

THE ROLE OF R&D MANAGER FOR PUBLIC AND PRIVATE R&D PARTNERSHIP

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Abstract

Global competition encourages companies to seek a more innovative way to survive. More and more complex R&D based activities are introduced, and the managerial approach is of great importance, while R&D by its nature requires special managerial dealing. Meanwhile, public R&D institutions act in less competitive environment, which has conditioned lower tension and less stressful environment resulting in less innovative output. As a consequence, the managerial approach for public R&D institutions is left out of day-to-day processes. However, the fact that public research institutions, as new knowledge generators, represent a different approach concerning R&D results from R&D intensive business, which supposes to exploit R&D results, should be taken into consideration. To increase the performance of public and private partnership in R&D, the unified mutually accepted platform for both, public and private R&D sectors, is the main concern of policy makers and R&D practitioners. The managerial approach dealing with different nature of R&D performance could facilitate the public and private partnership and increase the linkages. Despite many progressive transformations that have been discussed and introduced during 2007-2010 years on the national level, the managerial approach is still missing in the agenda of R&D policy in Lithuania.

The purpose of the paper is to investigate the key responsibilities of a R&D manager and to discuss the role of the R&D manager inside public R&D institutions organisational structure, which fits the demand of public and private partnership.

This research was conducted for the R&D sector that has substantial long-lasting policy support, which has the expression of extra funds allocation annually on competition basis in the period of 2002 – 2009. The Biotechnology and Laser Technology R&D domain was chosen for the investigation. The selected R&D sectors demonstrate high excellence both in fundamental research and technological development and have long-lasting tradition cooperation between public and private institutions.

The main duties of a R&D project manager are analysed. The investigation revealed the principal mission for the R&D manager to become a mediator between researchers and entrepreneurs. The duality of the R&D project manager is observed and could be expressed via competition of objectives: to be flexible for knowledge creative environment and be strict in scheduling and seeking time efficiency. The investigation has disclosed that R&D management is still not clearly conceptualised in the eyes of researchers and the managerial aspect as an opportunity for seeking results oriented R&D system is not exploited. Since the organisational design is very sensitive to the positive impacts of manager incorporation in R&D process performance, when decentralisation is balanced to ensure creativity on the one hand and responsibility on the other hand, certain organisation design aspects are discussed.

Keywords:

R&D, project management, R&D manager, public and private partnership.

Introduction

Global competition encourages companies to seek a more innovative way to survive. More and more complex R&D based activities are introduced and the managerial approach is of great importance, while R&D by its nature requires special managerial dealing. However, being time and money consuming, R&D activities are under high risk and uncertainty. Therefore, public and private partnership seems to be the plausible measure which could be exploited as a stabilised factor

for the private sector sharing the risk on the one hand and increasing the performance and effectiveness for the public R&D sector on the other hand. The other benefits could be named as follows: helping focus public R&D programs, increase awareness between industry, regulators and researchers, closing the gap between theory and technology (Sperling, 2001).

However, the fact that public research institutions, as new knowledge generators, represent a different approach concerning R&D results from R&D intensive

business, which supposes to exploit R&D results, should be taken into consideration when public and private partnerships are under discussions. Meanwhile, public R&D institutions act in a less competitive environment, which has conditioned lower tension and less stressful environment resulting in less innovative output. As a consequence, the managerial approach for public R&D institutions is left out of day-to-day processes. Different private and public institution attitudes to driven targets, availability of time for innovation, motivation, and desirable results place the R&D management in duality state and make public and private partnership as a form of cooperation under risk of unmanageability.

To increase the performance of public and private partnership in R&D, the unified mutually accepted platform for both, public and private R&D sectors, is the main concern of policy makers and R&D practitioners. The managerial approach dealing with different nature of R&D performance could facilitate the public and private partnership and increase the linkages. Despite many progressive transformations that have been discussed and introduced during 2007-2010 years on the national policy level, the managerial approach is still missing in the agenda of R&D policy in Lithuania (Mikulskiene, 2009 a, Mikulskiene, 2009 b).

The purpose of the paper is to investigate the key responsibilities of a R&D manager and to discuss the role of the R&D manager inside the public R&D institutions organisational structure, which fits the demand of public and private partnership.

The research method includes comparative and systematic analysis of scientific references regarding R&D project management and interviewing researchers from public and private sector. Data is collected from interviews with R&D project leaders, who are herewith the leaders of informal groups and in some cases leaders of formal units as well.

Analytical approach

R&D public and private partnership. Among various definitions of public and private partnership, the following one is accepted for the base of this research: “a cooperation between public and private actors in which actors develop mutual products and/or services and in which risk, costs and benefits are shared” (Klijn et al, 2003).

The definition of public and private partnership in R&D as a form of cooperation could be specified as the linkage between a public or non-profit organization such as a university, research institute, or government laboratory and a private knowledge intensive company with the purpose of partnership in engaging in technology co-development or cooperative R&D, technology transfer, technology assistance, joint or grant funding. Public and private partnership management background

lies in the nature of R&D management.

R&D management. R&D management as a research topic is on the scene for the countries, where strong industry has built its success on R&D for years and represents prominent R&D outputs suitable for further use, for instance – UK (Winter *et al.*, 2006), Italy (Cesaroni *et al.*, 2004), New Zealand (Elias *et al.*, 2002), China (Yunsheng *et al.*, 2007), Sweden (Wincent *et al.*, 2009). During the last century, R&D management, as innovation stimulator, has passed the evolution of 5 generations, which were characterized by simultaneous progress of handling of R&D activities (Jincao, 2005; Park, 2005). The first generation of using R&D was expressed by corporate lab creation, what later in second generation was transformed into the whole business system incorporated R&D. The third generation is represented by the project management and portfolio management. The fourth generation puts suppliers and customers on the R&D management scene, while the next generation is represented as a network of innovation actors and stakeholders. The effective management of R&D process, when is multiple, complex to manage, and a wide variety of management targets exists, becomes a multidimensional task.

Every new generation adds extra managerial task to the list of a manager’s duty (Wang *et al.* 2005).

The managerial approach to R&D activities is based on the projects management, concerning project idea conceptualisation, project timing, budget, project teams and leadership. Seeking to describe the main manager duties of R&D in six evolutionary generations, in the first instance it is necessary to classify R&D performance components that are outside direct R&D activities but can’t be separated from the whole system.

R&D activities. The activities carried out by R&D organizations are the following: fundamental research, applied research, development, demonstration, technology scanning, and entries to the market. The described activities are characterized by the different time scale (short-term projects of 1 to 3 years for entries to the market and more than 3 years for applied research), funding resources (internal for entries to market, external for fundamental research, mixed for any other).

R&D project team. Innovation is the result of integrated and diverse efforts across different units in organisation. There is evidence of positive relationship between R&D team managing and R&D performance (Yunsheng *et al.*, 2007). The same situation is observed in formal and informal groups, where responsibilities are shared among participants. The organisational framework must create supportive environment for informal group activities in order the project management culture would be created successfully. In building the successful project team, four components are essential: accountability, adequate information and

resources, appropriate staffing and training, rewards for efforts (Kolb *et al.*, 2008).

Funding. Searching for the source of project funding, participation in funding competition is a long-lasting, high skill and time consuming activity, which accompanies any R&D activity. This duty might be delegated to a finance-friendly person, i.e., a manager. Due to high uncertainties, long duration, R&D activities are more and more often outsourced due to the economical and managerial reason (Mukherjee *et al.*, 2007).

Stakeholders managing. The scientific references have distinguished the importance of timely recognition of stakeholders and proper involvement in R&D project as managerial task (Elias *et al.*, 2002). The term of stakeholders is comprehended a long list of interest parties that equally shared the responsibility of success of R&D project development. They include a sponsor, consumers, distributors, suppliers and any other parties interested in R&D. The list of stakeholders can't be static and may vary depending on the project type, i.e., taking into regard whether research or development project is underway.

Public and private managerial background: nature of duality. If we argue that a manager gets the mandate to make actions coherent, we must describe the component of coherence. Investigations reviewed in literature based on big international prosperous companies, such as Nissan or Erickson (Chiesa, 2000), have revealed that R&D public and private partnership success depends on "appropriate managerial and organisational tools and mechanisms", when it is aimed to improve the quality with every new challenging technological task

However, partnership as a type of cooperation is not a spontaneous action, since it is going to connect different performance cultures, as public and private R&D is. It requires a special approach and substantial managerial efforts. The nature duality of R&D management lies in the following subjects:

Driving forces. A businessman's interest to invest in R&D is driven by the financial benefit, while a researcher in a public institution is driven by the personal curiosity mainly. As a consequence, managers get the mandate which covers mediation between representatives of different cultures, nature of which is driven by very opposite forces, which must be merged in a balanced way.

Result orientation vs. process orientation. Curiosity driven targets determine the expression of results. A researcher is focused on new knowledge while both proving and disproving of a suggested theory or analytical approach is accepted plausibly. Meanwhile, R&D results which could be sold in the market and give real profit are acceptable for a company. More specifically, a researcher could sell the idea, while a company is selling goods with applicable practical value.

Time pressure. Global competition makes pressure on R&D intensive companies to be mobile and catch new knowledge on the way. Time pressure pushes companies to use tacit knowledge. As a consequence, they aim to be as close to knowledge generation as possible, to use every of knowledge spreading channels as formal or informal networks (Kratzer *et al.*, 2008). Meanwhile, a public R&D organisation can operate in the self-defined time regime, which is sometimes slightly determined by external funding bodies.

Control level. The notion of soft management control is going to be introduced when R&D project management is considered. Scholars distinguish between the manager's role in research and development projects in terms of intensity and frequency of interaction. In research projects, the manager's role is limited by "soft" coordination to the exchange of views in order to safeguard the free spirit of scientific creativity, while development projects require more "intense interaction" (Chiesa *et al.*, 2009) in every project phase starting from project conception definition to project finalization on time and within budget.

Communication. The duality of the manager's duty lies in finding the language equally understandable by both researchers and other stakeholders from non-pure scientific world. Stakeholders represent the wide range of diverging part of society, which has its own working language, priorities, and way of acting.

Leadership vs. assistance. The manager and leadership are comprehended as complementary categories. It has been proved that the leadership style directly influences innovation, shapes activity outputs and works as stimulus for team collaboration and identification (Paulsen *et al.*, 2009). R&D autonomy tends to suggest that it could feel the lack of assistance instead of outside leadership. It is not expected that a leader will assist. In such a case we transit to the opposed categories instead of complementary categories.

Coping with different R&D performing culture represented by two poles of R&D performers (public-oriented and business-oriented), special managerial efforts to facilitate public-private partnership are needed. Active managerial strategies are discussed in literature (Bjerregaard, 2009) and new managerial concepts should be elaborated and proposed (Klijn *et al.*, 2008).

Organisational design. To facilitate the public and private partnership management and coordination, certain infrastructure which could act in alignment with organisational design is needed. It is possible to distinguish two types of infrastructures: temporary (coordination body) (Sperling, 2001) and permanent (R&D manager or R&D support structure). The coordination body takes the leading role for public and private partnership coordination and steering, it acts as an independent actor in the "zone" free from individual

public institution or private company stakes, and moves forward on the basis of unified stakes. This coordination body could act effectively just in the case with support of each organisational design (permanent infrastructure). As for the organisational structure, the balance between R&D centralisation and decentralisation is under discussion (Chiesa, 2008). The tendencies of downsizing, outsourcing and internationalization in coherence with decentralization of R&D (Christensen, 2002) were demonstrated for the last three decades. Thus, the organizational design in public R&D institutions should respond to the decentralization approach for R&D management while a R&D manager is incorporated in the hierarchic structure of an organization.

Research

The current research is constructed in the way to find out whether there exists space between researchers and businesses in Lithuania for a manager mediation to increase public and private partnership and performance interaction. This analysis lets us identify the attributes which could be assigned to the role of a R&D manager.

The Lithuanian Biotechnology and Laser Technology R&D domain was chosen for investigation for several reasons. Firstly, both sectors demonstrate public R&D excellence. Institutions were chosen according to the highly ranked scientific output (number of publications, patents, number of projects). Secondly, there are several R&D intensive companies established as spin-off and now using external public R&D outputs and internally created knowledge in these sectors. There is both informal and formal cooperation between R&D intensive companies and a selected public institution. Thirdly, these sectors have substantial long-lasting policy support, which has the expression of extra funds allocation annually on competitive basis in the period of 2002 – 2009. This support has been planned to prolong in the same extent.

The institutional selection was made seeking to cover all possible available organisational structure (Research University – one selected structural unit has 7 acting informal groups, research institute – one selected structural unit with 4 informal groups, R&D intensive companies – 2). 217 participants are covered in this investigation in total. Formal and informal teams as a single undivided unit are analysed. The team size varies from 4 to 21 persons.

Data has been collected from semi-structural interviews with R&D project leaders, who are herewith the leaders of informal groups and in some cases leaders of formal units as well. Also paperwork, analysis of existing organisational structure and active participation in R&D projects is conducted.

Results

According to the leaders of the interviewed R&D teams, the public and private partnership has the expression of cooperation in R&D projects. However, managerial activities concerning public and private partnership are not conceptualised, except for project management.

The investigation has revealed that a R&D project manager position in the formal staff list exists neither in R&D intensive companies, nor in public research institutions. Projects are managed by local internal capabilities: a senior researcher manages projects in a public research organisation, or an upper-level executive takes the role of the leader of activities related with R&D. It is common without any exception that every team leader acting as a manager starts his carrier as a researcher.

Public R&D organisations have only a few positions of academic career for researchers: starting with a junior researcher, then senior researcher and chief researcher as the upper-level of academic career. Among others requirements for the upper academic position as being active in R&D activity and taking part in scientific communication, a chief researcher should lead the R&D topic, which means being the informal leader of an informal team. Actually, a dual career path is present, when, in addition to direct R&D activities, the management of R&D is assigned. The abundant evidence demonstrates that managerial activities step by step are transforming into full administrative work and takes the whole working time, while formally it is a researcher's position with formal annual requirements for scientific outputs. The duality of occupation is the ground for R&D activity imitation.

Answering the question what the main duties of a R&D project leader regarding R&D management were, respondents mentioned the main tasks listed as follows: project idea generation, goals and task formulation, team formation (in many cases, informal team is settled long ago and usually incorporates researchers and engineers with the same background), project proposal writing, project management, which is called day-to-day administration, participation in direct R&D activities, paper work, ending with report writing and communication of R&D results. Generally, in practice, communication is limited with the preparation of scientific publications. Meanwhile, two project leaders have reported non-typical accidental communication cases: indirect communication via media when seeking public awareness (several interviews for the press about personal researcher's lifestyle) and writing of popularisation publications. All the mentioned managerial activities are supplementary activities to the main duties of teaching and directing of R&D activities.

No special attention is given to stakeholder analysis or communication strategy with stakeholders; however, an unexpressed communication channel with governmental bodies is established and perfectly used for the time being, which has the expression of steady additional public budget allocation. Communication with a wider range of stakeholders is not mentioned as the task of project leaders. Meanwhile, project leaders take part in R&D policy formation on demand as external experts on the national and EU level frequently, they communicate with private partners.

The most typical attitude towards R&D management is revealed by questions about the demand for a R&D manager. From the whole set of interviewed team leaders, only one leader acknowledged the demand of R&D manager who could be introduced into the horizontal structure of the team. He is leading quite a large R&D team of 21 participants. Actually, team leaders of the smallest informal team assure that they tackle with R&D project management. Small teams of 4-6 researchers per informal group secure the effective flow of information and sharing of new knowledge; it is easier to condition the team identity and secure the rewards for efforts.

Discussion

Duties for R&D manager. The investigation revealed that there is a gap between R&D performance and professional management practice, which causes misalignment of public and private partnership. Determining the hypothetic requirements for R&D managers, only the supporting R&D activities at micro level (assisting to a scientific leader) were stressed as the main concern. This could imply that the macro level in public and private partnership was left outside R&D performance management.

Despite the fact that no unified description of the duties of R&D managers was traced, it is possible to define the desirable requirements for a R&D manager as R&D project team member. The role of a manager varies within organisation depending on the units or type or R&D project he or she could assist. The full list of a manager's duties is oriented to support researchers in their every occupation making the researchers' mind free for their direct activities and to stimulate business-oriented thinking. Communication is critical to a R&D project manager. According the respondents, a manager must keep the following duties:

- Administrative assistance in everyday duties;
- Communication (internal and external).

The list of duties fully corresponds to the following conceptualised requirements:

- Non-specified higher university degree, preferably in the same field as that of the management team;
- Creative and communicative person;

- Commitment and good organisation, negotiation and presentation skills;
- Fluent foreign language (English is preferable) for scientific communication;
- Experience in the particular field is of great importance;
- Experience in international R&D project management;
- Skill to establish balance between power and influence;
- Commitment and responsibility;
- Technical expertise;
- Problem solving.

When enumerating the requirements for a manager, researchers were guided by the aim to have scientific freedom for themselves and delegated those activities that were extra to them. Actually, researchers emphasised the commitments of a manager but nobody asked for leadership.

All researchers suspiciously analysed the hypothetic suggestion to hire a manager for project management from outside, if the manager's background were other than that of the project team. They worried about losing the control of the project performance, R&D results development and letting the project success to the hands of the manager who "could not understand the R&D particularities".

For the time being, public and private partnership is the common rhetoric for politicians; however, there is no clear translation of policy measures to policy implementers who are represented by stakeholders (R&D performers, investors, R&D results transferring bodies, customers, suppliers, media). The sole tangible measure from the side of policy public and private partnership implementation is the requirement for R&D team formation. The R&D funding bodies determined the conditions of eligible partners: they demand that public R&D performers should participate only along with private R&D supporters.

Despite the similarities of attitudes to R&D project management role, the strong antagonism between researchers from public research institutions and R&D intensive companies is noticed when asking about partnership on R&D project development. A company manager stated that researchers from Lithuanian public institutions performed high-quality research, created wonderful, inspired fundamental theories, but, on the other hand, the national research system worked in regime of "performance", but not in regime of "production". That is the main obstacle that makes R&D oriented companies to keep away from universities R&D. On the other hand, researchers from the public sector claim that companies avoid investing into fundamental research, make preference for partnership just in commercialisation project phases and prefer investing

into short-term projects. The antagonistic nature has proved the duality of managerial approach and is tightly related with the interpretation of stakeholders' input. However, stakeholders' management is let out of manager duties and still not conceptualised as an additional success factor for R&D. That could be generalised as weak comprehension of benefits gained from public and private partnership. Different expectations, driving forces, timing pressure, commitments, organisational culture makes a R&D manager's role highly complex.

Based on the analysis, the full set of a manager's duties which could facilitate public and private partnership have been formulated and are the following:

- Administrative assistance in everyday duties;
- Communication (internal and external);
- Communication with a stakeholder (stakeholder identification and involvement in the project);
- Outsourcing of management;
- Searching and competing for funding;
- Equipment support.

Organizational structure has crucial impact on the duties of a manager and managerial impact on public and private partnership. Therefore, a R&D manager must take the responsibility to assist R&D team and put that all above-mentioned components in to whole active system. Thus, the organizational design in public R&D institutions should respond to decentralization approach for R&D management while a R&D manager is incorporated in the hierarchic structure of an organization. The degree of hierarchy is tightly related with the certainty of task units are dealing with. Due to R&D uncertainty, high risk and duality of R&D management, the hierarchic degree is accepted as low as possible.

On the contrary, highly bureaucratic R&D organisations are an obstruction for a public and private partnership. Such organisations still avoid managerial view in the micro level of organisational design despite permanent efforts to introduce managerial offices in between the administration and R&D performers. Such kind of managerial support serves more to the administration functions for the upper hierarchical level administrators ensuring better administration and control targeted at the lower hierarchy level of R&D performers instead of implementing all R&D manager duties. Such kind of organisational structure contradicts the nature of R&D management and has negative impact on the emergence of public and private partnerships.

Hereof, good R&D performance exists in organisations, where informal teams of researchers are formed from bottom up, are assisted by a manager and supported by the organisational structure in the macro level. A R&D manager could be granted the autonomy to safeguard creativity and balance control to support flexibility. For that occurrence an R&D manager should operate in tight contact with R&D performers on the same hierarchical level as researchers of informal groups.

Conclusions

Global competition encourages companies to seek a more innovative way to survive. More and more complex R&D based activities are introduced, and the managerial approach is of great importance. Meanwhile, public R&D institutions act in less competitive environment, which has conditioned lower tension and less stressful environment resulting in less innovative output.

Therefore, the public and private partnership seems to be a plausible measure which could be exploited as a stabilised factor for the private sector sharing the risk on the one hand, and increasing performance and effectiveness for public R&D sector on the other hand.

As a consequence, the managerial approach for public R&D institutions is left out of day-to-day processes. R&D management practice is still empty or implemented by self-educated senior researchers. To increase the performance of public and private partnership in R&D, the unified mutually accepted platform for both, public and private R&D sectors, is the main concern of policy makers and R&D practitioners. The managerial approach dealing with different nature of R&D performance could facilitate the public and private partnership and increase the linkages.

The duality of duties of a R&D project manager lies in the nature of R&D, which is characterized by high autonomy level that stimulates creativity, high risk and uncertainty at multidimensional environment. That effect has direct impact on the managerial attitude, where competition of objectives must be taken into consideration. The task for a manager is to be flexible, to secure knowledge-based creative environment and be strict in scheduling and seeking time efficiency. The regardful attention should be paid on the question how autonomy of R&D activities and strict managerial control should be balanced.

It is practiced that inside of a formal institutional structure, R&D project constructs its team from virtual or informal spontaneously grouped teams of researchers, and these informal groups are rather stable through the years. One of the successful factors of the investigated teams is the size, which, together with leadership, stimulates the team identity and secures high project performance. The leaders of the smallest teams express lower demand for R&D manager assistants than leaders of larger teams. The same could be underlined for the knowledge commercialisation oriented team.

The investigation has revealed that there is demand for a manager who could act as a mediator for R&D staff in its contact with external non-academic world. Mediation encompasses merging, stimulation, control, scanning, supporting, and networking. Equally, the manager is expected to be not a substitute of a R&D team leader but a team participant with shared and assigned non-R&D activities in his/her responsibility field.

The existing organisational structure functions as an obstacle rather than support for public and private partnership, since the tendency to incorporate managers

in the upper level of hierarchical structure of R&D public organisation is rather spread.

The tendency: not a single respondent mentioned other new knowledge communication forms seeking contacts with industry, government or other stakeholders. That could be the guide to explain why a R&D manager is still not introduced in R&D project management – that is the inadequate conceptualisation of R&D users, clients and whole list of possible stakeholders, the recognition of which can dramatically change the researchers' attitude to R&D outputs and, consequently, to R&D process and benefits from public and private partnership.

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