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 **Goals and Objectives of Civil Engineering Systems**

Assignment Title:

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**Introduction**

 This course seeks to show the inportance of preparation before during and after Civil engineering systems.The forms of preparation as I so put in it are termed as goals and objectives.These are further broken down in MoES which can be used for any phase of a Civil engineering system. In this course there is an analysis of the usage of the phases in systems engineering and the content is straight forward and understandable.

 The MOES are a guide for engineers during the Initial cycle of the sysytem and the rest of life cycle of the civil engineering systema as well.

**Body of Assignment**

**1. You are asked to design a pedestrian footbridge over a busy street in the downtown area of a city. What are some of the structural engineering considerations that need to be taken into account during the analysis and design of this structural system?**

 The location is a busy street because it is located in a downtown area of the city.The Pedestrian footbridge purpose or objective is to assist pedestrians in crossing from one side to another without hindering moving traffic.

 The main objective of the structure is to assist pedestrians in crossing so the structure has to be strong and go over the road in the form of a bridge.This structures are public and will have many properties to reflect the safety of the city, the road and the public.

This Civil engineering system will be called Pedestrian Footbridge and will have the following Measures of Effectiveness/M.O.E

1. Planning phase-Suitable MOEs to produce a efficent and sustainable plan measured by the performance of the MOEs.

2. Design phase-Implementation of suitable MOEs with the right aesthetics.

3. Construction phase-applicable MOEs to construct the pedestrian footbridge with quality material at a reasnable cost.

4. Monitoring phase-Maintenance engineers will monitor the treatment plant.

5. Operations phase-Applicable MOEs to maintain and opérate the plant in terms of personel and running costs.

 Finally, the design should take into consideration the users and the community as well as sysytem owners.The footbridge is a benefit and will assist pedestrians in crossing the Street safe and reduce accidents in the city.

**2. A proposal has been made to design and implement physical modifications to the existing bus transit system infrastructure in a major city by providing new buses and terminals. Discuss some of the efficiency, effectiveness, and equity issues associated with this effort.**

 Concerning this Bus transit sysytem infrastucture in a major city for example; Newyork City or casablanca city.The maintenance or operations phase of the Civil engineering sysytem is what comes into practice here.Having a proposal is a formal way of starting the Design and implementation of physical modifications to the Bus transit sysytem infrastucture (B.T.S.I), which during the lifecycle of the civil engineering sysytem this part comes on the System Operations phase.One of the modifications involves the addition of resources to the Fleet,e.g Buses and more terminals.eg Terminals where passengers arrive and depart.

Analysis of the Design and Implementation of Physical Modifications

Efficiency of the Proposal

The proposal seeks to implement modifications to a public sysytem as well as a community system thus the result of increased buses and areas to be dispatched from will be a benefit and a excellent result thus validating the resources invested in increasing the number of Buses and also the number of Terminals.The waiting time of the sysytem should be reduced as well and thus make passengers get a better service and as a result profits are expected to rise.

Effectiveness of the proposal

 With the established Measures of Effectiveness (M.o.Es) which include monetary and non-monetary MoEs, the proposal will either prove to have been effective depending on the style of implementaion adopted by the Engineer in their particular proposal to provide buses and terminals.

Equity of the Proposal

 This part allows the agency, user ,community and civil engineer to look at the project uopon completion and considering the Systems phases of this particular Bus terminal,the costs of the Implementation of each phase based on the appropriate and applicable MoEs then the results analysed will conclude whether the analysis and design of the Pedestrian footbridge was fair.In this case "Fair" means that the system was seen as honest and free of arbitary costing and using un recommended material in the System operations phase.

 Conclusion

 As expected the Civil Engineer in this case a Design engineer or Construction engineer could anaylyse the System plan and impement the modifications in an efficient manner.Thus the effort would be seen as progressive.

**3. If you were asked to recommend some changes in the operational setup (no bus or terminal improvements) of your campus bus transit system, which factors would you take into consideration?**

 As the Engineer in charge there would be a evaluation using the Measures of Effectiveness (M.o.Es) specific to the Bus Transit Sysytem Infrastructure under the Sysytems phase called the System Operations Phase.

 Analysis

Resources available in bus termminal

Examlpe of Bus terminal: Caribe Bus Terminal, 27 of February Avenue, Santo Dominigo

-50 Buses

-10 terminals

-3 bathrooms

-ticket area

-adminstration office

-sitting area

-Entrance and Parking lot

Factors to be taken into Consideration

1) MOEs

Monetary Measures of Effectivenes

a) Initial costs

b) Resources available in bus terminal

c) Finance availability

d) Material availability

e) contractor availability

Non-Monetary

a) User feedback

b) community feedback

II) Efficiency

 The project should be made to be efficient by analysing the intenetion of the project and if the benefits for the user and community outway the input of resources such as Finance.

III) Equity

 This is another factor to be considered when making changes in the Bus transit system.

 Hence, the Civil Enginner can come to a positive conclusion and state that we donot need Buses and more terminals and make recommentations such as

a) improve the usage and maintenance of the current fleet

b) Improve driving

c) Hire specialist drivers

d) Have Mechanical department with updated equipment

e) Other recommendations.

Thus this would be a professional and competent way moving forward on this new proposal.

**4. A parking garage is planned for construction in the downtown area of a fast growing city.Using the classifications shown in Figure 3.1, list at least two outcomes in each of the four categories of outcomes (intended vs. unintended, beneficial vs. adverse).**

 Typically or typical goals, objectives and performance of any Civil Engineering System are usually expressed in terms of the intended and beneficial outcomes.(Labi,2014)

Civil Engineering System -Parking Garage Infrastructure System

Location-Downtown area of a fast-growing city.

Outcomes

Intended outcomes

a) Sustainable parking Garage

b) Profitable parking garage

c) Efficient infrastructure system

d) Manageble Parking Garage

UnIntened outcomes

a) costly

b) Structural weakness

c) poor aesthetics

Beneficial outcomes

a) Suitable parking

b) Good roads and pavements

c) User friendly

d) uncomplicated

e) easy access

f) Safety measures

Adverse Outcomes

a) High fees

b) Hard access

c) complicated parking system

d) Aesthetics- are uncomfortable

e) Reduced sitting space

f) No security

 In establishing a Parking Garage the result of the initial phases which are planning, design and construction and the rest-of-life phases like operastions, maintenance and monitoring need to be taken into account by the Design engineer. (Labi, 2014).thus a critical appraoch to the data of benefits to adverse effects will provide the Enginner with the tools to make a decisive decision.

**5. The specific objectives at each phase influences, and also is influenced by, the specified tasks and tools at that phase. For each of these two cases:**

**(i) at the phase of needs assessment for a new subway system, and**

**(ii) at the phase of monitoring the condition of a steel tower, what are some of the objectives, and how does this translate into a task for the engineer at each of these phases; also, list at least two analytical tools used to address this task.**

 I as an Civil Enginnering student agree with the above statement,"The specific objectives at each phase influences, and also is influenced by, the specified taskes and tools at that phase."This means that the intentions in the form of objectives direct the Civil Engineer to make a plan of the different tasks to do the project as well as the tools to implement the tasks. The objectives are as follows

**(i) at the phase of needs assessment for a new subway system, and**

The objectives of a new subway system-Needs assessment Phase includes-

The subway system should carry a increased number of passengers btween a certain time in a particular route to allevate traffic congestion in busy áreas of the city.

**(ii) at the phase of monitoring the condition of a steel tower, what are some of the objectives, and how does this translate into a task for the engineer at each of these phases; also, list at least two analytical tools used to address this task.**

Some objectives of a Steel tower

-should be tall enough to serve more than one option.

-The Steel tower should be inspected and maintenance done.

-The asethetics should maintained

- The maintenance costs shoud be sustainable

 The tasks could be handled by a maintanance engineer who would be responsable or maintenance but most likely would surpervise the operations of the Steel tower.

Two analytical tolos would be the MEASURES OF EFEECTIVENESS AND MEASURES OF COST.

**6. Explain, with examples, how the values held by a society could influence the establishment of goals and objectives for the design of a new civil engineering system or the operations of an existing system being planned in that society.**

 Enginnering in any society comes with what will be the advantages for the uses and by extention the society.Historical evidence as well as contempory data seeks to show that Civil enginnering sysytems has both bad and good outcomes.However planning is done to get the beneficial or intended outcomes.Fistly, the System has to take account of the two General phases of that sysytem:

*General Phase 1: the initial phases which are planning, design and construction*

*Genaral Phase 2: the rest-of-life phases like operations, maintenance and monitoring*

 Considering all this analysis brought forward by the professional Civil Engineer; the project cannot move forward in isolation of the society.The method of analysis of the values of the society are usually termed on criteria for measuring performance as Non-monetary MoEs.These are how the engineer takes inot account the values of society.

 Normally, Communities may be contacted by local government to a meeting to disscuss how the project will be implemented, benefits and any concerns by the community.During this meeting all stakeholders who have issues and criticisms of the project will have an equal opportunity to voice their concerns.Concerns concering land, water, easy access, aesthetics, initial costs and life cylcle or rest of life costs such as the operation of the cystem and maintenance costs.

 For example, The local Government wants to start a residencial complex of a minimum 5000 apartments in the form of apartments with each building having ten apartments.Thus the monetary benefits and non-monetary MoEs will be proposed as well the the methods of effectives, efficiecny and equity. The quality of material will be analysed as well as the location.A formal proposal should be done including all Civil Engineering sysytem phase namely the Initial and Rest of life phases.

**7. Explain, with illustrations in the context of a specified civil engineering system in your city, the differences between the three overall goals (effectiveness, efficiency, equity).**

 Analysis of Cicil Engineering sysytem in my city is an implementation of a Residencial city with different residences.The total number of residences I was able to count was about eleven different Residences done by different Civil Engineers, Construction companis and local contractors.

 I personally worked and the overall goals of effectiveness, efficiency and equity can be seen to be implemented.

Analysis

Role of Equity

The implementation of this mega project can be said to be fair cause it provides needed housing facilities to city residents at a market price where finance is usually provided by a lending institution.

Role of Effectiveness

This role is usually measured by performance indicators called Measures of Effectiveness and Measures of Cost.

Role of Efficiency

This Role of efficieancy when applied to this housing project can be explained in terms of the revenue gained from the sales of the apartments and to the reviews given by new owners by word of mouth, in general conversation or letters of appreciation to the Company or the Construction Engineer or Design Engineer.

ILLUSTRATIONS

**8. Major expansion of an existing airport located near a suburb has been planned. List at least 4 key stakeholders associated with the improved system upon completion, and discuss their perspectives (expectations of benefit and concerns of adverse consequences). Citing examples, discuss how these perspectives translate into specific objectives of the airport expansion decision maker, and how they could influence decisions associated with the expansion.**

 When building a mega project and in this case an expansion there are many factors that heave to be taken into consideration.In these type of Project requires different typor of speacialist engineers, for example there might be a need for a soil enginneer to test the comonents of the soil and to know how to approach exacavation works.For this answer I will use the Rosie Douglas Internaltional Airport in Melville Hall, Commonwealth of Dominica as my example.

4 key stakeholders associated with the improved system upon completion

1) The User

2) The community

3) The employees

4) Businesses and Government

User Perspective

 A typical user would be someone like me for example an Civil Engineering student travelling to take up internship with a Construction company or a Maufacturing company. I would expect an Easy access airport with signs and symbols and a departure Gate taht is efficient and allows passengers to board at a reasonable pace depending on the circumstanaces.

 Another typical User would be a United States resident visiting family and friends for the summer and needs to leave the United States to arrive in Dominica, thus he would transit via Puerto Rico before moving to Dominica and vice versa.This Anerican resident would expect the same or even better service that what I recieved.

Thus two scenarios usally represent what would be expected from a User Perspective.

The community Perspective

The Community and in this case the community of Melville Hall and by extension Marigot would expect benefits in terms on employment form the expansion and easy acess for example entering and leaving the airport.The community would also like to see an increase in tourist arrivals and expats wanting to come home beacuse the airport has improved customer service.

The Employess Perspective

Locals will want to work and ffeed their families and as a result will be happy for the ecomnomic benefits brought in the the expansion project.The initial phases such as planning, design and construction will provide employment for consuultant Civil Engineers and the Rest of life cycle phases such as operation, maintenance monitoring, and end of life will also have consultations.The main benefit to the comunity would be the employment of locals and this would be a tremendous opportunity.

Businesses and Government Perspective

Local businesses a will show an improvement in business transaction as well as the Government will expect to see the public benefits.The busineeses such as restaurants will see an increase in sales for people working on the expansion project since they would be buying breakfast, lunch and other items.

Objectives of the expansion of the Rosie Douglas International Airport

Objective 1: To improve air acess and landing capabilities of the airport.

 Objective 2: To increase flights to the airport

Objective 3: To reduce boading times to planes

Objective 4: To increase the efficiecieny and sustainability of the airport

 These critical objectives have to meet the criteria of efficiency, equity and effectiveness.Then Performance criteria has to be taken into consideration such as the Meausres of Effectiveness(MoEs) that will make the project outcome more beneficial than negative.

**9. Explain why systems scholars including de Neufville and Stafford (1971) and Dandy et al. (2008) stress the importance of selecting appropriate MOEs for engineering systems.**

 Systems scholars including de Neufville and Stafford (1971) and Dandy et al. (2008) stress the importance of selecting appropriate MOEs for engineering system for many pertinent reasons.Reasons include the operation and maintenance monitoring of the systems since it is during this phases the benefits of the sysytem will be tested by users and a particular community.The monetary and non-monetary MoEs have to be considered and analysed.

 Labi in his book claims that the Civil Engineer role has evolved and as a result the Enginners has a responsibilty to the general public and users to construct or design a plausible and sustainable sysytem.The Earths resources are limited and the engineer has to create a plan to use the limited resources effectively and efficiently.

 If their is lack of planning one of the fundermental mistakes that usUally takes place is structural mistakes in the design of the system.Another mistake will be one of costs where initial estimations of costs would be irrelevant as the costs would increase.

 We live in modern times where the rule of law comes in to play readily and Civil engineers dont want to be sued for negligence and so they stive to provide quality civil engineering sysytems.Thats why performance indicators in the form of MOEs are used to determine the best Inittial phased and rest of life phases of any Civil engineering sysytem.

**10. A systems engineer seeks to establish MOEs to evaluate alternative strategies for operating an existing urban drainage network. List and discuss any**

**(i) five desirable properties of each individual MOE and**

**(ii) three desirable properties of the set of MOEs for choosing between the strategies.**

 The Systems Engineer needs to establish the right MOEs to evaluate the different alternatives available.The question is what alternative strategies are available for operating an existing urban drainage network.

**(I) five desirable properties of each individual MOE and**

Individual MOEs of Existing Drainage network

1) costs to the sysytem owner, Monetary MOE

2) Downtime: Monetary MOE from the system user.

3) Normal operations of the system

Five properties that would make these MOEs diserable would be

-appropraiateness

-measurability

-dimensionability

-realistic

-defensible

These properties are expected to be part of the MOEs for each individal MOE at each phase such as the Inital phase and the life cycle phase.

For example an MOE IN the sysytem operation phase could be

MOE- system owner-The physical condition of the Drainage system

**(II) three desirable properties of the set of MOEs for choosing between the strategies.**

-appropraiteness

-measurability

-defensible

These three properties could be used to consider the alternative operating design to an exisiting drainage network and analyse the better alternative to be considered for implementation.

**11. For any civil engineering system in your community, list and discuss any 10 MOEs that could be used in evaluating the system performance. Indicate which of these are monetary or nonmonetary and which are derived from agency, user, or community perspectives.**

**1O MOEs used in evaluating the sysytem performance**

1. Monetary MOE-User: The inititaial costs of the project.

2. Non-Monetary MOE-Community: The community wants to know the public benefits

3. Non-Monetary MOE Community and User-Asethetics

4. Non-Monetary MOE Community and User-Environment Effects

5. Non-Monetary MOE-system owner: Structural Intergrity of the sysytem

6. Non-Monetary MOE- system owner: Physical condition of the Civil Engineering system

7Non-Monetary MOE- system owner: sysytem life

8Non-Monetary MOE- system owner: system reliability

9 Non-Monetary MOE- system owner: reliability of supply of resources

10. Non-Monetary MOE- system owner: constructability and maintainability

**12. A new waste treatment plant has been planned to replace an existing small aging plant for your hometown. Discuss the MOEs for**

**(i) the overall system,**

**(ii) each phase of the overall system development, and**

**(iii) the operations phase of any of the plant’s processes.**

Civil Engineering sysytem- A new waste treatment plant

 I) MOEs of the overall system

MOE –Initial costs

MOE-Life cycle costs

II) MOEs of each phase of the overall system development, and

Initial phases-planning, design construction

MOES-

Costs to sysytem owner
Downtime

Pysical condition of the Waste treatment plant

Structural integrity of the system

III) MOEs of the operations phase of any of the plant’s processes.

MOEs- Rest of life cycle’System operations phase

Environment effects-Non monetary-sysytem user and community

Aesthetics- Non monetary-sysytem user and community

These are some MOEs that can be used but is at the discretion of the Design engineer as to how many MOEs he needs to present to evalaaute the waste treatment plant.

**Conclusion**

 In concluding this course I have learnt much about the goals and objectives in civil engineering systems and I would like to become a really great Engineer.This course show u show to be responsble in the planning, design, operatiions, construcition and maintenance monitoring or the civil engineering sysytems.

**Bibliography**

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