

## **Assignment**

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**Subject risk and disaster management**

**Q1: What is the difference between hazards and threats? Provide examples.**

### **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.

**Hazard:** A source of danger that may cause harm to an asset.

- A property, a situation, or a state.
- Not an event but a prerequisite for the occurrence of a hazardous event..
- Often, but not always, related to energy of some kind

A hazard in safety management s is a condition that poses danger to your organization, and can lead to an accident, incident, or other mishap if not mitigates.

A hazard satisfies ALL of the following conditions:

- **Is a dangerous condition**, such as an object, situation, circumstance, that **poses an unacceptable level of danger**
- **Occurs once** in the safety mishap lifecycle;
- **Can lead directly to risk occurrence** (i.e., safety mishap, accident, etc.) if not mitigated; and
- **Arise from hazard mechanisms**, such as initiating actions and hazardous sources.

**For example:** electricity, chemicals, working up a ladder, noise, a keyboard, a bully at work, stress, etc. A risk is the chance, high or low, that any **hazard** will actually cause somebody harm. **For example,** working alone away from your office can be a **hazard**.

**Threat:** Anything that might exploit vulnerability

- Any potential cause of an incident can be considered a threat
- Closely related to hazard
- A threat is a hazard, but a hazard need not be a threat
- **For example: The introduction of a better alternative** for an impersonal product: if a company has been selling the same product for years, without ever making any effort to interact with their customers and build trust, then the introduction of a better alternative

could be called a threat. This is because a portion of the company's current market could switch to the alternative, causing them to lose out on profits.

**Threat agent:** A person, organization, thing, or entity that acts, or has the power to act, to cause, carry, transmit, or support a threat.

- Who could want to exploit vulnerabilities, and how they might use them against the system
- Intention, capacity, and opportunity

### **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.

**Q2: Define risk and provide a classification of risk on its sources. Provide an example for each risk source.**

Although it is often used in different contexts, risk is the possibility that an outcome will not be as expected, specifically in reference to returns on investment in finance. However, there are several different kinds of risk, including investment risk, market risk, inflation risk, business risk, liquidity risk and more. Generally, individuals, companies or countries incur risk that they may lose some or all of an investment.

In an investor context, risk is the amount of uncertainty an investor is willing to accept in regard to the future returns they expect from their investment. Risk tolerance, then, is the level of risk an investor is willing to have with an investment - and is usually determined by things like their age and amount of disposable income.

Risk is generally referred to in terms of business or investment, but it is also applicable in macroeconomic situations. For example, some kinds of risk examine how inflation, market dynamics or developments and consumer preferences affect investments, countries or companies.

### **Classification of risk based on its sources**

Identifying risk sources provides a basis for systematically examining changing situations over time to uncover circumstances that affect the ability of the project to meet its objectives. Risk sources are both internal and external to the project. As the project progresses, additional sources of risk can be identified. Establishing categories for risks provides a mechanism for collecting and organizing risks as well as ensuring appropriate scrutiny and management attention to risks that can have serious consequences on project objectives.

## **Sources of Risk**

### **1. Commercial and strategic**

- Competition
- Market demand level
- Growth rate
- Technological change
- Stakeholder perception
- Private sector involvement
- Site acquisition

### **2. Economics**

- Discount rate
- Energy rates
- Exchange rate variation
- Inflation
- Population growth
- Commodity price

### **3. Contractual**

- Client problems
- Contractor problems
- Delays
- Insurance and indemnities
- Joint venture relation

### **4. Financial**

- Debit/ Equity ratio
- Funding sources
- Financing costs
- Taxation impact
- Interest rate
- Residual risks for government

### **5. Political**

- Parliamentary support

- Community support
- Government Endorsement
- Policy change
- Sovereign risk

## **6. Environmental**

- Amenity values
- Approval process
- Community consultation
- Degradation or contamination
- Endangered species

## **7. Social**

- Community expectation
- Pressure groups

## **8. Project initiation**

- Analysis briefing
- Functional specifications
- Performance objectives
- Evaluation program
- Stakeholder rules and responsibilities

## **9. Procurement planning**

- Industry capability
- Technology and obsolescence
- Private sector involvement
- Utility and authority approval
- Completion deadlines

## **10. Human factors**

- Estimation error
- Operator error
- Sabotage
- Vandalism

## **11. Natural events**

- Landslip/subsidence
- Earthquake
- Flood, lightning
- Fire, wind, weather

## **12. Systems**

- Communication or network failure
- Hardware failure, software failure

- Linkages between sub system
- Policies and procedure

### **13. Project delivery stages**

- Procurement and contractual
- Contract selection, client commitment
- Consultant/ contractor performance
- Negligence of parties
- Error in documentation

### **14. Construction and maintenance**

- Build ability, contractor capabilities
- Design and documentation
- Geotechnical condition
- Health and safety
- Material availabilities

### **15. Organizational**

- Industrial relations
- Resources shortage
- Scheduling, operational policies
- Management capability
- Personal skills
- Work practices

## **Q3: How would you assess the performance of transportation system of a city?**

### **Introduction**

Over the last few years, the public transport industry in many developing countries has been involved in a process of deep transformation. At present, personal mode usage is more than public transport mode, causes. Series of problems in daily life like, traffic congestion, delay, air pollution, noise pollution and large amount of energy wastage which has a negative impact on environment as well as on public health. A mobility requirement in metropolitan cities causes continuous growth of personalized vehicles leading to pollution and traffic congestion. To reduce the current pollution level, congestion and make the cities environment friendly, it is necessary to encourage the commuters to use the public transport system. To provide the desired service delivery level for public transport, it is essential to evaluate the existing transport systems using a reliable performance evaluation technique which can eventually help in enhancing the transit service delivery to their trusted passengers.

### **Performance Evaluation**

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 good 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

### **Factors Effecting Service Quality**

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.

Various number of factors to define the service quality. The different service attribute dimensions are described in

Table 1.

<b>Researcher’s Name</b>	<b>Type of Transit System</b>	<b>Service Quality Attributes</b>
Parasuraman et al.(1985)	Bus, Train, Metro	Reliability, Assurance, Tangibles, Empathy and Reliability
TRB USA (1999)	Buses, Tram, Metro and Rail	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 and time to access and regress trip, Waiting condition at stop ,Driver behavior, Information in vehicle, Accessibility w.r.t Disabilities, Transfer distance, Transfer waiting time, Info regarding transfer
Margarita Friman (2009)	Buses	Frequency, Travel time, Punctuality, price, Information, Cleanliness, Bus comfort, Staff behavior, Seat availability, Bus stop security, Safety from accident, On board security, Bus stop condition and Info bus stop
Eboli and Mazzulla (2009)	Buses	Route characteristics, Service characteristics, Service reliability, Comfort, Cleanliness, Fare, Information, Safety and security, Personnel and Customer service
Sudin Bag and Som Sankar Sen (2012)	Metro	Air condition & lighting, Seating and free space, Inside atmosphere, Parking space, Smart card and multi ride facilities, Staff behavior, Management attitude, Helpfulness of staff, Attentiveness and resolve quarries,
Marta Rajo, Harman, Luigi and Angel (2012)	Bus and Train transit system	Journey time, frequency, Condition of vehicle, Route , Number of intermediate stop, Bus stop location, Connection



		with other transport mode, Time table info, Possibility of buying ticket at home, Journey distance, Cost of journey, Number of delay bus and train services, Average speed of journey,
Adris.A.Putra (2013)	Bus Transit System	Safety, Accessibility, Affordable Tariff, Capacity, Regularity, Swift and fast, On time, Integration, Efficent, Easyness, Orderly, Security, Cozy, Low Pollution,

**Method of collecting user perception data**

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 eliminate 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.

**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.

**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 [9].

### **Impact Score Technique (IST)**

Federal Administration of the U.S (1999) developed a simple and effective measurement method to evaluate 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 ratings 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

### **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.

### **Conclusion:**

Among above discussed models, SERVQUAL model is one of the simplest model to enumerate the service quality but it isn't vastly used in transportation reasearch 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 modelling approach in the field of research on service quality measurement.

## **QUESTION NO 4**

### **ANSWER;**

#### **SECURITY VULNERABILITIES OF A UNIVERSITY CAMPUS:**

Sometimes it seems like the security challenges facing American colleges and universities are never-ending.

Students and others share user information. Campus visitors pop USB sticks into networked machines. Hackers find their way into an internal network through carelessly discarded information from an open screen or from an infected workstation.

keep campus security people up at night, and big challenges that schools should address to make themselves more resistant to cyber threats

#### **Phishing and Social Engineering Attacks**

One of the biggest challenges with university cybersecurity is the sheer amount of hacking that goes on in these environments. Schools have to deal with a unique mix of user levels, including students who are often young, and relatively trusting, and are not employees of the organization — so they're less controlled.

For example, research shows a full 90% of malware attacks originate through e-mail. Various types of spoofing and spear-phishing campaigns entice students and others to click on illegitimate links that can usher in a Trojan Horse to do damage to a network system, or compromise the security of information. Many of these kinds of phishing are cost, high — which leads to an inundation of hacker activity that schools have to keep in top of, by somehow segmenting network systems, by shutting down compromise parts of the system, or by some other high-tech means.

With this in mind, better security often starts with identifying separate pools of users — for example, administrative staff versus faculty and students, and then customizing controls and access for each of these groups individually.

#### **The IT Crunch: Limited Resources**

The challenge of limited resources and funding for university cybersecurity generally speaks for itself. The above kinds of network monitoring and cybersecurity engineering have significant costs attached to them, and many universities simply find it difficult allocate the manpower or the funding to address cybersecurity issues.

#### **Regulatory Burdens and Secure Data Efforts**

Another part of this challenging cybersecurity environment is that schools and universities have big compliance burdens under many different types of applicable regulation.

Some campus leaders tend to focus on items like NIST 800-171 and the use of controlled unclassified information, just because there is a deadline on for this particular type of compliance right now.. However, regulations like

FERPA are also critical. Even HIPAA puts pressure on schools to tighten up cybersecurity, since as healthcare providers, schools may hold student health data. Third-party cloud providers often offer FEDRAMP certification and other qualifications for cybersecurity on their side of the fence — but that doesn't fully bring a university into compliance unless it can bring its own internal systems up to standards.

### **System Malware — Zero Day Vulnerabilities and More**

Universities and colleges also have to anticipate situations where hackers may exploit existing system vulnerabilities. They have to look at continuing support for operating systems and other technologies. There is a reasonable expectation that manufacturers will make adequate security available, but this doesn't absolve the university of having to look for security loopholes and close them. This means evaluating architectures — for example, can hackers get host names, IP addresses and other information from devices like printers?

It also means using multi-factor authentication to control user activity. It means understanding how malware will enter a system, and anticipating attacks. The good news is that modern security tools go well beyond the perimeter of a network to seek out harmful activity if they are set up right and controlled and observed well, they can dramatically decrease risk.

### **Protecting Personally Identifiable Information**

At the heart of many of these cybersecurity efforts is the daunting struggle to protect all sorts of personally identifiable information, from simple student identifiers to financial data and medical data, from grades to Social Security numbers and items that identity thieves might use. The above-mentioned regulations are part of the drive to secure this type of data, along with more general standards and best practices for enterprise. Simply put, data breaches cost money, both in damage control, and in the reputation of the school itself.

In some ways, this ongoing data vigilance is hard for schools, because the academic world isn't necessarily into strict control of information. But it's also hard in a practical sense, because so many cybersecurity architectures just can't handle modern challenges, like a WannaCry infiltration or other attacks that exploit common vulnerabilities. Many schools have up to a dozen or more security tools