Appendices

Appendix A Semi-Structured Interview

Semi-Structured Interview

Part One (open ended questions)

1. Introduction

A. Purpose

This research is aimed to develop a sustainable framework for offshore topside facility projects; therefore, this interview is aimed to identifying and rating the factors/criteria affecting **sustainable design and materials selection** from sustainability perspective. Your participating will provide important information that will be used in PhD research.

The interview will take 90 minutes and the information you provide will be strictly used for this study alone. No reference will be made in the written dissertation could link to your personality.

B. Interviewer

Name: Ezeldine Alyafei
Programme: PhD (Research in Construction).
University: Heriot Watt, School of Energy, Geoscience, Infrastructure and Society.
Royal Academy of Engineering Center of Excellence in Sustainable Building Design.
Address : Edinburgh EH144AS
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C. Interviewee

Kindly supply the following Information:

Personal Information

1. Occupation and discipline:
2. Years of experience in Oil and Gas sector:
3. Educational level:
4. Gender and Age:

Organization Description:

1. Type of Organization: A. Oil and Gas Operator (Client) or
   B. Consultant Office

2. Organization Business : A: Local
   B: International

3. Size of Organization globally: A. (500) employees and above.
   B. (1000) employees and above.
   C. (5000) employees and above.
   D. (10,000) employees and above.

4. Age of the Organization: A: above 5 years.
   B: above 10 years.
   C: above 15 years.
   D: above 20 years.

2. General knowledge about sustainability in offshore industry

1. How would you describe the sustainability of topside facilities in offshore oil and gas platforms?

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2. How would you describe the environmental and social impacts of topside facilities?

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3. Do you think the current platform systems are environmentally friendly?

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4. How would you describe the material selection during the early design phase in your organization (copy and paste, standards, guidelines, procedures..etc.)?

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5. From sustainability perspective, do you think a proper materials selection framework will influence the platforms design and consequently reduce the environmental, economic and social impacts related to offshore industry?

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6. In your job as engineer, have you experienced or used a sustainable framework for material selection or engineering design for offshore topside?

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Part Two (closed ended questions)

Factors and criteria affecting the sustainable design and materials selection in offshore industry

1. To what extent are the following factors important in sustainable design and materials selection in terms of environmental impact related to the offshore industry? *Please rate the level of importance of the derived factors based on scale 1 to 5, where (1) is least important and (5) is extremely important.*

No.	Environmental Factors	Importance				
		1	2	3	4	5
Environmental pollution to air and water						
1	Minimum discharge to air. (Gas emissions, flaring, vents, and combustion of toxic product).					
2	Energy consumption and efficiency for product and equipment during operation.					
3	Minimum discharge to marine from topside facilities. (Produced water, drainage system, oil and water separation, others).					
4	Solid, liquid and construction waste management (hazardous and non-hazardous materials).					
5	Noise and vibration due offshore operations and offshore transportation.					
6	Risk of oil and chemical spill from topside facilities. (Operation activities, storage, transportation and handling hazards materials).					
Energy and emissions through materials life cycle process						
7	Embodied energy during material extraction.					
8	CO2 equivalent during material extraction.					
9	Energy consumption during material manufacture.					
10	CO2 equivalent during material manufacture.					
11	Energy consumption during transportation and use.					
12	CO2 equivalent during transportation and use.					

2.To what extent are the following factors important in sustainable design and materials selection in terms of social impact related to offshore industry? *Please rate the level of importance of the derived factors based on scale 1 to 5, where (1) is least important and (5) is extremely important.*

No.	Social Factors	Importance				
		1	2	3	4	5
Offshore Health and Safety						
13	Process safety and security.					
14	Fire and explosive strategy.					
15	Chemical properties of materials (Flammability and toxicity)/ hazardous materials.					
16	Explosiveness of the materials.					
17	Safe installation and removal procedure for products, equipment and system.					
18	Avoid or mitigate offshore welding.					
Human Right for the Offshore Workers						
19	Working Hazard. (Safe and suitable work condition).					
20	Workforce protection (Easy access to safety protection equipment).					
21	Evacuation plan and clear escape route to muster area.					
22	Effective communication and clear roles and responsibilities between workers.					
23	Use local labourer.					
24	Well skilled labourer and or providing training.					
25	Adequate offshore accommodation.					

3.To what extent are the following factors important in sustainable design and materials selection from engineering and technical point of view? *Please rate the level of importance of the derived factors based on scale 1 to 5, where (1) is least important and (5) is extremely important.*

No.	Engineering and Technical Factors	Importance				
		1	2	3	4	5
Technical						
26	Conformance to standards, specifications and codes.					
27	Mechanical Properties (tensile and yield strength, creep, fatigue, toughness..etc).					
28	Physical properties (density, moisture, porosity,..etc).					
29	Chemical and electrochemical properties.					
30	Electrical properties (conductivity & resistivity)					
31	Corrosion and erosion.					
32	Corrosivity evaluation and system contents (CO2, H2S, O2, SOx, NOx,CL, PH,…etc).					
33	Inspection strategy and Corrosion control.					
34	Durability.					
35	Reliability.					
36	Operation Environment.					
37	Chemical Resistance.					
38	Swelling and Shrinkage by gas and liquid.					
39	Thermal Properties (expansion, conductivity, thermal stress..etc)					
40	Thermal stability.					
41	Thermal Radiation.					
42	Heat and thermal resistance.					
43	Weldability.					
44	Wear and abrasion resistance.					
45	Operating pressure and temperature.					
46	Fire performance and resistance.					
47	Availability in the local Market.					
48	Recyclable material content.					
49	Reused content.					
50	Free of harm contaminants.					

51	Dimensional properties (size and shape).					
52	Easy offshore installation.					
53	Less hot works in offshore					
54	Easy to use.					
55	Safe to use.					
56	Design life of the product or system.					
57	Coating and corrosion protection methods.					
58	Weight.					
59	Decommissioning plan (greenfield project).					
Design Consideration						
60	Prefabrication flexibility.					
61	Minimum offshore installation hours.					
62	Bolting design connection.					
63	Design for easy assembly.					
64	Design for easy disassembly.					
65	Design for flexibility to reuse.					
66	Design for easy inspection.					
67	Design for easy maintenance.					
68	Design for indoor environmental comfort and water consumption efficiency in case of accommodation and offices space.					

4.To what extent are the following factors important in sustainable design and materials selection in terms of economical impact related to offshore industry? *Please rate the level of importance of the derived factors based on scale 1 to 5, where (1) is least important and (5) is extremely important.*

No.	**Economical Factors**	**Importance**				
		1	**2**	**3**	**4**	**5**
69	Design and Engineering cost.					
70	Initial cost for the material and or equipment.					
71	Prefabrication and fabrication cost.					

72	Offshore installation cost includes transportation (shipping to offshore).					
73	Operating cost during life cycle.					
74	Maintenance cost.					
75	Replacement cost.					
76	Offshore demolishing cost.					
77	Disposal cost.					

5. Conclusions: to what extent are the following criteria important in sustainable design and materials selection from sustainability perspective in offshore industry? *Please rate the level of importance of the sub-groups based on scale 1 to 5, where (1) is least important and (5) is extremely important.*

No.	**Major Criteria**	**Importance**				
		1	**2**	**3**	**4**	**5**
1	Environmental Pollution to air and water.					
2	Energy and emissions through material life cycle					
3	Offshore health and safety.					
4	Human right for the offshore workers.					
5	Engineering and technical aspects.					
6	Design Consideration.					
7	Economical aspects.					

Part Three (continuation of open ended questions)

7. Do you now think a materials selection framework in terms of sustainability dimensions is required for topside offshore platform for both greenfield and or brownfield projects.

8. Please indicate the ones, which you are familiar with *(you may select more than one)*?

   A. Life cycle costing concept
   B. Life cycle costing analysis
   C. Time value of money concept
   D. Value engineering
   E. Value engineering Matrix

9. Now, understanding the meaning of sustainability, and after discussing the 77 identified criteria, what are the components and outcomes required from the sustainable design framework?

10. Please provide any additional criteria or factors that might have an influence on the sustainable design and materials selection and not listed in previous sections? or any additional comments and suggestions?

A. Environmental factors.....

B. Social factors.....

C. Engineering and technical .....

D. Economical factors.....

Additional comments:.....

Thank you for your participation, time and cooperation. Would you be interested in participating later this year? If so, please tell us your email address to get in touch with you

Interviewee email :

Date: