

A Discussion on the Evaluation of RTD Supports on Innovative Performance of SME's in Turkey

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Abstract: As a general, increasing the performances of the SMEs which have important shares in the employment and production increases the economic activities of the economies and produces public benefits. The "innovation activities", which result in new product development and introducing them to the market, consequently make great contribution to economic performance, development and strengthening of the SMEs. On the other hand, the most strategic activity in this process is the fact that taking some risks and expending or supplying important amount of resource for the new product development processes. At this point, governments try to increase the companies' "innovation performances" directing proper Research and Technological Development (RTD) support programs sharing the costs of such risks. In the presented study, "RTD Supports", "SMEs" and "Innovation Performance" concepts, are explained by a literature survey and then made some proposals in order to increase firms' innovation performances by "RTD support programs".

Key Words: R&D, RTD, SME, Innovation Performance, Evaluation,

Özet: Genel olarak, istihdam ve üretimde önemli paylara sahip olan KOBİ'lerin performanslarının artırılması, ülkelerin ekonomik faaliyetlerini arttırmakta ve kamu yararı yaratmaktadır. Yeni ürün geliştirme ve bunları pazara sunma ile sonuçlanan "yenilik faaliyetleri" aynı zamanda KOBİ'lerin ekonomik performansına, gelişimine ve güçlendirilmesine büyük katkı sağlar. Bu süreçteki en stratejik faaliyet, risk almak ve yeni ürün geliştirme süreçleri için önemli miktarda kaynak harcamak veya temin etmektir. Bu noktada hükümetler uygun "Teknolojik Araştırma Geliştirme" destek programları uygulayarak şirketlerin "inovasyon performanslarını" arttırmaya çalışmaktadır. Sunulan çalışmada "Teknolojik Araştırma Geliştirme Destekleri", "KOBİ'ler" ve "inovasyon performansı" kavramları bir kaynak araştırması yoluyla açıklanmış ve firmaların "Teknolojik Araştırma Geliştirme destek programları" ile inovasyon performanslarını arttırmak için bazı önerilerde bulunulmuştur.

Anahtar Kelimeler: R&D, Teknolojik Araştırma Geliştirme, KOBİ, İnovasyon Performansı, Değerlendirme

1. Introduction

It is widely acknowledged that competitive private enterprises are one of the main sources of economic growth and global wealth, and they make a significant contribution to reducing poverty. Although large and multinational companies are well known by the public, most of countries' business life is carried out by small and medium-sized enterprises.

It was declared, in one of expertise theses prepared for a Governmental Planning Organization, that SMEs are the 98 to 99 percent of the manufacturing companies in number and take around 60 percent of employment for OECD countries. In terms of countries SMEs constitute all the businesses of 97.2% in the USA, 99% in Germany, 99.4% in Japan, 96% in England, 99% in France, 98% in Italy, 98.6% in India, 98.8% in South Korea and 99.2% in Turkey (Cansiz, 2008). Such enterprises in general, provide more than 50% of new globally created jobs and the ratio even higher in developing or emerging countries. In addition to their significant contribution to employment, SMEs have a potential to contribute to the social and economic development of employees and their communities

(Croucher et al, 2013). These measures are similar nowadays and even increasing in some countries. For this reason, countries accept the key roles of SMEs in the industrial structure and continue to develop their politics and supporting programs. Although it varies slightly according to various public and private institutions and countries, the definitions of SME are made in terms of number of employees and/or annual sales and/or capital revenue. SMEs are classified as follows by ODESME-KOSGEB (Organization of Development of Small and Medium Enterprises) which is a non-profit governmental RTD support organization in Turkey;

- Micro-enterprises: Enterprises that employ less than ten employees average in a year and do not exceed three million Turkish Liras (around 450 thousand Euro) of annual net sales revenue or financial balance.
- Small business: Companies that employ less than fifty employees average in a year and which annual net sales revenue or financial balance does not exceed 25 million Turkish Liras (around 3,9 million Euro).
- Medium-sized enterprises: Companies that employ less than 250 person annual employment and which annual net sales revenue or financial balance

does not exceed 125 million Turkish Liras (around 19,5 million Euro). (Using exchange rates of 2019 and definition of 2018) (Kobilerin Tanımı, web.).

SMEs have many advantages compared to large companies despite their limited financial strength. The flexibility against customer demands, being open to innovations, being more prone to searching new facilities to find solutions for their own problems, achieving higher productivity in technical innovations, adapting their employees more easily to changes are some of them. Other advantages are having less bureaucracy, having relatively low indirect costs due to the small size of the firm, the ease of reaching different regions in marketing and sales and finally, the ability to increase employment at lower costs are mentioned advantages (Turkoglu, 2003). The importance of SMEs in local or national economies has continuously been increasing related to the globalization. As it is known, economic boundaries between countries tend to be disappeared. This situation leads to a further increase in competition, and SMEs are more likely to adapt this situation with their advantageous structures. For increasing international character of trade and increasing global competition, SMEs' ranks in this race are determined by the level of realization of innovation (Sendogdu & Ozturk 2013). As a result of the difficulties in adapting the required changes and developments for the big enterprises, the concept of "being a big enterprise" has changed gradually and the concept of "shrinking" has become more attractive (Orucu *et.al.*, 2011).

At this point SMEs acts as a safety valve with their energetic, flexible, multi directional product and service structures, in the times of crisis of market distress is increasing in the world economy, demand is falling, energy and raw material bottlenecks are experienced. They have become an indispensable part in the economic life (Orucu *et. al* 2011, Akata & Akyol 2002).

2. The Importance of RTD and Innovation

As mentioned before, due to the severity of global competition, productivity and serving new products to the markets become the most important activity for a country to stand out in a competitive environment. The importance of increasing the production, employment and export in terms of gaining benefits for the enterprises is valid for the country and the state. Nowadays, countries and enterprises are trying to create a difference by doing innovation thus taking lead in this race. The added value provided by innovation and production increase will raise the rank of the obtained position for both the companies and the countries. In this process, two concepts are being

emerged today: RTD and Innovation. RTD and innovation aim to identify the problems or needs of today's consumers and thus provide new products or services for them. As a result, an improved product or service is added to the market for the consumers' considerations. Within this context in doing and directing the R&D activities, the main problem is uncertainty. This subject affects the firms' R&D programs, structures and collaborations (Quelin, 2000). For this reason, RTD and innovation are at the top of the country's economic and industrial policies in recent years. Governments support RTD and innovation activities of the companies through incentive programs as they want to make differences in production and increase in production and exports of the country even in times of crisis.

Companies are trying to develop their management skills and RTD activities in an innovative way in order to achieve a competitive advantage. On the other hand, the degree of presence of innovation capability of their own is important in decision making for their changing processes in order to get advantageous position in the competition. The difference between their current abilities or situations and those in the successful companies affects the managers' decisions and initiatives (Salimi & Rezai, 2018). The basic elements of this competition are research, technology development and training. In this context, RTD includes the whole of the activities carried out in the form of basic research, applied research or experimental development in order to produce the information needed in cases where the information obtained from the literature is incomplete or inadequate in design and new product development processes (Lazzarotti *et.al.*, 2011). While basic and applied researches are mostly carried out in public and non-profit institutions, universities and other research institutions, the experimental development activities are mostly being done by private enterprises.

At this point, although innovation is a Latin word that means change or "renewal", actual meaning shifted to creating social and economic value-adding. On the other hand the real meaning of innovation, which is characterized by "commercialization", is expressed as to become advantageous amongst the competitors by developing new ways in design, production or product marketing. Therefore innovation includes both the renewal process and the results that emerged at the end of this process (Orucu *et.al.* 2011). Another expression of the importance of innovation in today's economy is "innovate or perish".

Globalization is forcing SMEs to change their business models with new innovation capabilities. To enter and manage a successful innovation process, there are four

steps that need to be taken. These are awareness, reconciliation, strategy and system. Awareness is the understanding of what innovation is and why it is important by all the staff and managers. Reconciliation is a common decision-making step by all managers and employees of the organization to work on innovation. Strategy is the process of determining how the organization will proceed with innovation. The system refers to the regulations used to manage the innovation cycle (Sendogdu & Ozturk 2013).

3. Innovation Performance and the Measurement

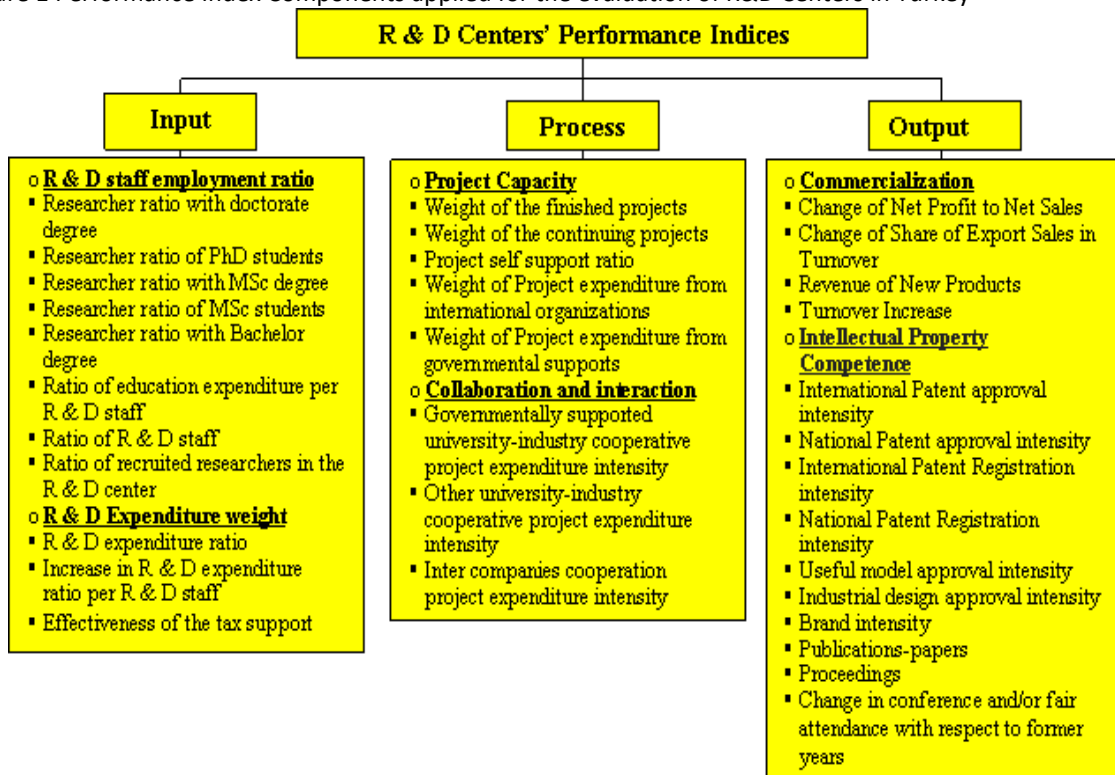
Determining whether the acting innovation processes of actual enterprises is being managed effectively or not, is a kind of measure of “innovation achievements” or “innovation performances”. Stating the situations or monitoring the processes will also lead better executions for them. As it is known, it is essential to know and measure in order to manage. In this context, various measures and evaluation concepts have been developed.

Global Innovation Index-GII is one of them and explains the innovation capacity of an environment or a region or a country. Looking at the conceptual framework, it is observed that the GII is built on two sub-indices. One is the “Innovation Input Sub-Index”

and the other is “Innovation Output Sub-Index”(Benavente & Dutta,2011; Karaata, 2012; Savasci, 2017). In order to determine the sub-index components, each of the elements of the components must be determined (Akata, 2017). Various quantities which can be calculated using the information obtained within the Index and in the questionnaires can be found in the related literature.

There are several studies on the measurement of innovation performance of the individual enterprises. OECD which is one of the institutions that carry out detailed studies on performance measurement and the European Commission prepared a guide collaboratively, which has been developed over time, called the “Oslo Guide”. This guide aims to set the standards for the definition and measurement of innovation. Numerous countries have adopted the structure set out in the Oslo Guidelines. The countries have carried out their innovation surveys in accordance with the questionnaires conducted with this guideline. Turkey Institute of Statistics (TSI) is implementing the Oslo Guide by taking a 3-year reference period to include innovation surveys in Turkey (Karaata, 2012). The components of the evaluation indices that are used by the Ministry of Science Industry and Technology in the performance measurement of “R & D Centers”, are given in Figure 1.

Figure 1 Performance Index Components applied for the evaluation of R&D Centers in Turkey



(Rearranged from Bilim, Sanayi ve Teknoloji Bakanligi, “Ar-Ge” Merkezleri Performans Endeksi Modeli.(n.d). (2015)).

The components, listed in Figure 1, are mainly defined for R&D centers or highly innovative or high tech small companies. Being approved as a R&D Center is determined by somehow complex procedures. At least having a minimum number, fifteen or equivalent research and support person, and quite amount of research facility are essential and a hard evaluation is needed.

Although there are official R&D centers in some SMEs, majority of ordinary SMEs are directing their RTD works as discrete projects. These types of SMEs make project applications to RTD calls of official programs in order to get RTD supports. At this point, support organizations want to evaluate their activities with respect to the official goals. In this context, evaluation of the RTD project applications and their closing reports need a different measure than those of R&D centers.

Although the amounts in the "input" and the "output" groups obviously are very high for the R&D Centers than the other SMEs, the "process" group elements are comparable for both R&D centers and discrete RTD projects of the SMEs.

4. RTD Support Programs for SMEs and Innovation

As mentioned earlier, it is very important to increase the innovation efforts of SMEs, due to their high share in the countries' economies. Because of the financial difficulties and their relatively low RTD capacity of such small enterprises, encouraging them by innovation supports and promotions is very useful for increasing the country's innovativeness. Therefore, it is aimed to discover factors that will contribute to innovation in SMEs in recent studies. The ratio of RTD investments to turnover, encountering with information centers and financial assistance taken from authorities for innovation are emerging indicators in such studies.

Other important factors are as follows: Cooperation with other companies (1), Collaborations with research institutions and universities (2), The proportion of higher educated staff in the company (3), Implementing significant or new changes in corporate strategies (4), Implement new and/or advanced management strategies (5), Significant changes in the company's market concept or strategies (6), Significant aesthetic changes in appearance and design (7) (Sendogdu & Ozturk 2013). SMEs should be able to allocate budget to increase RTD and innovation activities. In globalized world conditions, rapid changes in social, economic, political and especially in production technology leave

enterprises face to face with various competition problems, particularly in financing, human resources and marketing.

At this point, it is essential the establishments of the cooperation between the private sector and governmental authorities in order to create the necessary innovation environment for the companies. For this purpose, a support system for SMEs has been initiated since the end of the 1980s. In this process, SME policies determined at national level are gaining an international quality. SMEs' RTD supports and support programs that are being implemented in this field, are can be highlighted as follows (Turkoglu & Celikkaya 2011);

- Turkish Scientific and Technological Research Council(TUBITAK)' Technology and Innovation Evaluation Department (TEYDEB) R & D supports,
- R & D supports of Small and Medium Enterprises Development Organization (KOSGEB),
- Turkey Technology Development Foundation (TTGV) R & D Project Supports,
- Ministry of Industry and Trade - General Directorate of Industrial Research and Development R & D Support to SMEs (Industry Thesis /SAN-TEZ program),
- Supports of Turkish Patent Institute, Ministry of Finance.

In these programs where the relevant organizations have declared details in their official web pages, the expenses of various items are supported at various rates in the industrial RTD projects which are approved by the supporting organization. During the execution of the projects, "referees" who are formally assigned by the organizations, review and report the projects progress guiding the official project application files in pre-determined periods making "monitoring visits". Companies should consider the discussions, with the project referees during these visits, as a very important opportunity and should also take into account the critics made in the ongoing project and during the preparation of the projects they intend to do later. Although, the each successfully completed RTD project normally causes to begin or leads another RTD projects as a natural result, it is thought that the development of a formal and numerical consideration procedure of the formerly applied projects of the companies is needed.

5. The Need of Change in RTD Environments

On the other hand the "change", that is needed to become more economical and innovative, is the most important issue in the ever-changing world. Industrial organizations in today's world act as an "open system"

connected to the “environmental dynamism” due to the effects of communication technologies and social changes. Environmental effects both in terms of competitiveness and social changes force the organizations to reevaluate their situations. Within these circumstances a need of change emerges.

Change process includes four actors that are interrelated to each other; “people”, “technology”, “company structure” and “goals”. “People” wants to get advantageous new products with higher quality and lower prices, this affects the other three actors. “Companies” then need new “technologies” and to determine new “goals” and this can only be achieved by a new organizational structure and thus they need to “change”. For this reason, the change process produces the needs of “ownership and

development of knowledge” and “being innovative” for the organizations (Akata & Toker 2007).

On the other hand, the change process can be achieved using several methods or strategies. The “planned change model” is one of them and can be explained with a flow chart as a close loop (Akata & Toker 2007). Some of the flow chart elements, such as current situation and the target level can be represented with matrices and matrix difference. Such an attempt was made as a proposal and discussed briefly (Akata & Akata 2009). The model can be applied for any organizational change management or in evaluation of a process. Such a proposal flow chart for the organizational change in RTD environment is given in Figure 2.

Figure 2 “Planned Change” model for “Organizational Change in RTD Works.

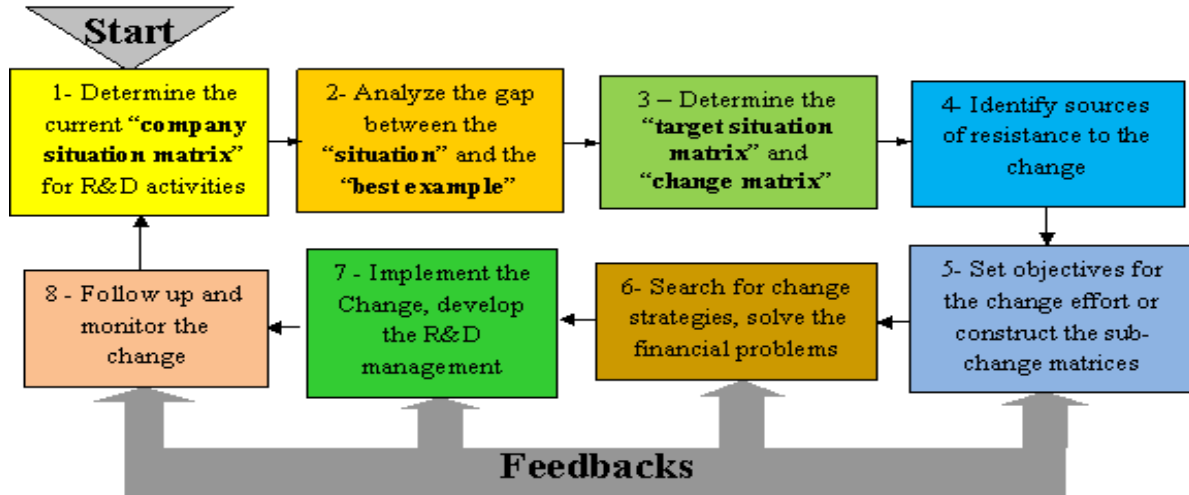


Figure 2 shows required actions in a stepwise manner in a close loop due to the nature of the process. Change process should continuously be monitored using the feedbacks. According to above flow chart, step 2 and step 3 can be written in matrix form for comparison of the organization with the best examples. The step 5 and step 6 have paramount importance due to decision making. In this context, a suitable decision making method or procedure should be applied to the organizational data.

6. The Importance of Monitoring the RTD Activities as a Change Process

Trying to direct RTD projects or in general at least proposing innovative activities of SMEs can be regarded as they are attempting an entrance in a change process (Akata, 2017). As it was mentioned in the previous sections, monitoring the RTD projects during their advance is very important by two reasons. First one belongs to the support organization in order

to complete the formal evaluation process itself. As it is known, the main aim of the RTD support programs is to encourage the SMEs in attempting to be more innovative by shearing some of the financial aspects of such activities. On the other hand such RTD supports or finance, mainly come from governmental budget obtaining from tax payers. For this reason, evaluation of the effects of the RTD supports is the main concern of the managers of the support programs.

In this context, evaluating the RTD project applications, their courses and the final project reports need some different measure than those of R&D centers. Such an evaluation method or procedure will produce benefits for both the support organizations in their supportive decision processes and the firms in their self-assessment cycles. Additionally, the monitoring process helps SMEs achieve appropriate management for their projects and activities as they progress through their projects. The second reason is related to a very important and a recent subject

“Product Lifecycle Management – PLM”. PLM has become more important in companies providing technologies and methodologies to manage the data, information, and knowledge along the whole product lifecycle (Corallo *et.al*, 2013; Javvadi, 2015). In industrial world PLM is a process that manages all the stages of the life cycle and responsible to the development of the product too (Akata, 2019; Verstraeten-Jochemsena, 2018).

On the other hand in each stage of a project and an innovation activity, documentation is the key issue in the PLM concept. For this reason, enforcement of all the SMEs to apply a proper documentation process and adoption it as a habit will produce benefits for both the support organizations and the SMEs themselves. This goal can be achieved by informing them during the monitoring visits of the RTD support organizations and dissemination meetings that will be organized for potential applicants by the RTD support organizations.

7. Conclusions and Recommendations

In the presented study, the importance of the RTD projects of SMEs in the context of being innovative and the evaluation and monitoring the projects are emphasized. Due to the total effect of SMEs on the local and global economy, it can be concluded that enforcement of the SMEs to be more innovative will bring benefits both to economy that they take part in and themselves against their competitors. SMEs should develop and increase their innovation efforts in order to increase their successes in a competitive environment. In conjunction with this issue, supporting them by sharing some financial risks through their innovativeness voyages with certain rates will encourage the SMEs to carry out and increase RTD and innovation activities.

There are various support programs and supporting institutions, monitoring the SMEs’ such activities throughout the processes and, evaluation of their results is getting an increasing importance. Although there are various scales and concepts have been developed for the evaluation process for some developed RTD organizations such as R&D Centers, it is difficult to apply them for the evaluation of the SMEs’ project works, which mostly are small scale both in budget and work packages. For this reason, evaluation processes of such projects are mainly dealt with the application and preparing the project closing report stages.

On the other hand, the continuity of innovation efforts of small enterprises is as important as the success of their ongoing projects. As a measure of “the

continuity”, the number of additional RTD projects of such organizations originated or inspired by previously completed ones may be considered processing or multiplied by a proper coefficient during the acceptance stage. Additionally, dissemination of previously supported and successfully completed projects in scientific platforms may be promoted by a similar concept. Within this context, dissemination activities can be evaluated quantitatively and the scores taken into account for their sooner applications. Additionally, RTD support organizations may develop more numerical evaluation procedures for both RTD calls and monitoring processes of the accepted projects using decision making algorithms from the related literature. Such a procedure will produce benefits for both the support organizations and the firms’ self assessments.

Finally, the SMEs should be informed about the PLM concept due to its increasing importance in the global economy. It is thought that the documentation of the RTD and innovation studies of the enterprises related to this concept will contribute the SMEs to be more innovative and more continuous in RTD works. It is clear that a correct and detailed documentation will be the most valuable part of the company's RTD and Innovation “memory” and “treasure”.

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