MANAGEMENT SCIENCES NAUKI O ZARZĄDZANIU

sciendo

Year 2019, Vol. 24, No. 2
ISSN 2080-6000
e-ISSN 2449-9803

THE LEADERSHIP OF R&D TEAMS: SIGNIFICANCE, CHALLENGES, COMPLEXITY AND REFLECTION ON THE EXISTING MODELS

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DOI: 10.15611/ms.2019.2.02
JEL Classification: M10

Abstract: The literature in the leadership field covers extensive research, studies and compendia. However, only a small part of them are focused on leadership in research and development (R&D) teams working on innovations. Those authors who address the subject highlight the specifics of the scientists' and engineers' leadership engaged in creative work on innovation. Even less research and papers are connected with academic scientific teams searching for technology-based innovations, while one can recognize a research gap in the area of leadership, in sophisticated technology-based project teams like interdisciplinary or transdisciplinary teams. In this article was present a review of literature on leadership of innovative R&D teams. The goal of the article is to present a review of the literature in the area of leadership in R&D teams, along with a critical analysis of selected leadership models as well as an indication of the research interest and trends in terms of the described issues.

Keywords: leadership of innovation, R&D team, R&D organization, innovation, leadership model.

1. Introduction − research on the leadership field

Leadership as a research area after World War II developed along three main lines: (a) behavioural and attitude research; (b) behavioural, social-cognitive, and contingency research; and (c) transformational, social exchange, team, and gender-related research [Lord et al. 2017].

During the last ten years researchers have only focused on a few aspects of the field. The analysis of the Web of Science among highly cited articles in the field of leadership showed 72 papers in such categories as: management, psychology applied, business, political science, health care sciences services. Among all the articles there are some of pertinent topics and common areas of scientists' interests. For example, Day D.V., Fleenor J.W., Atwater L.E., Strum R.E., McKee R.A. reviewed the theoretical and empirical literature on leader and leadership development published over the past 25 years. They focused on the intrapersonal and interpersonal issues related to the subject of effective leadership, a description of how development emerges with an emphasis on multi-source or 360-degree feedback processes, they conducted a review of longitudinal studies of leadership development and investigated methodological and analytical issues in leader and leadership research [Day et al. 2014]. Most of the articles in the last ten years were connected with positive leadership, especially servant, authentic and ethical leadership. The reviews and comparisons also recall transformational leadership [Hoch et al. 2018] often in comparison with transactional leadership [Wang et al. 2011]. However, it is worth underlining that the destructive nature of leadership was shown only twice in most of the cited articles over the last decade. The researchers highlighted that constructive leadership still dominates leadership

research, and at the same time an increasing number of studies investigate different forms of the negative effects of bad leaders [Schyns, Schilling 2013]. The aspect of the influence on creativity was also presented in leadership context [Liu et al. 2012; Braun et al. 2013]. Not many articles covered the issue women's leadership subject because women are still underrepresented in leadership positions. Moura G.R., Leicht C., Leite A.C., Crisp R.J., Goclowska M. focused on finding the answer of how to effectively promote diversity in leadership [Moura et al. 2018]. Also specific target groups were checked as an aspect of being a research object in the leadership area, and mentioned in the Web of Science. The sources showed that great attention was paid to hospital staff: nurses, physicians as well as mental health services [Shanafelt et al. 2015].

Finally, among the most cited articles during last 10 years the aspects connected with science, engineering, innovations and R&D, were presented in three scientific papers:

- Vaccaro I.G., Jansen J.J.P., Van Den Bosch F.A.J., Volberda H.W. [2012] analysed 1000 Dutch firms from the REACH database to compare transformational and transactional leadership. They indicated that for smaller and less complex companies, transactional leadership suits better during the process of innovations management. Larger organizations need transformational leaders to develop the management of innovations and compensate for the complexity of big companies.
- Rosing K., Frese M., Bausch A. [2011] integrated literature on leadership and innovation and proposed an ambidexterity theory of leadership for innovation and called it ambidextrous leadership. They took into consideration two complementary aspects of leadership behaviour that facilitate exploration and exploitation in individuals as well as teams – opening and closing leader behaviours, respectively. Another key factor in this approach is the ability to switch between them in order to manage the ever-changing requirements of the innovation process.
- Braun S., Peus C., Weisweiler S., Frey D., [2013] based on a sample of 360 employees from 39 academic teams, studied the relations between transformational leadership and the relevant outcomes at individual and team levels of analysis, including investigations of mediators at both levels and cross-level effects.

The goal of this article is to present a review of the literature in the area of the leadership in R&D teams along with a critical analysis of selected leadership models, as well as an indication of the research interest and research trends in terms of the described issues.

To understand the R&D process and the role of the leader in innovation teams more clearly, some definitions should be presented.

Innovation, in a few simple words, "is the creation of something both novel and useful" [Hill et al. 2014]. Additionally it is worth underlying that "innovation is about challenging the status quo and introducing new and, one hopes, better products, processes, services or management approaches. Innovation requires curiosity, experimentation and openness to change.

Leadership of innovation: to build up this definition the key issue is that "leaders create the environment that somehow draws out the slice of genius in each individual and then leverages and melds those many slices into a single work of innovation – a new product, a new process, a new strategy, a new film – that represents collective genius" [Hill et al 2014]. It is significant to complete the definition that "leadership in an R&D organization is essentially a process of mutual influence between the supervisor and the employees. Knowledgeable workers do not work towards a goal because someone else has set it. They work towards it because they believe that it is right" [Wagner Weick et al. 2010]. At the same time another important issue is "innovation leadership is about bringing the gap between dreams and reality, past and future, certainly and risk, concrete and abstract, us ("we love innovation") and them ("they don't want to change at all") and success and failure. And all of these dualities are present at the same time" [Buijs 2007]. Leadership roles "involves activities both inside and outside of the organization" Elkins T., Keller R.T., 2003. To complete the definition it is crucial to mention that "project leaders have to organize and manage their teams across organizational lines. Often the project manager becomes a social architect who understands the interaction of organizational and behavioral variables, facilitates the work process, and provides overall project leadership for developing multidisciplinary task groups into unified teams, and fostering a climate conductive to involvement, commitment, and conflict resolution" [Thamhain 2004].

Research and development (R&D) teams: "are different from typical teams in that the tasks performed are nonroutine. Usually R&D projects deal with complex tasks, requiring technical skills in multiple areas; consequently, there is an obvious need and benefits to using teamwork since tasks are challenging requiring diverse skills specialty" [Wagner et al. 2010]. To make the description complete we should add that "the combination of a broader range of motivations, different types of participants and differing organizational forms expands both the

number and diversity of the proposed solutions. It is this diversity that makes competitions so appealing to companies seeking breakthroughs" [MacCormack et al. 2013]. Furthermore, "if we casually observe a cross-functional team at work, we see that power relationships within a team shift over time according to their relevance to the task (…) hierarchical authority is not the only power structure in teams. Theories of shared leadership assume implicitly that individuals share responsibilities (specifically, leadership) within the team" [Aime et al. 2014]. Finally, it is necessary to understand the wide meaning "the project group is the vehicle of choice because such groups, often cross functional in membership, can bring right mix of scientists, engineers, and other specialists together to bring in and process scientific and technological information into technological innovations" [Elkins, Keller 2003].

2. The unique nature of innovation and R&D processes and the leaders expectations

Innovation requires breaking the rules. This is always a risky process, complex, complicated and full of challenges as well as contradictions. This means that managing innovation processes is a special mission for the leader. In the paper of Buijs J. [2007] the author said that innovation leadership should be a controlled schizophrenic behaviour and act in different ways at the same time. Leaders must adjust to a situation and switch from one leadership style to another. Innovation processes consist of divergent and convergent phases. Between them are sub-steps. The process can be divided into a few stages. All of them require different techniques to stimulate, for example, creativity during divergency or defining during convergence. During the process, leaders must coordinate many different aspects such as communication among team members, dealing with different conflicts and tough situations. They need to be aware of cross-functional diversity, gender aspects, as well as age, experience or even the personality styles of team members. It is important to underline that during innovative work there is not just one innovation process but a series of them running in parallel. Team members have also a lot of complex expectations from the leader such as to be in charge and to be in control, being supportive, enthusiastic and trustful. They do not want to feel that the leader is weak and lacks clear vision. They must use both a generative mode of leadership (e.g. vision development, challenge and risk-taking) as well as focusing on the mode of leadership (e.g. goal management, business orientation, defining action) [Buijs 2007]. Frequently interactions among team participants are not based on face to face interaction but on virtual interaction. The leaders of such teams are expected to understand all diversity of human behaviour without regular interpersonal interactions. Additionally they have to understand, among many other things, the entire spectrum of national cultures' variety. There is also the technical aspect, very important for beneficial cooperation, of the proper and adequate electronic communication technology [Snyder, Duarte 2006].

The innovation process it is not about solo genius, it is about collective genius [Hill et al. 2014]. Creative research is very demanding and complex work which includes such elements as idea generation, evaluation of obtained projects as well as the implementation of ideas to applicable results. Research projects often require significant resources – costs and needs increase over the life of project. At the same time it requires a wide knowledge to cover different aspects such as: complexity, sponsoring organization, funds and many different kind of problems. Scientists' daily activities consist of non-defined novel elements. Science leaders need multidisciplinary skills to manage all aspects of their reality, also social skills are necessary to lead teams and projects. That is why even if the leaders are effective at one stage, they could not be effective at another aspect of their leaders activities [Robledo et al. 2012].

Sapienza focused on scientists with their own experience of management. She completed research for the period of five years which included more than 200 scientists questioned about their own experience of management during in-depth interviews. Additionally other qualitative methods, such as document analysis, participant observations, and open-ended surveys, were used. The author defined a lack of information on:

- how scientists define effective and ineffective leaders;
- what it feels like being led by an effective or ineffective leader (and the impact of leadership innovation);
- scientists' own concerns about managing people.

The selection of the target group was focused on scientists interested in managing people. It helps to talk with people familiar with thoughts about the effectiveness of leadership. The scientists were representatives of academia, government and industry R&D sectors, and they came from Europe, Asia and the USA. The results showed that an effective leader was described as caring and compassionate (28% of responses) and the ones possessing managerial skills (such as: communicating effectively and listening

well, resolving conflict, being organized, holding informative meetings). An ineffective leader was described as abusive (19%) and exploitative (19%). Among scientists, the most difficult problems were presented as: becoming a leader (such as: being authoritative, staying focused, balancing scientific efforts with management responsibilities, delegating) (26% of responses) as well as dealing with conflict (21%). During those studies, some other information was also interesting. From the insider's point of view, the interviewees in the research, scientists should manage scientists and at the same time scientists are not trained to lead people as their academic education prepares individualists. There is also the aspect of the correlation between leadership and scientific results. The author underlined that for the leader to be effective in the science area he/she must have the scientific skills as well as non-scientific skills to organize the work of a team, deal with all the formal needs of the system, be prepared for people recruitment suitable to the team, know how to conduct the evaluation process, and how to reward team members [Sapienza 2005]. At the same time the social abilities of the leader are even more important than leaders knowledge about the project [Buijs 2007].

Sapienza and Lombardino also wrote about other aspects. In science teams micromanagement may occur more likely than in other teams. There are two important aspects. First of all, the individualistic attitude of education (underline independence, autonomy, and self-sufficiency) of future leaders and team members which may affect the tendency to overcontrol others, and secondly the obligation to stay focused on new data, emerge. Unfortunately micromanagement does not support high morale and creativity among team members. Scientists are driven through scientific method and are sceptical of the development or usage of the so-called "soft skills" – for them true science is hard science: observable, measurable, replicable and nomothetic. At the same time people do their work because it is inherently interesting, enjoyable as well as satisfying. Among certain conditions which inhibit creativity there are: constrained choice, overemphasis on tangible rewards, evaluation, competition, perceived apathy by leaders towards the scientists' work, unclear goals, insufficient resources, overemphasis on the status quo and time pressures.

Finally, scientific work is much more than the team work and requires multidisciplinary team effort. That is why leadership is so important in science team management in order to manage how people should work in the research laboratory, how scientific activities should be carried out, how groups should behave, etc. [Sapienza, Lombardino 2005].

One more aspect of the leaders supportive activity is worth underlining, namely knowledge management. In relation to "organizational knowledge creation theory", the organization is "moving between cycles of sense-giving from the top and sense-making in the middle, to sense-giving in the middle and sense-making at the top". The leader of innovation should maintain a space suitable for the growth of relationships called "ba" [Nonaka et al. 2006]. This is very important because a developing team's learning skills as well as its creativity are dependent on the organizational structure. During the process of team development, the leader must be aware of the multiple and transitive power of a heterarchy [Aime et al. 2014]. Regarding the concept of the heterarchy, leadership is distributed in the organization that supports the flow of knowledge from the middle to the top and down to the rest of the organization [Nonaka et al. 2006].

Concluding, many studies show that leadership roles and styles, in the context of innovation and R&D teams as well as scientific environment, differ from the traditional roles (e.g. Mintzberg) or styles (e.g. Reddin, Blake, Mouton, Goleman etc.) and previous concepts and models are insufficient to describe those complex phenomena.

3. Leadership models in R&D teams – a critical review

As was mentioned before, leaders of innovators have specific roles, different from typical categorisations. There are no easy or clear answers. For example Rosing K., Frese M., Baush A. [2011], demonstrated that effective leadership style could be different and that it is the only variable, nevertheless most authors underlined transformational leadership as the most related to innovation because transformational leadership enhances motivation and may encourage the followers to challenge the status quo [Rosing et al. 2011].

Therefore, how to present and describe leadership of innovative processes? How to combine all of the critical aspects which determine its specific? How could we include the diversity of processes according to the kind of situation? Some researchers proposed and developed adequate models dedicated to innovation environment. A few proposals are presented below.

A model of transdisciplinary leadership was proposed by [Gray 2008]. In this model three key duties of leaders were shown: cognitive, structural and processual. Supportive cognitive leadership helps transdisciplinary researchers to believe in the vision. It is a kind of mental map with desired goals to motivate

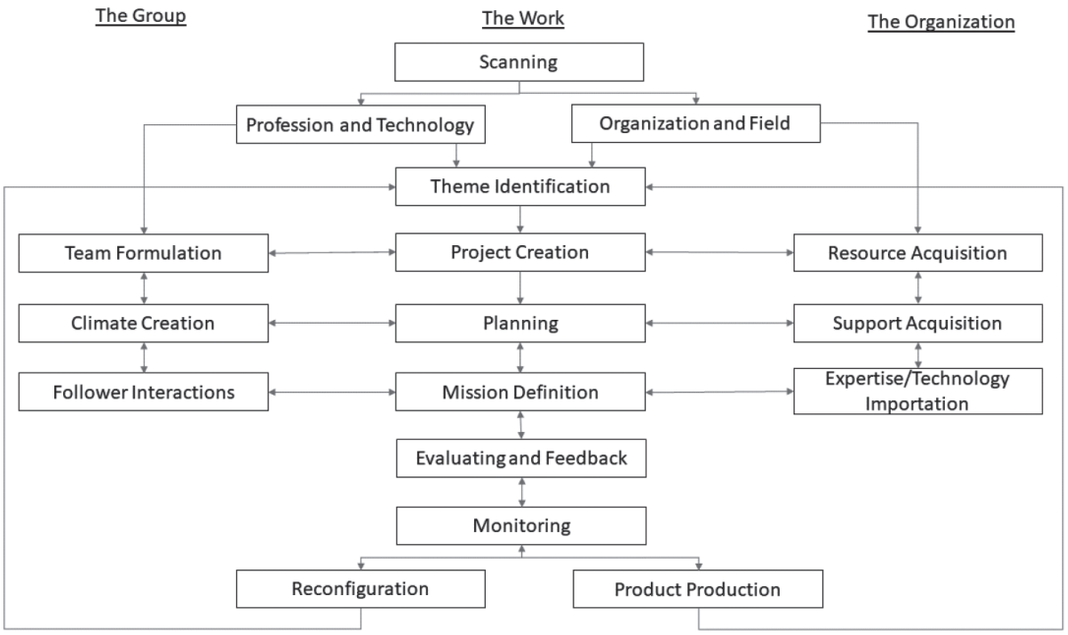

Fig. 1. Model of scientific leadership

Source: [Robledo et al. 2012].

the whole team and individuals to step out-of-the-box of their discipline, beliefs and go after new ideas. This is connected with the ability to join teammates, despite the diversity among hermetical languages of specific disciplines. Efficient structural leadership establishes a structure for unconnected parties and provides the team and external stakeholders with a social network and information exchange. Thirdly, processual leadership promotes trust and provokes constructive interactions to control and prevent conflict situations due to interpersonal skills, so important to beneficial cooperation. Certainly, when the size of the project increases or geographic dispersion requirements against leadership grow, then it is necessary to organize multiple leaders with different skills, network and abilities. The author has shown analogous comparison of the role of multiple leaders to brokers who know how to communicate and connect other people, which is a critical issue in such complex teams.

Many scientists who have been exploring the topic of leadership of scientists and engineers conclude that it is such a specific kind of environment which needs its own characteristic model [Robledo et al. 2012; Hill et al. 2014]. According to the model of Robledo I.C., Peterson D.R., Mumford M.D. [2012], there are three key elements of influence which leaders should develop: organization, the work and the group (Figure 1).

In order to plan in the good way the development of research teams, leader's key role is to be aware of new research findings, forecast future trends, as well as with recognized gaps in identified fundamentals (scanning the environment) [Robledo et al. 2012; Sapienza, Lombardino 2005].

Working with a group requires not only team formulation, which is often changeable and depends on the project's stage (cross-functional teams) but also thoughtfulness about the proper climate in the group and care for participants' interactions. The leaders role is also to take care about organizational support and the integration of the project work to define and redefine missions and their elements, to evaluate and feedback and finally to monitor the results. Thus leaders of scientists and engineers have in this proposed model three distinct and very complex roles that make this type of leadership different from others, and show what wide and great responsibility rests on these kinds of leaders. In the model there is a place for an organisational aspect, but the issue of hierarchy was not presented and described in this paper. In the aspect of the group there is lack of information or accent on defining common relations and team spirit building, whereas extension of the group or reformulation or even redefinition of the group regarding the situation when new members join or circumstances changed.

Another model – a model of leading innovation, was proposed by Hill L.A., Brandeau G., Truelove E., Lineback K. [2014], in the book: "Collective genius. The art and practice of leading innovation". The team conducted research using ethnographical methods for ten years, observing closely 16 leaders of innovation who were able to produce innovative solutions again

and again, from 7 countries and 12 industries. Their lessons also showed that innovation requires different kind of leaders. They underlined that innovation leadership is not only about creating vision and inspiring others to realize it, or that the innovation itself is not about solo activity but it demands "collective genius". During the innovation project there are many trials and errors, wrong beginnings, lots of missteps and mistakes. Leading innovation is about creating a space where individual people come together ready to work hard through collaboration, discovery-driven learning, and integrative decision--making to often solve difficult problems. Innovation most often arises from the interplay of ideas and interactions during experiments by people with diverse expertise, experience or points of view. Searching for innovation is also solving complex problems involving deep understanding of the nature of the problem, ideation, prototyping, and testing ideas. It is a design-thinking process where, on the one hand, the team use science-driven methods and on the other, design a way of thinking. During creative work on innovation, the leader's role is to direct the team among a series of paradoxes and stresses. The quoted researchers identified six such 'unleash-harness' paradoxes (Figure 2). This is possible only when the leader knows how to build a community with a sense of shared purpose, values and rules of engagement.

Fig. 2. Six paradoxes

Source: [Hill et al. 2014].

The researches proposed a three-vector model where organizational capabilities essential to innovate problem solving include: creative abrasion, creative agility and creative resolution (Figure 3).

Creative abrasion is when ideas can be generated during discourse or debate. In such an environment there is always some level of conflict – disagreement, opposition, and counterargument. Such an environment is not easy to build. It is possible that a community whose members are bound by a common purpose, share values and rules of engagement that include conflict and are able to keep it productive rather than personal and destructive. Creative friction is a process in which potential solutions are created, explored and modified through debate and discourse.

Creative agility is about being able to test and refine the portfolio of ideas through the quick pursuit of reflection and adjustment. It is also about design thinking when the team could use an interesting combination of science method and design-driven methods in order to solve the problem. It is about running a series of experiments, not about a series of pilots because experiments are usually about learning, when even a negative outcome builds knowledge.

Creative resolution is about the decision-making process which combines even contradictory ideas and uses them in different combination to create a new and useful solution.

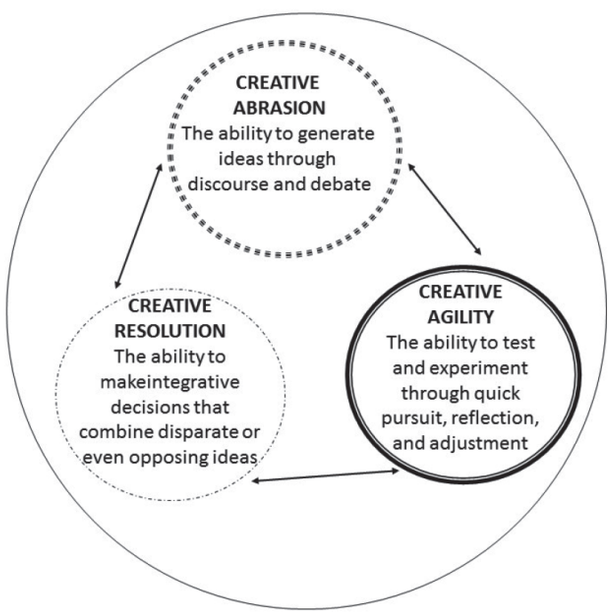

Fig. 3. The ability to do the hard work of creative friction

Source: [Hill et al. 2014].

The above described three-vector model is very comprehensive and at the same time seems to be very useful and visionary for conscious and goals oriented organizations which allocate their resources precisely and give space for experiential learning during discovery innovations. It also offers a new look and provides new ideas, such as 'unleash-harness' paradoxes. At the same time, the model does not elaborate all the impact of the environment on the team and leader. This is very important, especially regarding academic teams.

Rosing K., Frese M., Baush A. [2011] suggested one more proposal: a theoretical model called the ambidexterity theory of leadership for innovation. In their opinion its crucial feature is based not

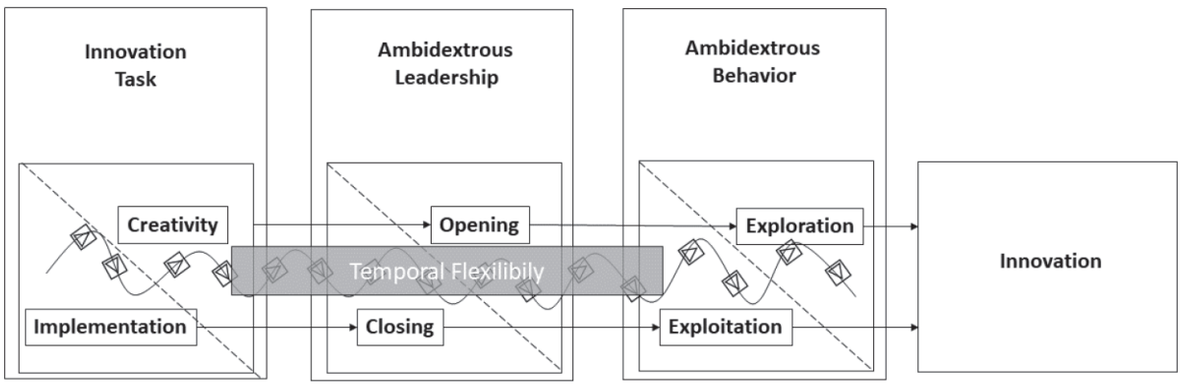

Fig. 4. Overview of the proposed model

Source: [Rosing et al. 2011].

only on leadership style, but on the ability to react adequately to a situation using the whole set of leadership behaviour – closing and opening. Very little has been said about so called heterogeneity and the differences between exploitation (routine, closing behaviour, risk avoidance) and exploration (innovation, opening behaviour, risk taking, searching for alternatives) behaviour of the leader and the ability to switch between them. The authors suggested that leadership styles have very different relationships with innovation, depending on third variables [Rosing et al. 2007]. Innovation processes are multiple and consist of divergent and convergent phases [Buijs 2007]. That is why exploration as well as exploitation are of crucial importance for innovation. At the same time, the style of leadership must be flexible and the role of the leader must use a combination of different leadership behaviour within the innovation process. It is worth underlining that the ambidextrous leadership model is a theory of direct and frequent interaction between the leader and the follower(s) and it does not apply to the organizational level. The model, consisting of three elements, is shown in Figure 4, which are as follows: opening leader behaviour to foster exploration (e.g. motivating to take a risk), closing leader behaviour to foster exploitation (e.g. taking a corrective action) and the temporal flexibility to switch between them adequate to the situation during the process of innovation. Returning to the role of leadership styles, the authors underlined that most of the styles show a broad range of correlations that depend on moderating conditions. Leadership styles (transformational, transactional and others) can represent both opening and closing leadership behaviour, may increase or decrease variance in behaviour depending on the applied specific leadership behaviour as well as the situation during the innovation process [Rosing et al. 2011].

The ambidexterity theory of leadership for innovation, as the previous model, deeply analysed the specific nature of the process of innovation as a design-thinking process, which consists in alternating phases of convergent thinking (designer way of thinking) and divergent thinking (engineering way of thinking). This determined the particular role of the leader to possess the ability to "produce" innovations again and again. None of the presented models include a very important factor such as heterarchy, which is extremely crucial in science teams. Being a participant of a few projects, they have a few leaders and the role of a person varies from the leader position to consultant, or regular scientist for example. this is a huge complication during daily activities for the maintenance of the rules and priorities.

4. Discussion and future research propositions

The ability to develop innovation as a repetitive process requires outstanding skills from leaders. It is a very complicated and demanding role, even for highly qualified managers with a wide and deep management background. At the same time R&D teams permanently face a lot of expectations and pressure. Economic systems are not able to grow without innovations, new inventions, and new breakthrough technologies. The financial support of the European Union funds just for Poland in Smart Growth Operational Programme (*Program Operacyjny Inteligentny Rozwój*) in the 2014-2020 period is 8 613 929 014 euros to support innovation growing processes. The ability to develop innovations, to solve difficult problems and develop game-changing innovations requires excellent cooperation and the work of teams. Innovations are built by teams not individuals. The teams are very often interdisciplinary, transdisciplinary, international

or virtual. That is why the role of the leaders is so important during innovation projects.

Unfortunately, academic education produces narrowly trained individualists [Sapienza 2005]. At the same time effective leaders have this ability to combine the right people together to create visions, solve complicated problems and lead teams to implementable actions [Gray 2008]. There are a few ways to support these kind of leaders: training of existing leaders, preparing future leaders from among scientists and engineers for this role, as well as promoting stakeholder integration and giving appropriate feedback or coaching, and developing new processes and procedures which may support leaders [Robledo et al. 2012; Sapienza, Lombardino 2005].

The subject of leadership in innovation is underrepresented in the literature and research. Some models of leadership were proposed, but at the same it is still a complicated subject which should be continued and developed. The existing models do not notice for example significant impact of heterarchy on functionality as well as the effectiveness of the teams.

High quality education in the area of team building and leadership could have a significant impact on the performance of innovative teams. The influence of education on the change in functionality of teams could be an interesting area to research and to project adequate supportive actions for engineers, both people in science and in R&D.

The development of leadership models dedicated to inter or transdisciplinary teams which are often organized in consortiums, consisting of science and business teams which are more and more popular in R&D projects, may be very helpful for leaders of such teams in planning all actions.

As the literature research showed, there is a lack of research focused on the less valid impact of leadership. At the same time in our hierarchical R&D organisations, this may be very harmful to people and may explain people choices in this area.

During future research, additional quality procedures such as: in-depth interviews, observations, focus groups as well as surveys, will be conducted. It would be very interesting to verify the impact of team-building decisions of innovative team leaders on the ability to develop innovations as repetitive actions. A second aspect worth researching is the impact of heterarchy on the leader's position in an innovative team.

Going further, a few drafts were proposed in order to verify:

- R&D leader team building behaviour (the presence of participants from different teams, the cultural variability of the team, the presence of virtual participants in the team) is associated with the number of innovative projects in the portfolio of the team.
- R&D leader team building behaviour (the presence of interdisciplinary participants in the team, the presence of complementary disciplines represented by participants of the team, the presence of business partners in the team) is associated with the number of innovative projects in the portfolio of the team.
- Intensity of heterarchy (the number of centres of power, the variation of centres of power) is associated with the position of the leader in the R&D team.
- Intensity of heterarchy (the number of centres of power, the variation of centres of power) is associated with the number of innovative projects in the portfolio of the team.

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PRZYWÓDZTWO W ZESPOŁACH B+R: ISTOTA, WYZWANIA, ZŁOŻONOŚĆ

Streszczenie: Literatura zajmująca się problemem przywództwa obejmuje szeroko zakrojone badania, opracowania i kompendia. Niemniej zaledwie mała ich część skupia się na przywództwie w zespołach badawczo-rozwojowych zajmujących się innowacjami. Ci autorzy, którzy poświęcają im uwagę, podkreślają specyfikę przywództwa uczonych i inżynierów zaangażowanych w twórczą pracę nad innowacjami. Jeszcze mniej badań i artykułów jest związanych z akademickimi zespołami naukowymi poszukującymi innowacji opartych na technologii. Jednocześnie można zauważyć lukę badawczą w obszarze przywództwa, w zaawansowanych zespołach projektowych opartych na technologii, np. w zespołach interdyscyplinarnych lub transdyscyplinarnych. Artykuł zawiera przegląd literatury dotyczącej przywództwa innowacyjnych zespołów badawczo-rozwojowych. Oprócz tego jego celem jest krytyczna analiza wybranych modeli przywództwa i wskazanie zainteresowania badawczego oraz trendów w zakresie opisanych problemów.

Słowa kluczowe: przywództwo innowacji, zespół badawczo-rozwojowy, organizacja badawczo-rozwojowa, innowacja, model przywództwa.