

QUALITY ENHANCEMENT FOR IMPROVING THE PROCESSES OF MAKING DECISIONS WITHIN LIBYAN OPERATING OIL AND GAS COMPANIES

Rajab Abdullah Hokoma and Hanan Zawam Aburas*

Mechanical & Industrial Engineering Department, Faculty of Engineering,
University of Tripoli, Libya

* Senior Reservoir Engineer, Geosciences & Reservoir Engineering Department,
Mellitah Oil & Gas B.V. Libyan Branch
E-mail: r.hokoma@uot.edu.ly

الملخص

تبين هذه الورقة أهم العوامل المؤثرة على جودة عملية صياغة القرار في بعض شركات النفط والغاز في ليبيا. استناداً إلى الاستبيان الذي تم تصميمه لهذا الغرض وما تم استعراضه من منشورات متعلقة بهذا المجال تم تحليل البيانات التي جمعت وبينت النتائج أن تجهيز الخطوات اللازمة لعملية اتخاذ القرار تمثل تحدياً لمتخذيهِ إضافة إلى أن معظمهم عادة ما يركزون على استخدام أبسط الأدوات وعلى خبراتهم السابقة في اتخاذ قراراتهم. بينما تقتصر معظم تلك الشركات إلى وجود نظام فعال للتنسيق والاتصال والذي بدوره يؤثر سلباً على القرارات المتخذة في معظم الشركات المشمولة بهذه الدراسة. كما وجد أن الإجراءات المستخدمة خلال عملية اتخاذ القرارات داخل معظم الشركات التي تمت دراستها يمكن اعتبارها من العوامل ذات التأثير المباشر على تحسين جودة عملية اتخاذ القرار، يلي ذلك الأدوات والتقنيات المستخدمة، في حين وجد أن الاتصالات يمكن اعتبارها عنصراً مؤثراً في عمليات صياغة القرارات ولكن بشكل أقل تأثيراً من باقي العوامل المشمولة بهذه الدراسة.

ABSTRACT

This paper identifies the most affecting factors that enhance the quality of the decision making process within some Libyan oil and gas companies. Based on the developed questionnaire along with the literature review, the analysis showed that it is a challenge to processing the proper procedure for making decisions. However, most decision makers are found to be focusing on using simple tools for making their decisions, whereas, lacking of an effective communication network during making decisions are considered with a negative impact on making the proper decisions within most surveyed companies.

Furthermore, it was found that, the procedures for making decisions within most surveyed companies could be considered as the most crucial for improving the quality of the decision making processes, followed by the used tools and techniques, whereas, communications as a factor influencing the processes of making decisions is found to be at the lowest level throughout the entire decision making processes.

KEYWORDS: Communication; Decision-Making-Process; Enhancement; Procedures; Quality; Tools & Techniques.

INTRODUCTION

The stages throughout the process of making decisions could be classified as procedures, tools/techniques, and communications, whereas, time required for gathering and analyzing the data for making the proper decisions along with implementing what is

being decided are considered challenges for making an effective decision within any business area [1]. These variables/factors are usually identified based on the conceptions and definitions of Decision Making Process (DMP) [2]. It was also stated that the best decision results are obtained when the principle factors are clearly defined and then completely analyzed. Cultural background, personal experience, conflict of interest and leadership are being observed as critical factors that affecting making decisions in many organizations [3].

This paper investigates the impact of these factors on the DMP within some Libyan operating oil & gas companies, thereby points out their implications on the quality and effectiveness on making decisions within these companies. The targeted companies for conducting this survey are MOG-Oil, MOG-Gas, Waha, Akakus, Mabruk, Harouge, Zuetina, and NOC.

AN OVERVIEW OF DECISION MAKING PROCESS:

Making decisions with the most advanced techniques and tools usually results good outcomes [1], that depends on whether the decision is taken using the proper processes or by a qualified decision maker [4]. The relationship between the communication and making decisions could be defined as a process whereby transferring the decision from one to another in the organization. It was also stated that, time constraints, personal distractions, poor decision making skills are usually lead to making insufficient decisions thereby deteriorating the managerial system within many organizations [2]. Whereas, understanding and establishing an effective communication system for making good decisions are considered as the most significant issues for leaders and managers to create clear policies within their businesses areas [3]. As an example, several oil companies spend up to eighteen months in decision cycle-gathering information, analyzing data, and modeling risk and uncertainty before selecting the proper decision system. However, there are many factors with either positive or negative impact on DMP, but with different levels, for instance, government policies, country regulations and risks [5].

There are some other factors that could influence DMP, among of them are corporate strategy, economic status (as it directly associated to the costs) and political issues. Those factors should be taken into considerations when making decisions for any developments throughout any management system within any business area [3]. In respect of decision making tools, several tools and software can help and facilitate the working environment to make better and effective decisions. Some recent surveys from different industries indicated that making use of integrated approaches, efficient tools and standard methodologies in DMP can help individuals and organizations to meet objectives [6].

Parakash [7] stated that, there is a strong correlation between process, people and technology for processing making good decisions. Therefore building and integrated approaches towards DMP should be considered as an important aspect for creating a strong decision support system. Furthermore, in respect of professional training on decision making skills, Hokoma [8] believed that the industry should encourage academia for graduating better qualified and trained engineers in decision making disciplines. In line with this, Thakur [9] stated that a working team approach and integrated technology usually lead to a successful reservoir management organization. In general, several large organizations struggled with issues such as time constraints, cost, procedures, and efficient tools and techniques [10].

METHODOLOGY AND DATA COLLECTION

The questionnaire was developed for gathering the required data for investigating the factors that influence the decision-making processes within the surveyed operating oil & gas companies. The participants for this survey are the related decision makers involved in DMP within these companies. The sample size was calculated, where 237 hard copies were distributed and 216 were fully completely returned with a response rate of about 91%. Five Likert Scale was used, and the weight was calculated to determine the duration of the mean values for each response. The used length duration is (4/5), giving 0.8 for each response. Therefore, the duration length was based on the weight responses (1-2-3-4-5). Table (1) shows the durations of the weighted mean values with different colors. The red color refers to a very low scale and the dark green refers to the very high scale. The first part of the developed questionnaire contains general information regarding biographical and personal data of the respondents, whereas the second part contains questions regarding DMP procedures, communication during DMP, and the tools/techniques that used in DMP, the second part is designed to investigate the impact-level of these three factors on DMP within the targeted companies.

Table 1: Weighted mean duration length for each response

Scale	1	2	3	4	5
Mean Value	1.0 to 1.79	1.80 to 2.59	2.60 to 3.39	3.40 to 4.19	4.20 to 5.0
Response	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree

DATA ANALYSIS AND DISCUSSION

As a first step of analyzing the gathered data, a reliability test (Cronbach's Alpha) was conducted and found to be equal to 0.84, meaning that the internal constancy of the questionnaire is stable and good enough to be analyzed [11]. Majority of participants are found with age group of between 36 to 46 years old, and the participated managerial levels for this survey are found mostly male-gender with about 85% from the total participants. Academic qualifications are also investigated Figure (1), and the findings show that about half of the participants are BSc holders, and about 40% are holding MSc degrees, meaning that the operating companies within the oil & gas business area are managed by qualified managers.

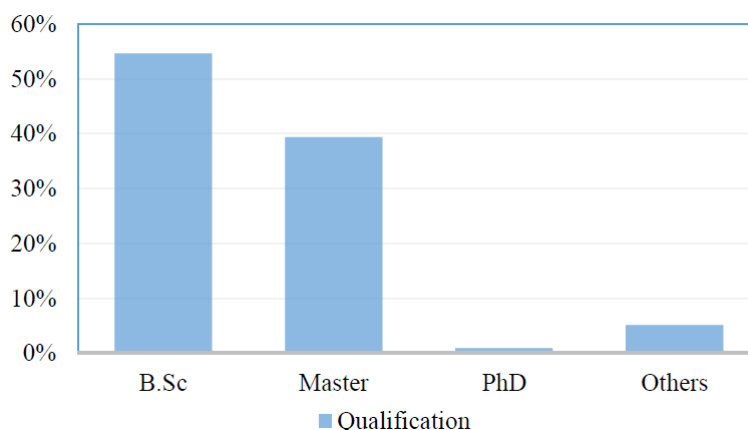


Figure 1: Respondents' educational levels

Table (2) shows the participated managerial levels, the senior managers are found at the highest level of participants, followed by coordinators and managers.

Table 2: Participated managerial levels

Managerial levels	Manager	Superintendent	Coordinator	Supervisor	Team Leader	Specialist	Senior	Others
Frequency	32	29	42	14	4	23	63	9
%	14.8	13.4	19.4	6.5	1.9	10.6	29.2	4.2

Investigating the DMP Procedures:

This section investigates the procedures that could influence the processes of making decisions within the targeted companies. Table (3) shows the highest value is found within the categories (Strongly Agree) of delaying making decisions could be as a result of bad procedures' documents, whereas the category (Not Sure) of preferable effective decision making processes should be established in short time is ranked with the lowest value, which means the respondents' opinions point to a lack of awareness about this category. The overall total average mean value is found to be at 3.65, meaning that the required procedures of the processes for making decisions are surely having influence on the performance of DMP.

Table 3: DMP procedures as seen by participants

Statement	Mean Value
Required time to make decisions is a challenge in DMP.	3.73
Required procedures to make decisions is a challenge in DMP.	3.68
Preferable effective DMP should be established in short time	3.33
Some decision makers try to avoid long DMP to make decisions	3.49
Steps of DMP are not independent from each other	3.72
Lack of scientific procedures leads to ineffective decisions.	3.75
Delaying making decisions could be as a result of bad procedures documents.	3.84
<i>An overall mean value</i>	3.65

Investigating the communication during DMP

This section investigates the DMP could be influenced by the communication. The results of the analysis are clearly explored in Table (4), showing that majority of respondents are strongly agree with the absences of good coordination and communication with staff and departments, and within the departments. The overall total

average mean value stands at 3.81, meaning that most of the respondents are totally agree that the communication influences the performance of DMP within their companies.

Table 4: Communication during DMP as seen by respondents

Statement	Mean Value
Participant usually involved in DMP.	3.44
Lack of communication with staff has a negative impact on DMP.	4.22
Lack of communication with departments has a negative impact on DMP.	4.27
Decision makers use individual decisions rather than group decisions.	3.18
Less employees participation in making decisions leads to poor DMP	3.87
Decisions in the company are usually taken without sharing team works.	3.18
Good communication between departments helps DMP.	4.54
<i>An overall mean value</i>	3.81

Investigating the Tools and Techniques used within DMP:

Investigating the third factor that may influences DMP within these targeted companies is conducted in this section, the results are explored in Table (5), showing most participants believed that choosing the right tools and techniques have a positive influence on the DMP. The overall total average mean value is found to be equal to 3.92, giving an indication that the tools and techniques are crucial and have influence on DMP within the Libyan operating oil & gas companies.

Table 5: The used tools and techniques within DMP

Statement	Mean Value
Best tools in terms of quality, timing and accuracy are needed for DMP	4.35
Computer programs have become an essential tool to aid make decisions.	4.17
Decision makers prefer using simple tools to make a good decision.	3.55
Choosing right tools and techniques has a positive impact on DMP.	4.18
Improve all managerial techniques and tools are considered in DMP.	3.33
<i>An overall mean value</i>	3.92

Hypotheses Testing

Investigating the reliability of the used data should be considered as crucial for obtaining the interpretation results of the multi regression model. Figure (2) shows the histogram of the dependent variable (DMP) with independent variables (Procedures, tools/techniques & communication during DMP), whereas, the normal P-P plot regression of the standardized residual is obtained on figure (3). The P-P plot indicates that the used data is fit to a straight line and the histogram shows that the data is around normally distributed. Hence, the regression line is more likely to be statistically significant, meaning that the three mentioned independent variables are positively related with DMP, and it can be seen that the results of regression model is valid to be analyzed.

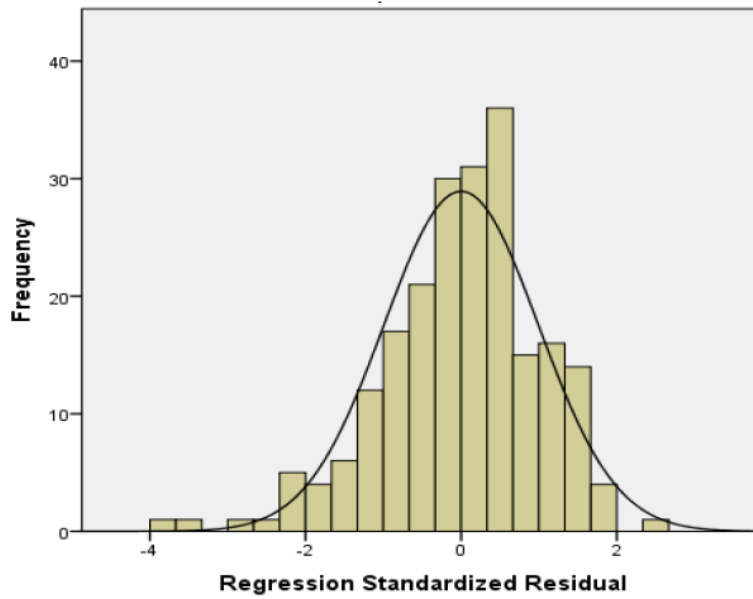


Figure 2: Histogram of Standardized Residual

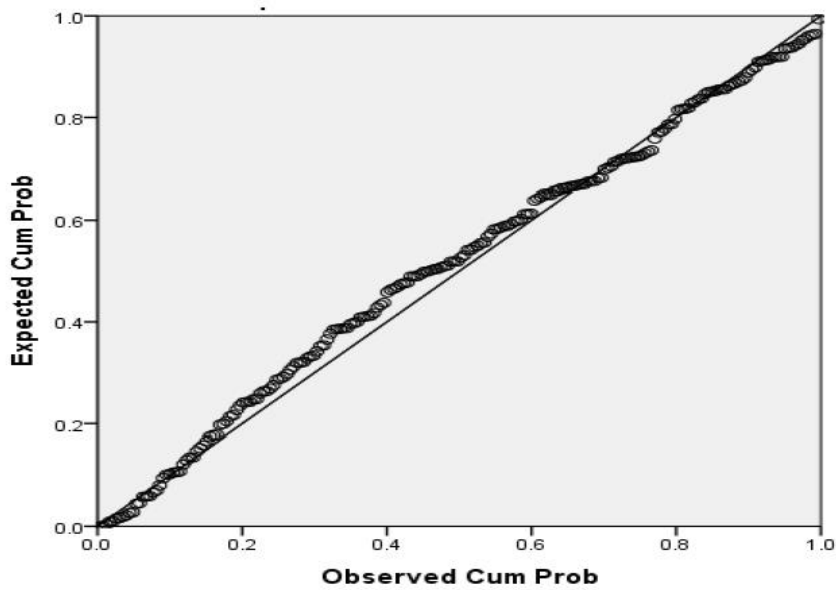


Figure 3: Normal P-P plot of the regression

The multiple regression model was used to investigate the impact of the three independent variables (procedures of making decisions, communication within decision system, and the used tools and techniques) on the DMP (dependent variable). The key results are summarized in Tables (6) and (7).

Table 6: Multiple Regression model key findings

R	R Square	Change Statistics	
		F Change	Sig. F Change
0.556	0.309	31.563	0.000

It can be seen that the R value is equal to 0.556, indicating that the correlation is at a medium level, whereas as (Sig. F Change) is found to be equal to 0.000 which is in range of less than 0.005, indicating that the null hypothesis should be rejected and accepting the alternative [12], confirming that there is an impact of the investigated independent variables on DMP.

Table 7: Multi Regression Model Coefficients

Independent Variables	Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.
	B	Std. Error	Beta		
(Constant)	0.711	0.329		2.165	0.031
Procedures	0.377	0.068	0.352	5.541	0.000
communication	0.209	0.059	0.214	3.560	0.000
Tools/techniques	0.215	0.070	0.187	3.065	0.002

Table (7) shows the coefficients regression value (*beta value is a measure of how strongly each predictor variable influences the criterion variable*). The overall regression model is statistically significant and the expressed equation of multi regression model could be formulated as follows:

$Y = a + b_1X_1 + b_2X_2 + b_3X_3$, leading to expressing the following equation:

$$\text{DMP} = 0.711 + 0.377 (\text{Procedures}) + 0.209 (\text{Communication}) + 0.215 (\text{Tools/techniques})$$

The quality of DMP could be enhanced through applying the formulated equation with using specific values of procedures, communications and used tool/techniques. For example in case of increasing 2 units of procedures, involving 3 people and using 2 modern tools/techniques in making a decision, the quality of DMP will be enhanced by about 2.5 degrees .

CONCLUSIONS AND RECOMMENDATIONS

The findings show that the decision-making processes within the surveyed companies are depending on the procedures being used throughout the decision system, the second affecting factor was the adapted tools and techniques throughout the decision system. However, communication is ranked with the lowest affecting level. It was also found that each procedure usually contains people, tools and techniques to analyze data for making decisions, whereas, using the proper tools and techniques are crucial for adding values and enhancing decisions' quality. Finally, the following recommendations can be pointed out:

- For enhancing the decisions' quality, the processes should be developed and improved continuously by using advanced techniques and tools, sharing new ideas and learning from fault decisions. That could be considered as an essential success factor for any organization.
- Decision making process for developing oil and gas fields should be well-identified for the related staff to be aware of all the procedures of making good decisions.
- Better communication network should be well-established between staff and departments to improve the quality of decision making processes

- Developing an effective communication network including providing an equal opportunities for exchanging ideas and enhancing the work performance.
- It is advised to conduct further investigations within the area of oil and gas along with other related areas for pointing out any other issues that may have either negative or positive impact on the decision-making processes.

REFERENCES

- [1] Steve M., Human Decision-Making Under Uncertainty in the Upstream Oil and Gas Industry, Ph. D. Thesis, The University of Adelaide, Australia 2007.
- [2] Frefer A. Project Management, Decision Making, chapter 4, Faculty of Engineering, University of Tripoli, Libya. 2014.
- [3] Ejimabo N., The Influence of Decision Making in Organizational Leadership and Management Activities, Journal of Entrepreneurship & Organization Management, Vol 4, issue 2, pages 13, 2015.
- [4] Hokoma R., Khan M., & Khalid H., An Investigation of Total Quality Management Implementation Status for the Oil & Gas Industry within Libya, MEQA, 2nd Annual Congress, Dubai, UAE, 2008.
- [5] Coopersmith E., *et al.*, Making Decisions in Oil and Gas Industry, Oilfield Review, Winter Schlumberger, 2001.
- [6] Hokoma R. & Mabrouk A, Business Process Re-engineering, and its Possible Applications for Improving the Libyan Banking Sector, The International Journal of Engineering and Information Technology, Misurata University, 2016.
- [7] Prakash D., Decision Making in Upstream Oil and Gas Industry- An Integrated Approach, India, SPE-154999-MS, 2012.
- [8] Hokoma R., A Way Forward for Implementing Just-In-Time Techniques within Oil & Gas Industries: Domestic Appliances, Journal of Engineering Research, Faculty of Engineering, University of Tripoli, Issue 21, Tripoli, Libya, 2016.
- [9] Thakur G.C., The Role of Technology and Decision Analysis in Reservoir Management, Chevron Petroleum Technology Company, Bahrain, SPE 29775, (1995).
- [10] Bickel J. & Bratvold R., From Uncertainty Quantification to Decision Making in Oil and Gas Industry, Energy Exploration & Exploitation, Vol. 26, No. 5, 2008.
- [11] Hokoma R., Khan M., Hussain K., Strategic Impact of JIT Technique For Reducing The Storage & Eliminating The Waste Within Petroleum Industry, Proceeding of the Ninth Mediterranean Petroleum Conference and Exhibition, Tripoli, Libya, 2006.
- [12] Laerd Statistics, Multi Regression Analysis using SPSS statistics, available at: <https://statistics.laerd.com/spss-tutorials/multiple-regression-using-spss-statistics.php>, [accessed in Jan 2017].