving factor for all Checks projects is the findings, as if findings' repair requires high labor hours this may affect the planned re-delivery date of the aircraft likewise the budget of the project. Some findings would have no repair option, and the only option would be defects parts replacement, which is very critical especially if the part is out of production that also known as obsolete parts, in this case the available parts in the market would be either in overhauled, repaired, or inspected condition, either condition is normally offered at high price due to the scarcity, which affects one of the triple constraints (i.e. cost) [1].

I was assigned as a project manager for one of the VVIP aircraft that my organization maintain and operate. The project is a Check project for to perform D-Check tasks of the aircraft, including some modifications to comply with regulatory requirements and other modifications on the entertainment systems to enhance customer experience. A Request for Proposal (RFP) was released to be sent to the bidders once the tender is initiated. After receiving proposal from all bidders, it is project manager's task to evaluate all the proposals and filter it accordingly, and if any of the proposals have not covered all the scope of work, then it will be considered disqualified. Once all proposals been filtered and only the ones that covers all the scope of work remained, then the next step is to use project selection model that are in-use in my organization, which is an unweighted factor

scoring model. Finally, after selecting the highest scored proposal, the budget is then to be calculated as in this research we will address risks if the calculated budget was not precise. Furthermore, the goal is to develop a method to estimate the contingency budget precisely that should cover the impact of the project, then to discuss the result of the Expected Monetary Value (EMV) after applying risk management processes. Currently the project is at the execution phase.

Project budget estimation or calculation is one of the key activities when working in projects, as the budget is the key factor to run project's resources either labor or material. To increase the rate of project success, project budget needs to be calculated precisely. It is important to take into account when calculating project budget to make sure that the calculated budget covers all the activities that will be accomplished during Project Life Cycle (PLC) including any activities that need to be accomplished if any risks occurred and this will be placed under the contingency budget.

Before proceeding with risk analysis, we need to understand what the risk is, and what is the importance of identifying risks in projects. Risk in simple is any event if occurred during PLC would have negative consequences, positive outcome, or uncertainty of outcome [2]. Simply identifying risks in early stage of the project will assist in developing strategies such as preventive controls and response controls for reducing or eliminating risk's probability or impact before it occurs, as if risks were not identified in the early stage of the project, this may affect all project's triple constraints (i.e. scope, schedule and cost) [1], which will affect project success.

2. LITERATURE REVIEW

Several studies presented risk identification and analysis of aircraft maintenance projects, which are similar to my project's area and sector. So, in this research paper we will review some of those studies to enhance future aircraft maintenance project's risk identification and analysis.

2.1. Framework for Aircraft Maintenance Estimation (FRAME)

The researchers have developed a new framework that uses qualitative and quantitative characterization to assist MRO centers in enhancing project's planning and scheduling [3]. The new framework is based on an assessment of 372 maintenance projects, in which they confirm that the driving factor of maintenance projects is the unscheduled maintenance, which is also known as non-routine tasks [3]. The FRAME developed a method for data analysis that is known as 3-Dimensional Maintenance Data Analysis (3D-MDA), in which the dimensions are Space, Time, and Skill. Space refers to the aircraft work zone, time refers to the project work phase, while skill refers to the type of technicians required. This increases the accuracy of the estimations of the needed resources for planning and scheduling [3]. FRAME can be adopted in my organization by taking into account the 3D-MDA method when identifying and analyzing project risks.

2.2. The method of HHM-RFRM

The researchers have developed a new method that are divided into two stages known by HHM, then followed by RFRM [4]. HHM do analyze the essential characteristics of the project using several factors, and it is good for risk identification of large projects [4]. RFRM is divided into eight stages, which can summarized by a filtering tool that filters the risks in eight stages and produces only the important scenarios of risks [4]. HHM-RFRM can't be adopted in my organization as it is more suitable for MRO centers who perform the actual tasks on the aircraft.

3. METHODOLOGY

The best methods to be adopted to calculate the contingency budget in D-Check projects or any other projects would be divided into four stages, then presenting the results of the stages in tables.

3.1. First Stage: Using brainstorming, expert judgement, scenario analysis, or SWOT analysis to identify potential risks.

3.2. Second Stage: Using bow-tie analysis to identify preventive controls and response controls.

3.3. Third Stage: Using risk matrix to indicate the probability and impact of each risk with using percentage or rating instead of low-mid-high.

3.4. Fourth Stage: Calculating the Expected Monetary Value (EMV) for all risks to calculate the contingency budget to cover any cost impact on the project.

4. RESULTS AND DISCUSSION

After using the first stage of brainstorming, and expert judgement to identify the risks that might causes budget overrun or affects all project's triple constraints (i.e. scope, schedule and cost) [1] as shown in Table 2. Then, followed by using bow-tie analysis as second stage to identify the preventive and response controls as shown in Table 2. Furthermore, after using risk matrix as identified in Table 1 in the third stage to indicate the percentage of the probability and impact of each risk as shown in Table 2. Lastly, the fourth and last stage is to calculate the EMV by multiplying the percentage of the probability by the cost impact for each risk, then summing-up all the EMV for each risk to get the total EMV, which will represent the contingency budget of the project as shown in Table 3.

Table 1		Risk Matrix Ratings					
Impact	3. Major (90% = 0.9)	Medium (0.09)		High (0.45)		High (0.81)	
	2. Med (50% = 0.5)	Low (0.05)		Medium (0.25)		High (0.45)	
	1. Minor (10% = 0.1)	Low (0.10)		Low (0.05)		Medium (0.09)	
		1. Low (10% = 0.1)		2. Med (50% = 0.5)		3. High (90% = 0.9)	
		Probability					

Table 2

Risk Register

Risk Information			Risk Controls			Risk Scoring ¹	
#	Risk Description	Risk Triggers ²	Potential Impacts ³	Preventive Controls	Response Controls	Probability	Impact
1	Severe Corrosion on Aircraft Structure	Rain and Humidity	Cost and Schedule	Park the Aircraft Inside Climate Controlled Hangar	Repair Corroded Panels	2 (0.5)	3 (0.9)
2	Extra Test Flights Required	Ground Tests Failure	Cost and Schedule	Perform All Ground Tests with Flight Simulation Tests	Limit the Extra Flights to Two Only	1 (0.1)	3 (0.9)
3	Delivery of Modifications Materials Delayed	Late Purchase Order	Cost and Schedule	Order the Parts As Soon As the Projects Starts	Find Alternative Seller at High Cost	1 (0.1)	2 (0.5)
4	Bad Aircraft Paint Quality	Inexperienced Paint Center	Quality of Work	Evaluate the Paint Center Prior Selection	Place Penalty on the Contractor	1 (0.1)	1 (0.1)

¹ The Rating of each risk in term of Probability and Impact depending on Risk Matrix rating.

² The factors that triggers or causes the risk to occur.

³ The potential impacts such as schedule, quality of work, or cost if the risk occurred.

Table 3

Risk Contingency Budget Using EMV Technique

Seq	Risk Description	Probability (P)	Cost Impact (Ic)	Risk Contingency (P*Ic)
1	Severe Corrosion on Aircraft Structure	0.5	\$ 10,000.00	\$ 5,000.00
2	Extra Test Flights Required	0.1	\$ 5,000.00	\$ 500.00
3	Delivery of Modifications Materials Delayed	0.1	\$ 2,000.00	\$ 200.00
4	Bad Aircraft Paint Quality	0.1	\$ - 5,000.00	\$ - 500.00
Total EMV			\$ 12,000.00	\$ 5,200.00

The calculated budget in the APM research was \$ 26,180.00 without a contingency budget. Therefore, after identifying the risks that might causes budget overrun or affects all project's triple constraints, then indicating the percentage of the probability and impact of each risk as shown in Table 2, the EVM was calculated for each risk by relying on percentage of the probability for the risk to occur and the impact to project if the risk occurred, then summing-up the cost of each risk contingency with total of \$ 5,200.00 as shown in Table 3, which represents the total contingency request of the project. This amount should be added to project budget under risk contingency budget clause. So, the total project budget should be \$ 26,180.00 plus \$ 5,200.00, which ends up with total project budget of \$ 31,380.00.

5. REFERENCES

1. Franklin, T. (2008, August). Adventures in agile contracting: Evolving from time and materials to fixed price, fixed scope contracts. In *Agile 2008 Conference* (pp. 269-273). IEEE.
2. Hopkin, P. (2018). *Fundamentals of risk management: understanding, evaluating and implementing effective risk management*. Kogan Page Publishers.
3. Dinis, D., Barbosa-Póvoa, A., & Teixeira, Â. P. (2019). A supporting framework for maintenance capacity planning and scheduling: Development and application in the aircraft MRO industry. *International Journal of Production Economics*, 218, 1-15.
4. Zhu, J., Liu, B., Dong, P., & Zeng, L. (2021, March). Quality-Risk Identification and Screening of Aircraft Major Overhaul Project Based on HHM-RFRM. In *Journal of Physics: Conference Series* (Vol. 1827, No. 1, p. 012194). IOP Publishing.