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Mitigation Practices on Shift Changes in the Oil Sector at Ciudad del Carmen

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Abstract: ***Determine the best mitigation practices for companies in the oil sector that conduct shift changes through the analysis of the human resources maintenance subsystem so that companies can comply with their work program. This research has a quantitative approach because it is sequential because each stage precedes the next and it is evidentiary because through the collection and analysis of data the hypothesis and research questions are proven. The scope of the research is descriptive and correlational. The research subject is workers aboard marine platforms.***

Keywords: Mitigation Measures; Onboard personnel; Human Resources Administration Subsystem**.**

1. Introduction

The objective of this investigation is to determine the best mitigation measures to companies on the oil sector that conduct shift changes, a revision of the theorical framework was realized initiating with the administration personnel subsystem and covering up to the human resources maintenance subsystem. An instrument was designed, called: Mitigation practices on shift changes in the oil sector at Ciudad del Carmen. The study subject considered for the investigation is the workers aboard marine platforms on the Ciudad del Carmen municipality.

The investigation is correlational, and the work design is nonexperimental [1]. There are two variables presented. The dependent variable is the Mitigation Measures amidst the COVID-19 and is confirmed by four dimensions: accommodation (H), COVID-19 tests (PC-19), transportation (T), and hygiene kit (KH); and the independent variable is the Human Resources Maintenance, in turn, this variable is conformed by four dimensions: Remunerations (R), Social benefits (PS), work environment quality of life (CVT) and Personal relationships (RP).

The results obtained establish that the companies that developed an elevated level of mitigation measures are those that comply with the human resources maintenance, according to the Law, and provide other benefits.

2. Theorical framework

The Human Resources Administration Subsystem is confirmed by Human Resources Provision, Human Resources Organization, Human Resources Maintenance, Human Resources Development and Human Resources Audit, furthermore, the Human Resources Maintenance is the focused area for this investigation. This subsystem includes remuneration, according to Werther and Davis [2], the compensation category covers salary, benefits and all monetary remuneration on which workers are gratified for their labors on the company; Valera [3] considers that benefits are direct payments to the worker that include: retirement pension, social security, vacation bonus, life insurance, major medical insurance, and other services depending on the company; on the other hand, Chiavenato [4] defines that quality of life represents the worker's level of satisfaction on which they are satisfied with their work environment. Werther and Davis [2] cite that work relationships, when companies count with management and executive support, the Human Capital Department tries to be proactive and search different ways to apply and demonstrate the improvement of the work environment, as well as Bohlander, Snell and Sherman [5] describe the work conditions, the organizations must have a security program that guarantees favorably the work conditions of each the workers inside the company, in addition to establishing the health and safety on the job, is a fundamental part of every company the risk level in which its employees are considered, also establishing the conditions that the company must have to prevent risks and, in this way, guarantee that the workers perform their activities on

environments that ensure their life and health; finally, from the perspective of Delgado [6] the occupational security aims to promote, develop and maintain the level of physical, psychological and social well-being on the highest levels in the company workers.

One of the alternatives on providing better security is on the risk mitigation, since it will be possible to plan to know how to act in the event of any contingency or disaster that could cause loss of lives, physical damage to the company, financial well-being. The planification process involves the organization and planification of resources since this will ensure its execution, risk evaluation, strategy development and adopting and implementing a plan, having a mitigation plan increases the conscience on all the adversities and actions to reduce them [7].

It is important to understand that due to the critical sanitary condition resulting from the Covid-29 pandemic, the mitigation measures define as protocols, resources or rules that make viable to avoid the contingency, crisis or risk to end in a disabling, incapacitating or mortal condition for the organization workers.

3. Contextual Framework

The state of Campeche, Mexico forms a fundamental part on the Mexico's oil industry, it's registered that it occupies the 86.8 of the extraction revenue on oil and gas, producing the 75% of crude oil and 40% of natural gas in all the country, thus being the oil activity that generates more than eleven thousands of jobs on the area of Campeche, on which the vacancies are covered on the majority by workers from different states of the Mexican Republic, likewise, Petroleos Mexicanos (PEMEX) manages a fortified infrastructure for the shipping of oil products and its derivatives from their origin to the involvement of their exportation, storage and distribution. The main exportation destinies were the United States, Canada, China, India and Spain [8].

During the year of 2023, the deposit that contributed the most were Maloob, Zaap, Quesqui, Ayatsil, Tupilco, Profundo, Xanab y Balam, with a total of 949 million of barrels daily, with the most outstanding one being the Maloob with 288 million of barrels daily. Most of these deposits are found in the vicinity of the Ciudad del Carmen Island, therefore it is well known in all the country [9]. This has brought therefore that companies from other states established branches on Ciudad del Carmen to bring attention to the platform workers, thus the influx of people that enter and leave the city is constant. The Mexican Association of Hydrocarbons Companies (AMEXHI), on the 2021 forum review forum, mentions that the oil industry has done investments of more than 18,000 million of dollars on the years 2015 to 2021, thus the existence of an economic increment expectative, which is estimated to be mor than 42,000 million dollars. There has been an increment in the contract disposition related to the oil area, which involves a significant increment in investments. It is considered that on the lapse of 2019-2024, 50% of the planned activities have been executed [10].

COVID affectations on the oil sector. At the end of March 2020, Mexico was on the first phase of the sanitary contingence caused by COVID 19, which was affecting most countries in the world. Consequently, the Mexican Government represented by the president Andres Manuel Lopez Obrador declared that the country was entering an emergency sanitary state, derived by the very rapid increases in infections, after accounting before the 30th of March on 2020, the situation of 28 deceased and 1,094 positive cases [11].

Derived from the sanitary emergency, dispositions were implemented for all industry sectors, oil producing included the education sector suspended classes for students on all levels, and they were given the indication to only work on companies with staggered personnel, or to implement strategies to guarantee the workers safety.

From this rearrange of working activities in all sectors, the oil sector found itself in the need to modify the routine activities through the shift changes to ensure the operation in all work areas. Regarding Campeche, the PEMEX director, the agricultural engineer Octavio Romero Oropeza, collaborated with the Campeche governor at the time, Mr. Carlos Miguel Aysa Gonzales, together designed the intervention protocols to prevent infections, as well as the attentions to the infected by COVID-19 on marine oil platforms, to give prompt care, since these were far from firm ground, all with the objective of reduce or eradicate the epidemic outbreak, an evaluation took place of the infections on those places, as well as the revision of valid sanitary protocols. For the case of platforms located on the Gulf of Mexico, PEMEX announced the Emergency Response Plan for COVID 19 (PRE-C), which considered the attention and relocation of personnel that had symptoms of the disease on any of the platforms and process centers [12].

However, since the start of the pandemic, PEMEX as a company reported more deceased by COVID-19 between personnel, retirees, and families, which brought therefore that PEMEX was considered the company with more casualties on its employees at a world level because of the coronavirus. Only in the year 2020 PEMEX registered 2,324 deceased between active personnel and families by 54%. In 2021 it was registered a total of 3077 deaths, without taking into account retirees, representing the 52% [13].

The infections on maritime platforms were on the increase, caused by the difficulty in keeping a safe distance, coupled with chronic conditions workers had, like diabetes or hypertension (comorbidity factors).

On the start of the pandemic, there was a high incidence of contagion cases between personnel on oil platforms, caused by the next activities:

- Massive events with the personnel without adequate protection, causing infections.
- Personnel reuniting at breakfast, lunch, and dinner hours on the same place they accommodated.
- Medical exams for the detection of the disease, for all the personnel, were on the same day.

- The personnel were not safeguarding on secure conditions during quarantine, assisting to crowded places or socializing, not abiding to the sanitary indications.
- All workers were transported on the same vehicle for shift changes without social distancing.
- All personnel entered the capacitation rooms without taking the proper sanitary measures.
- Personnel were accommodating in double rooms, this not being the most recommended way to prevent the infection.

Based on the activities previously mentioned (information provided by conducted surveys, there were a series of practices that contributed significantly to the propagation on the infection between personnel [9].

4. Methodology

A review of the theory framework was conducted, starting with the personnel administration subsystem, up to the human resources maintenance subsystem, the contextual framework was analyzed, on which it was determined the problematic to stablish the objectives and hypothesis of the investigation. From this, a design, type and focus of investigation were created, and the sample was delimited at the end.

Interviews were programmed for the personnel working aboard platforms, to later process the data, do the statistical analysis and elaborate recommendations and conclusions.

Investigation variables. The dependent variables are the Mitigation Measures (MM) amidst the COVID-19, and it is confirmed by four dimensions: Accommodation (H), COVID-19 tests (PC-19), Transport (T), and Hygiene Kit (KH). The independent variable is the Human Resources Maintenance (MRH), conformed by four dimensions: Remunerations (R), Social Benefits (PS), work related quality of life (CVT), and social relationships (RP).

4.1 Investigation type and focus.

This investigation uses the hypothetic-deductive type of investigation, due to the observation part, then the hypothesis proposal, conclusion deduction from previous knowledge and verification [14].

In terms of its scope, it is correlational because it relates variables through a predictable model for a group. For this research, the dependent variable (mitigation measures) and the independent variable (human resource maintenance subsystem) [15]. This type of design is nonexperimental because it does not have direct control on the independent variable [1].

4.2 Sample and population

Ciudad del Carmen has a population of 248,255 habitants according to the INEGI's 2020 census of population and housing [16]. Without considering the personnel that boards and leaves platforms, denominated floating population (coming from diverse municipalities). A decision was made that the sample for the investigation was chosen according to the availability of the personnel during their resting periods. It was programmed to apply the interview to tome personnel, but the climatologic conditions did not allow it, therefore only forty-one workers participated from various companies, subsequently the instrument was applied to personnel willing to participate via videoconference.

5. Instrument elaboration.

The instrument elaborated for the investigation is confirmed by two sections: the first section contains the general data and mitigation measures; and the second section contains the human resources maintenance. (See Table 1).

Table 1: Investigation instrument sections

Variable/Dimension	Items	%Weight of the V or D
1.Mitigation Measures (MM)	39**	68.42
2.1 Accommodation	10	17.54
1.2 COVID-19 tests	8	14.04
1.3 Transport	11	19.30
1.4 Hygiene kit	10	17.54
Total	57	100
2. Human Resources Maintenance (MRH)	18**	31.58
2.1 Remunerations	3	5.26
2.2 Social Benefits	5	8.77
2.3 Work related quality of life	7	12.28
2.4 Social relationships	3	5.26

The ** means that the variable includes questions that are not considered on the correlation.

5.1 Instrument reliability.

To validate this investigation, the IBM SPSS Statistics 25 statistic software was utilized to obtain the Cronbranch's alpha coefficient. (See Table 2).

Table 2. Cronbach's Alpha reliability statistic

Cronbranch's alpha	Element Number
0.821	41

The coefficient value obtained was 0.821, respecting table 2, revealing that the instrument has a high reliability according to George and Mallery [17].

6. Materials and methodology

The instrument was applied to forty-one workers, 77% being men and 33% women. The companies where the workers operate are classified by oil sector: 38% work on perforations, 29% on construction, 15% on perforation services, 10% on shipping lines and 8% on accommodation and food.

From the data obtain when applying the corresponding test, and through its processing with the IBM SPSS Statistics 25 statistic software we have that, on Figure 1, its shown the salaries by sector, with 46.7% of the salaries being 13,000 to 24,000 Mexican pesos the most presented salary, and in the case of the construction and perforation sector, it presents a salary up to a maximum of 50,000 Mexican pesos.

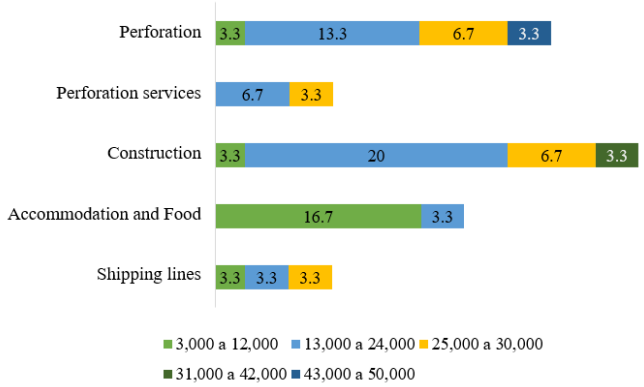

Figure 1: Salaries by oil sector (percentage). Self-made elaboration considering analysis results on IBM SPSS Statistics 25 software.

6.1 Mitigation measures variable

The dependent variable Mitigation measures (MM) amidst the COVID-19 with four dimensions: Accommodations (H), COVID-19 tests (PC-19), Transport (T), and Hygiene Kit (KH) (See Table 3).

The MM variable obtained a mean of 166.51, locating at a normal level according to the classification, thus the worker considers normal mitigation measures. The standard deviation has a value of ± 41.5. The dimension H obtained a mean of 43.34, locating it at an elevated level according to the classification, with a standard deviation value of ± 10.66. Dimension PC-19 obtained a mean of 38.17, obtaining an elevated level according to the classification, with a standard deviation of ± 7.35. Dimension T obtained a mean of 44.39, locating it at a normal level according to the classification, with a standard deviation of ± 18.53. Dimension KH obtained a mean of 40.60. locating it at a normal level according to the classification.

6.2 Human Resources Maintenance

The independent variable Human Resources Maintenance is presented, with the four dimensions: Remunerations (R), Social Benefits (PS), work related quality of life (CVT) and social relationships (RP), with a total of eighteen items (See Table 4).

The MRH variable obtained a mean of 77.34, locating at a normal level according to the classification, thus the Work relationships on the company and workers were normal, complying to the corresponding dimension, with a standard deviation of ± 23.38. The R dimension obtained a mean of 12.9, locating at a normal level according to the classification, with a standard deviation of ± 4.17. The PS dimension obtained a mean of 20.85, locating at a normal level according to the classification and a standard deviation of ± 6.08. The CVT dimension obtained a mean of 30.63, locating at an elevated level according to the classification and a standard deviation value of ± 9.95. The RP dimension is confirmed by 3 items, obtained a mean of 12.95, locating at a normal level according to the classification and a standard deviation value of ± 4.09.

7. Correlation analysis

The correlations between dependent and independent variables are shown along with their dimensions (See Table 3 and 4). The variable denominated Human Resources Maintenance was presented with high congruence between Mitigation Measures variable and dimensions (values higher than 0.814) as well as between themselves (values higher than 0.686). The dispersion diagram shows a positive lineal correlation [18] (See Figure 2).

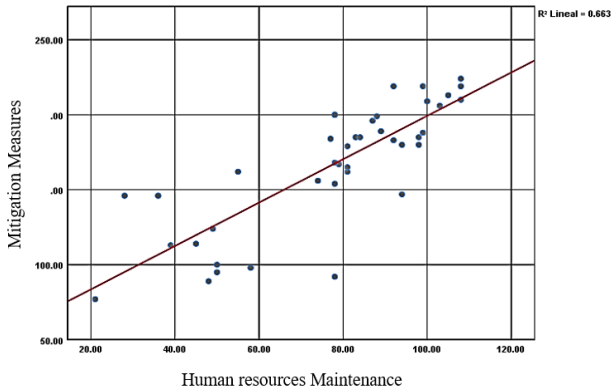

Figure 2: Correlation between Mitigation Measures and Human Resources Maintenance. Self-made based on analysis results with IBM SPSS Statistics 25.

Table 3: Statistic analysis of Mitigation Measures variable. Self-made elaboration based on analysis results from IBM SPSS Statistics 25.

Variable/Dimension	Mean	Stand Dev	MM	H	PC-19	T	KH
1.Mitigation Measures (MM)	166.5122	41.53680	1				
2.1 Accommodations	43.3415	10.66679	0.724**	1			
1.2 COVID-19 tests	38.1707	7.35834	0.672**	0.384*	1		
1.3 Transport	44.3902	18.53089	0.885**	0.549**	0.385*	1	
1.4 Hygiene Kit	40.6098	14.30363	0.872**	0.450**	0.650**	0.666**	1

Table 4: Statistical analysis of the human resources variable. Self-made based on analysis results with IBM SPSS Statistics 25

Variable/Dimension	Mean	Stand Dev	RL	R	PS	CV	RP
2. Human Resources Maintenance (MRH)	77.3415	23.38548	1				
1.1 Remunerations	12.9024	4.17016	0.957**	1			
1.2 Social benefits	20.8537	6.08507	0.960**	0.887**	1		
1.3 Work related quality of life	30.6341	9.95931	0.982**	0.930**	0.919**	1	
1.4 Personal relationships	12.9512	4.09238	0.922**	0.868**	0.859**	0.864**	1

8. Conclusions and recommendations

This investigation resulted in the proposal of mitigation measures towards the companies in the oil sector that have shift changes, indiscriminating the activity they dedicate to. This companies can upgrade their shift changes with the objective of not interrupting their duties during work period thus complying with the work program.

In conclusion:

- According to interviews, it is concluded that there is a high correlation between companies that grant social benefits and the Mitigation Measures.
- The construction and perforation companies mostly were distinguished by the best practices on high Mitigation Measures levels.

The recommendations that emerge from this study are:

1) Formalize the Mitigation Measures, integrating them with the client contracts of the service providers.
2) It is recommended to annually present an award or badge to the companies that comply with the Mitigation Measure standards.
3) Modify the board of roles and responsibilities on the teams aboard maritime platforms.
4) Conciliate with the client the increase in operations due to the implementation of Mitigation Measures.
5) Raise awareness among companies that their actions must be aimed at safeguarding the lives of workers.
6) Train the human resources department staff on the importance of implementing mitigation measures during shift changes.
7) Strengthen trust between employees and the company so that employees feel comfortable disclosing if they are sick with COVID or another illness and are granted sick leave in accordance with the law.
8) If companies improve their mitigation measures, it will increase the sense of belonging in the workplace.
9) Promote mitigation measures on social media to raise awareness of the efforts made by the company to safeguard the lives of its workers.

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