Assigment

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Question#1:

Hazard:

Anything that has the potential to cause harm, ill health and injury , damage to property , products or the environment, production losses or increase liabilities

Hazards Examples:
At workplace categorized: Physical, Chemical, Biological & Physcosocial

Chemical:

- Hydrocarbon under pressure
- Smoke
- Toxic material
- Volatile fluids in tanks

Physical:

- Moving road tankers / vehicles
- Elevated objects
- Noise
- People working at heights
- High voltage

Biological:

- Toxicological lab (catering facility at distant work station).

Physcosocial:

- Working outside the country without family members.

Threat:

A possible cause that will release the hazard to become a top event-includes thermal, biological, electrical, chemical, kinetic, climatic, radiation or human factors.

Top events like (Loss of containment, Electrical shock, Fall from heights, Exposure to toxic material, Exposure to radioactive material, Effluent discharge into waterways, Emissions of toxic gases).

Threat examples:

- High temperature
- Corrosion

- Bacteria
- Overpressure
- Erosion
- High voltage
- Ultraviolet radiation
- Environmental conditions
- Human incompetence
- Design / process unknowns

Question#2:

A: Definition of Risk:

Definition of risk from different Industries and standards:
"[Risk is the] combination of the risk of exposure and the impact = combination of (likelihood of the threat being able to expose an element(s) of the system) and impact"
"[Risk is] A probability or threat of damage, injury, loss, or any other negative occurrence that is caused by external or internal vulnerabilities, and that may be avoided through preemptive action."
[Risk is] An uncertain event or set of events which, should it occur, will have an effect on the achievement of objectives; a risk is measured by a combination of the probability of a perceived threat or opportunity occurring and the magnitude of its impact on objectives.
[Risk is] An ongoing or upcoming concern that has a significant probability of adversely affecting the success of major milestones.[Risk is] The likelihood of variation in the occurrence of an event, which may have either positive or negative consequences.
[Risk is] An uncertain event or set of events that, should it occur, will have an effect on the achievement of objectives. A risk is measured by a combination of the probability of a perceived threat or opportunity occurring, and the magnitude of its impact on objectives.
[Risk is] A possible event that could cause harm or loss, or affect the ability to achieve objectives. A risk is measured by the probability of a threat, the vulnerability of the asset to that threat, and the impact it would have if it occurred. Risk can also be defined as uncertainty of outcome, and can be used in the context of measuring the probability of positive outcomes as well as negative outcomes.

B-Classification of Risk:

Uncertain events can have both a positive and a negative effect: on the one hand, in fact, they are a threat to the achievement of business objectives, on the other hand can become a significant source of opportunities for companies able to understand, anticipate and manage them. According to1, *risks* are *“events with negative impacts that can harm the creation of*

business value or erode the existing one" while *opportunities* are *"events with positive impact that may offset negative impacts"*. The opportunities are chances that an event will occur and positively affect the achievement of objectives, contributing thus to the creation of value or preserving the existing one. Management needs to assess the opportunities, reconsidering its strategies and processes of setting goals and developing new plans to catch benefits derived from them.

An inherent risk can so be defined as "the possibility that an event occurs and have a negative impact on the achievement of objectives" while the control can be defined as "any means used by management to increase the likelihood that the business objectives set are achieved", mitigating the risks in an appropriate manner. In this context, a hazard is a "potential source of risk" while a residual risk is the "risk that still remains after mitigations".

Along with these definitions, it is possible to organize the different types of risks in different classes and their possible combinations. In Table 7.1 first example of classification is shown, based on two characteristics that relate the origin and generation of the risk (organizational perimeter) with the possibilities of intervention (controllability of risk).

Table 7.1 Example of risk classification by perimeter

		Controllability		
Organization		*Controllable*	*Partially controllable*	*Uncontrollable*
	Internal	Quality and cost of products	Environmental impacts	Incidents and accidents
	External	Technological progress	Demand variation	Natural disasters

Further classifications can also be taken from the already mentioned risk management models, where the descriptive categories are represented as a function of different objectives and decision-making levels (Table 7.2).

Table 7.2 Example of risk classification by target

Model	Dimension	Classes
Risk Management Standard2	Level of interaction (internal and external)	- Strategic risks (partner and market) - Financial risks (economic-financial cycle) - Operational risks (process) - Potential risks (social and territorial environment)
Strategy Survival Guide3	Decisional level	- External risks (PESTLE - Political, Economic, Socio-cultural, Technological, Legal/regulatory,

		Environmental) - Operational risks (delivery, capacity and capability, performance) - Change risks (change programs, new projects, new policies)
FIRM Risk Scorecard[4]	Area of impact	- Infrastructural risks - Financial risks - Market risks - Reputational risks
Enterprise Risk Management[5]	Area of impact	- Strategic risks - Operational risks - Reporting risks - Compliance risks

Developing the classification to an extended level and considering all the sources of uncertainty that affects business targets, vulnerability of organizations can be assessed on five different areas (Table 7.3).

Table 7.3 Risk classification by organization

Risk Category	**Risk factors**
Demand (Customers)	- Number and size of customers - Changes in number and frequency of orders - Changes to orders - Seasonal and promotional effects - Forecasting - Warehouses and inventory - Level of innovation and competition - Life cycle of the product - Timing and mode of payment - Retention rate
Offer (Suppliers)	- Number and size of suppliers - Level of quality and performance - Level of flexibility and elasticity - Duration and variability of lead time - Length and mode of transfers - Forecasting and planning - Just-in-Time or Lean approaches - Cost efficiency - Price levels

Table 7.3 Risk classification by organization

Risk Category	Risk factors
	- Outsourcing - Internationalization - Disruption
Processes (Organization)	- Flexibility of production-distribution systems - Variability in process management - Variability in process performance - Level of productivity - Capacity - Handling - Operational and functional failures - Redundancy of backup systems (quantity and quality) - Profit margins - Technological standards - Technological innovation of product and process - Product customization
Network and collaboration (Relations)	- Trust and interdependence among partners - Level of collaboration - Design and development of relations - Level of integration - Level of service - Opportunism and information asymmetry in transactions - Bargaining power - Strategic objectives and mission - Corporate cultures - Business Logic - Relationship and stakeholder engagement - Social and administrative responsibility - Availability and reliability of information systems - Intellectual property
Environment (Externalities)	- Regulations - Policies - Laws - Taxes - Currency - Strikes - Natural events - Social events (i.e. terrorism)

Question#3:

Abstract:

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. In this regard, it is essential to conduct a thorough evaluation of public transport modes. This information gives an overview and presents the possible ways to identify and measure the performance of public transit system. It presents the definition and literature in respect of different measurement models towards the public transit performance assessment coupled with comparative study of different measurement models that can be used for performance evaluation.

So key word for this information is performance evaluation, public transit and evaluation process.

For assessment of transpiration system it's required to introduce the transportation system problems like below:

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. Mobility requirements in metropolitan cities cause 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. There we will discuss reliable methodologies to evaluate the public transport with respect to user perception.

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 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.

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. Different researchers have given various numbers of factors to define the service quality. The different service attribute dimensions are described in below table

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

		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 services
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, Harnan, 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, Efficicent, 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 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 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.

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.

Importance

Minor priority 1	Maintenance achievement 2
Low 4 Q	Excessive 3 X

Implementation (Performance/Satisfaction)

Figure 1: Cartesian Diagram or IPA Diagram (Supranto, 1997)

It can be used for comparing two or more systems. This method does not reflect the dependence between two or more variables and effect of the presence or non-presence of different variables on overall service quality.

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).

F), Ordered Logit Model:

The ordered logit models are regression models for ordinal dependent variables and the genesis behind using this model is to understand how well that output can be predicted by the responses to other questions. This model was used by Tyrinopoulos and Antoniou (2008) for interpretation of the quality implications of the variability of the users' perceived satisfaction across operators in Greece. Laura Eboli and Gabriella Mazzulia introduced discrete choice logit models to calculate the probability of choice of some alternative transit services and determined the importance of each service aspect. Cinzia Cirillo et al. investigated the heterogeneity of transit users in perceiving service quality through a mixed logit model with a non -parametric distribution of the coefficients. Although ordered logit model can be used in rating systems (poor, fair, good, excellent), opinion surveys (strongly agree, agree, neutral, disagree, strongly disagree), and Ranking (senior, junior, sophomore, freshman).

G), 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.

H), Soft Computing Techniques:

At present soft computing techniques are also being used by researchers for performance appraisal of different transit system. Among different soft computing techniques Artificial Neural Network (ANN), Fuzzy logic and Genetic algorithm now a days quite popular. An Artificial Neural Network is a parallel information processing unit that's has working function same as biological neuron. Artificial neural network consist of large set of processing unit called neurons. Each of the neuron connects with each other by means of a direct link and each link associated with a specific weight. ANN based performance evaluation increase the accuracy of computing. Few researchers used this ANN concept to evaluate the performance of different transit systems. Shen and Li (2014) used a hof field neural network for studing performance of bus transport for five different routes. The fuzzy inference system is one of the latest and advanced soft computing technique for detecting the fuzziness and defining the service quality parameter when going towards system performance comparison of large set of transit companies. Fuzzy theory was introduced by Zadeh (1965), which deals with positions that cause true to a certain degree (somewhere from 0 to 1). Few researchers used this fuzzy set concept to evaluate the performance of different transit systems. Chung-Hsing (1999) are among those few who studied the performance of 10 bus systems in Taipei using fuzzy inference system and set different membership functions different variables that impact the performance of transit system by considering five major factors i.e, safety, comfort, convenience, operation and social duties and also defines ranking of the systems based on a new approach of Overall Performance Index (OPI). The main drawback of this technique is that the application of fuzzy set theory in system

performance evaluation needs higher expertise and knowledge for application and is also difficult for an operator to understand.

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. This is because, SEM enables understanding the impact of each variable on service quality and customer satisfaction in a more pragmatic manner and thus provide appropriate model for the estimation of each factor score and overall satisfaction in terms of quantitative measurement.

Question#4:

Definitions:

A weakness of an asset or group of assets that can be exploited by one or more threats, where an asset is anything that has value to the organization, its business operations and their continuity, including information resources that support the organization's mission

A weakness in automated system security procedures, administrative controls, internal controls, and so forth that could be exploited by a threat to gain unauthorized access to information or disrupt critical processing. 2. A weakness in system security procedures, hardware design, internal controls, etc. , which could be exploited to gain unauthorized access to classified or sensitive information. 3. A weakness in the physical layout, organization, procedures, personnel, management, administration, hardware, or software that may be exploited to cause harm to the ADP system or activity. The presence of vulnerability does not in itself cause harm; vulnerability is merely a condition or set of conditions that may allow the ADP system or activity to be harmed by an attack. 4. An assertion primarily concerning entities of the internal environment (assets); we say that an asset (or class of assets) is vulnerable (in some way, possibly involving an agent or collection of agents); we write: V(i,e) where: e may be an empty set. 5. Susceptibility to various threats. 6. A set of properties of a specific internal entity that, in union with a set of properties of a specific external entity, implies a risk. 7. The characteristics of a system which cause it to suffer a definite degradation (incapability to perform the designated mission) as a result of having been subjected to a certain level of effects in an unnatural (manmade) hostile environment.

Vulnerabilities are classified according to the asset class they are related to:

- **hardware**
  - susceptibility to humidity
  - susceptibility to dust
  - susceptibility to soiling
  - susceptibility to unprotected storage
- **software**
  - insufficient testing
  - lack of audit trail
  - design flaw

- **network**
  - unprotected communication lines
  - insecure network architecture
- **personnel**
  - inadequate recruiting process
  - inadequate security awareness
- **physical site**
  - area subject to flood
  - unreliable power source
- **organizational**
  - lack of regular audits
  - lack of continuity plans
  - lack of security