

# IDENTIFYING THE RELEVANT VARIABLES AFFECTING THE ADOPTION OF INNOVATIVE DRILLING TECHNOLOGIES IN UPSTREAM UAE OIL AND GAS

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## ABSTRACT

*The Researcher uses Strauss and Corbin's version of Grounded Theory to find the variables relevant to the adoption of innovative drilling technologies in upstream oil and gas. The justification for selection of grounded theory as the appropriate research method is already furnished in Paper titled – "Choosing Grounded Theory and Frame Work Analysis as the Appropriate Qualitative Methods for Research". The researcher applies Predefined codes and Categories of codes to the data collected. The relevant questions to be asked are derived from the conceptual lens formulated by the researcher in the Paper titled – "Constructing an Innovation Adoption Conceptual Lens/Preliminary Frame Work for Further Testing in Upstream Oil and Gas". The qualitative data analysis results in a "Preliminary Frame work" pertaining to Upstream Oil and Gas Innovation Adoption from which the variables can be extracted. The Research Objectives are already furnished in the paper titled – "Systematically Arriving at the Research Topic for Study in Oil and Gas". Qualitative Data Analysis furnished in this paper answers the Research Objective 1 – The Variables are identified. This Preliminary frame work goes as an input to the Framework analysis for answering Research Objective 2.*

**Keywords:** Conceptual Lens; Frame Work; Innovation; Qualitative Data Analysis; Upstream Oil and Gas; Coding

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## 1. INTRODUCTION

The adoption of innovative drilling technologies is slow in Upstream UAE Oil and Gas (Nechully, Pokhriyal and Thomas, 2018). The objective of the researcher in this paper is to identify the relevant variables affecting different stages of innovation adoption. This paper serves as the first stage of qualitative data analysis to propose a Frame Work to enhance the adoption. The prospective variables are already identified and a conceptual lens is already proposed by the researcher in the paper titled “Constructing an Innovation Adoption Conceptual Lens/Preliminary Frame Work for Further Testing in Upstream Oil and Gas” (Nechully and Pokhriyal, 2019a).

## 2. METHODOLOGY

The Researcher employs the Qualitative Data Analysis Method – “Grounded Theory” to unravel the variables affecting different stages of adoption. Semi-Structured Interviews will be conducted for data collection (Nechully and Pokhriyal, 2019b). The Relevant questions to be asked will be drafted keeping conceptual lens as the reference. NVIVO 12 will be used for Qualitative Data Analysis.

## 3. USING NVIVO 12

The Interview transcripts are cleaned, formatted and imported for data analysis. The answers from various transcripts are consolidated under each headings/questions for easy analysis using “AUTO CODE” function. The “MIND MAP” function can be used to create tentative nodes structure – If the conceptual lens/preliminary frame work is known. Once these answers from various transcripts are consolidated under each questions/headings, the coding is done. In NVIVO, the relevant portions of text coded are put into containers called “NODES”. Either the Nodes will be Pre-labeled or are labeled as or when the codes are generated. The Insights or Useful observations emerged during the process of coding are noted down under “MEMOS”. In due course of data analysis – these Memos are connected together to unravel or validate the patterns of relationships of codes generated (Wright, 2018).

## 4. INTERVIEW PROTOCOL

- Can you please tell me something about the Oil and Gas scenario in UAE now?
- Can you please tell me something about the buying of new technologies in UAE Oil and Gas?
- Can you please explain in detail – the buying process of innovative technologies – prior to adoption, adoption and post adoption stages in your organization?
- Do you think Identifying Innovation opportunity and Technology finalization constitute Pre-Adoption, Contract finalization, implementation and utilization constitute adoption and ultimately the future technology usage decisions constitute the post adoption?
- Do you think the general attitude and readiness of an organization motivates you to search for an innovation opportunity in your organization?
- Do you think innovativeness of an organization and organizational culture affects readiness of an organization?
- Do you think general attitude and readiness of an organization affects the technology finalization in your organization?
- Do you think the readiness of an organization and attitude affects contract finalization?

- Do you think the readiness of an organization affects implementation of innovative technologies in an organization?
- Do you think attitude affects implementation of Innovative technologies in an organization?
- Do you think the general attitude, organizational readiness and intention to use affects the utilization of innovation in your organization?
- Do you think intention to use and the decision to repurchase/substitution/new purchase affect the future usage of innovative technologies in your organization?
- Do you think the variables like Ease of identification and usage, Affordability, Usefulness and Scientific credibility leads to a favorable attitude for problem solving?
- Do you think the variables like absorptive capacity, patterns of purchase, facilitating conditions, resources and information affects organizational innovativeness?
- Do you think organizational climate and customs affects organizational culture?
- Do you think hype cycles, decision types, various compliances, customization and compatibility, satisfaction, aftersales support and resistance to change affects intention to use an innovative technology in your organization?
- Can you please tell me whether Inter-generational competition, alternatives, technological advances, reversibility, last ditch efforts of the innovator, Re-Invention etc affects the substitution/re-purchase/new purchase decisions
- Do you think High resale price, Objectives, Intergenerational competition, Speed of organizational changes, brand loyalty, reorganizing and marketing strategies of innovator affects the substitution/re-purchase/new purchase decisions?
- Do you think Fashion, Seasonality etc affects hype cycles?
- Do you think optimism affects the hype cycles?
- Can you please tell us the reasons for resistance to change in your organization?
- Can you please tell me about the various sources of information regarding the innovative technologies in your organization?
- Can you please tell me about the aftersales supports expected from the innovator?
- Do you think variables like History and Frequency of past purchases; familiarity etc. affects the purchasing patterns in your organization?
- Do you think Ease of learning and Usage and Complexity of the technology affects the total efforts to be put in by the end user?
- Do you think variables like beliefs and outcome, production timeliness, User experiences etc contributes to User satisfaction and Trust towards an innovation in an organization?
- Do you think variables like CEO and Individual innovativeness, Market competition, Curiosity and R&D affects learning capacity of your organization?
- Do you think inter-organizational dependence, Market structure, Market competition and Organizational Openness affects the learning capacity of your organization?
- Do you think variables like Price, Budget allocation, Switching cost etc influence affordability of innovative technologies in an organization?
- Do you think variables like Cost savings, Profitability, Safety, Enhanced Job Performance, Environmental benefits, Long term consequences etc. affects the usefulness of the technologies in the organization?

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- Do you think Security, Safety, Time budgets, perceived innovation characteristics and Market potential affects the usefulness of the technologies?
- Do you think variables like Infrastructure, Managerial skills, Government support, Innovator support, Licensing, Leadership, Organizational Strategies etc. influences facilitating conditions of an organization?
- Do you think Proper Technology assessment, General Economic Conditions, Relationships, Degree of Innovativeness, and Organizational Priorities affects the facilitating conditions of the organization?
- Can you please tell me about the various resources required for adoption and utilization?
- Do you think variables like performance, quality of results, demonstration of the equipment, product features enhance the scientific credibility of the technologies?
- Can you please tell me about the variables affecting the compliance requirements in your organization?
- Do you think image enhancement, reference group, social pressure, Network externality, geographical proximity, Central decision maker, Network membership, Legitimization and Reputation of the vendor affects compliance requirements?
- Can you please tell me about the variables affecting the customization and compatibility requirements?
- Do you think variables like Organizational routines, Norms etc affects the customs in your organization?
- Do you think variables like Job Characteristics, Cross-functional teams, Authority etc affect the Organizational climate of your organization?
- Do you think variables like Organizational Structure, End user involvement etc influences the decisions in an organization?
- Do you think age, motivation, communication channels and voluntariness affects the decisions in organizations?

## 5. QUALITATIVE DATA ANALYSIS

### 5.1. Scope for Innovative Technologies in UAE Oil and Gas

The scenario in oil and gas is ripe for innovation adoption. The oil prices have stabilized around \$ 70 and UAE Government is not going to hold back on projects. They have announced many ambitious projects in UAE and they have also started releasing budgets for various activities - P1 “Even though the oil prices are around 70\$ per barrel – the scenario is somewhat optimistic compared what it was it 2015/16. SPC has allocated \$ 110 Billion – 60% to upstream and 40% to the downstream. New projects are coming up. So let’s hope it will regain its old glory very soon”. ADNOC has streamlined its operations in the last two years. ADNOC is also searching ways to enhance and lower the cost of production. In short – it’s a very optimistic scenario – P3 “In 2017 – the whole ADNOC group has streamlined its operations. “Now it is trying to explore avenue to reduce cost and enhance productivity. Government is investing money in various oil and gas project. They are in the process of expanding the Ruwais refinery. Western region of Abudhabi is a very happening place again”.

### 5.2. Process of Innovation Adoption in UAE Oil and Gas – Validation First Stage

The Stages of (1) Technology finalization and (2) Contract finalization have been confirmed by this question (2). From the statements from P1, P2, P3, P4, P5 regarding the Technology

Finalization – P1 “If we come across an innovative technology”, P2 “The management has to be convinced about the innovation proposal. They do not simply experiment like other sector”, P3 “The requirement is send to the purchasing department”, P4 “End user sends the requirement to contract/procurement department”, P5 “We just send our requirement to them” – It can be inferred that the end user finalizes the Technology requirement and send it to procurement/contract department for further processing. The contract finalization is done by the Procurement/Contracts department. The researcher needs to elicit more information on Pre-Adoption and Post- Adoption steps.

### **5.3. Process of Innovation Adoption in UAE Oil and Gas – Validation Second Stage**

The Statements from P1 and P4 – confirms the proposed stages in adoption. The first stage Pre – Adoption stage starts with “Finding an innovation opportunity” relevant to the company and ends with Selecting an “Innovative technology for that opportunity”. Pre – Adoption Process consists of (1) Innovation Opportunity Search (2) Technology Finalization. Statements from P1 and P4 verify the Pre-Adoption process: P1 “Yes. Once the end user identifies an opportunity – he searches for an appropriate technology/product HE presents the proposal to his superior and requests for budget through proper channels. Sometimes he gets the information from innovator. Once the budget is allocated, the purchase request along with three budgetary quotes is sent to procurement department”. P4 “We review our process/operations regularly and at the same time searches internet for the best practices/case studies etc from other Oil and Gas companies. Or at times we get inputs about latest technologies from Vendors. Once we identify an opportunity – we check the feasibility of it and searches solution for it. Once we identify a technology, we study more on it. Sometimes we request more information, presentation from the vendors. If the Technology is promising, we send it to the management though the section head for final approval and budget allocation”.

The Adoption process consists of 3 steps (1) Contract Finalization (2) Implementation (3) Utilization. The Technology requirement is sent to Contracts/Procurement department and the Request for Quotation/Proposals are issued to the Vendors and negotiated. Subsequently the Technology is implemented and Utilized by the end users. Statements from P1 and P4 confirms this – P1 “The procurement department selects the experienced vendors and floats RFPs/RFQs/RFX. The best proposal – Techno-Commercial proposal is awarded the contract. The supplier delivers the item as per the contract and we used it in our plant”, P4 “Once budget is allocated then the procurement process starts. The common specs are sent to the Contracts/Procurement Department and they float RFPs/RFQs/RFXs to a selected vendor list. Proposals are evaluated and contract/LPO finalized. Then the innovation is implemented or delivered in/to the plant and we use it in our day to day operations”

The Post adoption stage consists of Future Technology Usage decisions – Whether to abandon it or to continue with the same technology. Statements from P1 “Based on the results from the innovation and aftersales service/support we will decide whether to use the same in the future or whether we need to search for other alternatives. Some times better alternatives come in the market and we change the product/technology” and P4 “Based on the results of the technology we continue the usage. The replacement of innovation is cyclic process. When something innovative comes the same process starts again” – Validates the Post adoption stage.

### **5.4. Process of Innovation Adoption in UAE Oil and Gas – Validation Third Stage**

The remark from P3 confirms all steps involved in adoption process from Innovation search to Future Technology usage decisions. P3 “We always search for improvements and when we spot one –we find the solution for that opportunity. Then we decide on the new technologies for that

opportunity. Once the technology is finalized – then proposals are invited. Contracts are awarded based on experience, delivery terms, prices etc. Once the innovation is delivered and utilized for the problem at hand – Future usage depends on the success of the utilization”. Innovation adoption is a cyclic process. Technologies and Processes will become obsolete at some point of time or other. Obsolete technologies or Processes are to be replaced and the cycle continues.

### **5.5. Variables Affecting Innovation Opportunity Search**

Comments from the participants – P1, P2, P3, P4 and P5 support the view that both attitude and readiness influences the innovation opportunity search in the organization.

Organizational attitude is very important and the attitude can motivate employees to search for innovation opportunities in the organization – P5 “A Favorable feeling towards the innovations by the organization encourages the employees also to search for innovation opportunities”. The organization should have a favorable attitude towards innovation and employees who come up with innovation opportunities – P1 “The organization should have a favorable attitude toward the innovation. Otherwise it will not work. They should have a favorable attitude not only towards innovation but should reward employees who come up with innovative ideas. What is happening is we put forward the idea and credit is take by somebody else”. The deserving credit should be given to the employees coming up with innovative ideas – P3 “In most cases, the suggestions of improvements are not acknowledged and this discourages the employees”. Skeptical attitude – To view innovation always with suspicion discourages the employees – P2 “skeptical attitude discourages the employees to search for innovation”.

Organizational readiness also influences the Innovation opportunity search. A hostile environment discourages employees to search for innovation opportunities – As remarked by P5 “Organization environment is not conducive to accept the change” and P3 “Lack of preparedness discourages employees to pursue innovation opportunities”- The organization should be well prepared with conducive conditions for innovation opportunity search. Organizational Readiness not only implies resources but also an Innovation climate and an Innovation culture. An Organization without a culture of innovation cannot encourage its employees to search for innovation opportunities – As correctly pointed out by P1 “Regarding the organization opportunity – most often what is happening is that organization will not be ready to accept these innovations – in the past the real problem was we were making money like anything”. Only when the oil prices started falling in 2014-15, people started looking for innovative technologies. “A work environment which encourages our ideas and suggestion should be there in the organization. Otherwise nobody will take initiatives. Not only that – there should be people in the top management who will take initiatives for this – not just conducting some seminars – once in three months about best innovation practices or giving prizes once in a while”. Organization Readiness also implies a change in approach from the top management regarding innovation activities. A feeling that “some body is listening” creates miracles in organizations. Top management can contribute a lot to organizational readiness by allocating sufficient resources.

### **5.6. Variables Affecting Organizational Readiness**

Organizational innovativeness reflects the orientation of an organization towards innovation. An organization lacking this orientation cannot prepare itself to adopt innovation – P2 “We can say that if an organization is not inclined towards the innovations/changes then those organizations will die eventually”. Organizational innovativeness helps to find the inefficiencies in the organization and to select appropriate technologies to eliminate the

inefficiencies – P1 “An organization should be always open to innovation. Otherwise there will be a lot of inefficiencies in the organization. It should have the capacity to identify new technologies and change accordingly. An organization looking for innovation will be willing to change”. An organization lacking “Innovativeness” cannot adapt to the changing environments. Organizational innovativeness is nothing but willingness and Commitment to change – without which Organizational readiness is not possible to achieve – P4 “Willingness and commitment to change”

Organizational culture also affects the Organizational Readiness. Without a culture of innovation, the organization cannot prepare itself for change – supported by P3 “if it does not provide a culture of innovation, then those organizations will die eventually”. Changing a company culture is not an easy thing. So Culture change should start from Climate change. Only a climate which fosters innovation, in turn creates a culture of innovation – P1 “The overall working environment within the organization should also encourage innovation” and P4 “a conducive organization environment” supports the view.

### **5.7. Variables Influencing Technology Finalization**

P1, P2, P3, P4 and P5 support the view that Attitude and Organizational readiness affects the Technology finalization.

The organization always goes for a technology which it is capable of adopting in the organization. To pursue a technology – far beyond the capabilities of an organization is a mad waste of time or the organization should have the confidence to make the necessary changes for adoption – P3 “If the organization is not ready with necessary requirements for adoption-then what is the use in searching for an appropriate technology. It’s a made waste of our time and effort”. It is not only infrastructure and Skilled manpower – at times the necessary budgets will not be available (Organization can afford but sufficient budgets will not be allocated). So the organization should be ready with the budgets as well. Otherwise it leads to procedural delays. Timely allocation of budgets is also very important – P1 “The main problem is even if we decide on the technology, it takes so much time from technology selection to actual procurement. The procedural delays at time go to the extent of dropping the idea. Everybody gets frustrated. The infrastructure of the organization and competency of the personnel is taken in to account while going for new technologies”.

An Organization without a positive attitude self-destructs – pointed out by P3 “If the organization is lacking in a positive attitude towards change, it self-destructs”. A P5 “Liking towards innovation” helps to welcome innovation whole heartedly. An organization can enhance the favorable attitude by eliminating procedures which delays innovation and by creating a separate department to oversee innovation activities. The department should be approachable to all employees with innovative ideas – as remarked by P1 “The organization should change its procedures which causes delays and should establish a separate department to look out for innovation”

### **5.8. Variables Affecting Contract Finalization**

P1, P2, P3, P4 and P5 confirm the fact that Organizational readiness and Attitude affects the contract finalization.

P1 “A Favorable attitude towards the Brand/Technology and the distributor/Agent affects the contract finalization” – A favorable attitude towards the brand/technology or Distributor speeds up the contact finalization process. A favorable attitude – The change for betterment should be there in the organization to speed up things – P5 “A favorable attitude towards change – Change is for the betterment of the company should be there in the minds of all employees”

While evaluating the contract, the “Organization Readiness Factor” comes in to play. The contract will not be – as remarked by P5 “given to vendor whose technology cannot be implemented in the organization. Sometimes the technology appears to be very advanced for the organization”. The contact is finalized based on the readiness level of the organization.

### **5.9. Variables Influencing Implementation**

Organizational readiness and Attitude affects the implementation of innovation in the organization.

P1 “We should have proper infrastructure, Training programs and procedural changes to use the new technology. Then only the organization will be ready to accept change” - The organization should be ready with the necessary procedural changes, infrastructure and training programs for skill set enhancements. Lack of organizational preparedness delays the implementation of innovation and causes losses. Man power requirements, Job roles etc are to be planned in advance for smooth implementation – P2 “Lack of preparedness delays the implementation and causes further loses. How to implement, roles to be played, necessary training to be given, and additional manpower requirement – all these have to be planned in advance”. This view is further supported by P3 “Readiness of an organization is .... required for implementation” and P4 “The readiness affects the implementation stage”.

P3 “Only with a favorable attitude – the employees will cooperate for changing the existing systems and procedure” – The cooperation of employees is required for procedural changes or changing the existing systems in the organization. Only employees with a favorable attitude towards innovation will cooperate whole heartedly. This view is further supported by P4 “Attitude determines your altitude. Attitude is very important. Without a positive attitude the innovation can never be implemented” and P5 “A liking towards the technology encourages the employees to make necessary adjustments”. It is true – Attitude determines your altitude. Attitude is the “Game changer” in the adoption process. Without a liking towards the technology, employees will not make the necessary adjustments.

### **5.10. Variables Influencing Utilization**

A favorable attitude from the organization is very much required to inculcate a favorable attitude in the minds of employees towards utilization of adoption – aptly pointed out by P1 “If organization management shows a positive attitude towards the innovation by informing the benefits, conducting trainings etc, employees also show the same enthusiasm. We should also feel that it is easy to use it” and P3 “A negative attitude causes outright rejection of innovation” and P4 “Positive attitude”. Many organizations in Oil and Gas have attitudinal problems towards innovation. Attitude strongly influences the utilization of innovation.

Organization Readiness shows the willingness and ability to adopt innovations – P5 “Ability and preparedness of organization”. Organization should have competent employees and related infrastructure for utilization of innovation – as remarked by P1 “Organization readiness in terms of competent employees and infrastructure is also very important”. If the organization lacks the necessary infrastructure and skill let – the employees will show reluctance to use the innovation – P1 “The employees should also feel to use the innovation. Otherwise whatever the organization do will go waste” All efforts to utilize innovation will go waste if the organization lacks infrastructure and necessary skillset. This view is also shared by P3 “Without proper infrastructure or resources – it is almost close to impossible to utilize innovation” and P4 “with well-trained employees and necessary infrastructure”.

Intention to use – Where and how to use the innovation also affects the utilization of innovation. Intention to use can be intensified by motivating employees in terms of Rewards



and Proper training – P1 “Reward systems, proper training and how it helps us encourage us to use it”. The statements of P5 “An idea about where and how to use innovation” and P4 “high willingness to use” supports the fact that Intention to use influences utilization of innovation.

### **5.11. Variables Affecting Future Usage**

Future usage of a technology in an organization depends on the Usage and Purchasing Intentions. Intention to use influences the decision to continue with the same technology or to adopt innovative technologies for the problem faced by the organization. The statements from P5 “Whether the innovation is to be actually used” supports this view. Intention to use signifies the willingness to adopt an innovation – P3 “Willingness to use a particular technology”

Purchasing decisions often influence the future usage decisions. Either the purchase initiatives come from the end users or it comes directly from the top management. As rightly pointed out by P1 “Sometimes we give feed back to the organization to change it as the technology becomes obsolete or at times it comes from the Top to change it – might be due to marketing efforts of the innovator or according to the market trends”

### **5.12. Variables Affecting Attitude**

Expectations of efforts to be put in by the end users influence the attitude formation towards an innovation – P4 “The effort to be put in by the end user is also equally important”. End users prefer to use an innovation which require minimum efforts to operate – Pointed out by P1 “Minimum effort and maximum gain – that is what we are expecting”. Minimum efforts and maximum gains cultivate a favorable attitude towards innovation.

The usefulness of an innovation to an organization helps to develop a positive attitude – supported by the statements from P1 “The equipment should be useful to us in the field. We should have a feeling that it will be helpful” and P4 “The benefits expected from the innovation develops a favorable attitude”.

An Organization will not pursue an innovation – which it is not capable of buying. The statement from P4 “The end user will not go for a technology for which he is sure – will not be approved due to lack of budget. So a favorable feeling is developed towards affordable Technologies” - The researcher infers that affordability creates a favorable attitude towards innovation.

Oil and Gas cannot afford to experiment with unproven technologies – Either it should prove its credibility during field trials or it should have been proven in other sectors. Failures can be catastrophic. The statement from P1 “Failures can be catastrophic in Oil and Gas. So we always prefer to have proven technologies – at least in some other sectors or in some other plant” and P4 “Oil & Gas always prefers proven technologies to be used in the field because they cannot afford failures” – Oil and Gas companies always have a favorable attitude towards proven innovations.

### **5.13. Variables Influencing Organizational Innovativeness**

Organizational innovativeness refers to the Curiosity of an organization towards innovation as remarked by P2 “leads to “Curiosity” towards innovation”.

Absorptive capacity refers to the ability to learn new things - P2 “The ability of an organization to learn new things”. In fact it describes the learning skills of an organization – P4 “Learning skills of an organization”. Only a learning organization can survive in this competitive scenario – P1 “A learning organization survives”. The ability to learn enhances the Organizational innovativeness as confirmed by P1, P2 and P4.

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Facilitating conditions of an organization play a significant role in enhancing innovativeness. The constraints imposed by the actual conditions within the organization introduces an element of practicality in to the organizational views – The organization tends to be inclined towards those technologies which can be implemented within the constraints of facilitating conditions of an organization – P1 “An organization always tends to orient towards technologies which can be implemented within the constraints of resources and other favorable conditions”. The organizations should have a clear cut idea regarding the resources – man power, budgets, technological infrastructure etc. which facilitates the innovation adoption.

P4 “In many circumstances what happens is that the past purchases orients an organization towards a particular line of technology” – The researcher infers that the patterns of past purchases orients the organization towards a particular line of purchasing. The organization should not get locked to a particular line of technologies.

Relevant information enhances the curiosity of the end users. An organization should not be overloaded with information. Information overload leads to total confusion – as aptly remarked by P1 “It should also get the relevant information which suits their applications. In today’s scenario – the marketer overloads the organizations/employees with information”. Access to the relevant information enhances the organizational innovativeness – P4 “access to information about the latest trends”.

### 5.14. Variables Affecting Culture

Organizational culture can be defined as the way an Organization behaves or responds to the external challenges. A culture of innovation is required for an organization to survive – As rightly pointed out by P5 “A culture where innovative ideas thrive is required for an organization to survive”. Organizational culture defines the overall functioning of an organization – P2 “Overall organization operations”.

The statements of P1 “Organizational climate and Customs affects the Organizational culture” and P2 “Overall organization operations are affected by feeling about the work places and how to behave in a particular situation” proves that Organizational climate and Organizational Customs influence Organizational Culture.

Organizational climate refers to the perception of the employees about the working environment in the organization. A working environment which encourages creativity is required for the survival of the organization. These views are confirmed by the text of P4 “Organizational climate is all about the feeling about the work environment an employee has in an organization. A stimulating working environment is required to come up with innovative ideas” From the Statement of P2 “Our appreciations/motivation from the management for the accomplishments, the results of our actions, how we performed for a particular problem etc. In fact we also get an impression about the work place from these experiences” – The researcher infers that the appreciation for good work in the work place, reward systems, general management attitude towards employee’s problems etc contributes to a positive feeling about the work environment.

Customs are deep rooted practices of an organization – followed by the organization for years. Customs dictate how an employee reacts or behaves in a particular situation in an organization – rightly remarked by P4 “Organizational customs decides how the employees behave in an organization”. It is extremely difficult to change the customs of an organization which can be inferred from the remarks of P2 “How we respond is actually determined by the customs of the organization. There are some customs which are followed for years and it is very difficult to change”

The culture of an organization is something which has evolved over years and difficult to change. Organizational culture comes from the various past experiences of the organization – P2 “comes from the experiences we are having now and what we had in the past”.

### **5.15. Variables Affecting Intentions to Use**

Decision making styles affect the Intention to use. P1 “If we are involved in decision making – then we think it as our duty to get maximum benefit out of that” – a Bottom up – participatory approach in decision making creates a feeling of “being a part” of the process. The employee will start considering it as his duty to use it to the benefit of the organization. Participatory decision making enhances the commitment of usage form the end users.

Hype cycles also influence the Intention to use. The hype regarding a technology – about its benefits intensifies the Intention to use – very evident from the statement of P5 “Overestimation of technology benefits “. But when the end user realizes the actual benefits, the reality reduces the “usage intentions”.

User Satisfaction and Trust is based on the “Results of Utilization” and it changes according to the results of utilization. Our earlier experiences also contribute to the initial trust placed on the innovation or brand. The statements from P2 “Our earlier experiences with the Vendor/Principal” and P5 “Satisfaction from the previous products” supports the view that User Satisfaction and Trust contributes to Usage Intentions. When the reliability of the results starts getting affected, the intention to use also changes. Erroneous results - result in the loss of trust.

Resistance to change also affects the Intention to use. P2 “in that case we do not want to change” – End users comfortable with a particular technology and lack self-confidence to learn new things block the usage of innovations in the organizations. Resistance to change decreases the tendency to experiment with new technologies.

Compliance requirements enhance the intention to use – the view is supported by P2 “the technology should be meeting the standards”. The technology should be customized to the field settings and compatible with the existing systems or to the site requirements. This is pointed out by P2 “to be suitable for actual field applications”

Aftersales support is an important variable affecting the usage intentions – as remarked by P5 “Continuous support is required to keep the technology running”. Lack of continuous support creates a negative feeling in the minds of end users and ultimately leads to usage reluctance or even premature abandonment. Selection of an innovator should be done based on whether they have sufficient resources to provide 24 x 7 supports or not.

### **5.16. Variables Affecting Repurchase/Substitution/New Purchase**

Technology advancements in a particle line of technology influences the purchase decisions. This view is supported by P1 “Developments in technology” P2 “Advances in Technology influences the substitution”, P3 “Technological advances affects purchase decisions”. Technical advances can be of two types – incremental improvements or disruptive innovations in a particular field – an entirely new technology emerges. Incremental improvements create “intergenerational alternatives” or disruptive innovations cause completely different alternatives. The views from P1, P2 and P3 validate this point. Since these two concepts are very closely related – the researcher clubs Technology advances and Alternatives into single variable – “Technology advances and Alternatives”.

At times, manufacturer of a technology on the verge of obsolescence “Re-Invents” to boost the sales by adding new applications or features to the existing ones. This creates a tendency to prolong the use of the existing technology – P1 “Sometimes what happens is that the innovator adds some new features and finds some new applications for the product or they reduce the

prices or do something when the sales is falling” and further supported by P5 “Re-Invention affects the purchase decisions”. Sometimes, the Re-Invention initiative comes from the end users to prolong the scrapping of the existing technologies with which they are extremely comfortable. The benefits of the “Re-Invention” has to be weighed against the “benefits from the innovation” – which will be often missed or delayed due to Re-Invention.

P4 confronts that very fact that Higher resale price affect the Re – Purchase/Substitution decisions. Obsolete technology has not value in Oil and Gas for Re-Sale. P4 “No Higher resale price does not affect the Replacement/Substitution decisions. There is no value for obsolete technology in Oil and Gas. But we prefer to have trade up or exchange scheme”. P4 has coined a term for new variable – “Trade up or Buy back” which is frequently done in Oil and Gas. The Trade Up or Buy back Scheme can be included in the Contract finalization stage itself. The innovator is liable to either upgrade or supply the latest innovation as an exchange for the obsolete technology. This creates lot of cost savings for the company rather than dumping of obsolete technology. So the new variable which affects the Purchase decisions is “Trade up or Buy back”.

Many Organizations fall into the trap of “Brand loyalty”. Brand loyalty stymies adoption of innovation from other brands – very evident from the text of P5 ““Brand loyalty affects purchase”. The organization considers innovation from certain brands or a certain brand only for a particular application(s).

### **5.17. Variables Affecting Hype Cycles**

Industry specific trends also create Hype cycles. Industry Trends are there in Oil and Gas – right from the discovery of oil by Bissel and Drake in 1859 – Evident from the statements of P1 “Yes there are industry trends but it is not fashion”, (P2) “but I have seen the companies going behind the particular industry trend without actually studying it prior to 2015 – when oil price was at its peak and budgets were available”, P3 “but it is affected by the emerging trends in other industries”. The whole industry goes behind the Trends. These trends can come from other industries as well.

In most cases, the benefits of the technology are exaggerated – P1 “There are times when a technology is exaggerated and the whole industry goes beyond that”. These exaggerations cause the whole industry to pursue it – without actually understanding the pros and cons of innovation. The benefits of the innovation are over estimated – P4 “over optimism about an emerging technology creates hypes”. Optimism gives way to Exaggeration and causes Hype cycles.

### **5.18. Variables Affecting Resistance to Change**

The main reason for resistance to change is “Satisfaction with the Old practices”. The end users become so comfortable with the existing system to the extent that they do not want to come out of their comfort zone to learn new things. Evident from the statements of P1 “The main reasons are comfortableness and satisfaction with the exiting instruments” P2 ““Satisfaction and Comfort level with the existing technologies”. Another reason for reluctance to change is the satisfactory results given by the existing system. End users do not want to change a system giving them good results. Analysis of text from P3” When the existing system is performing so well, we are happy, the company is happy”.

Changing a system giving good results to something which the end users are not sure of performing well – There is an element of risk or uncertainty involved. Statements from P1 “another important thing is whether the new technology will really help?” P3 “why should we take unnecessary headaches changing something which is giving us good results” and P5 “Uncertainty regarding the results” clarifies the point of risk element involved with innovation.

Self-efficacy is the “Self-confidence” to deliver a certain level of performance. In most of the cases, the end users are skeptical – Whether they can master the usage of innovation as rightly pointed out by P1 “doubt whether we can learn the new things”, P2 “lack of confidence to master the new technology are the main reasons”, P3 “New technology means new methods and new systems – we need to spend a lot of time studying it” and P4 “Lack of confidence to study new things is the main reason”. Lack of self-confidence creates the Fear of change.

### **5.19. Sources of Information**

Various sources of information are (1) Advertisements (P1) (2) Social Media (P1) (P2) (3) Success Stories/Product Reviews (P1) (4) Referrals (P4) (5) Technical Journals/Magazines (P5) (6) Seminars/Workshops (P1) (P2) (P3) (P4) (P5).

### **5.20. Variables Affecting Aftersales Support**

The aftersales support expected from an innovator are P1 “Training, Warranty/Repair support” P2 “We need Services like Warranty, Repair, Hardware and Software updates” P3 “We need warranty, repair, training”, P5 “Their services of repair/warranty claims etc also should be very good”- What the researcher can infer from these statements is after sales service (like warranty claims, repairs, training etc) is perceived as an important variable affecting adoption decisions.

The end users also expect 24 x 7 Technical supports as well. P1 “Person with whom we can liaise whenever we confront a problem with the innovation”, P2 “Some department or person to provide us Technical support 24 x 7 because of the criticality of plant operations”, P5 “If they can provide online trouble shooting – then it is the best”.

From the above paragraphs – the researcher divides – Aftersales support into two categories of (1) Aftersales services and (2) Tech support. Lack of Aftersales Support even leads to abandonment of innovation and innovator – forever as remarked by P2 “What is happening nowadays is that, the Principal promises everything during the negotiation stage – bit once the payment is received, they abandon us. They will not pick up calls or email us back. So we also abandon them”.

### **5.21. Variables Affecting Purchasing Patterns**

History and Frequency of past purchases incline organizations towards certain technologies or certain vendors. This is not done consciously but it happens. Statements made by P1 “Especially while purchasing new technologies – they always prefer to buy from a reputed who has history of successfully supplying innovative technologies” and P2 “Frequency of past purchase affects the purchasing patterns”, P5 “History plays an important role in determining the purchasing patterns” – supports the fact that History and Frequency of previous purchases made affects the purchasing patterns in an organization. The Frequency of Past purchase embeds this “Behavior” to the Organizational memory. Since History and Frequency of past purchases are to be considered as one variable – the researcher merges both to “History and Frequency of Past purchases”

Familiarity with a brand helps to speed up the prequalification process. Familiarity with a particular brand or Vendor influences the purchasing patterns. As remarked by P3 “the organization get biased to a particular line of technology due to relationship with a particular vendor” – Familiarity builds the initial rapport or relationship which creates a favorable environment for adoption. The influence of Familiarity is also supported by P5 “Familiarity plays an important role in determining the purchasing patterns”. But an organization should not get locked along some particular lines of technologies due to History of purchases or Familiarity.

### **5.22. Variables Affecting Total Efforts**

Ease to learn and use contributes to the total efforts put in by the end user. P1 “We as end users should be able to learn it very easily..... it should be easy to use as well”, P2 “End users should easily understand the operations of the new technology.... it should be easy to use as well” – Statements support the aforementioned views. Many important innovations are not used frequently due to effort required to operate it – P1 “Many good products are not used in field due to difficulty to use in the field”. Complexity of the Technology or How the technology is presented to the end user – enhances the “perceived efforts” required in the minds of the end users. Complexity induces a feeling of “Ho! It’s very complicated to use” – Supported by the views of P2 “The problem is if the Technology is so complex to understand – it makes an initial impression that it is difficult to use and creates some sort of hesitation to use. In fact – the complexity enhances the perception of effort”. So the impression of complexity creates a “mental block” in the minds of end users.

### **5.23. Variables Affecting User Satisfaction and Trust**

The innovation should be able to deliver the expected results. If there is any mismatch between the expected and the actuals – its causes dissatisfaction. Dissatisfaction causes loss of trust. This view is supported by P1 “Should satisfy the expectations of the organization” and P3 “Results builds trust”. Dissatisfaction leads to abandonment of innovation – which is rightly confirmed by P2 “Disappointed and abandons innovation”. In short, an innovation should deliver P2 “What it has promised”. The researcher clubs Expected and Actuals as “Beliefs and Evaluation”.

(View 1) Prior Experiences with the innovator creates an initial good impression about the innovator and this creates a conducive environment for the creation of satisfaction and trust. P5 “Horrible experiences with the innovator in the past always force us to view the innovation with suspicion” confirms this. There is a contradictory view regarding prior experiences. (View 2) The supporters of these views propose that “Initial Bad experiences” reduce the expectations and “Initial Good experiences” enhance the expectations. In Oil and Gas - where zero risks are tolerated, nobody experiments with an innovator whose technologies have not given the expected results. View 1 Prevails.

A Technology which gives the best result but if it is extremely difficult to use, the end user will abandon the innovation – for a technology that gives the same results but which is easier to use. It is not only the results, but the experience during usage – enhances or diminishes the satisfaction – proved by the statement of P3 “Even though it produces good results – the use of the technology might not be an easy task – which does not give a pleasurable experience”. Usage Experiences play a crucial role. Some of the best innovations are abandoned in due course of time due to the usage difficulties.

Timely production completion and delivery also contributes to trust and satisfaction. P5 “Delivery commitment is also very important because all our plans will be made around the delivery schedules” - Delayed deliveries undermine the operations in the plant. Delayed deliveries negatively influence the Satisfaction and Trust.

### **5.24. Variables Affecting Absorptive Capacity**

A Strong R&D helps to keep abreast of things happening in the market. P1 “A strong R&D helps to develop solution internally and to keep track of happening in the market”. It also helps to develop solutions internally. A Strong R &D also tries to experiment with the innovative technologies to check its feasibility in the plant. P3 “Experiments with the technologies

available” P5 “Test the feasibility of innovative technologies” – Views of P3 and P5 confirms the relevance of strong R&D.

P1, P2 and P4 confirm that CEO and Employee Innovativeness positively influence learning capacity of organizations. Without the willingness on the part of Management and Employees to embrace adoption – the organization will never ever prosper. P1 “Management and Employee Innovativeness enhances”, P2 “CEO/Employee innovative enhances”, P4 “CEO and Individual innovativeness affects” – support the aforementioned point. These two variable CEO innovativeness and Employee innovativeness are combined to form one variable – “CEO and Employee Innovativeness”

As P1 Confirms “There is no competition” in oil and gas. The market structure where there is no competition is “Oligopolistic” market. Oil and Gas do not face competition from within but they face competition in the international energy market from various sources of energy. So Market Structure and Competition influences the learning capacity. To outperform the competition – organizations need to learn new things. The researcher clubs these two variables to “Market Structure and Competition” as both of them are very closely associated variables.

Organizational openness can influence your learning capacity. An organization should keep its eyes and ears open to its surroundings. Then only it can survive. As P4 remarks – “Only an open organization can bring in fresh ideas”. A closed organization isolates itself. P4 states “A Very competitive market compels an organization” – Very true. The energy market will be very competitive in the years to come with solar, tidal etc becoming economical. To remain economical Oil and Gas has to remain competitive. For this they have to learn new things. Yes. Competition enhances Absorptive capacity.

### **5.25. Variables Affecting Affordability**

Affordability is an important variable for adoption. Organization will not waste time on unaffordable innovations – As remarked by P3 “Affordability is an important factor. If we think that our organization cannot afford a particular technology due to lack of budget we will not waste our time on this”. Buying price of innovation affects the affordability – P1 “Quoted price affects the affordability”. Buying price should be always lower than the budget allocated for innovation. It is not only the buying price which should be factored into - P3 “Purchasing and Implementation cost should be below the budgets available”. Implementation cost is nothing but “Switching cost”. For implementation – P5 “Infrastructure changes” should be done in the plant. The expenses to change from one technology to another are called Switching costs. The buying cost + switching cost should be lower than the allocated budgets – as remarked by P5 “We often consider only the cost of technology. We need to factor in all the costs like training, technology infrastructure etc and request for budget”. So (1) The buying price (2) Switching cost and (3) Budgets allocated affects the affordability of innovation.

### **5.26. Variables Affecting Usefulness**

Environmental Friendly Technologies or any innovation which reduces the foot print - very much welcomed in Oil and Gas. The remarks from P1 “Environmental friendly should be focused on”, P2 “Environmental benefits etc.” clearly proves this. Environmental Friendliness of operations is not only statutory requirements but also commitment to society – for the generations to come.

Something which makes the job easier for the end user will be always preferred – Statement from P3 “As the individual is concerned – it should help him to perform better”. Innovation should make the life easy for the individual in the work setting. The statement from P1 “make our life easy in the field” supports this view.

The rosy picture in oil and gas is long gone. Now the oil and gas companies are looking for ways to reduce cost and enhance profitability. They are searching for ways to reduce – CAPEX/OPEX and Enhance recovery. Statements from P3 “Generate sufficient ROI for the organization” and P1 “Opportunities for making savings.....technology which saves money” proves the point that Cost savings are very important in oil and Gas.

Safety, Security and Time budgets are very important variables influencing the usefulness of technologies – P4 and P5 (INVIVO CODES). Oil and Gas gives topmost priority to Safety. Confidential information of the plant is not to be compromised at any rate. Time budgets – Getting things done in minimum time is important in Oil and Gas.

### **5.27. Variables Affecting Facilitating Conditions**

Infrastructure is one of the important facilitating conditions for adoption. As remarked by P1 “The organization should have necessary infrastructure” P2 “Technological Infrastructure” – Technological infrastructure to adopt the innovation is crucial. Not only for adoption, relevant infra-structure is required for utilization as well.

General Market Conditions facilitate changes – the way an industry operates. P1 “Last two/three years..... Getting reorganized... Oil and gas as such was not booming”. The general market conditions changed the way ADNOC operated. ADNOC has stream lined all operations. Government support with favorable innovation polices – as remarked by P2 “Government policies on innovation also speed up” help to create a culture of innovation in the economy. General Market conditions and Government support are very closely associated topics. So the researcher merges these two variables in to “General Market Conditions and Government Support”.

Statements from P1 “In fact they can provide many important information regarding ....usage” and P2 “Support for training, installation etc” – emphasize the importance of Innovator support. Innovator can support during pre – adoption stage by providing useful information. Innovator can support during installation and commissioning stages as well. The researcher has kept “Aftersales support” as a separate variable due to its importance. The researcher categorizes support of innovator till the finish of installation and commissioning into “Innovator support” and all the other helps/supports after that into “After sales support”.

Organizational Strategies for innovation adoption is very important. “Clear cut idea ...How various departments are to be coordinated, timelines, change etc” P3 – Statement clearly states the importance of strategy. A strategy provides a clear cut direction as to how the changes are implemented and how various departments coordinate. Without a strategy – the implementation will be completely chaotic. Organizational Priorities also decide whether to adopt or not. – P1 “An innovation may be beneficial but not a priority/relevant to us” – So the timing is also important. Organizational priorities depend on Organizational objectives and are influenced by external factors. As Organizational priorities changes, so does the Organizational Strategies. So the researcher combines both these concepts and brings under one variable – “Organizational Priors and Organizational Strategies”.

Organizational leadership – the ability to oversee the innovation activities /implementation of strategies is very important. The management should lead from the front – as inferred from the statements of P2 “Visionary Leadership”, P1 “Leadership to implement the innovation and see to it that it produces results”, P3 “Somebody to lead from the front”. Managerial Skills are also important to understand “the intricacies of implementation” (P3). Managerial skills are also required to identify the correct people to be selected as leaders - P1”Department heads can ensure this”, P2 “Managerial skills enhances the adoption” P2. But without Management support and Commitment, adoption will not move an inch – P1 “Most important – you need to



get support from the Top management”. These three variables are closely related concepts to be merged together as “Leadership, Management support and Managerial Skills”.

So, the researcher infers “Leadership, Management support and Managerial Skills”, “Organizational Priorities and Organizational Strategies”, “Innovator support”, “General Economic Conditions and Government Support”, “Technical Infrastructure” and “Motivated, Competent and Qualified work force” as the facilitating conditions. “Motivated, Competent and Qualified work force” is taken from the cancelled category “Resources”.

Organizational Priorities can change the relevance of a particular innovation to the organization. It changes according to the objectives of the organization. P4 “Organizational Priorities changes ...relevance of innovation” – supports the aforementioned view. General Economic Conditions affect the General Business Confidence in an economy. If the general scenario is not optimistic as stated by P4 – “Cast optimism or pessimism” – a feeling of insecurity blocks all innovation activities in an organization.

### **5.28. Variables Affecting Resources**

The most important resource for any company is “Motivated, Competent and Qualified work force”. Competent and Qualified work force can be easily trained. This view is supported by P1 “Raise the competency levels”, P2 “Competent ... biggest resource” P3 “Skilled man power ... for adoption”, P4 “Educated ... greatest resource” P5 “Motivated employees ... biggest asset” – all without an exception support the view that “Motivated, Competent and Qualified work force” is the greatest asset an organization can have. The resources facilitate adoption of innovation. So the researcher eliminates the category “resources” and re-assigns this variable to “facilitating conditions” category – which is more appropriate. Motivation level of the employees is very important. Competence alone will not do miracles; the employees should be motivated to learn new things.

### **5.29. Variables Affecting Scientific Credibility**

Oil and Gas processes are very critical. It cannot afford failures. So oil and gas always prefer proven technologies – at least it should be proven in field trials. The results of field trials enhance the scientific credibility. P1 “Prefer to use first hand in the field and see the result”, P2 “Demonstration of a proto type and ...results...” P3 “Prove the worth in some other industries” – clearly state that the proven technologies are adopted faster than the unproven technologies. Either it should be proven in the same field by field trials or in other fields. Successful field trials dispel “fear or failure” as remarked by P3. The innovation also should have the features desired by the end users – P1 “especially it has data logging and downloadable results” – clearly states the features enhance the scientific credibility.

### **5.30. Variables Affecting the Compliance Requirements**

Statements from P1 “Saved Dirhams in other ADNOC group”, P2 “Other companies in the network”, P3 “Other ADNOC Company is using it” – clearly conveys the message that – “Somebody else in the group is doing it. So we also should do it”. Group pressure forces companies to adopt certain innovations even if it is not really needed for them. Compliances are also made for want of compliances with Industry standards. P2 “Technology has to meet the Rules/Standards”, P3 “Technology has to meet the acceptable standards” P4 “ Standards and accepted practices have to be complied with” P5 “Rules and Standards are to be complied with” – compliance with the industry standard is a mandatory requirement in Oil and Gas. The problem faced by most of the oil and gas companies and innovators alike is that – there are no “Pre-Set” standards in the oil and gas for emerging technologies and this delays the adoption.

So the researchers identifies the variables affecting the compliance requirements as (1) Group Pressure and Image enhancement (2) Statutory and Industry Standards.

Group pressure forces compliance. Many a time, the compliance is for image enhancement with in the groups. The statements from P4 “Network pressure forces...” and P5 “Being a part of ADNOC...” support the fact that group pressure creates compliance requirements. The researcher redefines the variable “Group pressure” as “Group Pressure and Image Enhancement” as at times “Image enhancement” is required to maintain the membership in a particular group – P5 “We also see how many oil and gas companies reputed”. So to belong to that reputed group – the company has to comply with the Group requirements.

### **5.31. Variables Affecting Customization and Compatibility Requirements**

“Able to use the technology in the field....works perfectly in the lab ,, actual work setting it fails...”P2 “meet our job requirements” P3 “Use it for our application” P4 “Meet our specific applications” P5 “meet the requirements of organizations” – clearly testifies the fact that innovation should be able to meet the specific requirements of the organization. It should “Fit to the Work settings”. The work settings in the plants will have specific applications or requirements which the innovation is supposed to fulfill.

Adaptability to the local conditions is also important. Innovator should have a clear cut idea as remarked by P1 “where and how to use”. It has to be – P2 “Compatible with the existing systems” of the plant or as P4 remarked “match the organization infrastructure”.

Customization and Compatibility are closely related concepts. So the researcher combines both these variables to a single variable “Customization and Compatibility”

### **5.32. Variables Affecting Organizational Customs**

Organizational Norms and Organizational Routines affect the Organizational Customs in an organization. Norms are the “Value of an organization (P1)” – Value system in an organization. Norms can be defined as the value systems which defines the accepted practices with in an organization or industry. All participants unanimously supports that the norms affects the customs. Routines are the recurring patterns of activities/behavior within an organization – as a standard response to a problem. Routines become the customs of an organization if it becomes widely accepted in the organization or industry. All Participants support that the Routines become the customs of tomorrow if it is as per the accepted norms of the industry/organization. Customs are “Organizational way to doing things (P1)” – Ways: Practices/Procedures followed by the organization for a very long time.

### **5.33. Variables Affecting Organizational Climate**

Organizational climate refers to the perception of employees about their work environment. Organizational climate is affected by Rewards, Job Roles, Tenure, Authority etc. Analyzing the text, P1 remarks that “The working environment is affected by the rewards...Motivation from upper management”. The researcher infers that the motivation from the upper management for good work in the form of rewards, cultivates a good feeling about the work environment. The remarks of P1 “Helpful colleagues”, P2 “Help from my team”, P4 “For that your co-workers...” clearly indicate that the relationships between coworkers inculcate a sense of mutual help in times of need. A good rapport with your colleagues facilitates a conducive work environment for creativity to flourish. The researcher merges both these concepts to a single variable called “Work environment – Rewards and Relationships” for a better understanding.

From the texts of P1 “Power given to me”, P2 “Power to execute the things assigned”, P4 “Your authority to execute things” – the researcher infers that the individuals should be

adequately empowered to execute their task. If they do not have sufficient power or authority to execute the assigned task a feeling of frustration creeps in and it makes them uncomfortable and induces hostile feelings.

Job Roles and Tenure are closely associated concepts. So the researcher merges these concepts. The job roles should be very clearly defined. There should not be any overlapping responsibilities. A clear cut job role provides a direction for betterment for employees. The sentences from P1 “What I should do? Flexible timings help me to work without tensions...” P2 “Very clear job roles”, P4 “What you are to do?” clearly emphasize the aforementioned points. Unstable job tenure creates a feeling of insecurity in the minds of employees – P1 “Job Stability”. Employees prefer to have fixed contract jobs – P4 “type of contract offered”.

From the above responses – the researcher infers that the Organizational climate is influenced by (1) Job Roles and Tenure (2) Authority (3) Work Environment – Rewards and Relationships. A good organizational climate encourages creativity in the work place and helps to maintain a very healthy work environment – P1 “Help to maintain a good working environment” P2 “Creativity should come from the work place”. After all, the perceptions make all the difference.

### 5.34. Variables Affecting Decisions

The statements by P1 “A big organization with many levels .....delays decision” P2 “Decision making in a company like .....very tedious process”, P3 “Lots of approval...” and P5 “The size ....makes it difficult” clears points to the fact that the Bigger size of the company delays the decisions. Bigger the company size, more difficult it is to make decisions because of the various people involved in decision making. But oil and gas companies are always big. Even big company can make fast decisions keeping a flat structure. This can be clearly inferred from the remarks of P1 “many levels”, P2 “Always a flat organization simplifies decisions” and P3 “Approval required at every stage”. Or to speed up the adoption process – there can be alternatives to bypass these levels. Since these two concepts are very closely related, instead of keeping these as two separate variables, it is collapsed into a single variable “Organizational size and structure”.

End user involvement helps to understand the “ground realities” – P4 “Helps to understand the hard realities. Ultimately they are the ones to use it”. The end users are the “Infantry” of an organization and they are the ones ultimately using it. Nobody knows the actual situation better than the end users. The statements from P1 and P2 support the necessity of end user involvement. P1 “I have contributed should take initiatives..” – End user involvement creates a sense of responsibility in them to use it and to motivate others also to use it and reap the benefits of innovation. P2 “Creates a sense of belonging” – End user involvement creates a feeling of belongingness or a feeling of importance or a feeling of being considered – which enhances the commitment from them.

End user involvement and Communication channels definitely influence the decisions taken in an organization. Adoption of innovation is the end results of series of favorable decisions taken at various levels. Hence the decision making styles and communication channels play an important role – Which are supported by the views of P4 and P5. The remarks of P5 “Motivation and Communication channels affects” – clears supports the views. P4 states that “Motivation affects employee participation and directly speaking is the best way to communicate” – which clearly mentions that the best channel of communication is “Face to Face discussions” and Motivation influences employee participation. Since motivation results in End user participation and both - motivation and end user participation are very closely related concepts, the researcher concludes that the concept of End user involvement involves the essence of Motivation as well. So the researcher merges both these concepts to a single concept of End

## Identifying the Relevant Variables Affecting the Adoption of Innovative Drilling Technologies in Upstream Uae Oil and Gas

user involvement. P4 also states the “Directly speaking to each other” facilitates better opportunities for “Clarifications and Explanations” – which means a communication channel should not compromise on the quality of information transmitted and should be able to take live feed back. End user involvement creates a sense of commitment to carry out the decisions made by involving them.

### 6. OPEN CODING

Industry Trends	
Optimism	Hype Cycles
Risk/Uncertainty	
Satisfaction with Old Practises	Resistance to Change
Fear of Change/Self Efficacy	
Sources of Information	Information
Aftersales Service	
Tech Support	Aftersales Support
History & Frequency of Past purchases	
Familiarity	Purchasing Patterns
Ease of Use	
Ease to learn	Efforts
Complexity	
Beliefs and Evalaution of outcome	
User Experience	User Satisfaction and Trust
Production Timeliness	
CEO and Individual Innovativeness	
Market Structure & Competition	Absorptive capacity
R&D	
Organizational Openess	

Switching Cost	
Budget allocation	Affordability
Price	
Cost Savings & Profitability - Short and Long Term	
Environmental Benefits	
Security	Percieved Usefulness and Benefits
Safety	
Time Budget	
Enhaced Job Performance	
Complimentary Infrastructure	
Government Support & General Market Conditions	
Innovator Support	Facilitating Conditions
Leadership, Management support and Managerial Skills	
Motivated, Competent and Qualified Work force	
Organizational Priorities & Strategies	
Trade Up or Buy Back	
Technological advances	
Alternatives	Re-Purchase/Substitution/New Purchase
Brand Loyalty	
Re-Invention	
Field Trials Results	
Product Features	Scientific Credibility
Reputation of the Vendor	
Group Pressure and Image Enhancement Compliances	Compliances
Statutory and Industry Standards Complaine	
Fit to Work Settings	
Local Adaptations	Customization and Compatability
Job Roles and Tenure	
Authority	Organizational Climate
Working Environment - Relationships and Rewards	
Organizational Norms	Organizational Customs
Organizational Routines	
Organization Size and Structure	
Communication Channels	Decision Styles
End User Involvement	

**Figure 1** Open Coding

## 7. AXIAL & SELECTIVE CODING

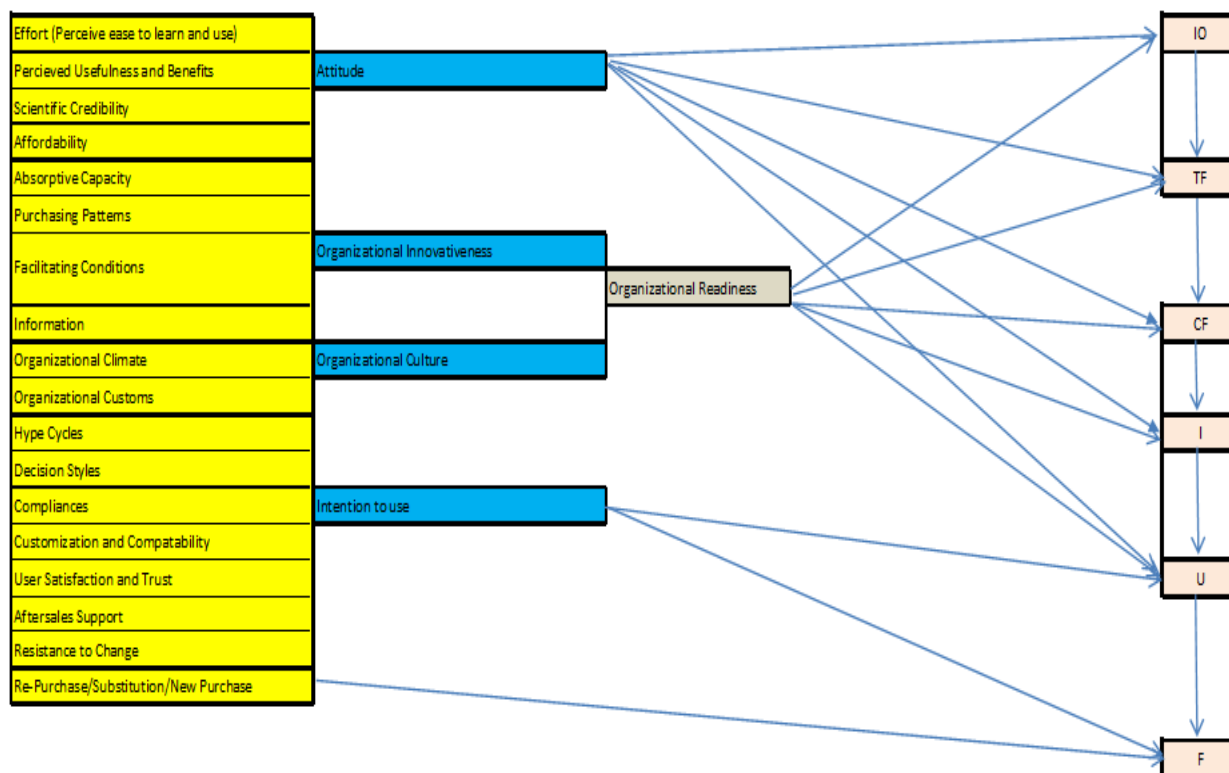


Figure 2 Axial & Selective Coding

## 8. CONCLUSION

The data analysis resulted in finding the relevant variables affecting different stages of Innovation adoption in upstream oil and gas. The Innovation Adoption Process proposed by the researcher gets validated three times (Question Numbers: 2, 3, 4). Further validation of the Adoption Process will not be done in the subsequent stages of analysis. The Qualitative Data Analysis using Grounded theory resulted in a Frame Work which goes as an input to further Qualitative Analysis – Frame Work Analysis – to ultimately propose a “Frame Work to enhance the adoption of Innovative Drilling Technologies”.

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