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Research Article

How do R&D and Firm Size Play a Role in The Relationship Between Public Incentives and Firm Performance?

Kamu Teşvikleri ve Firma Performansı İlişkisinde Ar-Ge ve Firma Büyüklüğü Nasıl Rol Oynar?

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Abstract

The aim of this study is to examine the level of benefiting from the incentives applied according to the size of the companies operating in Turkey and the reflections of these incentives on their performance. In examining the relationship between incentives and performance, the effects of firms having R&D departments and firm sizes are discussed interactively. In this context, the data obtained through questionnaires from 577 managers were evaluated with SPSS and Process Macro applications. Explanatory factor, regression and regulatory variable analyzes were performed in the study.

According to the results of the study, the level of benefiting from public incentives, the existence of R&D departments and the size of the firms affect their general and financial performances negatively and significantly. This relationship becomes positive and meaningful for companies with R&D departments benefiting from incentives, large companies benefiting from incentives and large companies with R&D departments. In the detailed analyzes made in this context, as the companies get smaller, there is a significant effect in favor of those who do not have an R&D department in the effect of public incentives on the company's (general and financial) performance. Moreover, this situation has the opposite effect on those who have an R&D department. On the other hand, it has been observed that as the firm grows, the effect of public incentives on general and financial performance increases significantly in favor of firms with R&D departments. In other words, as the level of incentive increases in large firms with R&D departments, performance increases significantly, whereas in large firms without R&D department, the increase in incentives shows a negative and significant relationship with performance.

Keywords: *Public Incentive, R&D, Firm Size, Firm Performance.*

Öz

Bu çalışmanın amacı, Türkiye'de faaliyet gösteren şirketlerin büyüklüklerine göre uygulanan teşviklerden yararlanma düzeylerini ve bu teşviklerin performanslarına yansımalarını incelemektir. Teşvikler ve performans arasındaki ilişkinin incelenmesinde Ar-Ge departmanlarına sahip firmaların ve firma büyüklüklerinin etkileri interaktif olarak tartışılmaktadır. Bu kapsamda 577 yöneticiden anket yoluyla elde edilen veriler SPSS ve Process Macro uygulamaları ile değerlendirilmiştir. Araştırmada açıklayıcı faktör, regresyon ve düzenleyici değişken analizleri yapılmıştır.

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Araştırmanın sonuçlarına göre, kamu teşviklerinden yararlanma düzeyi, Ar-Ge departmanlarının varlığı ve firmaların büyüklüğü, genel ve finansal performanslarını olumsuz ve anlamlı bir şekilde etkilemektedir. Teşviklerden yararlanan Ar-Ge departmanları olan şirketler, teşviklerden yararlanan büyük şirketler ve Ar-Ge departmanları olan büyük şirketler için bu ilişki olumlu ve anlamlı hale gelmektedir. Bu kapsamda yapılan detaylı analizlerde firmalar küçüldükçe kamu teşviklerinin firma (genel ve finansal) performansına etkisinde Ar-Ge departmanı olmayanlar lehine anlamlı bir etki görülmektedir. Üstelik bu durum Ar-Ge departmanına sahip olanlar için tam tersi bir etki yaratıyor. Öte yandan, firma büyüdükçe kamu teşviklerinin genel ve finansal performans üzerindeki etkisinin Ar-Ge departmanı olan firmalar lehine önemli ölçüde arttığı gözlemlenmiştir. Diğer bir deyişle, Ar-Ge departmanı olan büyük firmalarda teşvik düzeyi arttıkça performans önemli ölçüde artarken, Ar-Ge departmanı olmayan büyük firmalarda teşviklerdeki artış performans ile negatif ve anlamlı bir ilişki göstermektedir.

Anahtar Kelimeler: *Kamu Teşviki, Ar-Ge, Firma Büyüklüğü, Firma Performansı.*

1. Introduction

One of the necessary instruments for the sustainable growth of economies, although the cost-benefit analysis is discussed, is the incentive policies implemented by the countries for the private sector. These incentives consist of tax reductions, corporate tax reductions and exemptions, tax credits, tax deferrals, supports and exceptions for labor costs, and different arguments like these. Among these, the importance of R&D investments in explaining economic growth has been mentioned extensively (Minniti and Venturini 2017, p. 316-327; Zhu et al., 2021, p. 3267-3287; Opoku-Mensah et al., 2021, p. 211-223; Bronzini and Piselli 2016, p. 442-457). In the current economic policies of countries, it is observed that supporting R&D investments has reached a more acceptable point. However, these subsidies can become an increasingly scarce resource in times of financial crisis and economic austerity when government funding is difficult. Therefore, it is important to target the effective use of available funds (Becker, 2015, p. 917-942). It can be observed that R&D subsidy, which is one of the public incentives, may increase R&D investment, but R&D efficiency of enterprises may not increase (Zheng, 2016, p. 1036-1043).

In order to achieve sustainable success in the market, to achieve export-oriented success, to realize and maintain profitability and growth on a macro scale, the contributions of public incentives for both R&D, export and investment cannot be ignored. Indeed, many studies in this area (Hall and Jorgenson 1969, p. 388-401; Easson, 1993; Guellec and Loannidis 1999, p.123-138; Guellec and Van Pottelsberghe 1999, p. 95-122; Çiloğlu, 2003, p. 29-48; Çelebi and Kehriman 2011, p. 33-63; Liu et al., 2021, p. 1-12) reveal the positive effect of incentives.

Increasing companies' R&D and technological investments will increase their product and process innovation performances, and as a result, their overall innovation performance. Companies with high investments in R&D and technology generally have higher performances (Yıldız and Aytekin 2019, p. 477-478). Many studies have revealed that R&D and technological expenditures to create innovation will provide a competitive advantage in the medium and long term rather than the short term, and performance will improve in the long term (Wang and Sun 2020, p.373-390; Yücel and Ahmetoğulları 2015, p. 87; Demir and Güleç 2018, p. 57; Karacaer et al., 2009, p. 65; Alper and Aydoğan 2016, p. 99). Some studies show that the significant effect of R&D expenditures on financial and non-financial performances of firms is neither in the short term nor in the long term (Elmas and Polat 2016, p. 648; Demirhan and Aracioğlu 2017, p. 195; Hitt et al., 1991, p. 693; Artz et al., 2010, p. 725).

In developing countries, SMEs have critical importance in terms of R&D and public incentives and their contribution to economic development. In China, the impact of R&D innovation performance and public incentives on R&D and thus growth is heavily debated. While some studies have focused on the short and long-term effects of public subsidies on R&D investments and firm growth, and ultimately on the growth of the country, some studies have focused on the regulatory effect of public incentives on R&D and performance. On the other hand, the regulatory effect of R&D on innovation performance or sector growth is also discussed. In fact, it is thought that the use of public incentives by companies that do R&D will contribute more to their financial and non-financial performances than those that do not. Since the majority of developing country firms are SMEs, public incentives are also more likely to be directed towards these firms (Caleb and et al., 2021, p. 1-9).

In general, these supports follow the policies implemented by countries for innovation incentive and value-added processes such as R&D investments, training, consultancy, human resources, financing, quality, technology, machinery-equipment and marketing support (Kalkan, 2005, p. 4-5). Among these, R&D incentives are particularly important. Chavez (2019, p. 16-22) analyzed the reflections of public R&D incentives on private firms in his study in Mexico. In the study, it was revealed that the innovation-oriented R&D incentives of the public had a positive effect on the personnel in the innovation department, but did not contribute much to the private companies. Moreover, it was emphasized that it would be more reasonable to direct these public resources, which are distributed with incentives, to universities and other public institutions.

While this is an expected result for underdeveloped or developing countries, it may lead to different results in developed countries. For example, the presence of public incentives in a developed country like Germany causes private companies to carry out 4% more R&D-intensive activities and innovate (Almus and Czarnitzki 2003, p. 226-236). On the other hand, in a study conducted on the manufacturing industry in Turkey, it was observed that private firms' R&D tendency increased and even had an acceleration-oriented effect on R&D expenditures when R&D incentive, which is one of the public incentives, was provided (Özçelik and Taymaz 2008, p. 258). It is observed that government incentives have a positive effect on firm performance in Turkey, where the majority of enterprises (99.8%) are SMEs (Yerlikaya and Arıkan 2016, p. 1007).

In this context, the main purpose of this study and its contribution to the related literature is, considering other developing countries such as Turkey, how government incentives affect firm-based financial and non-financial performance in terms of Turkey sample, and how these relations affect corporate research and development such as firm size and having an R&D department. It provides empirical evidence on how it is affected by Ge structures. In this context, in this study, it is also discussed whether the level of benefiting from government incentives and whether the performance relations of the companies that are predicted to be in a systematic R&D structure institutionally by establishing an R&D department differ from those of other companies. In the study, it was also examined whether the level of benefiting from the incentives and the performance of the companies differ according to whether they export or not, whether they have an R&D department, whether they operate internationally, whether they are in the service or production sector, and whether they differ according to the size of the firm.

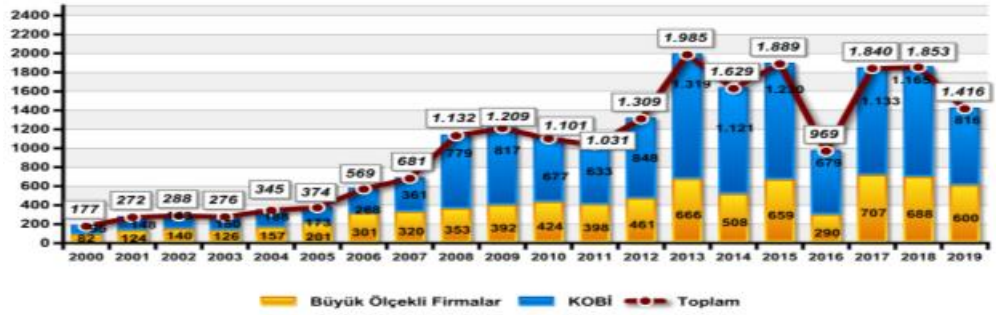
2. Conceptual framework

2.1. Public incentives

Public incentives are financial or non-material support, aid and incentives provided by the state in order to facilitate the further and rapid progress of economic activities compared to each other. Incentives are policies that facilitate the achievement of investment, production and export activities of developing countries in suitable places, amounts and periods in accordance with the plan and program targets (İncekara, 1995, p. 9).

Public incentives are offered in different ways. The results of the incentives generally offered through Tübitak in Turkey according to the size of the companies are as in Figure 1.

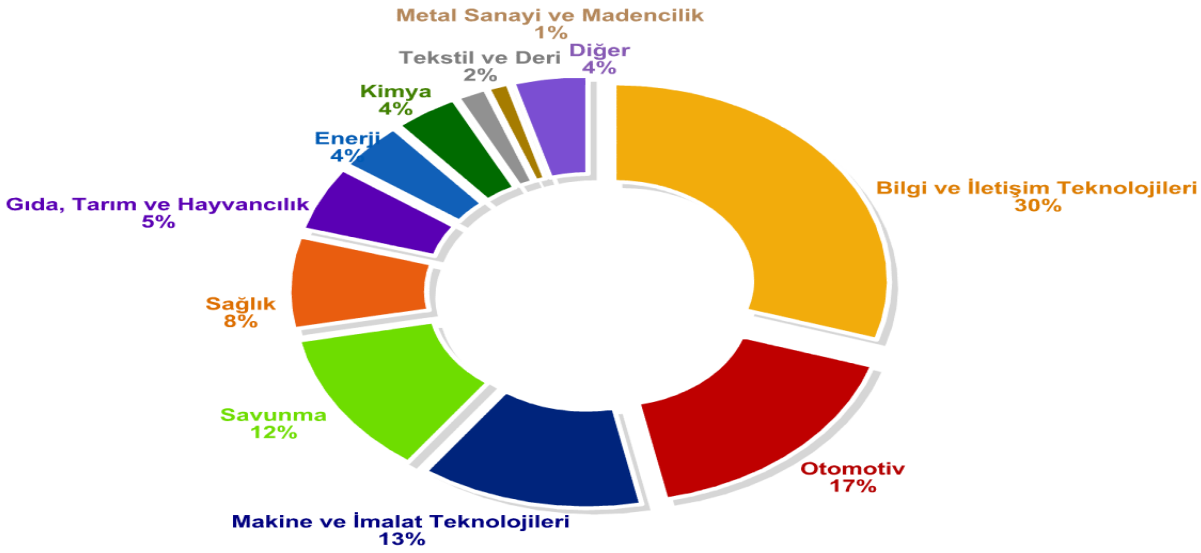
Figure 1. 20-Year Distribution of Incentives by Scale



Source: TUBITAK, 2020.

When Figure 1 is evaluated, the supports given to companies according to their scales are offered by TUBITAK over the years. It is observed that SME supports increased regularly from 2000 to 2019. Especially with the effect of the incentive law implemented after 2006, the acceleration of the rise is increasing even more. In 2016, a decrease in support is observed due to political instability and the coup attempt. On the other hand, if we look at the sectoral distribution of these incentives, it is better understood which areas are given importance as a country. On the other hand, information showing the distribution of public incentives on a sectoral basis is shown in Figure 2.

Figure 2. Distribution of Public Incentives by Sector



Source: TUBITAK, 2020.

As can be seen in the distribution of public supports on a company basis (Figure 2), it can be said that increasing the R&D and innovation content in this sector is encouraged, especially by giving the most support to the information and communication technologies sector. In this context, it is expected that companies using R&D will benefit from more incentives and have a positive effect on their performance.

2.2. Research and Development

Research and development (R&D) is the collection of information that enables companies to achieve innovative structures and to be successful in the long term, especially in technology-intensive sectors. More generally, R&D expenditures are considered to be one of the most extensively researched intangible accounting items in the fields of economy, accounting and finance (Guo et al., 2006, p. 550-579). There are studies showing that R&D expenditures are an important factor in financial indicators such as profitability, sales rates, earnings per share, stock prices and returns (Lev and Sougiannis 1996, p. 107-138; Yücel and Ahmetoğulları 2015, p. 87). On the other hand, it can be said that companies in growth stage, unprofitable or science-based sectors invest more in R&D. Overinvesting in R&D can lead to poor future performance, such as low operating return on assets, lower product market share, higher frequency of layoffs due to poor performance, and negative abnormal stock returns (Fedyk and Khimich 2018, p. 78). However, it is possible to say that it is an important phenomenon in long-term non-financial performance indicators (Eberhart et al., 2004, p. 623-650; Guo et al., 2006, p. 550-579). It can be said that R&D is a very important element in the incentive policies of countries as well as private investments in R&D on a company basis. At this point, it is curious how the benefiting from public incentives rather than their personal investments is reflected on their performance and the difference created by using R&D in this reflection.

2.3. Firm Performance

The concept of performance, which is defined as performance, is classified as financial and non-financial performance for organizations. According to another definition, organizational performance is defined as the efficiency of the organization in achieving its goals, as well as the success of the companies in

surviving in any given economy (Nzuve and Omolo 2013, p. 45-56). One of the purposes of investing in companies is to create value in the future. Every capital is valuable unless it fulfills the marginal conditions. At this point, non-financial performance refers to values related to firm value, including tools such as market share, customer satisfaction, and employee satisfaction. Firms create positive differentiation in organizational performance by using non-financial performance (Liao et al., 2016, p. 2152).

Financial performance is to be successful in terms of financial instruments such as profit, income, return on investment, return on equity and earnings per share (Fowowe, 2017, p. 8). On the other hand, it is possible to divide firm performance into sub-dimensions as product quality, product innovation, profitability, technology and innovation, quality and competitiveness, and financial performance (Kalkan, 2005, p. 4-5).

3. Literature review

One of the factors whose impact on firm performance has become better understood over time is public incentives. Among public incentives, it is emphasized that research and development supports have a significant impact on innovation performance. There are studies investigating the direct effects of public incentives on firm innovation (Brown et al., 2017, p. 447-467; Howell, 2020, p. 1069-1070). According to the study of Caleb et al (2021; p.1), a total of 524 foreign companies were examined in China, one of the emerging markets, of which 216 are entirely affiliated with the country's subsidiaries. The study observed that government subsidies positively moderate the impact of foreign firms' local R&D investments on local subsidiaries' innovation performance in China. It has been revealed that international firms have a stronger role in this regulatory effect than local firm partnerships (Caleb et al, 2021, p. 1-9). Even in a developing and conservative country like China, the innovation performance of international firms has been more successful than local firms. In another study, Bhattacharya et al (2021, p. 1-13), with data from manufacturing firms in India, highlight a mitigating effect of R&D intensity on the links between international firm activities (such as exports, imported inputs, capital goods, and foreign direct investment) and productivity. In the study, it is observed that high-tech industries with high R&D intensity achieve more productivity than low-tech companies. Compared to high-tech firms operating internationally, domestic high-tech firms have lower productivity gains from higher R&D intensity in the previous period. Again, the effect of high R&D intensity on domestic low-tech firms was also found to be insignificant. Moreover, providing R&D tax incentives targeting internationally active high-tech companies and public support for R&D yield more successful and productive results (Bhattacharya et al., 2021, p.1-13). In another study by Kotabe et al (2002, p. 79) it was determined that R&D and marketing capabilities have an important regulatory effect on the increase of operational and financial performance of multinational companies.

On the other hand, the positive effect of local government supports on company performance was also discussed by Sheng et al (2011, p.1-15). Moreover, it is emphasized that the public incentives of developing countries such as Turkey and Poland are an important factor in increasing innovation performance (Szczygielski et al., 2017, p.219). In a study on the manufacturing sector in China, it is observed that state companies and subsidies have a regulatory role in the financial and sustainable performance of state-owned companies and private companies. In the same study, a significant negative impact of R&D intensity on sustainable performance was reported (Liu et al., 2021, p. 1). In a study conducted in the USA, it was observed that regulating R&D tax credits within public subsidies would provide a long-term productivity increase (Minniti and Venturini 2017, p. 316). In addition, in a study conducted on the data of OECD economies, it is emphasized that R&D investments are an important element within public supports. It is emphasized that if the support provided is not meaningful and measured according to the sector and its purpose, there will be negative effects. In other words, R&D outputs will be reflected in growth more meaningfully if the supports provided in innovative companies are properly supervised and well managed (Brown et al., 2017, p. 447).

There are also examples in developing countries that R&D investments increase the performance of companies. In a study conducted by Tether (2002) on firms innovating in England, it was emphasized that innovation performance would be better if firms cooperated in R&D. In a study that considers R&D partnership as competitors, suppliers, customers, universities and research institutes, it is emphasized

that an R&D activity based on cooperation with competitors and universities helps to create innovations that enable the sale of new products to the market and increase the growth performance of companies (Belderbos et al,. 2004, p. 1477). In other words, in this study, the significant effect of joint R&D cooperation on firm performance is confirmed. Kirca et al (2016, p. 628), on the other hand, emphasize how investments such as R&D have a significant impact on the financial performance of multinational production enterprises and service enterprises, which they also classify according to their size. In addition, it is emphasized in the study that while multinational firms in the service sector are more dependent on marketing assets to be successful, the financial performance outputs of manufacturing enterprises are based on technological assets (such as R&D). Opoku-Mensah et al. (2021, p. 211), in a study conducted in manufacturing, information and technology firms in China, emphasize that R&D investments positively affect the performance values of firms. In other words, it has been observed that there is a significant increase in the market share of those who invest in R&D and that older companies generate more economic value than younger companies. It is understood that young firms have a long period of time to earn returns from R&D investments (Opoku-Mensah et al., 2021, p.220-222). Yücel and Ahmetoğulları (2015, p. 87) confirmed that the effect of R&D expenditures on firm performance is longer term, by using stock market data of information technology companies. Zhu et al (2021, p. 3267) also revealed the contribution of R&D practices of private and state-owned firms to firm growth in the manufacturing sector. In addition, it has been observed that R&D investments of small and non-medium-sized companies have a greater impact on growth than SMEs. In the same study, it is emphasized that R&D activities have different turning points in company growth according to company size and that public support should be made at an optimum level according to these points.

4. Research Methodology

4.1. Purpose and Importance of the Research

The aim of this study is to examine how government incentives affect firm-based financial and non-financial performance and how these relations are affected by corporate R&D structures such as firm size and having an R&D department. In this context, in this study, it is discussed whether the level of benefiting from government incentives and the performance relations of companies that are predicted to be in an institutional and systematic R&D structure by establishing an R&D department differ from other companies. In the study, it was also examined whether the level of benefiting from the incentives and the performance of the companies differ according to whether they export or not, whether they have an R&D department, whether they operate at national or international level, whether they are in the service or production sector, and whether they differ according to the size of the firm. In this context, the study provides an original contribution to the literature as it is a pioneer in this field.

4.2. Research Population and Sample

The provinces of Istanbul, Kocaeli, Bursa and Sakarya were chosen as the study population. In terms of the ability and validity of representing the whole of Turkey in the selection of these provinces, the number of corporations taxpayer enterprises, the number of newly established enterprises, the fact that their share in Turkey's industry and service production, exports, and employment in gross domestic product production is among the top 10 provinces and a significant level in total (It has been taken into account that they include a sufficient level in terms of representing Turkey (TOBB, 2018a; TUIK, 2018b; TOBB, 2019). In addition, according to TUIK (2018) data, 27.3% of the 289 thousand 791 R&D personnel employed in Turkey in 2018 were in Istanbul, 7.4% in the region and region formed by Kocaeli, Sakarya, Düzce, Bolu and Yalova. 5.97% were employed in the region consisting of Bursa, Eskişehir and Bilecik provinces (Gross domestic R&D expenditure and human resources according to TUIK, Statistical Regional Units Classification 2nd Level, 2018). In this context, it is seen that the provinces selected in Turkey's R&D personnel employment have a representation ability of over 30% compared to the Turkish tradition.

In this framework, the minimum sample size was calculated by calculating the sample size within the determined universe. Since it is not possible to know exactly the companies that benefit from the incentive in the universe and have an R&D department and the competent personnel who need to be included in the study in these companies, the sample size calculation was used when the population size

is not known exactly. Accordingly, the sample size calculated with a 5% margin of error in the 95% confidence interval was determined as 384.

The study has a sample of 577 participants, including the managers of production and service enterprises operating in the selected provinces. In order to obtain the sample, 603 participants who agreed to fill out the questionnaire were interviewed out of 1,150 participants reached by using the convenience sampling method, and 577 usable questionnaires were included in the study.

4.3. Research Variables

Public incentive, one of the variables of the study, was adapted to Turkish by considering cultural and legal practice differences in line with the expert opinion of Choe et al (2011, p. 5-25) and a scale consisting of four questions was created. The public incentive scale, which has a very high reliability and validity, has been evaluated within the framework of necessary analyzes.

Firm performance was measured with a 9-item scale including financial and non-financial performance dimensions. The scale consists of the statements that the participants are asked to answer considering the last three years of the company. Some of these statements consist of questions such as "successful in meeting production-related goals, successful in meeting quality-related goals, successful in meeting profit-related goals". While creating the firm performance scale, the scales of Baines and Langfield-Smith (2003, p. 675-698), as well as Li et al. (2006, p. 107-127), were used.

A 5-point Likert Scale (1=Strongly disagree, 3=Partially agree, 5=Strongly Agree) was used to measure the variables. SPSS Package Program and Process Macro programs were used in the analysis of the variables.

4.4. Research Model and Hypotheses

The conceptual and hypothetical model of the research, which includes the relations between public incentive and firm performance variables, and the moderator role of the research and development department and firm size variables in these relations is shown in Figure 3.

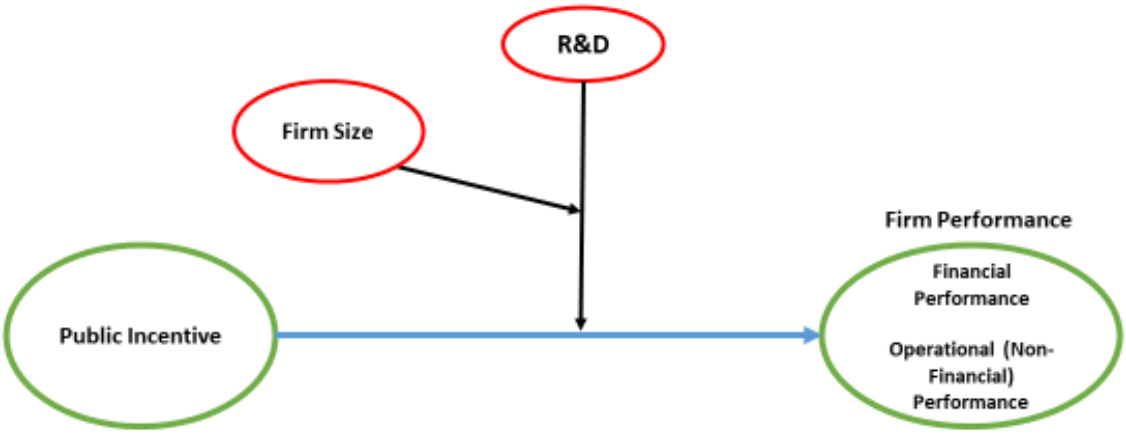


Figure 3: Conceptual Model of the Research

With the research model, the effect of the level of benefiting from public incentives for a developing country like Turkey, on the performance of companies in general, on financial and non-financial performance is examined. Moreover, it is tested whether variables such as R&D department and firm size have a regulatory role in this relationship. It also examines the firm size assumption that softens the regulation of R&D in this interaction. In addition, it is examined whether the companies are engaged in national and international activities, the level of benefiting from incentives according to their sectors (manufacturing and service) and export status, and whether the performances of the companies differ.

Public incentives are one of the strategic tools used to increase firm performance in developing countries. One of the most used incentives among these incentives is research and development

incentives. By spending these and similar incentives, companies are expected to have a significant impact on both short-term financial performance and non-financial performance in the long-term. Similarly, the relationship between incentives and performance has been examined in the literature (Yücel and Ahmetoğulları, 2015, p. 87-88; Ciabuschi et al., 2020, p. 271-272).

H1: Public incentives have a significant and positive effect on firm performance.

H1a: Public incentives have a significant and positive effect on financial performance.

H1b: Public incentives have a significant and positive effect on non-financial performance.

Public incentives and R&D subsidies are generally used in technological transformation projects. These projects not only extend the service life of enterprises' R&D equipment, but also greatly improve operating efficiency. It then indirectly reduces the R&D costs of R&D equipment, enabling businesses to accumulate more funds for R&D activities (Montmartin and Herrera 2015, p. 1065-1079). Having an R&D department will play an important role in the impact of R&D and similar public incentives on firm performance. In this context, the following assumption has been reached.

H2: Having an R&D department has a regulatory role in the effect of public incentives on firm performance. That is, companies with R&D departments benefiting from public incentives affect the overall performance of the company more positively.

H2a: Having an R&D department has a regulatory role in the effect of public incentives on financial performance. In other words, companies with R&D departments benefit from public incentives, increasing their financial performance more than companies that do not.

H2b: Having an R&D department has a regulatory role in the impact of public incentives on non-financial performance. In other words, the use of public incentives by companies with R&D departments increases their non-financial performance more than those without R&D.

Another factor as important as the role of having an R&D department in the effect of public incentives and the general and financial performance of the firm is the size of the firm. So much so that the special incentives given to SMEs, when combined with the R&D department, will reflect differently on the performance outputs. In addition, since large corporate companies will have a corporate R&D structure and department, the performance of the incentives they will receive in this field will be different. Government R&D subsidy not only encourages enterprises to increase their R&D investment, but also helps enterprises improve R&D efficiency and product quality (Wu and Zhao 2021, p. 1-18).

H3: Firm size moderates the regulatory role of R&D in the effect of public incentives on firm performance. Namely, as firms with R&D departments grow, their use of public incentives will have a greater impact on the overall performance of the firm. It's the opposite for those who don't have an R&D department.

H3a: Firm size moderates the regulatory role of R&D in the effect of public incentives on financial performance. Namely, as companies with R&D departments grow, their use of public incentives will contribute more to the financial performance of the company. It's the opposite for those who don't have an R&D department.

H3b: Firm size moderates the regulatory role of R&D in the effect of public incentives on non-financial performance. Namely, as companies with R&D departments grow, their use of public incentives will contribute more to the non-financial performance of the firm. This situation will be less in those who do not have an R&D department.

5. Research Findings

5.1. Demographic Findings

According to the descriptive analysis results obtained from the sample of the research, 19% of the participants were 20-30; 38% 31-40; 31% are 41-50 years old and the rest are 51 and over. On the other hand, 21.7% of the participants were female, 78.3% were male; 77.8% are married, 19.2% are single; 30.2% in terms of work experience 1-10 years; 22% are 11-15 years; 21.7% of them have 16-20 years and 26.3% of them have 21 years or more experience. In addition, in terms of the workplaces of the

participants, 36.6% of the participants were 1-29; 40% of them work in companies with 30-249 personnel and 23.4% in companies with 250 or more personnel. In terms of R&D departments, 54.1% are R&D departments and 45.9% do not have R&D departments; 83.5% are production enterprises and 15.9% are service enterprises; It is observed that 31.9% are business owners or partners, 20.5% are senior managers, 31.7% are middle-level managers and 15.9% are employees at other levels. Finally, 31.9% of the participants had an associate degree; 52% license; 15.9% of them have postgraduate education level.

5.2. Factor and Reliability Analysis Findings

According to the results of the explanatory factor analysis of the variables measured within the scope of the study, while the public incentive variable was collected in one component, the performance dependent variable was divided into subcomponents as financial and non-financial performance variables. Explanatory factor analysis, reliability coefficients, Average Variance Extracted (AVE) and Composite Reliability (CR) values of conceptual expressions are as in Table 1. The reliability of public incentive (Cronbach Alpha; 0.789) and firm performance (Cronbach Alpha; 0.810) variables obtained from the research variables were above acceptable limits.

Table 1: Explanatory factor and reliability analysis results of the variables

Fac.	Var.	Average	Fact.Load	Rel.	AVE	CR	Var. Explained	Eigen Va.
Public Incentives	PI1	2.5845	,868	0,789	0.62	0.87	61.882	2,475
	PI2	2.5563	,861					
	PI3	2.7518	,778					
Firm Performance	FP1	3,8319	,759	0,810	0.54	0.82	30.997	4,449
	FP2	3,7400	,748					
	FP3	3,7851	,745					
	FP4	3,9047	,669					
	FP5	3,8700	,549	0,809	0.51	0.84	30.651	1,100
	OP1	4.1456	,821					
	OP2	4.2184	,786					
	OP3	4,1525	,763					
	OP4	4,0555	,613					
Measurement Criteria		**PI:** KMO: 0.741 Approx. Chi Square: 777,821. Barlett's Test: 0,000. Extraction M.: Basic Components. Total Variance Announced: 61.882		**FP:** KMO: 0,878 Approx. Chi-Square: 2093,404. Barlett's Test: 0,000 Extraction Method: Basic Components Rotation Method: Varimax. Total Variance Announced: 61,648				

According to the results of the explanatory factor analysis, the independent variable public incentive statements were collected in a single component and significant results were obtained in terms of reliability and validity (Choe et al., 2011, p. 5-6). On the other hand, the questions created to express the dependent variable were collected in two subcomponents. The questions posed to measure the overall firm performance appear in two sub-dimensions as financial and non-financial performance, similar to the literature.

The results that test the differences of firm performance dependent variable and public incentive independent variables according to demographic variables are as in Table 2.

Table 2. T-Test Results of Firm Performance and Public Incentive in terms of Demographic Variables

Factors	Differences	N	Average	Std. Dev.	t	p
Overall Performance	National	389	3.934	.5820	-2.200	**.028***
	International	175	4.052	.5970		
Public Incentives	National	382	2.717	1.006	-1.379	.169
	International	173	2.841	.9173		
Overall Performance	Is exporting	250	3.993	.6112	.686	.493
	Does not export	307	3.968	.5738		
Public Incentives	Is exporting	246	2.869	.9759	2.439	**.015***
	Does not export	302	2.663	.9877		
Overall Performance	Production	445	3.9718	.6077	.956	.341
	Service	87	3.913	.5047		
Public Incentives	Production	439	2.807	.9615	2.138	**.035***
	Service	85	2.550	1.024		
Public Incentives	There is an R&D department	271	2.9262	.980	4.455	**.000***
	No R&D department	225	2.5389	.944		
Overall Performance	There is an R&D department	272	4.0114	.593	2.206	**.028***
	No R&D department	231	3.8947	.589		
Public Incentives	Between 1-29	197	2.5484	.975	(F)7.247	**.001***
	Between 30-249	228	2.8937	.983		
	250 and above	152	2.8258	.930		
Overall Performance	Between 1-29	197	3.9165	.603	(F)1.605	.202
	Between 30-249	228	3.9683	.596		
	250 and above	152	4.0307	.564		

When Table 2 is examined, it is observed that the overall performances differ according to the company mode (national activity or international activity). It can be said that the overall performance of international companies is better. However, the firm mode does not differ in terms of public incentives. On the other hand, while there is no difference between non-exporting firms and non-exporting firms in terms of overall performance, it is observed that exporting firms benefit more from the public incentives provided. When the sectoral distinction is made, although the number of participants in the service sector is low, there is no change in performance between the manufacturing and service sectors, while it is observed that the manufacturing sector is more advantageous in terms of public incentives. Again, based on firm size (by number of employees), no significant differences are observed in performance outputs ($F=1.605$; $p=.202$), while it is observed that large firms and SMEs benefit from more public incentives than small enterprises ($F=7.247$; $p=.001$). In terms of R&D activities, it is seen that the public incentives ($t=4.455$; $p<0.0001$) and the overall performance of the firm ($t=2.206$; $p<0.05$) change significantly depending on whether they carry out R&D activities or not. In fact, companies with R&D departments have higher results in terms of public incentives and overall firm performance than those without.

One of the assumptions to be able to conduct regulatory analysis is the correlation between the relevant dependent and independent variables (Hayes, 2018, p. 207-230). In this context, before examining the regulatory effects, Pearson correlation analysis was performed between the relevant variables, and since there was no significant relationship between non-financial performance and independent variable public incentives, no regulatory analysis was performed ($r=0.046$; $p=0.127$). In this context, hypotheses about non-financial (operational) performance were also rejected without the need for analysis. Since there was a significant relationship between other variables, the relevant regulatory variable tests were performed.

Two regulatory research equations based on the assumption that firm size controls the moderator role of R&D use in terms of the impact of public incentives on firm overall performance are as follows.

$$Y = b0 + b1X + b2W + b3Z + b4XW + b5XZ + b6WZ + b7XWZ + \varepsilon$$

The equation here contains the main effects of each of the three important predictor variables (independent and two moderators) and the two-way interaction term between each pair of variables and the total three-way interaction term. It is important to include two-way interactions. Because without these (or main effects) the results cannot be interpreted meaningfully. Continuous variables can be used raw, averaged, or standardized (here averaged values). The importance of the three-way interaction term (i.e. the b7 coefficient) is that the moderator effect of the R&D department (W) variable on the relationship between firm performance (Y) and public incentives (X) is governed by (ie dependent on) another regulatory (firm size Z) variable shows whether there is (Dawson, 2014, p. 1-19). In the same model, the dependent variable was changed to financial performance and tested again.

The results of the regression analysis based on the bootstrap method in order to test the moderator role of the use of research and development in the effect of companies benefiting from public incentives on company performance are shown in Table 3.

Table 3: Regression analysis results showing the regulatory effect on the firm's overall and financial performance (N=575)

Variables	Overall Performance			Finanical Performance		
	b	S.E.	t	b	S.E.	t
Constant	4.64*** [4.11, 5.17]	.26	17.28	4.664*** [4.06, 5.25]	.3031	15.39
Public Incentives (X(b1))	-.195** [-.37, -.02]	.088	-2.19	-.2324** [-.42, -.03]	.100	-2.318
R&D (W(b2))	-.52*** [-.84, -.19]	.165	-3.17	-.6782*** [-1.04, -.31]	.186	-3.644
Firm Size (Z(b3))	-.0009** [-.002, -.0001]	.0004	-2.26	-0010** [-.002, -.001]	.0004	-2.265
X.W (b4)	.157** [.04, .26]	.06	2.73	.2008*** [.07, .33]	.0647	3.106
X.Z(b5)	.0003** [.0001, .0006]	.0001	2.39	.0004*** [.0001, .0006]	.0001	2.429
W.Z(b6)	0007** [.0000, .0013]	.0003	2.07	.0008** [.0001, .0015]	.0004	2.149
X.W.Z(b7)	-.0002** [-.0005, .0000]	.0001	-2.11	-.0003** [-.0005, .0000]	.0001	-2.249

Note: R= .187, R2 = .035(Overall Performance); R= .211, R2 = .044(Financial Performance). *** p < .01, ** p < .05, S.H. : Standard Error, Values in brackets are confidence intervals. Non-standardized beta coefficients (b) reported.

It is said that the Bootstrap method produces more reliable results than the traditional method of Baron and Kenny (1986) (Gürbüz, 2021, p. 79; Hayes, 2018). Analyzes were performed using Process Macro developed by Hayes. In addition, 5000 resampling options were used with the bootstrap technique. In mediation and modulation effect analyzes performed with the bootstrap technique, it is necessary that the values in the 95% confidence interval (CI) obtained as a result of the analysis should not contain the zero value in order to support the research hypotheses (MacKinnon, Lockwood and Williams, 2004, p. 99-128). According to the results of the regression analyzes shown in Table 3, it was seen that all the estimation variables included in the analysis explained approximately 3.5% (R2= .035) of the change in firm performance. There are significant differences between public incentives (b= -.195, p< .05), having a research and development department (b= -.52, p< .01) and firm size (b= -.0009, p< .05) to the total performance of the firm. level effects have been found. However, in the analysis made at the same time, it was determined that the regulatory effect of benefiting from public incentives and having a research and development department on the overall performance of the firm was positive and significant (b= .157, p< .01). It is observed that the regulatory effect of firm size and having an R&D department is also significant and positive on performance (b= .0007, p< .05). Finally, it is observed that the regulatory effect of firm size, R&D department and public incentives is significant and negative on the overall performance of the firm (b= -.0002, p< .05). In this context, the research hypotheses H1 partially (significant but negative), H2 and H3 hypotheses were fully supported.

The results of the slope analysis showing the effects of the independent variables on the overall firm performance and the regulatory role are as in Figure 4.

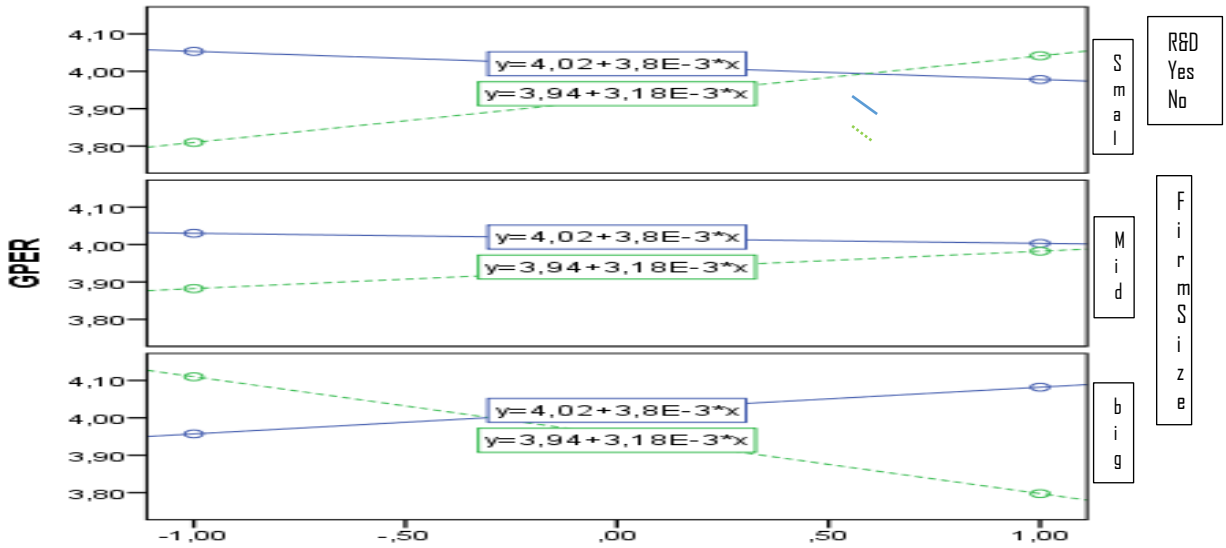


Figure 4. The regulatory role of R&D and firm size (FS) in the interaction of public incentive firm performance

According to the results of the slope analysis (Figure 4), the use of public incentives by large firms with an R&D department increases their overall performance more, while the overall performance of those without an R&D department decreases. Having an R&D department in medium-sized enterprises does not play a significant role in the effect of public incentives on overall performance. On the other hand, the use of public incentives by small enterprises without an R&D department plays a significant regulatory role on their overall performance (b= .200, p< .01). In other words, as the firm grows, the effect of public incentives on overall performance increases in favor of firms with R&D departments. However, as firms get smaller, the effect of public incentives on firm performance has an effect in favor of those without R&D department. As a result, if companies with research and development departments benefit from public incentives, their performance increases more. Finally, it is understood that systematic research and development activities regulate the relationship between public incentives and firm performance. The reason for this is related to the micro-base of the country's sustainable economic growth to develop and raise the independent innovation capabilities of enterprises (Hsiao, 2014, p. 2636). In terms of the internal incentive mechanism of micro-enterprise R&D investments, the reasons for the insufficient R&D motivation of the enterprises are as follows. First, research has public externalities. Second, the intellectual property protection system is relatively flawed. Finally, the innovation of the enterprise's core technology has the characteristics of high investment and high uncertainty. For this reason, in many countries, governments apply incentives to correct market failure through incentives such as R&D (Cappelen et al., 2012, p. 334; Broekel, 2015, p. 1087). Although the government corrects market failure with these incentives, it often disrupts the market incentive mechanism and reduces market allocation efficiency (Chen and Yang, 2016, p. 433). In some cases, subsidies such as R&D may even reduce R&D investment due to the crowding out effect (Acemoğlu et al., 2018, p. 3450). However, it can be said that micro-level business performance can be beneficially channeled through the combination of R&D department and firm size with public incentives. This result fills an important gap in the literature and the field of practice and provides researchers with a perspective on incentives, R&D departments and their effective use, which are still discussed.

According to the regulatory effects of the independent variables on the dependent variable of financial performance and the results of the related regression analyzes, it was seen that all the estimation variables included in the analysis explained approximately 4.4% (R2= .044) of the change on financial performance. It has been determined that public incentives (b= -.232, p< .05) and having a research and development department have negative (b= -.678, p< .01) and significant effects on financial performance. Moreover, a negative and significant effect of firm size on financial performance was determined (b= -.0010, p< .05). It has been determined that the regulatory effect of public incentives and research and development on firm financial performance is significant (b= .201, p < .01). It is observed that the regulatory effect of firm size and having an R&D department is also significant and positive on financial performance (b= .0008, p< .05). Finally, it is observed that the interactional effect of firm size, R&D department and public incentives has a significant and negative effect on firm financial performance (b= -.0003, p< .05). Hypotheses H2a and H3a were fully supported.

In order to show the regulatory effects on financial performance, the slope graph is drawn. The related graphic is as in Figure 5.

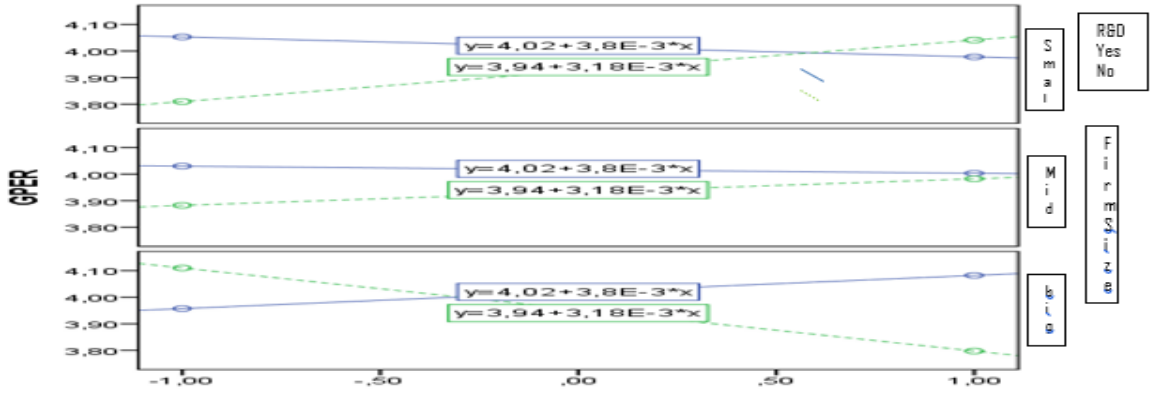


Figure 4. The regulatory role of R&D and firm size (FS) in the interaction of public incentive firm performance

When the details of the regulatory effect are examined, it is observed that the effects of public incentives on financial performance increase as companies with R&D departments grow. However, this effect is small and not significant. On the other hand, as firms without R&D departments get smaller, their benefit from public incentives has a more positive effect on financial performance ($b = .169$, $p < .01$). In other words, the use of public incentives by small enterprises without R&D department reflects more positively on financial performance. As a result, if large firms with research and development departments benefit from public incentives, their financial performance increases more. The opposite is true for those who do not have R&D departments. Finally, it is understood that the existence of the research and development department and the size of the firm regulate the relationship between public incentives and financial performance. Thus, as large and corporate companies with high productivity have more opportunities to benefit from public incentives, when they receive supports such as R&D incentives, the increase in productivity was supported by the active use of the R&D department of the corporates (Guo et al., 2018, p. 18).

Since the relationship between non-financial performance and public incentives is not significant, it is understood that the relevant regulatory analyzes will not be meaningful. In this context, the H1b and H2b hypotheses were rejected.

6. Conclusion and Discussion

In this study, it is aimed to reveal how public incentives are a determinant of the performance of organizations. In this respect, when the effects of public incentives, having an R&D department and firm size are considered separately, a significant and negative effect on general and financial performance has been observed. It has been determined that having an R&D department, which is another aim of the study, and benefiting from public incentives together have a significant and positive effect on general and financial performance. In other words, it can be said that the negative effect of public incentive alone turns into a positive and significant effect with the regulation of the R&D department. Moreover, when the size of the firm (according to the number of employees) and whether it has an R&D department are evaluated together, it is revealed that it has a significant and positive effect on general and financial performance. In other words, while having a single R&D department or firm size has a negative effect, the regulatory role of two variables makes this effect positive and significant. In other words, R&D and firm size together played a regulatory role in the effect of public incentives on the firm's general and financial performance. In addition, when the effect of firm size, R&D and public incentives are examined together, it is revealed that there is a significant and negative effect on the general and financial performance of the firm. On the other hand, neither public incentives nor the use of R&D has a direct significant effect on the non-financial performance of the firms.

When the difference results of the research are examined, it is observed that the general performance of the firm is more in favor of international firms, and there is no difference in terms of public incentives. Again, according to the export status of the companies, it has been determined that exporting companies benefit from more public incentives, and there is no difference in terms of firm performance. From a sectoral point of view, it has been determined that manufacturing companies benefit more from public incentives and there is no difference in terms of firm performance. This result is similar to the studies by Kirca et al (2016, p. 637-639) emphasizing that technology assets (R&D) are much more important especially for multinational companies involved in manufacturing compared to service-based multinational companies. While no difference was observed between performance outputs in terms of firm size, it was observed that large and medium enterprises benefited more from public incentives than small enterprises. Finally, it has been determined that companies with R&D departments are more successful in terms of both public incentives and overall performance compared to those without a department.

In the literature, there are results in which government-supported incentives have significant effects on the performance of firms (Maden, 2012, p. 238-242; Kalkan, 2005, p. 4-5; Bellucci et al., 2018, p. 232; Wu et al., 2019, p. 1-18; Li and Sun 2020, p. 373). However, studies showing the negative effects of incentives in some cases are observed (Maden, 2012, p. 232-234; Chavez, 2019, p. 16-22; Karhunen and Huovari 2015, p. 805-820). It is also important that public supports should be used correctly and in accordance with the purpose of private companies. Otherwise, the performance of the firm may decrease

further or even if it increases financial performance in the short term, it may decrease performance in the long term if not used correctly. It has been confirmed that supports are an important factor affecting the performance of multinational firms in developing China (Sheng et al., 2011, p. 1-14). Again, the positive effect of R&D investments of multinational companies in China on their performance is similar to the results of this study (Zhang et al., 2007, p. 1-20). The results of Caleb et al (2021) confirm the regulatory role of R&D in the relationship between government support and innovation performance in emerging markets, in line with this study. Moreover, this study has similar results to the study proving that R&D intensity plays a moderator role between international firm activities and productivity in manufacturing firms in India (Bhattacharya et al., 2021, p. 10-12). It has also been confirmed that state aid for R&D activities in developing countries such as Turkey and Poland contributes positively to the innovation performance of companies in both countries (Szczygielski et al., 2017, p. 235-236). Kotabe et al (2002, p.95-96) found that when multinational companies invest heavily in R&D, they tend to promote overall firm performance through greater operational efficiency and better product innovation. However, Hitt et al (1991) and Artz et al (2010, p. 725-726) reached opposite results. This study confirms the combined and regulatory effects of R&D, firm size and public incentives on firm general and financial performance. In other words, the fact that small companies without R&D departments received government support increased their financial and general performance. In small companies with R&D departments, it was not observed that receiving government support dramatically (though not significantly) increased their financial and general performance. It has been observed that the financial and general performance of medium-sized enterprises with or without an R&D department has not changed. In large companies with R&D departments, it was observed that government support increased financial and general performance, but this increase was not statistically significant. On the other hand, it has been observed that large companies that do not have R&D departments receive government support, significantly reducing financial and general performance. We observe that these results have turned the negative effect of government support on firm performance in favor of those with R&D departments in Turkey. However, when considered together with the size of the firm, it can be said that the regulatory effect does not contribute much to the total change.

This study has limitations in terms of relatively small sample size and homogeneity. In addition, the study only asks whether they have an R&D department. Other dimensions related to R&D are not measured. Moreover, the participation of only administrators can be counted among other limitations. Subsequent studies may be in a scope where the R&D variable is measured in detail with more data sets and a more homogeneous distribution. In addition, an international perspective is presented by comparing developed and developing countries.

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Araştırma Makalesi

How do R&D and Firm Size Play a Role in The Relationship Between Public Incentives and Firm Performance?

Kamu Teşvikleri ve Firma Performansı İlişkisinde Ar-Ge ve Firma Büyüklüğü Nasıl Rol Oynar?

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Genişletilmiş Özet

Amaç

Bu çalışmanın amacı, Türkiye'de faaliyet gösteren şirketlerin büyüklüklerine göre uygulanan teşviklerden yararlanma düzeylerini ve bu teşviklerin performanslarına yansımalarını incelemektir. Teşvikler ve performans arasındaki ilişkinin incelenmesinde Ar-Ge departmanlarına sahip firmaların ve firma büyüklüklerinin etkileri birlikte tartışılmaktadır. Bunun yanı sıra kamu teşviklerinin firma bazlı finansal ve finansal olmayan performansı nasıl etkilediği irdelenmektedir. Dahası bu ilişkilerin firma büyüklüğü ve Ar-Ge departmanına sahip olma gibi durumların düzenleyici rolü incelenmektir. Bu bağlamda bu çalışmada, Ar-Ge departmanına sahip kurumsal ve sistematik firmaların devlet teşviklerinden yararlanma düzeyinin ve performans ilişkilerinin Ar-Ge departmanı olmayan şirketlerden farklılaşıp farklılaşmadığı tartışılmaktadır. Araştırmada ayrıca firmaların teşviklerden yararlanma düzeylerinin ve performanslarının ihracat yapıp yapmamalarına, Ar-Ge departmanına sahip olup olmamalarına, ulusal veya uluslararası düzeyde farklılık gösterip göstermediği de incelenmiştir. Hizmet veya üretim sektörünün kıyaslanmasının yanı sıra, firma büyüklüğüne göre farklılık gösterip göstermediği de ele alınmıştır. Bu bağlamda çalışma bu alanda öncü olması nedeniyle literatüre özgün bir katkı sağlamaktadır.

Yöntem

Araştırma evreni olarak İstanbul, Kocaeli, Bursa ve Sakarya illeri seçilmiştir. Bu illerin seçilmesinde tüm Türkiye'yi temsil etme yeteneği ve geçerliliği açısından kurumlar vergisi mükellefi işletme sayısı, yeni kurulan işletme sayısı, Türkiye'nin sanayi ve hizmet üretimindeki, ihracatındaki ve istihdamdaki paylarının ne kadar olduğu, Gayri safi yurtiçi hasıla üretiminde ilk 10 il arasında yer almakta ve toplam içerisinde önemli bir temsiliyet kabiliyeti bulunmaktadır. Türkiye'yi temsil etme açısından yeterli düzeyde örneklem yer aldığı söylenebilir (TOBB, 2018a; TÜİK, 2018b; TOBB, 2019). Ayrıca TÜİK (2018) verilerine göre Türkiye'de 2018 yılında istihdam edilen 289 bin 791 Ar-Ge personelinin %27,3'ü İstanbul'da, %7,4'ü Kocaeli, Sakarya, Düzce, Bolu ve Yalova'nın oluşturduğu bölgede, %5,97'si Bursa, Eskişehir ve Bilecik illerinden oluşan bölgede istihdam edildiği gözlenmiştir (TÜİK'e göre Gayri Safi Yurtiçi Ar-Ge harcamaları ve insan kaynakları, İstatistiki Bölge Birimleri Sınıflaması 2. Düzey, 2018). Bu kapsamda Türkiye'de Ar-Ge personeli istihdamında seçilen illerin %30'un üzerinde yer edindiğinden temsil kabiliyetine sahip olduğu görülmektedir.

Bu çerçevede belirlenen evren içerisinde örneklem büyüklüğü hesaplanarak minimum örneklem büyüklüğü hesaplanmıştır. Evrendeki teşvikten yararlanan ve Ar-Ge departmanı bulunan şirketler ile bu şirketlerde çalışmaya dahil edilmesi gereken yetkin personellerin tam olarak bilinmesi mümkün olmadığından, nüfus büyüklüğü belirlenirken örneklem büyüklüğü hesaplaması kullanılmıştır. Buna göre %95 güven aralığında %5 hata payı ile hesaplanan örneklem büyüklüğü 384 olarak belirlenmiştir.

Araştırma, seçilen illerde faaliyet gösteren üretim ve hizmet işletmelerinin yöneticileri de dahil olmak üzere 577 katılımcıdan oluşan bir örneklemi içermektedir. Örneklemi elde etmek için kolayda örnekleme yöntemiyle ulaşılan 1.150 katılımcıdan anketi doldurmayı kabul eden 603 katılımcıyla görüşülerek 577 kullanılabilir anket çalışmaya dahil edilmiştir.

Araştırmanın değişkenlerinden biri olan kamu teşviği, Choe ve diğerlerinin (2011) kullandığı dört soru, uzman görüşü doğrultusunda kültürel ve hukuki uygulama farklılıkları dikkate alınarak Türkçe'ye uyarlanmıştır. Güvenirliği ve geçerliliği oldukça yüksek olan kamu teşvik ölçeği gerekli analizler çerçevesinde değerlendirilmiştir.

Firma performansı, finansal ve finansal olmayan performans boyutlarını içeren 9 maddelik bir ölçek ile ölçülmüştür. Ölçek, katılımcıların şirketin son üç yılı dikkate alınarak yanıtlanması istenen ifadelerden oluşmaktadır. Bu ifadelerden bazıları "üretimle ilgili hedeflere ulaşmada başarılı, kalite ile ilgili hedeflere ulaşmada başarılı, kârla ilgili hedeflere ulaşmada başarılı" gibi sorulardan oluşmaktadır. Firma performans ölçeği oluşturulurken Baines ve Langfield-Smith (2003, s. 675-698) ile Li ve diğerlerinin (2006, s. 107-127) ölçeklerinden yararlanılmıştır.

Değişkenleri ölçmek için 5'li Likert (1=Kesinlikle katılmıyorum, 3=Kısmen katılıyorum, 5=Kesinlikle Katılıyorum) ölçeği kullanılmıştır. Değişkenlerin analizinde SPSS Paket Programı ve Process Macro programları kullanılmıştır.

Bulgular

Araştırmanın sonuçlarına göre, kamu teşviklerinden yararlanma düzeyi, Ar-Ge departmanlarının varlığı ve firmaların büyüklüğü, genel ve finansal performanslarını olumsuz ve anlamlı bir şekilde etkilemektedir. Teşviklerden yararlanan Ar-Ge departmanları olan şirketler, teşviklerden yararlanan büyük şirketler ve Ar-Ge departmanları olan büyük şirketler için bu ilişki olumlu ve anlamlı hale gelmektedir. Bu kapsamda yapılan detaylı analizlerde firmalar küçüldükçe kamu teşviklerinin firma (genel ve finansal) performansına etkisinde Ar-Ge departmanı olmayanlar lehine anlamlı bir etki görülmektedir. Üstelik bu durum Ar-Ge departmanına sahip olanlar için tam tersi bir etki meydana getirmektedir. Öte yandan, firma büyüdükçe kamu teşviklerinin genel ve finansal performans üzerindeki etkisinin Ar-Ge departmanı olan firmalar lehine önemli ölçüde arttığı gözlemlenmiştir. Diğer bir deyişle, Ar-Ge departmanı olan büyük firmalarda teşvik düzeyi arttıkça performans önemli ölçüde artarken, Ar-Ge departmanı olmayan büyük firmalarda teşviklerdeki artış performans ile negatif ve anlamlı bir ilişki göstermektedir.

Sonuç ve Tartışma

Bu çalışmada, kamu teşviklerinin örgütlerin performansı üzerinde nasıl bir belirleyici olduğunun ortaya konulması amaçlanmaktadır. Bu doğrultuda kamu teşviklerinin etkileri, Ar-Ge departmanına sahip olma ve firma büyüklüğü ayrı ayrı değerlendirildiğinde, genel ve finansal performans üzerinde önemli ve olumsuz bir etki gözlemlenmiştir. Çalışmanın bir diğer amacı olan Ar-Ge departmanına sahip olmanın ve kamu teşviklerinden birlikte yararlanmanın genel ve finansal performans üzerinde anlamlı ve olumlu bir etkisi olduğu tespit edilmiştir. Başka bir deyişle, kamu teşvikinin tek başına olumsuz etkisinin Ar-Ge departmanının düzenlemesi ile olumlu ve anlamlı bir etkiye dönüştüğü söylenebilir. Ayrıca firmanın büyüklüğü (çalışan sayısına göre) ve bir Ar-Ge departmanına sahip olup olmadığı birlikte değerlendirildiğinde, kamu teşviklerinin genel ve finansal performans üzerinde anlamlı ve olumlu bir etkiye sahip olduğu ortaya çıkmaktadır. Yani, sadece Ar-Ge departmanına sahip olmak ya da sadece firma büyüklüğüne göre değerlendirmek firma performansına olumsuz bir etkiye sahipken, hem Ar-Ge departmanına sahip olmak hem de büyük fşrma olmanın birlikte düzenleyici rolü bu etkiyi olumlu ve anlamlı hale getirmektedir. Diğer bir deyişle, Ar-Ge ve firma büyüklüğü birlikte kamu teşviklerinin firmanın genel ve finansal performansı üzerindeki etkisinde düzenleyici bir rol oynamıştır. Ayrıca firma büyüklüğü, Ar-Ge ve kamu teşviklerinin etkisi birlikte incelendiğinde, firmanın genel ve finansal performansı üzerinde anlamlı ve olumsuz bir etkisinin olduğu ortaya çıkmaktadır. Öte yandan, ne kamu teşvikleri ne de Ar-Ge kullanımının firmaların finansal olmayan performansı üzerinde doğrudan önemli bir etkisi yoktur.

Araştırmanın farklılık sonuçları incelendiğinde firmanın genel performansının daha çok uluslararası firmalar lehine olduğu ve kamu teşvikleri açısından bir farklılık olmadığı görülmektedir. Yine firmaların

ihracat durumlarına göre ihracatçı firmaların daha çok kamu teşviklerinden yararlandıkları ve firma performansı açısından bir farklılık olmadığı tespit edilmiştir. Sektörel açıdan bakıldığında imalatçı firmaların kamu teşviklerinden daha fazla yararlandığı ve firma performansı açısından bir farklılık olmadığı tespit edilmiştir. Bu sonuç Kırca ve arkadaşlarının (2016), teknoloji varlıklarının (Ar-Ge) özellikle üretim yapan çok uluslu şirketler için hizmet tabanlı çok uluslu şirketlere kıyasla çok daha önemli olduğunu vurgulayan çalışmasıyla tutarlıdır. Firma büyüklüğü açısından performans çıktıları arasında fark görülmezken, büyük ve orta ölçekli işletmelerin küçük işletmelere göre kamu teşviklerinden daha fazla yararlandığı gözlemlenmiştir. Son olarak Ar-Ge departmanı olan şirketlerin, departmanı olmayanlara göre hem kamu teşvikleri hem de genel performans açısından daha başarılı oldukları tespit edilmiştir.

Bu çalışmanın nispeten küçük örneklem hacmi ve homojenlik açısından sınırlamaları vardır. Ayrıca, çalışma sadece bir Ar-Ge departmanına sahip olup olmadıklarını soruyor. Ar-Ge ile ilgili diğer boyutlar ölçülmemiştir. Dahası, sadece yöneticilerin katılımı diğer sınırlamalar arasında sayılabilir. Sonraki çalışmalar, Ar-Ge değişkeninin daha fazla veri seti ve daha homojen bir dağılım ile detaylı olarak ölçüldüğü bir kapsamda olabilir. Ayrıca gelişmiş ve gelişmekte olan ülkeler karşılaştırılarak uluslararası bir bakış açısı sunulabilir.