SYSTEMATICALLY ARRIVING AT THE RESEARCH TOPIC FOR STUDY IN OIL AND GAS: “A FRAME WORK TO SPEED UP THE ADOPTION OF INNOVATIVE DRILLING TECHNOLOGIES IN UPSTREAM OIL & GAS”

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ABSTRACT

This Article describes how the researcher defines the Area of Research, Identifies the Business Problem, Research Gaps, Theoretical Underpinning and Theoretical Gap, Aligns the Research Gaps with Theoretical Gap and Formulates the Research Problem, Research Questions, Research Objectives, Frames an appropriate Title for study, Selects the appropriate Research Design and Finalize the Research Outline with Completion Plan.

Key words: Business Problem, Research Gaps, Theoretical Underpinning, Theoretical Gap, Research Problem, Research Questions, Research Objectives, Research Design, Completion Plan

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1. INTRODUCTION

The very question that puzzled the researcher when the decision to pursue PhD was made was in which field and on what area to do the research. The researcher bound by the constraints of time and with an intention of becoming a Part Time Student, decided to do it in an area familiar to him – Oil and Gas. Next decision was to – what in oil and gas to research upon? The researcher in his professional role as Sales Manager is entrusted with the responsibility of finding innovative technologies and promoting it in UAE Oil and Gas. So naturally the decision was to do it on – Innovative Technologies in UAE Oil and Gas. Oil and Gas industry is broadly

divided in to (1) Upstream (2) Midstream (3) Downstream. The researchers’ next dilemma was on which “stream” and on “what” technologies. Since the researcher interacted with “Upstream Professionals” on a day to day basis and was fascinated by “Innovative Drilling Technologies” – the Area of Research was further Narrowed down to “Innovative Drilling Technologies in Upstream UAE Oil and Gas”. Accessibility to data / Feasibility of data collection is a very important factor to be considered while selecting a research topic. A university with necessary “Oil and Gas” expertise has to be chosen to enroll as a Part Time Researcher. Many academically correct concepts or notions can be different or at times even wrong in the industry/sector context. In a university without necessary domain specific expertise – it might be difficult to present and convince the research findings. So “UPES” was selected.

2. PHRASING THE BUSINESS PROBLEM

Now the researcher needs to find a business problem in “Innovative Drilling Technologies in Upstream UAE Oil and Gas”. Going through various research reports and industry specific articles, the real business problem was identified as “The Diffusion/Adoption of innovative drilling technologies is abysmally slow in UAE Oil and Gas inflicting losses for innovator and Oil and Gas companies”. The Diffusion can be studied from “Innovator” point of view and the “Adoption” can be studied from “Oil and Gas companies’/End user” point of view. The decision was made to study the adoption from Oil and Gas companies’ perspective. Further narrowing down, the business problem can be rephrased – “The adoption of innovative drilling technologies is abysmally slow in UAE Upstream Oil and Gas resulting in losses – leading to missed or delayed opportunities to reduce cost”. Compared to other Middle Eastern countries UAE tops the Innovation index and UAE Upstream Oil and Gas has changed a lot in the last two years. UAE Oil and Gas adopts innovative technologies faster than its counterparts in Middle East but still there is room for improvement and scope for study.

3. FINDING THE RELEVANT THEMES FOR THEME WISE LITERATURE REVIEW

Now keeping the business problem in mind, the researcher needs to identify the research gaps in the “area of study”. To identify research gaps, the researcher needs to go through the research papers. Four data bases were searched for research papers using various key words and its various combinations – Innovations in Oil and Gas/UAE Oil and Gas/Recent developments/New Technologies/Diffusion of Innovative Technologies in UAE Oil and Gas/Adoption of Innovative Technologies. Initial reviews of research papers helped to identify the relevant recurring themes related to “Innovative Drilling Technologies”.

- UAE Oil and Gas
- UAE Government National Innovation Strategy and Incentives
- Significance of Innovative Drilling Technologies in Oil & Gas
- Pace of Adoption of Innovative Drilling Technologies
- Impact of Non/Slow adoption of Innovative Drilling Technologies
- Marketing and Sales Strategies of Innovators in UAE Oil and Gas

Once the relevant themes were identified, theme wise literature review was conducted for important findings, inferences and research gaps. Research papers relevant to these themes were reviewed. In some cases, where the research papers were scarce, research reports pertaining to the themes were reviewed, especially for two themes – (1) UAE Government National

Innovation Strategy and Incentives (2) Marketing and Sales Strategies of Innovators in UAE Oil and Gas.

Table 1 Themes Selection Justification and Research Outlook

S No	Themes	Selection Justification	Research Out look
1	UAE Oil and Gas	To identify the general trends in the oil and gas industry and its impact/contribution on/to economy	To unravel how Oil and Gas affects the UAE economy, the Oil and Gas market structure, how international energy trends affects UAE oil and gas, to examine the current state of affairs in UAE oil and gas and to examine various initiatives by the Government in Oil and Gas
2	UAE Govt. National Innovation Strategy	To identify the impact of National strategy on adoption in Oil and Gas	To focus on “Oil and Gas innovation Strategy” in National Innovation Strategy and whether it has made any significant impacts
3	Significance of Innovative Drilling Technologies	To identify how innovations can enhance the bottom line	To identify various innovative technologies and to assess whether it can lower cost and enhances efficiency/safety/productivity
4	Pace of adoption of Innovative Technologies	To identify the real pace of adoption in UAE Oil and Gas	To uncover why the adoption is happening “at a certain pace”
5	Impact of Non/Slow adoption	If slow – To identify the Impact of Non/Slow adoption	To uncover the losses/missed opportunities for improvements due to lack or pace of adoption.
6	Marketing/Sales Strategies of Innovators	To identify whether the strategies of Innovators affects adoption	To examine the marketing/sales efforts by the innovator and to examine its impact on adoption – to identify the effective strategies with respect to oil and gas.

4. LITERATURE REVIEW OF THEMES

Consolidating the findings of Theme wise literature review for (1) UAE Oil and Gas, a Paper was published titled “UAE’s Oil and Gas – A Bird’s Eye view”. Consolidating the findings of Theme wise literature reviews of (3) Significance of innovative drilling technologies (4) Pace of adoption of innovative drilling technologies (5) Impact of Non/Slow adoption – a paper titled “Significance of innovative technologies in Oil and Gas Sector” was published. So the researcher will not be furnishing the findings of theme wise literature review for themes (1), (3), (4) and (5). Instead, the researcher will be discussing only the research gaps of themes (1), (3), (4) and (5). The researcher will be discussing in detail the findings/inferences and research gaps of themes (2) and (6).

It is inferred that the Oil and Gas constitutes 30% to the GDP of UAE. UAE government has declared many ambitious initiatives/projects in Oil and Gas. Even though the market structure of Oil and Gas is monopolistic – with no competition whatsoever, the government understands the importance of innovative technologies and is taking initiatives to enhance the adoption in all fields including Oil and Gas. Till 2015, the industry was complacent with oil prices above \$ 100 and the industry was in a position to afford inefficiencies due to non/slow adoption. But for the last two years the scenario has changed completely. Oil and Gas Companies are exploring all avenues to reduce cost, enhance production and increase the bottom line. But still the adoption of innovative technologies is slow in UAE Oil and Gas compared to other sectors. Compared to other Middle Eastern countries, UAE tops the Innovation index list and there still exists room for improvement in Oil and Gas. Innovative

Technologies lowers cost, enhances efficiency, productivity and safety of operation. The impact of non/slow adoption is missed/delayed opportunities for enhancing bottom line.

In 2016, the international oil market experienced low oil prices throughout the year, leaving no choice for OPEC member and other major petroleum producing countries to cut their production levels. As a result of the drastic action taken in November 2016, the oil prices have increased to 70 USD per barrel at the time of writing this report. The low oil prices in the international market are affecting the business confidence in UAE. Business confidence affects all activities in an economy (CIPD, 2016).

The oil exporting countries including UAE are experiencing lower growth and fiscal deficits. Growth in oil exporting countries average 5.2% between 2000 & 2012 but fell to 2.5 in 2017. UAE's GDP slowed from 4.7 growth in 2013 to 4.0% in 2015 due to low oil prices. In the medium terms IMF does not expects UAE growth rate to be more than 3.5%. Since its formation in 1971, UAE has been depending on Oil & Gas resources to support its economy. The Oil and Gas sector contributes 30% of country's GDP. Abudhabi in particular derives its revenues mainly from Oil and Gas. 60% of UAEs GDP owes to secondary sectors – Petrochemical, Construction, Ship repair, Textiles etc. Agriculture and Fishing contributes to a negligible – 1% of the total GDP (InterNations, 2016).

UAE's Visionary leadership is committed to investing the revenues from oil and gas sector wisely to other sectors. As UAE's crown prince H.H. Sheikh Mohammed rightly remarked, when the question of oil getting depleted completely in the next 50 years was put across to him – “If we are investing in the right sectors, we will be celebrating at that moment” – It's a statement with great foresight, from a true leader. UAE has already announced “Supreme policy for Science, Technology and Innovation” in UAE Vision 2021 – which includes 100 initiatives worth 300 Billion in health, education, energy, transport, water and technology. Moreover, UAE plans to triple the funds allocated to scientific research by 2021.

ABU DHABI'S OIL EXPORT REVENUES

Figure 1 Abu Dhabi's Oil Export Revenue (adapted from Abu Dhabi Chamber of Commerce, 2016)

IMF expects UAE to have a financial deficit of approximately 3.2% in 2019. Even with its objective of economic diversification (Plans to invest \$82 Billion), the revenues from oil are very vital in the short and medium terms (Fayad, 2016). Oil revenue constitutes 20% of the total export revenues. So to make investments in other sectors, revenues from oil is very much required, at least for the next few years (Gonzalez and Nabiyevev, 2009). UAE's revenues fell from 423 Billion in 2014 to 295 Billion in 2015 increasing the budget deficit by 53% (Federal Competitiveness and Statistics Authority, 2016).

Statement	2014	2015	Change Ratio 2015/2014 %
Total public revenues	423.0	295.0	-30.3%
Total public expenditures	492.2	401.0	-18.5%
Deficit / final surplus	69.2-	105.9-	53.0%

billion dirham

Source: UAE, Federal Competitiveness and Statistics Authority, primary numbers, June 2016

Figure 2 Revenue Vs. Expenditure (adapted from Federal Competitiveness and Statistics Authority, 2016)

The influx of oil from various quarters in global hydrocarbon market will keep the prices low and the prices are not expected to increase drastically in the coming years – which emphasize the need for innovative technologies to increase efficiency and to lower cost (The World Economic Forum, 2017). The sharp decline in the Oil & Gas prices has depleted the profit margins for UAE companies associated with oil & gas (Gulf news, 2017).

UAE is committed to develop “reliable, sustainable and affordable alternative energy” which helps to improve the carbon foot prints. To achieve this objective, the revenues from Oil & energy are significant in the short to medium term. Innovation in the energy sector is the key to prosperity and well-being of UAE residents (UAE State of Energy report, 2016). UAE Vision 2021 emphasizes the integration of three sectors- (1) Government as policy enabler, academic institution as R&D providers and private sector as the product developer – to enable successful innovation. Setting a policy frame work is very critical for innovation (Griffin, 2008).

Dubai launched “Mohammed Bin Rashid Innovation fund” worth AED 2 Billion to promote innovation in technologies, products, services and processes. Its objective is to achieve UAE’s target of getting into the list of first 10 most innovative countries by 2021. UAE National Innovation strategy focuses on innovation in (1) Renewable Energy (2) Transportation (3) Education (4) Health (5) Water (6) Technology (7) Space (UAE Ministry of Finance, 2017). “Mohammed Bin Rashid Centre for Government Innovation” was formed with an aim to promote innovation in every day practice – to promote a culture of innovation in all Government departments (MBRCGI, 2017). UAE Vision 2021 envisages: “Innovation, research and technology will form the pillars of a knowledge based, highly productive and competitive economy, driven by entrepreneurs in a business friendly environment where public and private sector form effective partnerships” (MOCFAF, 2018). As per Global Innovation Index, UAE is ranked first among the Middle East and North African Countries and 36th globally among 143 countries in terms of performance in 2014. In 2016 it has improved its rank to 17 (With a Competitiveness Index Score of 5.26), first being Switzerland with a score of 5.81. (World Economic Forum, 2016) UAE’s total investment in innovation is estimated to be AED 14 Billion in 2015, AED 7 Billion in R&D only. National Innovation strategy was launched with an aim to become one of the most innovation nations in the world. National Innovation Strategy has identified 3 key pillars of Innovation (1) An Innovation Enabling Environment (2) Innovation champions and (3) Innovation priority Sectors.

Figure 3 National Innovation Strategy (adapted from UAE Ministry of Finance, 2017)

Despite of innovation initiatives from governments there are certain legal reforms the government should promote to foster a culture of innovation in UAE. UAE should stop criminalizing business failures and strengthen legal structures that strengthen competition and innovation – Bankruptcy and agency laws needs to be reformed, Courts needs to speed up its proceedings. Government should dispel the fear of innovation failures from the minds of innovators/startups/government companies (Matthew , 2014).

The era of getting business in oil and gas by sharing visiting cards is long gone. Content marketing in the form of blogs, e-book info graphics, product videos and webinars is an excellent way of sharing information about the products and company to Oil & Gas professionals. (Cartwright, 2016) A perfect mix of events, newsletters and bulk emails can bring in more business for companies (Lacour, 2015). Personal selling is an extremely effective strategy to generate business is oil and gas. Establishing cordial relationship with end user is a way of getting business from Oil and Gas companies. (Guffei, 2015). Integrating personal selling in to a mix of advertising, public relations, sales promotion and direct marketing is the passport to success in Oil and Gas. Reliable and honest reputation of companies helps to get more business (Ashley, 2013) Public relations improves public image and name recognition. It helps to establish a mutually beneficial relationship in the industry. (Foster Marketing, 2014). Internet marketing helps companies to stay ahead of competition and to create brand awareness. (WebpageFX, 2014). Social media also if utilized properly can share knowledge/experiences, enhances the knowledge of work force and helps them to stay connected (Dutta, 2016)

5. THEME WISE RESEARCH GAPS – IDENTIFICATION AND CONSOLIDATION

The Theme Wise Research Gaps are identified as given in Figure 5. Theme wise research gaps are consolidated and combined to form the research gaps.

Consolidating Research Gaps, the researcher derive four research gaps

- Variables/Determinants affecting adoption of innovation not discussed.
- Interdependence of Determinants/Variables not determined.
- Strategies to enhance adoption not determined.
- A frame work to enhance adoption not specified.

The above Gaps can be further merged. Interdependence of the determinants/variables – The second Gap and Strategies to enhance adoption - The fourth gap, can be derived from the Framework. So the researcher further narrows down Research gaps as follows.

- Variables/Determinants affecting adoption of innovative drilling technologies not discussed.
- A frame work to enhance adoption of drilling technologies not specified.

Naturally the question arises – whether the variables/enablers can also be determined from the frame work? - Which is very true. But the researcher keeps this as a separate research gap (which later will be converted to a research question) so as to filter out the irrelevant variables from the list of variables derived from the Literature review. Moreover it serves as a pilot study of the research problem.

Table 2 Theme wise Research Gaps

Theme Wise Gap Analysis		
No	Themes	Research Gaps
1	UAE Oil & Gas Sector	The challenges to innovation not mentioned
		Opportunities for innovation not mentioned
		Strategies to promote innovation not mentioned
		Determinants affecting the adoption of Innovation not mentioned
		How business confidence affects adoption of innovation not mentioned
		The Impact of Govt. Policy on adoption of innovation not studied
		The impact of prequalification process on adoption of innovation not studied
2	UAE Government National Strategy & Incentives on Innovation	Lack of focus on O&G Sector
		Relevance of Innovation in O&G sector not mentioned
		Determinants affecting the adoption of Innovation not mentioned
		Strategies to promote innovation not mentioned
		Impact of National strategy on O&G not studied
3	Significance of Innovative Technologies in UAE Oil and Gas sector	Determinants affecting adoption of innovation not explained except three determinants.
		Strategies to enhance adoption not explained
		Impact of National strategy on O&G not studied
		A common platform to discuss O&G sector innovation not there in UAE
4	Impact of Non/Slow adoption of innovative technologies in UAE O&G	Strategies to enhance adoption of innovation not discussed.
		Determinants affects adoption of innovation not discussed.
		A Frame work or model for adoption not specified
		Interdependence of the determinants not found out
5	Pace of Technology adoption in UAE O&G	The reason stated for Non adoption/Slow adoption are only "complacency" and "lack of time"
		Strategies to enhance adoption of innovation not discussed.
		Determinants affects adoption of innovation not discussed.
		A Frame work or model for adoption not specified
		Interdependence of the determinants not found out
6	Marketing & Sales Strategies for Innovation in UAE O&G	Impact of National Innovation Strategy on Technology adoption not investigated.
		Determinants affects adoption of innovation not discussed.
		Interdependence of the determinants not found out
		Strategies to enhance adoption of innovation not discussed.
		Frame work or model for adoption not specified
		The impact of Operator engagement/involvement not studied in the context of UAE to enhance adoption
		Many of the discussions are from a "Marketer" point of view. The determinants not checked from an end user point of view. Views collected from Marketers not end users
		Impact of partnership on adoption not studied in the context of UAE
		"Risk" to be tested as a determinant of adoption in UAE O&G
		Studies regarding strategies not in the context of UAE O&G
		The impact of personal selling on adoption not carried out in the context of UAE
		The impact of Internet marketing/Social media on adoption not carried out in the context of UAE

6. THEORETICAL UNDERPINNING AND GAP

Simultaneously, the researcher did a literature review on “Theories and Models of Adoption” and three papers the researcher published based on the study namely (1) A Journey through the Evolution of Theories and Model of Adoption of Innovations (Years: 1798-1980) (2) A Journey through the Evolution of Theories and Model of Adoption of Innovations (Years: 1981 – 1999) (3) A Journey through the Evolution of Theories and Model of Adoption of Innovations (Years: 2000 – 2018). For an organization to benefit from adoption of innovation it should not only adopt, the adopted innovation should be utilized in their day to day operations/functions. So in fact, adoption should be viewed as a “Process of Organizational adoption and Utilization by Employees”. Adoption is incomplete without utilization. This theory/model was proposed by Frambach and Schillewaert (2002) - discussed two dimensions of adoption – Adoption of the innovation by organization and utilization of adoption by individuals (acceptance of innovations by employees). The model describes the steps involved in the Pre-Adoption process but fails to identify the variables affecting the Pre-Adoption stage. From the literature review the researcher infers that very few studies explain the factor affecting the Pre-Adoption process. So the theoretical gap is the role played by the “Pre-Adoption Variables” to enhance the adoption of innovation. The adoption process can be divided into three stages (1) Pre-Adoption (2) Adoption (3) Post-Adoption. To understand the process of transition from Pre-Adoption to Adoption stage, it is important to know the role played by variables at the Pre-Adoption stage. Adoption can only be enhanced if the organization moves quickly from the Pre-Adoption stage to Adoption stage.

7. DRAFTING RESEARCH PROBLEM BY ALIGNING BUSINESS PROBLEM WITH THEORETICAL GAP

Now the researcher needs to Refine/Rephrase the Business problem to a “Research Problem”. The researcher needs to know how to solve/overcome the business problem. The solution is to enhance the pace of adoption of innovative drilling technologies to reduce cost and enhance productivity. To enhance the process of adoption the researcher needs to know the variables/enablers affecting adoption and its roles at various stages of adoption. The researcher also needs to address the Theoretical gap – The role played by the “Pre-Adoption variables”. So the researcher drafts the research problem as “What is the role of adoption variables/enablers (with special emphasis to Pre-adoption variables/enablers”) to enhance the adoption of innovative drilling technologies in Upstream UAE Oil & Gas?”. The Research Gaps and Theoretical Gaps are perfectly aligned for further study.

8. DRAFTING RESEARCH QUESTIONS AND RESEARCH OBJECTIVES

Now the researcher phrases the research questions as (1) What are the different variables than can influence the adoption of innovative drilling technologies in Upstream UAE Oil & Gas? (2) What should be a Framework (covering the entire gamut of Technology adoption with special emphasis to Pre-adoption) to facilitate/enhance the adoption of innovative drilling technologies in Upstream UAE Oil & Gas?

Now the researcher can frame the research objectives as (1) To find out the different variables than can influence the adoption of innovative drilling technologies in Upstream UAE Oil & Gas. (2) To propose a Framework (covering the entire gamut of Technology adoption with special emphasis to Pre-adoption) to facilitate/enhance the adoption of innovative drilling technologies in Upstream UAE Oil & Gas.

Figure 4 Model of Adoption (adapted from Frambach and Schillewaert, 2002)

To Sum up:

8.1. Business Problem

- Pace of adoption of innovative drilling technologies is abysmally slow in Upstream UAE Oil and Gas sector thereby incurring losses to Oil & Gas companies

8.2. Combined & Consolidated Research Gaps

- Adoption “Enablers” not identified with respect to adoption of innovative drilling technologies in Upstream UAE Oil & Gas.
- A Frame work/Model for adoption of innovative drilling technologies not found with respect to Upstream UAE Oil and Gas in due course of Literature survey.

8.3. Research Problem

- The Research Problem is formulated as: “What is the role of adoption variables/enablers (with special emphasis to Pre-adoption variables/enablers”) to enhance the adoption of innovative drilling technologies in Upstream UAE Oil & Gas?”

8.4. Research Questions

- What are the different variables than can influence the adoption of innovative drilling technologies in Upstream UAE Oil & Gas?
- What should be a Framework (covering the entire gamut of Technology adoption with special emphasis to Pre-adoption) to facilitate/enhance the adoption of innovative drilling technologies in Upstream UAE Oil & Gas?

8.5. Research Objectives

- To find out the different variables than can influence the adoption of innovative drilling technologies in Upstream UAE Oil & Gas.
- To propose a Framework (covering the entire gamut of Technology adoption with special emphasis to Pre-adoption) to facilitate/enhance the adoption of innovative drilling technologies in Upstream UAE Oil & Gas

9. SOME DEFENITIONS – TO DETEMINE THE PRECISE SCOPE OF STUDY

Adoption: The scope of adoption covered in this study is only “External Innovative Technologies”. Innovations can be both external and internal. The word “Adoption” covers Pre-adoption & Adoption by the Organization” and “Utilization by its personnel”. So the variables/enablers affecting “Pre -adoption”, “Adoption” and “utilization” of External innovative technologies will be investigated. Just “Adoption” by organization will not accrue any benefits, unless and until the employees put the innovation into practical use.

Innovation: The innovation covered in the study is “Break-through” or “Radical Innovation” of Technologies – External to organization.

End User Perspective: Our study can be done in two perspectives – (1) From the perspective of marketer (2) From the perspective of end user – the company ultimately using the technology. The researcher has decided to conduct the study from “UAE Oil & Gas companies Perspective”

Upstream UAE Oil & Gas: There any many areas available in Oil & Gas sectors where the innovative technologies can be adopted. The focus of this research will be in the adoption of drilling technologies of Upstream UAE Oil & Gas.

Innovative Drilling Technologies: Innovative drilling technologies worth mentioning are: Dual Reamer RSS BHA Technology, Reamer on Demand Technology, Innovative Anit-collision monitoring & Ranging Technologies (MagTrac), Through-tube rotary drilling(TTRD),Coiled Tubing units/Multilateral wells/Designer wells/Intelligent Mud/laser, spallation, plasma, electron beam, pallets, enhanced rotary, electric spark and discharge, electric arc, water jet erosion, ultrasonic, chemical, induction, nuclear, forced flame explosive, turbine, high frequency, microwave, heating/cooling stress, Electric impulse Technology(EIT), Percussion Drilling and Thermal shock enhanced drilling system.

10. RESEARCH DESIGN

Abudhabi dominates the UAE Oil & Gas market with 96% of Oil and 94% of Gas reserves. The remaining emirates contribute only 4% and 6% of Oil and Gas reserves respectively. Abudhabi National Oil Company (ADNOC) operates 16 companies and oversees exploration, production, storage, refining, distribution and development of wide range of petrochemical products. Since Abudhabi dominates UAE market, ADNOC is considered as the driving force in UAE Oil and Gas. SPC is the authority for formulating Oil and Gas policy. So a study of Upstream ADNOC group of companies gives us the “Pulse of Upstream UAE Oil & Gas”. ADNOC End users constitute the population of study. The respondents whose designations are Senior Engineer or above will be selected – Senior Engineers/Consultants/Team leaders/Managers will be selected.

For Research Objective 1 – The various variables/enablers affecting adoption of innovation are isolated by Literature review and variables/enablers relevant to adoption of innovative drilling technologies in Upstream UAE Oil & Gas are identified by conducting “Semi structured interviews” and subsequent “Coding” of the Transcript either manually or by using appropriate software like QDA Miner Lite or TAMS. For Interviews, Judgment Sampling & Snow ball sampling techniques will be used. The Conceptual Lens or Frame work the researcher arrives at is grounded in the data. So the method is nothing but Grounded Theory.

For Research Objective 2 – The Frame work pertaining to adoption of innovative drilling technologies will be made by “Framework Analysis”. The research design proposed by Ritche and Spencer (1994) will be followed. Frame work analysis is capable of giving answer to Research Objective one as well. However the researcher adds an extra level of analysis for Pilot Testing of Interview schedule and to eliminate the irrelevant variables.

Figure 5 Research Flow Chart

Detailed justification for selecting Grounded Theory and Frame Work Analysis for Research Objective One and Research Objective Two are furnished in the Paper “Choosing Grounded Theory and Frame Work Analysis as the Appropriate Qualitative Methods for the Research”

Figure 6 Frame Work Analysis (adapted from Ritchie and Spencer, 1994)

11. RESEARCH FRAME WORK

Stage 1

The First stage of the research starts with finalizing on the area of study. Subsequently the Business Problem, Research Gaps, Theoretical underpinning and Gaps, Research Problem, Research Questions, Research Objectives, Research Title and Research Design are finalized. The First stage ends with deciding the General Research Frame work along with the Tentative Completion plan.

- UAE Oil and Gas – A Bird’s Eye View
- Significance of Innovative Technologies in Oil and Gas Sector
- My Research Journey till Synopsis
- Choosing Frame Work Analysis as the Qualitative method for Research
- A Journey through the Evolution of Theories and Model of Adoption of Innovations – 1
- A Journey through the Evolution of Theories and Model of Adoption of Innovations – 2
- A Journey through the Evolution of Theories and Model of Adoption of Innovations – 3
- Innovative Drilling Technologies
- Variables Influencing the adoption of Innovative Drilling Technologies in Upstream UAE Oil and Gas
- A Frame Work to Enhance the adoption of Innovative drilling Technologies in Upstream UAE Oil and Gas

Table 3 Research Framework

Task	Start Date	End Date	Duration
L. Review - Problem Identification	7/1/17	01-Nov-17	123
Synopsis Presentation	11/1/17	15-Mar-18	134
Synopsis Correction/Final approval	3/15/18	15-May-18	61
Questionnaire Preparation/Pilot Testing/Final Administration	5/15/18	15-Jul-18	61
Semi Structured Interviews	7/15/18	15-Aug-18	31
Paper Publishing	8/15/18	15-Nov-18	92
Abstract Preparation/Presentation	11/15/18	16-Mar-19	121
Abstract Corrections/Final approval	3/16/19	15-May-19	60
Final Thesis Submission	5/15/19	15-Jul-19	61

Figure 7 Completion Plan**Stage 2**

The Researcher's intention is to publish each of these proposed chapters as research papers consolidate it and submit it for final evaluation. In the second stage of research – the researcher hopes to publish the first eight papers in UGC Approved/Scopus Indexed Journals.

Stage 3

During stage 3 – The researcher will publish the remaining two more papers and complete the work. The published papers will be then consolidated and submitted for Evaluation. Data Collection and Analysis will be furnished in Paper 9 and 10. Paper 9 and Paper 10 – answers the Research Questions or Objectives.

12. CONCLUSIONS

As the Researcher’s guide always remarks – “There is no short cut in Research. The easiest way to complete the work is to do smart hard work” – Which is very true. The research has to be done in a systematic manner. The researcher needs to acquire both Domain specific knowledge and Theoretical knowledge of the process under study. Pursuing short cuts to complete research in fact prolongs the research. Manipulations at one stage trigger a chain reaction of manipulations. Ultimately the researcher gets totally disoriented and work becomes extremely difficult to complete.

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