Literature Review of the R&D Teams' Leadership to Manage Innovation

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ABSTRACT

One of the key organizational goals of today's business environment conditions is creating innovation capacity. Since the life cycles of the products are shortened, the importance of the innovation is enhanced and the role of the research and development (R&D) teams is increased and extended in its limits. In such an environment, R&S team leaders must have much more responsibility than ever. Literature reviews of leadership research typically cover a vast number of studies and experiments, however, only a small percentage of literature has been conducted in research and development (R&D) organizations or contexts. The question then arises whether the findings from the general leadership literature can apply to R&D or is the context of R&D different and should be analyzed for findings separately. From this point of view, this project aims to clarify how leaders impact innovation in R&D teams and examines how leadership identifies with innovation.

Keywords: Innovation management, Leadership, Research and Development Teams.

1. INTRODUCTION

More than three decades of innovation research (1980–2016) present a comprehensive picture of the antecedent factors that facilitate organizationally based innovation at the individual, team, and organizational levels. However, the processes that result in innovation are complex because they occur at various and nested levels of human organizing. OECD (2005, p. 46) characterized innovation as "the execution of another or altogether enhanced item (great or administration), or procedure, another marketing strategy, or another organizational technique in business rehearses, working environment organization or outside relations". The ideas of innovation and creativity are interlaced because creativity goes before innovation in a multi-stage process with the goal of new results. Creativity is required at different phases of the procedure of transforming ideas into results, yet it is just part of the innovation procedure. In this

perspective, creativity is frequently characterized as idea quality proportion, or ideation. Case in point, as per Amabile et al. (1996), creativity is "the generation of novel and helpful ideas." Innovation is the consequent acknowledgment and execution of ideas into results (Mumford and Gustafson, 1988; Shalley and Gilson, 2004).

Ideas are the crude material for innovation in organizations. Moreover, the procedure of creating innovations is characteristically questionable and includes impressive danger (Murray, 2017). For instance, Stevens and Burley (1997), in their study overviewed of new item development in a wide range of business sectors, achieved a striking conclusion. They found that of 300 ideas for new offerings (e.g., merchandise or administrations) proposed to administration, just around 125 of them really brought about new projects. Of these 125 projects, nine formed into bigger projects, four brought about real development endeavors, and two brought about new items. Of the new items propelled, stand out was productive. They additionally found that roughly, 90 to 95 percent of all U.S. licenses do not have any business sector significance, and just 1 percent is productive. Different assessments show that roughly 30 to 95 percent of the ideas for new offerings are unsuccessful (Tidd, Bessant, and Pavitt, 2001). From an authoritative point of view, innovation is regularly resource intensive (Damanpour and Aravind, 2012; Mumford et al., 2002). These resources might be the cash, time, and offices for new projects that create research thoughts (Pirola-Merlo, 2000) or, progressively vital, the entrance to applicable data and learning (Tidd and Bessant, 2009).

Organizations that need to augment their representative's innovation capacities should first survey their organizational structure. Excessively formalized and bureaucratic organizational structures appear to obstruct innovation. Interestingly, organizational structures in which basic leadership and impact over procedures are decentralized and in which project teams have extensive independence appear to encourage innovation (Damanpour and Aravind, 2012; Jung et al., 2008; Thompson, 1965). Upper administration should empower, expect, and compensate creative ideas (Mumford and Gustafsson, 1988), advance open and basic exchange without trepidation of negative backlashes, and acknowledge that disappointment is now and again inescapable (Mann, 2005; Pirola-Merlo, 2000). Project teams should have assorted qualities of capabilities (Reiter-Palmon and Illies, 2004) and in addition individuals with creative identities and proactive attributes (Feist and Gorman, 1998; Seibert et al., 2001). Last, team members should be given an unmistakably expressed vision (Pieterse et al., 2010). In any case, a basic inquiry must be asked: Who is in charge of executing these proposals and making situations that support singular innovation? It is clear that at last this obligation rests with the directors of the ensemble called organizational innovation — the leaders.

2. THE ROLE OF A LEADER TO MANAGE INNOVATION

Tidd and Bessant (2009) depicted four periods of a general innovation process. In the first place, organizations must output their surroundings to recognize open doors for innovation. For instance, these open doors might be new or changed client needs, new advancements that come from research exercises, or weights to comply with new enactment. This first stage, while indispensable, is regularly dismissed by vast organizations that would rather spend their resources on creating existing technology and obliging existing clients. As Christensen pointed out in his suitably named book,

The Innovator's Dilemma (1997), organizations that attention exclusively on refining their present offerings (through incremental innovation) may wind up at a deadlock when markets change or new markets rise with altogether different necessities and desires. In those cases, little organizations that gives attention exclusively on offerings to new markets may best the old contenders (Isaksen and Tidd, 2006).

The second and third periods of the innovation procedure include determination of the alternatives that are destined to deliver a focused edge and to the resourcing of those choices. Here, resourcing alludes to the obtaining of knowledge resources through R&D endeavors, to their buy, or to their community-oriented development with others. The fourth stage is the usage of the innovation, which frequently starts with an idea that creates through various stages toward a substantial result.

R&D leaders perform vital roles inside project groups that contribute essentially to execution. In one of the prior investigations of R&D leadership, Andrews and Farris (1967) inspected teams of scientists at a NASA research focus to figure out if administrators can affect the innovation of subordinates. Results demonstrated that the adequacy of leadership conduct was reliant on leaders' abilities. At the point when administrators were seen as having less specialized aptitude, higher execution was connected with giving subordinates more flexibility to investigate, examine, and challenge ideas. Research has additionally demonstrated that the leader's position can influence the adequacy of roles.

In literature, researchers have proposed that various leadership roles are vital for innovation in a R&D setting (Farris, 1988). Barczak and Wilemon (1989) distinguished four roles performed by leaders of working teams concentrating on incremental item change and enhancing teams concentrating on new item development: communicator, climate-setter, organizer, and interfacer. Roberts and Fusfield (1981) included idea creating, entrepreneurial/champion, project driving, gatekeeping, and supporting/honing as follows;

● The idea-producing role includes creating and testing new ideas and creative critical thinking.
● Inspiring team members, arranging projects, and planning team members are key exercises connected with the project-driving role.
● Supporting/instructing concentrates on giving direction and creating team members' capacities. Each of these roles concentrates principally on leadership practices inside a project group.
● Gatekeeping includes exercises both inside and outside of the project team, including data spread, work force coordination, and acquiring knowledge with respect to proficient development outside of the organization.
● At last, entrepreneurial/champion concentrates on getting resources and offering ideas to those outside of the project group.

In an investigation of R&D team leaders in Korea, Kim et al. (1999) found that the roles of specialized master, team developer, watchman and strategic organizer were identified with team execution. Except for team manufacturer, the relationships have to be more grounded as the leader's residency expanded. The roles of specialized master

and guardian were critical paying little heed to instability. In addition to their inward leadership exercises with project group members, project leaders have critical roles to play in crossing over the limits of the group and the R&D organization to different supporters both inside and outside the firm. For instance, inside the firm, the backing of larger amount administration, marketing, manufacturing, and working divisions is generally required for mechanical innovations to be effectively changed into new items and procedures that achieve the business sector. Outside the firm, relations with clients, suppliers, administrative organizations, exchange affiliations, and here and there even contenders are required for new item achievement. To achieve these few electorates, the project leader must apply upward and outward impacts crosswise over limits and frequently must go about as a project champion (Howell and Higgins, 1990b; Shim and Lee, 2001). Research has demonstrated that project champions are higher in danger taking and innovativeness and have a tendency to be more transformational in their leadership practices (Howell and Higgins, 1990a, 1990b).

Markham et al. (1991) contemplated 213 R&D projects from 21 firms and found that projects with a dynamic championing exertion from the leader were better upheld over the organization and more averse to get drop than projects without championing. An investigation of 40 R&D projects by Waldman and Atwater (1992) utilizing interviews reported that championing action and transformational leadership result in better project achievement, particularly when leaders apply impact at larger amounts of the organization. Ancona and Caldwell (1988), besides, contemplated 38 project leaders and found that team execution was identified with the fit between the level of boundary spreading over movement and how subordinate the project was on resources outside the project. Likewise, Shim and Lee (2001) concentrated on 83 R&D projects in 22 Korean research establishments and found that project leaders who apply upward impact have a tendency to be more accomplishment and self-observing focused and that the best impact style should fit the organizational connection close by. Indeed, even functional chiefs need to boundary range, as an investigation of 181 project teams from nine R&D organizations by Allen et al. (1988) found that functional chiefs added to project execution by keeping researchers upgraded with their range of science or technology. While leaders who boundary ranges can help their projects' execution, research has shown that they can likewise upgrade their own particular profession achievement. For instance, Katz and Tushman (1981) led a 5-year follow-up investigation of boundary spreading over project leaders and found that they were elevated to higher administration positions at a much more noteworthy rate than the individuals who did not boundary range.

3. LEADERSHIP IN RESEARCH AND DEVELOPMENT TEAMS
3.1 Transformational Leadership
The ideas of transformational and value-based leadership were initially verbalized by Burns (1978) in a political science connection and later planned into a theory of leadership in organizations by Bass (1985). As indicated by Bass' theory (1985), transformational leaders urge adherents to view issues from new points of view (scholarly incitement), give backing and consolation (individualized thought) and convey a vision (rousing motivation). Conversely, value-based leaders persuade subordinates using unexpected prizes, remedial activities (inactive administration by

exemption), and principle authorization (dynamic administration by special case) (Bass, 1985; Bass and Avolio, 1990).

In spite of the fact that transformational leadership theory predicts that transformational leaders will be successful in all circumstances, the theory likewise demonstrates that logical variables may build the adequacy of transformational practices (Bass, 1985). Predictable with transformational leadership theory, research has found that transformational practices are identified with leadership adequacy in various sorts of organizations (Bass, 1997). Further, meta-analysis results have shown that this relationship is steady crosswise over various levels of leadership (Lowe et al., 1996). Contemplates looking at transformational leadership in R&D organizations, in any case, recommend that leadership level and also other logical variables, for example, project sort may direct the relationship between transformational leadership and viability. In a longitudinal study looking at leadership practices showed by project leaders in three R&D organizations, Keller (1992) found that transformational practices were emphatically identified with project quality and spending plan execution. This relationship, additionally, was more grounded for research projects than for development projects. The relationship between value-based practices and project quality was more critical in development projects than in research projects.

As indicated by the Waldman and Bass (1991) model of leadership and the innovation procedure, transformational leadership practices are important in the early stages to make a vision and give scholarly incitement. Leaders who are well on the way to give scholarly incitement to project groups are project leaders. Accordingly, project adequacy should be most identified with transformational leadership practices showed by project leaders in research projects and larger amount leaders in development projects.

3.2 Path Goal
According to path-goal theory (House, 1971, 1996), a compelling leader is one who takes part in practices that encourage goal fulfillment and expand the estimation of this accomplishment, in this manner influencing subordinates' anticipations, valence, execution, and fulfillment. Also, the relationship between leader's practices and results are conjectured to be directed by situational variables including characteristics of the task, environment, and subordinates. Concentrates on looking at situational mediators have concentrated more on occupation characteristics than different sorts of arbitrators and have not reliably upheld path-goal theory expectations. In a meta-analysis, Wofford and Liska (1993) discovered backing for just 6 of 19 arbitrator theories. Task structure directed the relationship amongst thought and three results (anticipations, role clarity, and fulfillment with director) and between starting structure and one and only result (hopes).

Research analyzing path-goal theory in R&D organizations recommends that subordinates' characteristics may clarify a portion of the conflicting path-goal discoveries. In a study analyzing 477 expert representatives from four R&D organizations, Keller (1995) found that subordinates' requirement for clarity directed the relationship between starting structure and occupation fulfillment in each of the four organizations and between starting structure and execution in one organization.

Keller's outcomes demonstrated that the relationship between starting structure and fulfillment was more grounded for workers high in requirement for clarity. In this way, worker characteristics can impact the viability of order leadership practices.

3.3 Leader-Member Relations (LMX)

LMX was initially proposed by Graen and his partners (Dansereau et al.,1973) and concentrates on the social trade forms installed in the leader–subordinate relationship. Late revisions to the theory have further portrayed these social trades regarding three phases: (1) beginning testing including assessments of thought process, mentalities, resources, role desires; (2) development of shared trust, dependability, and admiration; and (3) development of common responsibility to organizational/unit goals (Graen and Uhl-Bien, 1991). It has been contended that a standout amongst the most imperative introductory parts of the trade relationship is subordinates' execution in a progression of managers' solicitations. Subordinates' responses to such demands can then impact impression of reliability and unwaveringness (House and Aditya, 1997).

As indicated by LMX theory, the nature of trade relationships amongst leaders and subordinates impacts various imperative organizational results (Graen and Uhl-Bien, 1995). In general, considers testing and applying LMX can be put into three general classes: (1) research inspecting variables that anticipate the nature of trade relationships, (2) research analyzing the relationship amongst LMX and practices of leaders and subordinates, and (3) relationship amongst LMX and results (Yukl, 2002).

The relationship amongst LMX and execution has been specifically compelling in R&D examines that have operationalized execution as creativity and innovation. It has been recommended that the way of great trade relationships that incorporate giving subordinates testing tasks, leader backing of danger taking (Graen and Cashman, 1975), leaders who secure task-related resources (Graen and Scandura, 1987), give acknowledgment (Graen and Cashman, 1975), and director support encourage representative creativity and innovation (Amabile, 1988; Mumford and Gustafson, 1988). Steady with expectations, research has found that high quality trade relationships are connected with innovation and creativity in R&D organizations. For instance, in an investigation of specialists, scientists, experts, and administrators in the R&D office of an extensive mechanical company, Scott and Bruce (1994) found that high quality trade relationships were identified with innovative practices and impression of an organizational climate steady of innovation.

3.4 Strategic Leadership

Research analyzing leadership in R&D connections has concentrated essentially on project leaders instead of those at the top administration level. Research looking at acquisitions and divestitures by organizations found that the extreme utilization of such exercises was identified with the execution of budgetary controls by top administrators, which negatively affected inward innovation (Hitt et al., 1996).

Different studies have shown that top administration backing can positively affect innovation. In an examination of 125 mechanical item firms, Cooper and Kleinschmidt (1987) found that top administration support for new item projects was identified with different parts of item achievement including payback period, residential piece of the pie, relative benefits, meeting deals, and benefits goals. Comparable results were found

by Green (1995) in an examination of R&D projects in view of Hambrick's (1989) strategic leadership structure. In this study, saw top administration backing was identified with expected commitment, size of speculation, innovativeness, and business support and affected whether a project was ended.

4. TEAM LEADERSHIP FUNCTIONS

Despite the fact that the wellspring of team leadership can change, all sources are eventually centered on fulfilling team needs with the goal of improving team adequacy. Leadership is the vehicle through which such needs are fulfilled. Past work on functional leadership theory has tended to center impressive consideration on team needs (or functions) and has given less thoughtfulness regarding the particular routes in which leadership can fulfill these requirements. To see how team needs get to be fulfilled, this study will concentrate on team leadership functions or the things that should be accomplished for the team to address its issues and function adequately. This structure of leadership functions will serve to coordinate past research and to expand team leadership research into new areas.

Teams perform crosswise over time in a progression of long-winded cycles of goal-coordinated conduct that can be sorted out into move and activity stages (Marks et al., 2001). This area concentrates on the leadership functions that are keys to the move period of team execution. The move stage is a timeframe when teams concentrate on exercises identified with organizing the team, arranging the team's work, and assessing the team's execution such that the team will at last have the capacity to accomplish its goal or goal (Marks et al., 2001). In this sense, the essential center of teams in the move stage is not on direct task work in essence, yet rather on exercises that build up the structures and procedures that will empower future adequacy. Essential team leadership functions incorporate guaranteeing the right blend of individuals in the team; characterizing the team's general mission, goals, and models of execution; organizing roles and obligations in the team; guaranteeing all team members are equipped for performing successfully; understanding the team environment; and encouraging feedback forms in the team. As these leadership functions are established after some time, teams build up the establishment on which future team activities that contribute straightforwardly to goal achievement will be performed.

● Compose team: Team behavior and performance is a reflection of its members. In this way, a key contribution to the functioning and conduct of any team is the team's composition, which alludes to the characteristics and qualities of the people who make up the team and in addition how those characteristics and traits are appropriated inside the team (Kozlowski and Bell, 2003). Earlier research gives an abundance of proof recommending that team composition is a critical determinant of team procedures and execution. Specifically, compositional components, for example, demographic differing qualities and team-level personality attributes and capacities have been connected to interpersonal procedures in teams, for example, coordination (Dahlin et al., 2005), correspondence (Keller, 2001), helping conduct and union among team members, inside team struggle and data trade (Drach-Zahavy and Somech, 2001). As far as execution criteria, team composition has been connected to teams' capacity to learn and adjust to changing task situations (DeRue et al., 2008), team creativity (Pirola-Merlo and Mann, 2004; Taggar, 2002), and task and relevant execution.

● Define mission: Once a team is created and its composition is established, the following team leadership function is to characterize the team's mission. This includes deciding and imparting the organization's execution desires for the team in a manner that they are separated into substantial, fathomable pieces. Once the team is clear about these desires, the team leadership process concentrates on building up the team's mission or reason. The essential leadership task is to ensure that the team's mission is clear, convincing, testing, and shared among team members. Characterizing the team's mission and guaranteeing that all team members have a typical comprehension of this mission is especially essential for fulfilling team needs and coordinating the team toward goal achievement. Specifically, this team leadership function gives the establishment on which a typical character can shape and firm relationships can create among team members (Dionne et al., 2004). Additionally, obviously characterizing the team's mission guarantees that the team has adjusted its motivation, goals, and strategic arrangements with the more extensive organization's desires, system, and qualities.

● Establish expectations and goals: The following leadership function speaks to a dynamic movement in the operation of the team as the members come into more dynamic inclusion in forming their future together. This leadership function includes building up execution desires and setting team goals. In teams with formal team leaders, the leader works with the team and individual team members to create goals and desires for task execution and in addition goals identified with learning and team development. For teams with a more casual leadership structure, team members effectively encourage the goal setting handle and decide for themselves how team members should be considered responsible as for execution desires. With the team's mission and general reason built up, setting testing however sensible goals for the team and plotting clear execution desires in light of those goals helps in finishing the team's task (Einstein and Humphreys, 2001). Indeed, teams with very much characterized goals beat teams without goals by a full standard deviation.

● Structure and plan: With team goals and execution desires set up, the following team leadership function is to structure and plan the team's work. The team's goals and execution desires give an objective to team execution, yet to accomplish these execution targets, team members need to build up a common comprehension of how best to facilitate their activity and cooperate to finish team goals. In this sense, team goals distinguish what the team is relied upon to finish, though the leadership function of organizing and arranging decides how best to accomplish those execution targets. The organizing and arranging team leadership function includes deciding or helping with deciding how function will be expert (e.g., strategy), who will do which parts of the work (e.g., role illumination), and when the work will done (e.g., timing, booking, work process). These practices result in an incorporated work arrange for that coordinates the team's execution, facilitates team endeavors, creates task execution techniques, and institutionalizes team forms. The significance of plainly organizing team member roles inside the team and building up a coordinated work plan to direct team members' activities is obvious over the majority of the team leadership sources recognized before.

● Train and develop team: As teams take part in numerous execution scenes after some time, teams and their leaders frequently distinguish inadequacies in the team's abilities, either on account of individual team members not being prepared to perform their appointed tasks or the team all in all not having the capacity to cooperate successfully. Such inadequacies in team execution capacities give the driving force and

setting to the train and create leadership function. To accomplish ideal levels of execution, teams should be talented in and equipped for the task work that is anticipated from the team. Teams need to learn and apply new things about both the current task and the interpersonal procedures that empower team members to cooperate as an aggregate unit. To build up these capacities in the team, the preparation and development function may include specifically giving focused on preparing to the team through guideline or show, trailed by progressing drilling. This leadership function additionally involves urging team members to utilize instructive resources gave by the organization. Furthermore, members of the team may take part in broadly educating and peer guiding to expand the conveyance of significant abilities and knowledge occupant among them.

● Sense making: During the life of all teams, occasions happen both inside and outside of the team that effect the team's experience. Earlier research has examined an assortment of various sorts of occasions that effect team functioning, including however not constrained to changes in team size and leadership structure (DeRue et al., 2008), changes in the team task and changes in the organizational environment. To the degree that an occasion is basic to team achievement, requires prompt consideration, and requires maintained consideration after some time, the occasion can be very troublesome to team functioning and contrarily affect team execution unless the team can adjust (DeRue et al., 2008).

● Provide feedback: Feedback is a vital contribution to the administrative instruments that immediate and control singular conduct (Bandura, 1986). In like manner, in social frameworks, for example, work teams, feedback is crucial for the functioning, support, and development of the framework after some time (Katz and Kahn, 1978). On account of team leadership, giving team feedback empowers the team to successfully survey its past and current execution and afterward adjust as expected to guarantee future achievement. Teams must intermittently audit their execution against set up breakthroughs, measurements, and desires, and to the degree execution is not meeting those desires, adjust, and decide more powerful methods for team functioning. All wellsprings of leadership can perform this team leadership function, albeit every will contrast somewhat as far as the sort of feedback they are ideally situated to give. Casual inside leadership can give and get continuous task-related feedback; casual outer leadership can give feedback that can help the team adjust to changing ecological conditions; and the two formal wellsprings of leadership can help teams audit progress against built up goals.

5. CONCLUSION

Firms' adaptation to changing environmental conditions is one of the most important topics in every century. Nowadays, focal point of competitiveness between companies in the production sector is shifted to desired time, desired quality, desired quantity and affordable price rule for both new and innovative products and to reach this superiority situation companies need an integrated management skill. Organizations that need to establish a framework for innovation should execute an innovation arrangement that prizes creative commitments and empowers risk-taking and innovation. Along these lines, organizations can make a situation that empowers people's willingness to embrace creative attempts (Hemlin et al., 2008; Mumford and Gustafson, 1988). Teams occupied with innovation work should be allowed adequate self-sufficiency for creative critical thinking and should be collected because of team member heterogeneity.

R&D consists of several human activities starts from finding new principles of nature, proceeds to manufacturing and testing new and beneficial products and production tools that asks human needs. R&D generally using innovative effort and knowledge in new applications based on a systematic basis with the aim of increasing scientific and technical knowledge. At this point, team leaders impact the innovation capacities of their teams and their members. Leaders should advance team standards that underline open talk, enthusiastic security, common regard, and euphoria through invigorating team reflection and shared basic leadership.

This study examines how leadership identifies with innovation and proposes and incorporates a few variables that clarify how leaders impact innovation in R&D teams. According to literature, the R&D project leader not just needs to lead inside and move the team members; additionally he/ she should take part in different roles including outer ones. To be specific, the leader should likewise boundary range with vital constituents outside the project group, for example, chiefs and staff in marketing, manufacturing, and working divisions, and in addition with clients from outside the firm. This sort of movement to champion the project can be basic to the survival and accomplishment of the project. As a further study, study can be extended with several variables to understand the role of leadership in R&D teams in detail. After a detailed variable analysis, traditional models and current models in the era of Industry 4.0 can be benchmarked with several managerial methodologies.

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