

Team Cohesion and Performance – A conceptual study in Oil Exploration Teams in India

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***Abstract:** The correlation between Team Cohesion and Team Performance has been an area of active interest, both among researchers and practitioners. This paper explores the cohesion–performance correlation through a synthesized review of literature on teams, in the specific context of Indian petroleum industry. The paper argues that while Cohesion helps Performance in the initial stages of team formation, excessive Team Cohesion beyond a threshold is detrimental to Team Performance in the context of petroleum industry. The argument is strengthened by triangulation of the literature review with qualitative enquiry to secure specific information about conceptualization of Team Cohesion and its relationships with Team Performance in Oil exploration teams in India. The framework relating to the various elements of team Cohesion at play in such oil exploration teams is proposed.*

***Keywords:** Demographic Diversity, Degree of Interdependence, Information Diversity, Intellectual Diversity, Power Distribution, Role Overlap, Social Cohesion, Task Cohesion, Team Cohesion, Team Evaluation, Team Performance*

1. Introduction

Paul [1], in his article in Harvard Business Review, has shown an empirical evidence that more social interactions in a team correlate with better team effectiveness. The dependence of team performance on various team-related factors have been widely discussed in Literature on teams through a number of theories. Such theories can be divided into two categories: (i) Compositional theories which draw from the individual characteristics of the team members and (ii) Structural theories which focus on the interaction chemistry among those members. It has been seen (Katz and Kahn [2]) that interaction (structure-related) chemistry can improve performance of the same team composition significantly.

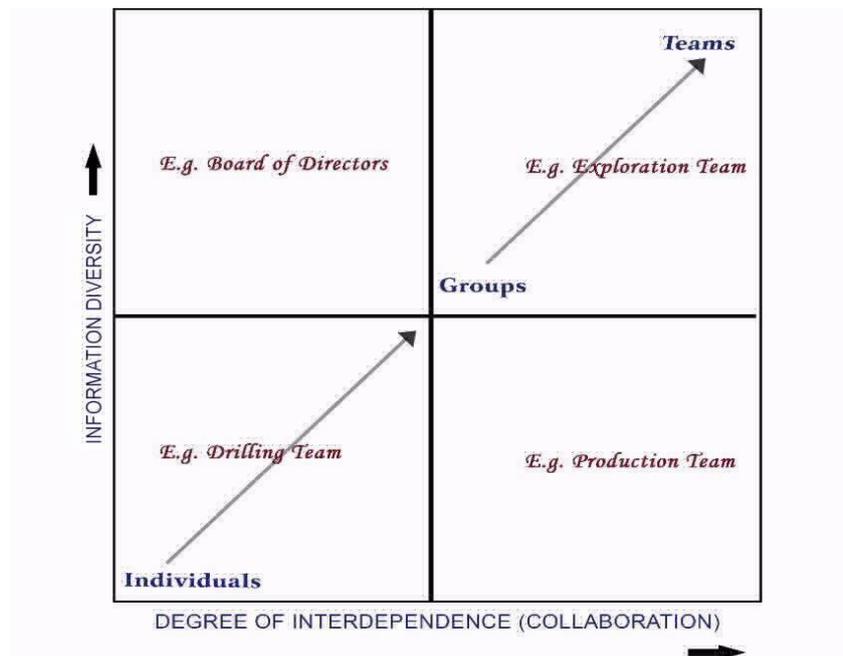
The paper builds on specific theories of Cohesion on Teams. Casey-Campbell and Martens [3] found that Cohesion is the shared bond/attraction that drives team members to stay together and to want to work together. Cohesion is one such structural element and is essential for teams (e.g. Beal et al. [4], and Chiochio and Essiembre [5]). Individuals who feel no sense of cohesion with their team (whether due to distrust, dislike, disinterest, or a host of other reasons) are less motivated and less likely to participate in the “teaming” behaviors that enable teams to reach their goals effectively.

Teams embody the dynamic process of development and involves both the composition and the interaction between founders and team members (Harper [6]). From an evolutionary perspective, team members can change over time situated along with the venture development and growth trajectory (Chandler, Honig and Wiklund [7]).

Team development theories (e.g. Kozlowski et al. [8]) and research on emergence over time (e.g. Coultas et al. [9]) offer insights into longitudinal cohesion measurement.

2. Oil Exploration Teams:

There are four classes of teams in an Oil Exploration & Production (E&P) organization, classified based on two constructs: Information Diversity and Degree of Interdependence (Mukherjee, Arora and Kapoor [10]). Degree of Interdependence signifies collaboration and Information Diversity signifies the range of information-providers. The following conceptual model of an exploration team is developed based on this study.



Information Diversity: This construct ‘Information Diversity’ (Stahl et al. [11]) refers to the distribution (range/standard deviation) of information (including ideas) that each member of the team possesses. Theoretically, the larger the diversity in a team, richer information is available to the team. However, larger diversity also makes it managerially challenging for the team to tap into all the pockets of information residing at each node (member). Information Diversity is said to be more in Teams with greater information variety which needs to be pooled from various individuals. It may be noted that the focus in this construct is on information residences and not the level of interaction (information trading). Information can be accessed by an individual team member from another just by asking another, without any significant interaction between the two. Interaction (information trading) among team members with current information (or ideas) and consequent brainstorming will result in creation (development) of new information (ideas) which adds to the information diversity. As an operationalized measure, the number of individual team members who has information (and ideas) significant to the team assignment can act as a measure of the Information Diversity of the team. To normalize this measure with the team size, the number of individuals can be expressed as a percentage of the team Size. For illustration, if 5 individuals have information significant for team assignment, in a team of 8 members, the Information Diversity is $(5/8) \times 100 = 62$ per cent

Degree of Interdependence: Interdependence has been discussed by various authors since long. The first of them was Karl Marx in Communist Manifesto (Marx, 1848), contrasting the concept with self-

sufficiency in economics. Contemporary authors (Natividad and Rawley [12]) view interdependence to exist when actions in one sub-unit (member of a team) of the organization affect important outcomes in another sub-unit (another member of the same team). The greater the interdependence between units, the greater is the need for communication and cooperation. Management's job is to optimize the whole system and not the sub-units. A high Degree of Interdependence increases complexity as many cross-unit interdependencies require frequent coordination and information exchange. Teams which need more interaction are said to have more Degree of Interdependence. As an operationalized measure, the minimum number of interactions needed among the individual team members of a team during a particular time period, is the Degree of Interdependence of that team. In the same numerical example of the team discussed above in Information Diversity, if the minimum number of interactions required in the 8-member team is 6 in a day, the Degree of Interdependence is $6/8 \times 100$ per cent = 75 per cent.

Exploration of Oil and Gas is the search for hydrocarbon deposits beneath the Earth's surface, by petroleum geologists and geophysicists. The team members' domains of expertise are diverse, ranging from geology, geophysics, geochemistry, petroleum physics, computer science, programming and data science. The **Degree of Interdependence in Exploration Teams** is **High** as the different elements of the team like geologists, geophysicists, geochemists, petroleum physicists, computer scientists, programmers and data scientists need to depend on each other. The **Information Diversity** in case of **Exploration Teams** is also **High**, as the distribution of information among the members of the exploration team is quite wide, it is not centrally available which anybody can access. Another feature of a good exploration team is that members keep learning from each other (Team Learning) as the team develops. The team tenures of oil exploration teams are typically high, say 2-3 years, which gives enough time for the members to develop their own dynamics worth investigating as a separate field of study.

3. A conceptual framework of Team Cohesion in Oil Exploration Teams

As shown in Figure 1, we present a conceptual framework that connect team cohesion with team performance in oil exploration. To develop a conceptual model of the Cohesion-Performance correlation in Exploration Teams, we secured some empirical data from field, based on a qualitative analysis (Grounded Theory) of **open-ended interviews of fifteen (15) team leaders in the largest upstream petroleum company of India viz. Oil and Natural Gas Corporation Limited (ONGC)**. One-to-one semi-structured interviews were conducted to capture primary data, which were then analyzed for securing themes to meet the research objectives.

Analysis of qualitative data and the emergent themes showed that the Team Cohesion in exploration teams are characterized by two main factors: Task Cohesion and Social Cohesion.

Figure I

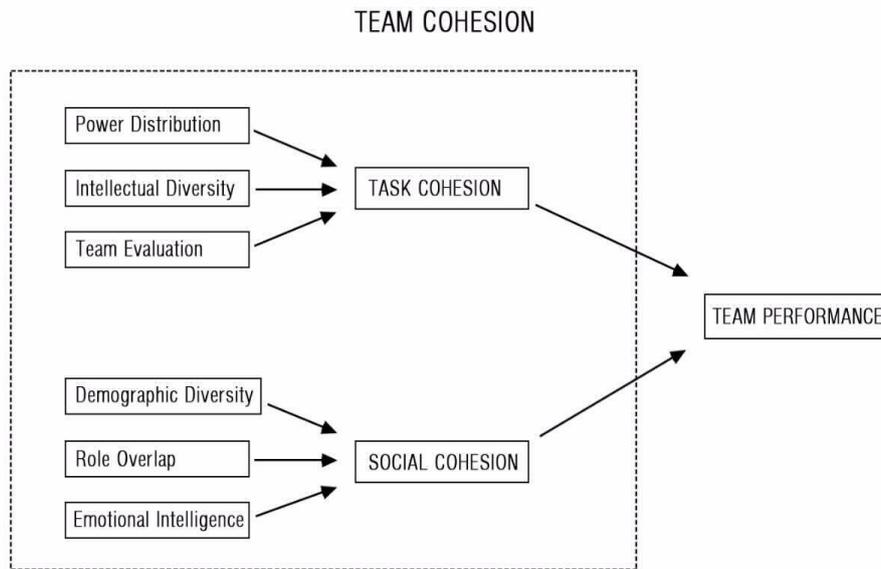
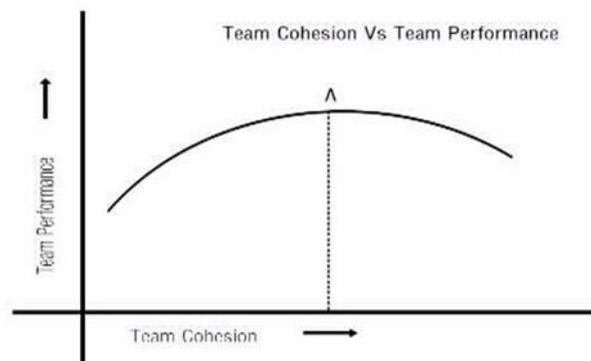


Figure I: A conceptual Framework on Team Cohesion and Performance in Oil exploration Teams

Figure II



These two factors of Team Cohesion varies over the life cycle of a team. Empirical evidence collected from 15 exploration team leaders in exploration company ONGC showed that after a team is formed, the Cohesion factor increases with time, thereby improving Team Performance. There is a point after which the impact of the improvement in Cohesion is neutral to Performance. Beyond this point, further improvement in Cohesion brings the performance down. This point, where marginal improvement in Cohesion does not bring about any increase in Exploration Performance, is the optimal point. The team leadership should take action to arrest Cohesion beyond this threshold. Refer Figure II.

In the Figure II above, the graph of team performance shows upward trend initially as Team Cohesion increases. However, at the point A, the team performance starts flattening out and then starts decreasing with any further increase in Cohesion. The Team Cohesion corresponding to the Point A is the optimal Team Cohesion.

The responses of the Team leads brought out the multi-factor characteristics of Cohesion. As per Richardson [13], the variable Cohesion is bipartite in nature and can be partitioned into two sub-variables: Task Cohesion and Social Cohesion.

3.1 Task Cohesion

Annelies and Dreu [14] studied drilling teams in USA and examined the relationship between personality composition and Task Cohesion, usually considered to be a stronger predictor of team performance than Social Cohesion. Task cohesion is the measure of how each team member is united in trying to reach the team task (s) and goal (s). In contrast, Social cohesion is the measure of how individual team members like each other and spend time together informally outside of work.

Task cohesion is a relatively stable variable. After the team is formed, the task Cohesion initially increases as the members are collectively drawn towards the team task. As the team develops further, the incremental improvement in task cohesion is uniform.

To triangulate the literature survey results and to juxtapose the findings in the specific context of exploration teams, Qualitative enquiries were held with team leaders of Oil and Natural Gas Corporation Limited (ONGC).

Veteran Team Leader General Manager Mr. Manik Mazumdar said, *“In Exploration Teams, task related interactions have a complex pattern as the team tenure progresses. Members of successful teams spend more time discussing job-related issues than social issues. Like, ‘How is the seismic data behaving in the latest findings? Or ‘How a particular member is acclimatizing to the assignment given to him?’ Rather than social issues like ‘What are you doing today after office?’ etc. As the team matures, it has been seen that more the task and job related exchanges, better the performance.”*

Chief General Manager Mr. Nirupam Banerjee opined, *“The focus of the team members on tasks is one of the most important success criteria in exploration teams. More the task-orientation of the members in oil exploration teams, the better is the collective group performance. The index of this task Cohesion is a high inertia one; it changes very slowly over the team tenure, but is central to team performance. A sample of communication exchanges between team members can tell-tale the performance story; if it revolves around tasks of the members, the performance is going up, and vice versa.”*

The above leads us to our first proposition.

Proposition 1. *Task Cohesion is correlated with Team Performance*

3.1.0 Task Cohesion in a Team can be partitioned into three factors (sub-variables). The three factors, along with their propositions are:

3.1.1 Power distribution: The delegation of decision-making power of the team to a number of team members is the Power Distribution. Clutterbuck [15] argues that compared with low power teams, a group of high power individuals is less focused, less creative, has more conflict and shares less information. As Oil Explorations need high information sharing and collective solution searching, high power teams have lower Task Cohesion and consequently low Team Performance. Conversely, low Power Distribution in Teams result in high Task Cohesion and high Team Performance.

ONGC Team Leader General Manager Mr. Sanjeev Sharma said, *“In Exploration Teams, democratic power is the best for optimum output; lop-sided power residences arrests free and frank interactions necessary for creative exploration solutions. A member who is not empowered will not be able to contribute significantly and individual contributions are vital and synergistic behind team success. A sure recipe for team failure is asymmetry in power distribution.”*

Deputy General Manager Mr. Lakhan Lal Gohare believes, *“More equity in the exploration team vis-a-vis decision-making makes the team members more aligned towards task. I have seen teams where power were limited to a few individuals, the team performance affected compared to those where more members were empowered. Power democracy lifts team spirits in exploration teams and that positively contributes to performance.”*

The above gives us our second proposition.

Proposition 2. *Power Distribution among team members improves team performance*

3.1.2 Intellectual Diversity: Intellectual Diversity is the diversity or distributed-ness of academic and intellectual credentials among team members. Exploration teams are defined by High Information Diversity and High Degree of Interdependence (Mukherjee, Arora and Kapoor [10]). Hence, Task Cohesion in Oil Exploration teams improves with Low Intellectual Diversity, i.e. when the intellectual credentials of members are of similar nature. Similar intellectual levels increase Interaction (information trading) among team members with current information (or ideas) and consequent brainstorming results in creation (development) of new information (ideas) which adds to the information diversity. With increasing Task Cohesion, Team Performance also improves.

ONGC Team Leader General Manager Mr. Vivek Mehrotra said, *“In Oil Exploration Teams, similar academic background and intellectual qualities facilitate close task-related interactions, which smoothens attainment of exploration goals of searching out oil and gas residences in the geological terrains. In our teams, if the intellectual levels are different, it is difficult for task related interactions to help the team. On the other hand, there is ample evidence that similar intellectual backgrounds catalyze rich task exchanges which push up team performance in exploration work.”*

ONGC Team Leader General Manager Mr. Rakesh Sharma was of the firm opinion, *“Closer intellectual range brings people closer and that builds task cohesion, which buoys up performance. Too much variety in intellect makes it difficult to sustain task-related exchanges, bringing down performance in exploration teams.”*

This leads us to our third proposition.

Proposition 3 Low Intellectual Diversity increases Team Performance.

3.1.3 Team Evaluation: Whenever evaluation of teams is the approach instead of evaluation of individual members, the contribution of each member gets aligned to the team task rather than lagging individual achievements. This is vital for Oil Exploration Teams as collective task processing is crucial. This improves Task Cohesion, and hence team Performance. In the article “Improving Group Dynamics” [16], Team Evaluation has been identified as one of the main factors behind a strong and positive group dynamics, which improves task Cohesion and hence team performance. Team members must be flexible enough to adapt to cooperative working environments where goals are achieved through collaboration and social interdependence rather than individualised competitive goals (Luca & Tarricone, 2001).

Veteran ONGC Team leader Chief General Manager Mr. Abhijit Mukherjee informed, *“Amazing improvements in Team Performance would accrue in exploration teams if we discontinue performance evaluation of individual team members and instead evaluate the team as a whole. Every individual will then align its contribution to the team tasks only without any individual agenda. This happens in teams with both young and matured members. Wherever evaluation of individual members are made, the members will try to show off their own singular contributions which destroys the team spirit. In*

collective evaluation of the team as a whole, the members work in unison not having to bother who gets the credit; that pushes up exploration performance which needs close exchanges.”

ONGC General Manager Mr. Roopesh Kumar strongly opines, “*Evaluation is an important determinant of team performance in exploration teams. The model of collective team evaluation has seen to give good results in many exploration teams in ONGC. I strongly feel that evaluation of teams should completely replace individual evaluation in exploration sphere.*”

This facilitates our fourth proposition.

Proposition 4. *Team Evaluation improves Team Performance*

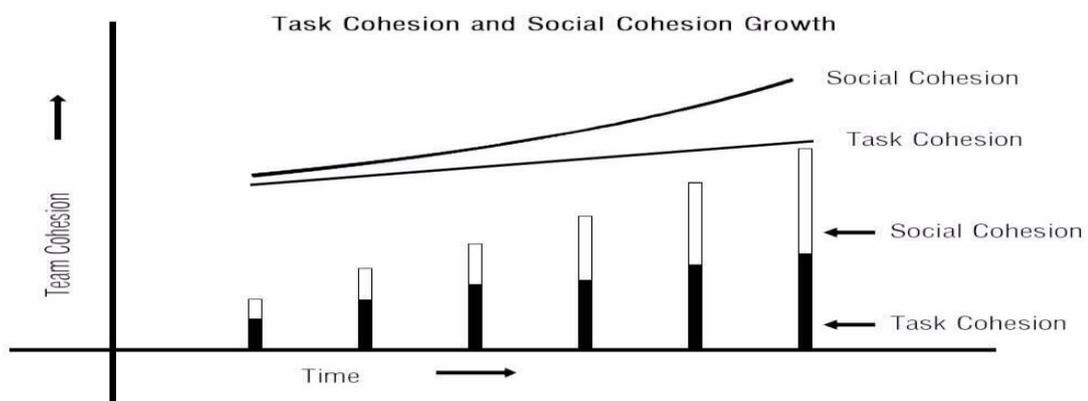
3.2 Social Cohesion

Barrick et al. [17] argued that team personality factors like extraversion and emotional stability were associated with team viability through Social Cohesion. Social Cohesion is a more dynamic and emergent variable and grows faster than Task Cohesion over time during team development as team members interact. This happens as the team members get to know each other and start spending more time outside office settings like in clubs, restaurants, family homes, etc.

Initial increase in Social Cohesion improves bonding and has a positive impact on team performance. However, beyond a certain point, the team members start trusting each other in terms of work contribution. In Oil Exploration teams, innovative approach is vital in discerning trends in oil migration and settlement. With high Social Cohesion, Group Think settles in and innovativeness of the team and Team Learning decreases. The younger members stop learning from their experienced peers. Some key members known to contribute innovative approaches go slack and start depending on other (younger) members to do their part. This reduces the benefits of divergence of opinions and hence negatively impacts exploration performance. This is more pronounced when the demographic diversity in the team is more.

Refer Figure III below.

Figure III



The qualitative enquiries undertaken with ONGC team leaders threw up interesting insights in to this peculiar role of Social Cohesion in Team Performance. Team Leader Mr. Ajay Sharma opined, “*In most cases, Social Cohesion appears to improve Team Performance in the initial stages. However, as the team dynamics is allowed to progress, Social Interactions hold back task-related delivery that affects team Performance badly. I have personally witnessed cases when a few of the team members become too friendly and thus becomes a group within the team. This polarization impedes team performance in the long run as exploration teams need to continue working as one single close-knit team.*”

Group General Manager Mr. Harish Awal agrees to this, “*In Oil Exploration Teams, social behavior of team members do not augur well for the team output in the long run. In some exploration teams, a few of the members have better social bonds than others, and this group has a politicizing effect on the team as a whole. In small exploration teams, this social bonding may bring good performance of the team initially, but with time, the politicizing impact dominates, bringing down the overall team morale, and hence performance.*”

This enables us to formulate our fifth proposition.

Proposition 5. *Social Cohesion is initially positively correlated with Team Performance in Oil Exploration Teams; after a point the correlation reverses.*

3.2.0 Social Cohesion in Oil Exploration Teams can be partitioned into three factors (sub-variables). The factors, along with their propositions are:

3.2.1 Demographic Diversity: The diversity of demographic profiles of team members (gender, age, ethnicity, marital status, etc.) has a strong say on Social Cohesion in Oil Exploration Teams. Kenneth et al. [18] posits that successful science teams particularly those involving scientists from different disciplines and backgrounds (like oil exploration teams), hinge upon effective team integration strategies and approaches of diverse backgrounds, which arrives in teams with high demographic diversity. If the demographic profiles of the team members are similar (Low Demographic Diversity), then the Social Cohesion increases fast and after a certain point: of time the Team Performance starts weakening.

ONGC Team Leader Manager Mr. Sujeet Sairam said, “*Some demographic coordinates like age and marital status brings people close and socialise better while working in exploration teams. Married members tend to stick together as their families can also meet freely. Similarly, engineers form their own group which tends to polarize from the group of geoscientists. Such demographic polarization becomes the order of the day when the demographic diversity is high and this brings down performance of exploration teams.*”

ONGC General Manager Mr. Rajvinder Singh shared, “*Similar demographic coordinates bring people closer in a culture like India and especially in exploration teams where well-knit continuous interactions are vital. So, low demographic spread is a damaging factor in team performance.*”

We can formulate the sixth proposition.

Proposition 6. *Low Demographic Diversity decreases Team Performance.*

3.2.2 Role Overlap: Erickson [19] finds that collaboration improves when the roles of individual team members are clearly defined and well understood. Roles of individual team members may be common to more than one member. Such overlapping roles increase Social Cohesion as two or more

members are engaged closely in the same task, augmenting personal bonding. High Social Cohesion arrests team performance in the long term.

ONGC Team Leader Chief General Manager Mr. Nirupam Banerjee said, “*Distinctive and exclusive role to each team member improves Team Performance in exploration related jobs. In my experience with exploration teams, I have seen that in cases where same jobs were assigned to more than one member, it lead to a fall of output after some time. Initially, both the members will be happy and productive; however, with the passage of time, their total performance will come down as more time will be spent on socialising while doing the same job. Hence, I personally would never allow any role overlap in my teams.*”

ONGC General Manager Mr. K M Shukla opines, “*Focus one assignment on a single member; its vital success criteria for team success in exploration. Overlapping roles have seen to lead to confusion and optimal performance has suffered in such cases.*”

This takes us to the seventh proposition.

Proposition 7. *High Role Overlap reduces Team Performance*

3.2.3 Emotional Intelligence: Druskat et al. [20] argues that Emotional Intelligence in teams leads to high social bonding. There may be emotional bonds between team members, which may either develop after team formation or may be already there before team formation. Such emotional indices forge strong Team Cohesion. Hence, high emotional index is detrimental to Team Performance.

ONGC Team Leader Group General Manager Mr. Aurobindo Mukherjee opined, “*Emotional Bonds build quick social relations. Such social equations within team members brings happiness but is not conducive to optimum team performance. I would personally prefer members with weak emotional bonds to work in exploration teams.*” Veteran Team leader Chief General Manager Mr. Abhijit Mukherjee said, “*Nothing feeds social relations better than emotions; but such social matrix slowly weakens Performance of Exploration teams. Emotional Intelligence is sure to usher in social relations and in exploration teams, extended social relations so not augur well. I know a number of successful team leaders who does not prefer gender differences in members because of this reason, as those may mature into emotional connects with time, reducing team effectiveness.*”

ONGC General Manager Mr. Rakesh Arora said, “*Emotions are strong social facilitators. Nothing builds relations better than emotional intelligence. In explorations teams also, social cohesion is strengthened by emotional quotient. Such social cohesions, unless controlled, may negatively impact exploration performance which requires sustained task focus.*”

This leads us to our eight proposition.

Proposition 8: *High Emotional Intelligence decreases Team Performance.*

4. Implications for theoretical development and contribution to Management

Our conceptual model can make notable contributions and enrich the existing literature in this area of oil exploration. Firstly, by taking a foundational perspective, we brought open the two related dimension namely Team cohesion and Team Performance. This helped us go further deeper in the constituent parts of Team cohesion. Furthermore, our study also adds to the most recent scholarly conversation on. Oil exploration teams are specialized teams and developing an understanding of such teams has many deeper serious implications for developing effective teams. Therefore, we argued to explore the causal

linkages among 8 key dimensions of team cohesion with team performance. More importantly, we develop some propositions linking dimension of team cohesion with team performance. . Thirdly, our study may contribute to the broader discourse on Collaboration and information diversity by amplifying the individuals, teams and groups in oil exploration sector. Our study also can contribute to management practices. It is crucial to design organization structure and paying close attention to team dynamics.

The micro-analysis of Team Cohesion and its decomposition into Task Cohesion and Social Cohesion have significant benefits in Corporate Teams in the Oil Exploration industry. The dynamics of the factors at play in building and weakening Task and Social Cohesion have been operationalized in concrete Propositions. Following these, significant upsides can be leveraged in Team performances in the petroleum industry, which is vital for any national economy.

5. Future Research Directions:

Team Cohesion can have more factors other than mentioned 8 factors. **Group Pride** and **Group Size** may also impact Team performance in many situations. More empirical research is needed to secure information about such factors of Cohesion and their measurements. Such research will serve as a more fine-grained approach to tailor the optimum determinants for better Performance.

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