Assignment:

Subject:

Risk and Disaster Management

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Submitted to:

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Q1 Answer: A hazard is any biological, chemical, physical or radiological agent that has the potential to cause harm. A hazardous event is an incident or situation that can lead to the presence of a hazard (what can happen and how). Risk is the likelihood of identified hazards causing harm in exposed populations in a specified timeframe, including the magnitude of that harm and/or the consequences.

- **Biological hazards**

These hazards include frank and opportunistic pathogens such as:

• bacteria;

• viruses;

• protozoa; and

• helminths

- **Chemical hazards**

A chemical hazard can be considered as any chemical agent that may compromise water safety or suitability.

- **Physical hazards**

Physical hazards may affect water safety by posing a direct risk to health (e.g. through

choking), through reducing the effectiveness of treatment and in particular residual disinfectants or because consumers find the water unacceptable and use alternative, more contaminated water sources. The most common physical hazard in water is sediment within the water supply. Sediments and particulates can also include pipe materials, pipe liner materials, sloughed biofilms or iron and manganese films. Suspended or suspended sediments can contain toxic chemicals or can have pathogens attached and can co-transport other hazards.

- **Radiological hazards**

Radiological contamination of drinking-water generally occurs as a result of contamination by man-made sources of radiation. Contamination can arise from:

• naturally occurring radioactive species in drinking-water sources;

• the contamination of water from the mining industry; and

• radionuclides from the medical or industrial use of radioactive materials.

Threat:

A threat is a possible danger that might exploit a vulnerability to breach security and therefore cause possible harm. A threat can be either "intentional" or "accidental" or otherwise a circumstance, capability, action, or event.

The definition of a threat is a statement of an intent to harm or punish, or a something that presents an imminent danger or harm. If you tell someone "I am going to kill you," this is an example of a threat. A person who has the potential to blow up a building is an example of a threat.

- **Two Types of Threats**

There are two types of threats that are used differently in different contexts. They are:

- General threats: the amount danger in a given circumstance; and
- Specific threats: a specific object, situation, behavior, etc., that corresponds to a rising level of danger within a given context.

Difference between Hazard and Threat

Sometimes, hazard and threat might be used interchangeably. Consider the example of a flock of birds flying close to an aircraft. This flock is both a hazard and a threat. However, because the concept of a threat is vaguer than the concept of a hazard, a threat is not always a hazard. Consider the example of: migrating birds, which are a hazardous source but not an actual hazard, or

fatigue, which is a contributing factor.

Q2 Ans:

In simple terms, risk is the possibility of something bad happening. Risk involves uncertainty about the effects/implications of an activity with respect to something that humans value (such as health, well-being, wealth, property or the environment), often focusing on negative, undesirable consequences. Many different definitions have been proposed. The international standard definition of risk for common understanding in different applications is "effect of uncertainty on objectives.

- **Classification of Risks based on resources**

Risk classification refers to the determination of whether a risk is preferred, standard or substandard based on the underwriting or risk evaluation process.

Standard risks are those who bear the same health, habit and occupational characteristics as the persons on whose lives the mortality table used was compiled. Basically, a standard risk is simply an average risk.

If a substandard risk presents an above average risk of loss, preferred risks present a below average risk of loss. In an effort to encourage the public to practice better health, the insurance industry has developed preferred risk policies with lower (or preferred) premium rates. Those applicants who may be eligible for preferred risk classification are those who:

work in low risk occupations and do not participate in high-risk hobbies (scuba diving, sky diving, etc.), have a very favorable medical history, presently are in good physical condition without any serious medical problems, do not smoke and meet certain weight limitations.

About 90 percent of individuals covered are standard or preferred risks. Less than 2 percent of individuals applying are turned down for coverage completely. That leaves about 8 percent that fall somewhere in between.

More and more high-risk cases are becoming acceptable (and, also, many conditions once considered high risk are now, on the basis of more experience, being accepted as standard). Today it is a rare case when coverage cannot be found anywhere for almost any risk.

Most insurers offer special but higher rates to persons who are not acceptable at standard rates because of health, habits or occupation. This is sometimes called substandard or extra risk insurance.

Risk management is an essential activity of project management. It is important to classify risks into appropriate categories. Risks can be classified into following 13 categories:

1. Operational Risk: Risks of loss due to improper process implementation, failed system or some external events risks. Examples can be Failure to address priority conflicts, Insufficient resources or No proper subject training etc.

2. Schedule Risk: Project schedule get slip when project tasks and schedule release risks are not addressed properly. Schedule risks mainly affect on project and finally on company economy and may lead to project failure.

3. Budget Risk: Wrong budget estimation or Project scope expansion leads to Budget / Cost Risk. This risk may lead to either a delay in the delivery of the project or sometimes even an incomplete closure of the project.

4. Business Risk: Non-availability of contracts or purchase order at the start of the project or delay in receiving proper inputs from the customer or business analyst may lead to business risks.

5. Technical Environment Risk: These are the risks related to the environment under which both the client and the customer work. For example, constantly changing development or production or testing environment can lead to this risk.

6. Information Security Risk: The risks related to the security of information like confidentiality or integrity of customer's personal / business data. The Access rights / privileges failure will lead to leakage of confidential data.

7. Programmatic Risks: The external risks beyond the operational limits. These are outside the control of the program. These external events can be Running out of fund or Changing customer product strategy and priority or Government rule changes etc.

8. Infrastructure Risk: Improper planning of infrastructure / resources may lead to risks related to slow network connectivity or complete failure of connectivity at both the client and the customer sites. So, it is important to do proper planning of infrastructure for the efficient development of a project.

9. Quality and Process Risk: This risk occurs due to;

Incorrect application of process tailoring and deviation guidelines

New employees allocated to the project not trained in the quality processes and procedures adopted by the organization

10. Resource Risk: This risk depends on factors like Schedule, Staff, Budget and Facilities. Improper management of any of these factors leads to resource risk.

11. Supplier Risk: This type of risk may occurs when some third party supplier is involved in the development of the project. This risk occurs due to the uncertain or inadequate capability of supplier.

12. Technology Risk: It is related to the complete change in technology or introduction of a new technology.

13. Technical and Architectural Risk: These types of risks generally generally leads to failure of functionality and performance. It addresses the hardware and software tools & supporting equipments used in the project. The risk for this category may be due to — Capacity, Suitability, usability, Familiarity, Reliability, System Support and deliverability.

Q3 Ans:

3.1 Abstract:

Performance Assessment of the public transportation system is gaining substantial importance and becoming a prerequisite to making the emerging urban life sustainable. Public transport usually refers to all available transportation modes which are envisioned to serve the public, regardless of the ownership or possession, provides mobility to all users, relieves congestion in the streets, and helps in creating and maintaining livable communities and environments. Performance Evaluation of Public Transport system is very much essential to understand the effectiveness of the plans in vogue as well as to devise plans for its improvement. Most of the major metropolitan cities of the world are presently witnessing rapid growth in industry, infrastructure, economic activities and population over the past few decades which make them more attractive to job seekers, causing major increase in personalized modes. As a result, the cities are subjected to increase in traffic congestion resulting in huge delays and environmental pollution. To tackle the huge transportation demand and to provide a sustainable environment there is a need for the provision of better public transportation facilities. To fulfill the high demand for better public transport system, there is a need to establish attractive, safe and highly sophisticated public transport systems.

3.2: Introduction:

Performance evaluation of public transport system requires understanding the terms on behalf of performance of the system to be evaluated. The evaluation can be done in two ways I) based on present perception of users about the service delivered ii) based on the feedback provided by experienced evaluation team. Performance evaluation is defined as the technique to evaluate how well or bad is the performance of a transit service is under the prevailing operating condition. The performance of transit system can be enumerated based on two distinct dimensions i.e., Service and Service quality. Service is described as “the business transaction that take place between a donor (Service provider) and Receiver (Customer) in order to produce an outcome that satisfies the customer” (Ramaswamy, 1996) . Whereas, Service quality gives the measure of how well the service level delivered to the commuter’s as per their expectation. Parasuraman

(1988) and Gronroos, (1984) defines service quality as a comparison between customer expectation and perception of service.

3.3: Literature:

Estimation of service quality in terms of user perception is purely based on psychological behavior of the commuters. It is necessary to understand the key parameters upon which transit performance depends, as these factors internally and externally affect the user perception and creates a perception of the transit system in the user's mind. The selection of factors differs from one public mode to another. Different researchers have given various numbers of factors to define the service quality. As below:

Table of Performance variables by different researchers

Researcher's Name	Type of Transit System	Service Quality Attributes
Parasuraman et al.(1985)	Bus, Train, Metro	Reliability, Assurance, Tangibles, Empathy and Reliability
TRB USA (1999)	Buses, Tram, Metro and Rai	Reliability, Competence, Access, Courtesy, Communication, Credibility, Security, Understanding of customer and Tangibles.
Chang, Hepu and Yu-Hern (1999)	Bus transit system	Safety, Comfort, Convenience, Operation, Social duty (Vehicle air pollution level, Vehicle noise level)
Y. Tyrinopolus and Antoniou (2008)	Bus and Metro	Service frequency, Service hour, Time table info, Behavior of personnel , Distance

3.4 Methodology:

Surveys and interviews are the most popular methods of primary data collection. The User perception data can be collected by conducting a Station/Stop Survey or Workplace survey by direct face to face interview or by using alternative (telephonic interviews) indirect techniques. Paper-and-Pencil Interview (PAPI) is very popular for data collection, in which an enumerator asks questions to the respondent by holding a printed set of questions. PAPI surveys should be carried out by taking proper precaution by randomly selecting a person from the

population, so that it eliminates the chance of nonresponsive and responsive biasness. At present internet based survey methods have taken over the place of PAPI method as it reduces the manpower, time and provide readymade scrutinized results. However, a major drawback of this method is its inability to cover of the population who are not familiar with the internet.

Survey scale selection:

Survey scale selection is solely based on the type of research work. Range of scales used is based on the type of data needed for research. The scale comes from psychological researchers, as suggested by "Rensis likert" . Most of the people used 10 point likert scale to evaluate the user perception by using a set of questions. Though researchers like Friman (2004) used a 9 point scale , Tyrinopoulous in 2008 used a ranked scale which ranges 1 to 4 , Eboli et al. (2009) used a 10 point likert scale and Putra (2013) used a 5 point likert scale [8]. It was observed that when the scale range increases it will enable us to grasp the detailed variation in data. Transportation researchers suggest using a constant scale for each variable in a set of questionnaire for better results and to avoid complex issues.

Performance evaluation models:

Major works on "performance evaluation" began after 1970; many of the transportation planners and researchers had started trying different approaches and techniques for developing different models to estimate the transit system performance in terms of user perception. Since service quality is a qualitative parameter hence modeling of qualitative parameters creates more difficulties. Service quality measurement models for different systems proposed by various researchers are discussed below:

A), SERVQUAL Model:

Parasuraman (1985) suggested a model for measuring service quality by measuring the gap between the service delivered and service received. It is mostly used by market researchers to identify customer satisfaction on behalf of service delivered. This model represents the service quality in terms of 10 dimensions namely, Reliability, Responsiveness, Competence, Access, Courtesy, Communication, Credibility, Security, understandability and Tangibles. But after 1988, these ten components were merged to formulate five distinct dimensions namely, Reliability, Assurance, Tangibles, Empathy, Responsiveness .These components are collectively called RATER. However, limitation of this model is SERVICE

QUALITY (SERVQUAL) factors are inconsistent and it is not incomprehensible for different applications.

B), Impact Score Technique (IST):

Federal Administration of the U.S (1999) developed a simple and effective measurement method toevaluate customer satisfaction for transit services termed as Impact Score Technique. The IST approach determines the relative impact of attributes on user satisfaction by measuring relative decrease in user satisfaction when there is a problem with the attributes. For each attribute the whole sample is divided into two categories, user who faced a recent problem and those who haven't faced any problem (within past 30 days). The gap between mean overall eratings of two groups is known as "Gap Score". A composite index is found out by multiplying gap score to problem incident rate. The impact score is obtained from this it listed in the descending order to identify top attributes that drives major satisfaction. This technique is one of the simple methods for the estimation of important attributes which can impact the satisfaction of the user and it would be easily understood by the operator as well. The limitation of this technique is that all the data have to be collected within the past 30 days.

C), Important Performance Analysis (IPA):

IPA was first introduced by Martilla (1977). IPA is also known as quadrant analysis which is used in many areas due to its ease of identification of different quality parameter that can lead to the improvement in Service quality. In IPA, user satisfaction is translated into Cartesian diagram where two lines perpendicularly divide it into four sections as shown in Figure 1. Where (Q) represents the average of average scores of level of implementation of all factors and (P) represents the average of average scores of the importance of all factors.

D), Customer Satisfaction Index (CSI):

Customer Satisfaction Index is a method to determine the level of satisfaction that has been achieved with respect to the service delivered. CSI was proposed by Supranto (1997). CSI can be computed by using the average value of the level of expectation and the performance of each service item. It enables estimation of service in terms of customer satisfaction in a very simple and systematic way based on the score provided by the customer but fails to take in account for the differences in user perception about different service aspects .Supranto suggested

rating for CSI ranges as very satisfied (0.81-1.00), satisfied (0.66-0.80), quite satisfied (0.51-0.65), less satisfied (0.35-0.50) and not satisfied (0.00-0.34).

E), Structural Equation Modeling (SEM):

Structural Equation Modeling (SEM) methodology is a powerful multivariate analysis technique in which asset of relationships between observed and unobserved variables are established. It is relatively new method which began in the 1970s (Fornell, 1981), it has been widely applied in various domain of research, including psychology, education, social science, economics, statistics, etc. SEM methodology refers to a series of statistical techniques such as factor analysis, path analysis and regression models which are used to analyze data. Over the years, there has been a rapid development of different software packages such as LISREL (Joreskog, 1988, 1989) and the AMOS (Arbuckle, 1995) which have greatly enabled the use and application of SEM techniques in diverse contexts. SEM tools consist of two parts, i) Latent variable model which describes the relation between the endogenous and exogenous latent variables and allows the direct ass essment of both path strength and their underlying impact among those variables. ii) Measurement model which depicts the correlation between latent and observed variables. Due to the popularity and simplicity in estimation, this method is used by various researchers. A. putra (2013) used SEM method for evaluation Bus service performance in terms of users expectation and satisfaction. Other researchers like Irfan (2012), Laura eboli (2012) used this method to identify transport performance in their respective countries.

3.5: Conclusion:

Among above discussed models, SERVQUAL model is one of the simplest models to enumerate the service quality but it isn't vastly used in transportation research domain as it fails to specify a proper model and its attributes are inconsistent. The IPA and CSI based models provide good results but are unable to give the reasons for the impact of each attributes on service quality, while Artificial Neural Network (ANN) and Fuzzy inference based methods presents better accuracy in analysis of service quality attributes, obvious drawback of ANN and fuzzy logic stems from the fact that it fails to yield any direct numerical model as an output. If one makes comparison on all the available models, it can be inferred that the Structure Equation Modeling (SEM) is one of the best modeling approach in the field of research on service quality measurement.

Q4 Ans:

Vulnerability: Mistakes happen, even in the process of building and coding technology. What's left behind from these mistakes is commonly referred to as a bug. While bugs aren't inherently harmful (except to the potential performance of the technology), many can be taken advantage of by nefarious actors—these are known as vulnerabilities. Vulnerabilities can be leveraged to force software to act in ways it's not intended to, such as gleaning information about the current security defenses in place. Once a bug is determined to be a vulnerability, it is registered by MITRE as a CVE, or common vulnerability or exposure, and assigned a Common Vulnerability Scoring System (CVSS) score to reflect the potential risk it could introduce to your organization. This central listing of CVEs serves as a reference point for vulnerability scanners.

A Security Vulnerability is a weakness, flaw, or error found within a security system that has the potential to be leveraged by a threat agent in order to compromise a secure network. There are a number of Security Vulnerabilities, but some common examples are:

Broken Authentication: When authentication credentials are compromised, user sessions and identities can be hijacked by malicious actors to pose as the original user. SQL Injection: As one of the most prevalent security vulnerabilities, SQL injections attempt to gain access to database content via malicious code injection. A successful SQL injection can allow attackers to steal sensitive data, spoof identities, and participate in a collection of other harmful activities.

Cross-Site Scripting: Much like an SQL Injection, a Cross-site scripting (XSS) attack also injects malicious code into a website. However, a Cross-site scripting attack targets website users, rather than the actual website itself, which puts sensitive user information at risk of theft.

Cross-Site Request Forgery: A Cross-Site Request Forgery (CSRF) attack aims to trick an authenticated user into performing an action that they do not intend to do. This, paired with social engineering, can deceive users into accidentally providing a malicious actor with personal data.

Security Misconfiguration: Any component of a security system that can be leveraged by attackers due to a configuration error can be considered a "Security Misconfiguration."

The Campus Vulnerability Assessment Team (CVAT) is a multi-disciplinary group which works collaboratively to resolve a number of inspection issues and to vet physical security requests. In addition, the Team works on enterprise wide safety, security, and vulnerability policies and protocols to address campus vulnerabilities. Objectives include:

1. Provide recommendations to Strategic Enterprise Risk Management and Compliance Committee and the Vice President for Finance and Administration/CFO UO for review and consideration for prioritization/resourcing
2. Propose new policies, procedures, technology, and enhancements to address campus vulnerabilities.
3. Make recommendations for funding high priority safety, security and vulnerability projects.
4. Manage protocols for departmental requests for panic buttons, security cameras, and security systems.

Team members include:

- Emergency Management & Continuity
- Office of Risk Management
- UO Police Department
- Environmental Health and Safety
- Campus GIS and Mapping
- Facilities Services
- Campus Planning & Real Estate
- Information Services
- Design & Construction
- University Fire Marshal
- University Housing