Assessment Industrial Hazards in Jubail City

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Jubail Industrial City serves as one of the biggest freelancing manufacturing development projects in the middle east. In addition, it is the most significant industrial city in Saudi Arabia as compared to other Saudi cities. As a result, Jubail supports the growth of energy-intensive companies and got situated near economically vital regions like Dammam, Ras al-Khair, and lastly, Ras Tanura. As an organized industrial city, Jubail incorporates different types of industries such as a steel mill, refineries and one of the world’s biggest desalination plants that as well generates electricity (The Saudi Network, n.d). Additionally, the city contains petroleum products like fertilizers, plastics, which get produced and then exported. This substantial industrial complexity within Jubail serves as the federal government’s dream of Saudi Arabian’s future growth. Such varying industries within Jubail City mainly get involved with various items of chemical equipment as well as an oil refinery.

Due to the natural characteristics of these industries situated in Jubail City, disasters are likely to occur because of possible industrial accidents; that is, these city industrial processes inflict hazards associated with different health issues. Likewise, there are frequent occurrences of multiple potential hazards resulting from the advanced industrial processes such as fire explosions, air pollution, building collapses, and others, which arise due to industrialization in Jubail City. It is thus significant to comprehend the possible effects of the City’s growth on the environment and residents of Jubail City (Almalki, & Al-Namazi, 2019). The collaboration between the hospital staff and industries’ staff might then contribute to the appropriate management of reducing the possible industrial disasters on the environment and people. This project will aid in searching and investigating the needed resources for possible hazards for Jubail Industries and Jubail City hospitals to increase the surge capacity as well as to find the common stocks among hospitals to cover deficiency and then respond to the potential industrial disasters.

# **Statement of the Problem**

In any industrial process, there are several issues associated with disaster or potential hazard occurrence. Similarly, as an industrial city, Jubail undergoes the same problem. For instance, various items of chemical equipment, together with the oil refineries and other processes mainly cause different accidents like gas suffocations, burns, deaths, and other instances, which affect the industrial workforce and even the city residents at large. Such risk factors have been increasing steadily with the growth and development of Jubail City. For instance, individual employees might suffocate from the chemical fumes or air pollution resulting from the ongoing processes.

 Likewise, the entire Jubail City faces air pollution due to industrial processes within the region. Other casualties, especially the workforce or even the neighboring residents, might burn from the fire explosions surfacing from the chemical processes. There are also death incidents, which occur due to the building collapses that might result due to inappropriate process exploration and others.

# **Project Purpose and Description**

As previously mentioned, the natural characteristics of the industries, including those within Jubail City, are associated with disasters like anticipated industrial accidents. Therefore, with advancements in Jubail industrialization, possible hazards will increase to occur, and further affect the human population, including company employees and even the community at large. It is thus significant to comprehend the possible effects of the City’s growth on the environment and residents of Jubail City (Almalki, & Al-Namazi, 2019). The collaboration between the hospital professionals and industries’ staff might then contribute to an appropriate management response within 96 hours after emergency occurrence to reduce the possible industrial disasters like gas suffocations caused by inhalation, burns, and others on the environment and people. This project will thus accomplish its purpose by achieving the following objectives:-

**Specific Objectives**

* To search and assess the needed resources for possible hazards for Jubail Industries
* To search and assess the necessary resources for potential dangers for Jubail City Hospitals
* To determine ways of increasing surge capability of the Jubail City hospitals
* To identify ways of finding the joint stocks among hospitals for covering healthcare shortages
* To create coordination among hospitals and respond to emergencies from Jubail City Industries, that is, burns, gas suffocation, and others.

# **Literature Review**

Several published papers have explored the disaster management interventions associated with limiting or preventing industry disasters like gas suffocation, burns, and the rest. Some of these papers include Mohammad, Ali, & Ahmad (2018), Aljanabi (2016), Alzaben (2015) and others. These interventions can then get implemented within 96 hours after the emergency occurrence and, if executed successfully, can aid in managing such industrial disaster and save lives. Some of these strategies investigated by those research studies incorporate resources needed for possible hazards for the industries in Saudi Arabia, and Saudi Arabia local hospitals. Other management strategies include increasing surge capability of the local hospitals and finding the joint medicinal stocks among hospitals for covering healthcare shortages. Literature has also investigated ways of creating coordination among hospitals and response to emergencies from Industries like burns, gas suffocation, and other type of injuries.

Mohammad, Ali, & Ahmad (2018) suggest three factors, including risk investigation, awareness as well as training to aid in evaluating the preparedness of managing disaster like burns and suffocation from industrial processes concerns. According to this article, it is significant to raise standards of risk analysis, particularly to identify losses size and probability degree. It is as well imperative to increase training programs of preparedness for dealing with disasters. It is essential to raise awareness programs for emergency management staff.

 Additionally, Aljanabi (2016) asserts that it is significant for the industrial workforce to have increased awareness of hazards to the public health as well as the environment due to their closeness to natural gas and oil production facilities within Jubal Industrial City. The strategy will assist the workforce in participating in Jubail’s disaster management plan. Aljanabi (2016) further claims that risk perceptions of employees depend on water, soil, environmental air, and social health. The article suggests that every employee must measure his or her working environment effects on the industrial outcome. Therefore, regarding the opinion on the industry impact, Aljanabi (2016) states that even employees will prioritize training as well as environmental safety activities and practices as the incidents associated with resources needed for the hazards like burns and gas suffocation within Jubail City industries.

 Moreover, Aljanabi (2016) confirms that such opinions might show that experienced and skilled employees as well as those with company full comprehension tend to limitedly affect the environment and community during their production process. As a result, Aljanabi (2016) concludes that such workforce awareness on the community and industry impact relates to the speed of disaster response. Such knowledge as well enables employees to have the demographic information associated with working in Gas and Oil Company.

 Likewise, The Saudi Network (n.d) asserts that even though the huge industrial complex of Jubail City promises future growth of Saudi Arabia, it is important to manage the growth and development of industries. The article thus recommends educating employees on the skill needed to fully and successfully fill the industry needs without causing disasters like fire explosions and gas leaks associated with burns and gas suffocation, respectively. First, as a resource for disaster management, The Saudi Network (n.d) proposes the Institute of Royal Commission for the Development of Human Research to train upcoming industrial employees on the required industrial skills needed to control the expected accidents like burns.

 Furthermore, The Saudi Network (n.d) confirms that Royal Commission Institute builds hospitals like the Royal Commission hospital and even the primary care facilities and clinics that offer epidemic control and first aid. These hospitals are completely computerized and have other medical clinics where the clinical needs of society become thoroughly covered. Such strategies tend to increase the surge capacity of these hospitals and also find the joint medicinal stock when the local clinics are out of medicine.

Similarly, as a way of preparing hospitals during an emergency attack in Saudi Arabia cities, Alzaben (2015) asserts that these clinics and hospitals tend to maintain their functions through long term strategies of improving the reliability as well as the quality of their services. In the process, they better utilize their resources.

Alzaben (2015) further indicates that such plans involve outsourcing as well as subsequent control of suppliers and contractors. The strategy effectively, affordably, and successfully maintains their day-to-day activities irrespective of destructions caused by the industrial fire explosions, building collapses, and others within the hospital premises. As a result, the plan strengthens the surge ability of responding to the massive casualty events like burns as well as gas suffocation. Similarly, such initiatives will ensure joint-stock among hospitals because in case the local hospital faces destruction, the outsourced or contracted stock will provide relevant resources required in effectively saving people's lives.

Additionally, as a way of creating coordination among hospitals and responding to emergencies from Jubail City Industries including but not limited to burns, gas suffocation, Alkhudairi (2016) suggests the use of a mobile application. According to this article, the mobile application introduction in managing disasters like gas suffocation and burns from industrial gas leaks and other incidents makes it easier to manage the victim’s condition when the disaster management team communicates with the healthcare professionals remotely, who immediately provide care to the victimized groups.

Such events enable the hospitals to prepare faster to attend to the injured parties, and even save on time because the phone calls quickly alert the care providers for a given disaster occurrence and associated injuries. Alkhudairi (2016) claims that the use of the mobile application as well helps in coordination to ensure that clients obtain critical information such as what to do or expect before the hospital team arrive at the scene to prevent further injuries associated with burns and gas suffocations.

According to Alyami (2018), healthcare within Saudi Arabia has been coming last after the developed nations because of insufficient healthcare practitioners as well as monitoring and tracking technology. Such shortages cause problems related to casualty misidentification, prolonged waiting times, together with the incapability of locating clinical equipment effectively and efficiently. In his suggestion through Saudi Arabian Vision 2030 plan, which promotes the regional health-associated educational outlets, Alyami (2018), however, solves such deficiencies. To improve hospital preparation in Saudi Arabia, some hospitals tend to devise information technology systems. Such systems tend to provide a proper selection for the real-time monitoring and tracking technology within Saudi Arabian healthcare, such as an integrated ZigBee/RFID system.

Furthermore, Alyami (2018) states that such IT systems such as ZigBee/RFID system improve healthcare staff efficiency as well as productivity to better care for the patients. Such instances further minimize long-term healthcare costs. According to Alyami (2018), these integrated IT systems offer interactive platforms for hospital staff to improve productivity and efficiency. As a way of increasing surge ability, through these integrated platforms, healthcare staffs are capable of lowering casualty waiting time when communicating their health concerns resulting from industrial disasters.

According to Alharthi (2017), structural solutions like hospitals with educational focus as well as the government policies for supporting healthy behaviors and industrial practices are essential in the effective management of industrial disasters. Alharthi (2017) thus proposes that it is vital to develop and encourage healthy and positive industrial practices such as smartphone use, educational classes. They assist both healthcare professionals and industrial workers in managing disaster occurrence and endorsing appropriate industrial activities to prevent emergency occurrence, respectively.

Blaisi (2019), on the other hand, reports that the management of disaster, for instance, those surfacing from the growth of construction and demolition, C&D waste are only possible when supporting environmentally sound waste control practices. However, Blaisi (2019) states that with an insufficient hospital or industrial collaboration, immature policies for efficient C&D recycling and management, as well as inadequate coordination between C&D generators and regulators, there is no proper disaster management. Furthermore, Blaisi (2019) records that lack of awareness, motives, and incentives for managing C&D and enforceable laws for the managers, the hospitals, together with the industries will be incapable of effectively managing the disasters associated with accretion of construction and demolition, C&D waste.

Last but not least, Mansour, Khadar &Falqi (2019) record that environmental and human protection requires the implementation and adoption of legal and economic procedures that can limit the adverse effects like disaster occurrence associated with industrialization. This article further states that environmental laws can influence the industrial construction within Saudi Arabia and then single out difficulties that the health practitioners might go through. With such laws, the development and demolition, C&D waste reduce, thus limiting the occurrence of industrial disasters originating from industrial accidents like burns and gas suffocation. Eventually, Mansour, Khadar &Falqi (2019) highlight that the Royal Commission for Industries in Jubail and Yanbu tends to issue the environmental laws applicable to hospitals and industries situated in the Royal Commission regions and contractors working within.

# **Methodology**

**General Overview**

The primary hypotheses of this study are that resources associated with risk analysis, training as well as awareness creation such as the Royal Commission, are essential for potential hazards for Jubail City industries and Jubail City Hospitals, mainly the Royal Commission Hospital. Secondly, the local inventories implemented by these resources, for instance, protection laws, training, and awareness made by the Royal Commission, are efficient in handling disaster management within the first 96 hours immediately after the disasters like burns or even gas suffocation occurs. Thirdly, these local inventories are essential in strengthening the surge capability to respond to these burns and gas suffocation targeting the industrial employees as well as the community at large. Last but not least, these local inventories are as well useful in finding the common stocks among hospitals for covering any shortage associated with disaster management.

## **Data Collection**

A systematic review of Jubail City industrial disaster management will get conducted where the evaluation and assessment of some research works addressing how industrial cities and hospitals globally tend to prepare for the industrial incidents like burns or even gas suffocations and then perform disaster relief associated with responding to the mass casualties will get explored. The review will center on using a planned approach of locating, assembling and eventually assessing Royal Commission Hospital Emergency Operation Plan associated with industrial emergency incidents, and then develop an annex as shown in the appendix below. The annex will ensure sufficient supplies to the identified industrial hazards.

**Appendix A:**

**Annex**

After a broad review of studies and literature associated with international industrial disaster management, including Saudi Arabian cities, an annex will be the best review method. The annex will serve as a training guide based on the Hazard Analysis and Critical Control Point system, HACCP. It will thus incorporate the following modules:-

* Codex Guidelines for the implementation of the HACCP system.
* Listing possible hazards resulting from the industrial processes defaults.
* Sources of hazard analysis information
* Measures of controlling the identified hazards

Examples of hazards from different industrial processes shall get reviewed from the Royal Commission Hospital Emergency Operation Plan, together with the identified control measures suitable for the respective hazards. The data shall then get recorded as exemplified in the table below.

|  |  |
| --- | --- |
| **Hazards** | **Control Measures** |
| Chemical Hazards  | **Agricultural chemicals like:-**PesticidesFertilizers**Prohibited Substances like:-**Indirect Direct**Toxic Compounds and Elements like:-**LeadMercuryZinc etcContaminants like:-Water treatment chemicalsPest control chemicals**Packaging materials like:-**PlasticizersCoding or printing inks |  |
| Physical Hazards  | Injuries like burn or gas suffocations.  |  |

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