



جامعة الجميع الذكية  
EVERYONE'S SMART UNIVERSITY

## Everyone's Smart University

### Project (Spring 2021)

|              |                            |               |
|--------------|----------------------------|---------------|
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Section

Master

Date

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Course Code

(PMG510)

## Project Risk Management

### Instructions:

- اخر 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 الانجليزية.
- 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 بالمرحلة 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 لاتستدعي 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.

لاتنس استخدام أسماء تصف طبيعة المخاطر بصورة فعالة – قم باستخدام كلمات تصف الحادثة الخطرة وتشير الى 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..

## **Project's Monitoring progress risk management**

### **1. Introduction**

Risk is the potentiality of something terrible event. Risk means uncertainty regarding the consequences of activity concerning something that people value (such as health, well-being, wealth, property, or the environment). According to ISO 31000, risk is the “effect of uncertainty on objectives” and an effect is a positive or negative deviation from what is expected. Risk management is the pinpointing, assessment, and prioritization of risks following that coordinated and cost-effective application of resources to minimize, monitor, and control the likelihood or impact of unfortunate events or maximize opportunities' success.

The King Abdullah Financial District (KAFD) is a master-planned development in Riyadh to become the city's new central business district. Including approximately 850,000 sqm NLA of office space, 115,000 sqm GLA of retail, 1,200 residential units, and 2000 hospitality keys in real estate growth, KAFD is a vital enabler of the KSA 2030 vision. This vast property is divided into 129 separate plots, each with varying degrees of completion. The development will be linked to the city's rapid bus, metro, and major highway networks. Once completed, KAFD will be one of the most popular destinations in Riyadh, Saudi Arabia, and will set a new standard for urban living. The project is government-sponsored and ongoing. The megaproject will cover 1.6 million square meters of land and is expected to cost \$12 billion when completed.

The company scope in this project is to provide the management of testing and commissioning of Mechanical, electrical, and plumbing (MEP) systems. As a project engineer, Due to a large amount of equipment, tracking and monitoring the progress of completed works without proper tools is challenging. It may delay delivering the project on time and thus extra costs. Risk management is required to identify the potential risks and provides appropriate controls and responses to minimize rules violation, mitigate hazard risks, control the uncertainties, and exploit opportunities.

## 2. Literature Review

The risk management process is executed in four steps as follows; risk identification, risk assessment, risk management, and risk monitoring respectively (Ennouri, W, 2013). In other hand, Paul Hopkin has explained the process in more details using the 8Rs and 4Ts of risk management (2018). These stages are recognition of risks, rating of risks, ranking against risk criteria, responding to significant risks, resourcing controls, reaction (and event) planning, reporting of risk performance, and reviewing the risk management system.

There is a different Techniques of Risk assessments to identify the probability and impact of risk such as brainstorming, qualitative approach, quantitative approach, root cause analysis, SWOT analysis, Probability and Impact Matrix, What-if analysis, Fault tree analysis (FTA), Failure mode event analysis (FMEA), Hazard operability analysis (HAZOP), Incident BowTie, and Event Tree (Stephen N. Luko, 2014). Expected monetary value (EMV) analysis is a mathematical concept that estimates the average outcome when the future involves situations that may or may not happen (R. C. WALKER, 2011).

## 3. Methodology

Brainstorming is the first step to identify the potential risk with the aid of 8Rs and 4Ts process. The list of risks is demonstrated using the qualitative risk assessment method. Results are then recorded in a risk assessment matrix to rate the value of probability and impact of risks. According to that, by multiplying the probability with impact will result the severity value which will assist to determine the required actions to control the risks.

At last, a quantitative risk assessment which is Expected monetary value (EMV) is used to determine the risk contingency budget to cover the impact on the project. The results are found by mathematical calculations of probability and impact. It calculates the average outcome of all future events that may or may not happen.

#### 4. Discussion and results

As illustrated before, the list of risks is recorded in the risk matrix table with the assessment of probability and impact as follows:

| # | Risk Activity                    | Impact                                                                                                      | Risk Rating |   |     |        | Controls                                                                                                                                                                                                                                                                                      |
|---|----------------------------------|-------------------------------------------------------------------------------------------------------------|-------------|---|-----|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |                                  |                                                                                                             | P           | S | P*S | RR     |                                                                                                                                                                                                                                                                                               |
| 1 | No site preparation              | <ul style="list-style-type: none"> <li>Financial loss</li> <li>Time delays</li> <li>Product loss</li> </ul> | 4           | 4 | 16  | High   | <ul style="list-style-type: none"> <li>Ensure work permit and supporting documents are signed and approved.</li> <li>Approved method statement to be available at the site, and Job Specific hazards and control measures to be communicated to all personnel involved in the job.</li> </ul> |
| 2 | No Personal protection equipment | <ul style="list-style-type: none"> <li>Serious injuries</li> <li>Time delays</li> </ul>                     | 3           | 4 | 12  | High   | <ul style="list-style-type: none"> <li>Ensure safety officers are available at site work.</li> </ul>                                                                                                                                                                                          |
| 3 | Not tracking the work progress   | <ul style="list-style-type: none"> <li>Time delays</li> <li>Effort's loss</li> </ul>                        | 2           | 3 | 6   | Medium | <ul style="list-style-type: none"> <li>Using proper tools to track and follow up the work progress.</li> </ul>                                                                                                                                                                                |
| 4 | Suppliers delay deliveries       | <ul style="list-style-type: none"> <li>Financial loss</li> <li>Time delays</li> <li>Product loss</li> </ul> | 2           | 4 | 8   | Medium | <ul style="list-style-type: none"> <li>Coordinates with more than one supplier.</li> </ul>                                                                                                                                                                                                    |
| 5 | Natural disasters                | <ul style="list-style-type: none"> <li>Serious injuries</li> <li>Time delays</li> </ul>                     | 1           | 5 | 5   | Medium | <ul style="list-style-type: none"> <li>Working outdoor is not allowed. Evacuation if needed.</li> </ul>                                                                                                                                                                                       |
| 6 | Inexperienced workers            | <ul style="list-style-type: none"> <li>Injuries</li> <li>Time delays</li> <li>Financial loss</li> </ul>     | 4           | 1 | 4   | Low    | <ul style="list-style-type: none"> <li>Safety induction. Technical training.</li> </ul>                                                                                                                                                                                                       |

The risk rating is based on the following classification chart:

|          |   | Probability |    |    |    |    |
|----------|---|-------------|----|----|----|----|
|          |   | 1           | 2  | 3  | 4  | 5  |
| Severity | 1 | 1           | 2  | 3  | 4  | 5  |
|          | 2 | 2           | 4  | 6  | 8  | 10 |
|          | 3 | 3           | 6  | 9  | 12 | 15 |
|          | 4 | 4           | 8  | 12 | 16 | 20 |
|          | 5 | 5           | 10 | 15 | 20 | 25 |

- 1-4 Attention required – Low risk
- 5-9 Corrective measure required – Medium risk
- 10-16 Corrective actions required – High risk
- 20-25 Elimination of hazard is required serious risk

Based on the risk matrix, the risk rating is measured and the control actions were determined to reduce the level of risk. However, the Expected monetary value (EMV) is calculated to find the total amount of contingency budget based on mitigation plan as follows:

| #            | Risk Activity                    | Mitigation                                                           | P   | IC              | P*IC            |
|--------------|----------------------------------|----------------------------------------------------------------------|-----|-----------------|-----------------|
| 1            | No site preparation              | Stop the work immediately and leave                                  | 80% | \$5000          | \$4,000         |
| 2            | No Personal protection equipment | Safety officers to punish the rules Violators and to aid the injured | 60% | \$3000          | \$1,800         |
| 3            | Not tracking the work progress   | Urgent meeting to find the proper solution                           | 40% | \$4000          | \$1,600         |
| 4            | Suppliers delay deliveries       | Coordinate with the other suppliers                                  | 40% | \$3500          | \$1,400         |
| 5            | Natural disasters                | Stop the work immediately and leave to the nearest assembly point    | 20% | \$9000          | \$1,800         |
| 6            | Inexperienced workers            | Change their task and to join under experienced workers              | 80% | \$1000          | \$800           |
| <b>Total</b> |                                  |                                                                      |     | <b>\$25,500</b> | <b>\$11,400</b> |

P: Probability

IC: Cost impact

P\*IC: Risk contingency

From the previous table, it might be thought that \$25,500 is needed to manage all risks, but this doesn't seem right. Amongst all the known risks, just some will occur. The risks that don't occur will add their EMV to the budget, while the risks that do occur will utilize the cash from the contingency budget. Hence, \$11,400 is needed to cover all identified risks.

The EMV works fine to determine the contingency reserve when having various risks because the higher identified risks, the range of the contingency reserve will be better among risks.

With the aid Failure Modes and Effects Analysis (FMEA), the risk matrix can be developed to include the risk ease of detection after determining the response controls as follows:

| # | Risk Activity                    | Probability | Severity | Detection | RPN |
|---|----------------------------------|-------------|----------|-----------|-----|
| 1 | No site preparation              | 4           | 4        | 1         | 16  |
| 2 | No Personal protection equipment | 3           | 4        | 1         | 12  |
| 3 | Not tracking the work progress   | 2           | 3        | 3         | 18  |
| 4 | Suppliers delay deliveries       | 2           | 4        | 3         | 24  |
| 5 | Natural disasters                | 1           | 5        | 5         | 25  |
| 6 | Inexperienced workers            | 4           | 1        | 2         | 8   |

Risk priority number (RPN) is calculated by multiplying the three scoring columns: Severity, Probability, and Detection. Low values are better and high values are worse. Detection score is easy to detect for the lowest values with the current controls while is the highest values are hard to detect.

## 5. References

1. International Organization for Standardization. (2018). ISO 31000 RISK MANAGEMENT
2. Ennouri, W. (2013). Risks management: new literature review, Polish Journal of Management Studies. Vol 8. pp. 288-297.
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6. D.R.Kiran. (2017). Total Quality Management: Key Concepts and Case Studies. Chapter 26 - Failure Modes and Effects Analysis. pp. 373-389.