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# The Role of Public Governance Practices for Business R&D Activity in the EU

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ABSTRACT

The public sector and public governance play a crucial role in the contemporary society which takes care of social needs. Therefore, it is not surprising that good governance has often been used to explain good economic performance as well as the well-being of a society over the last decade. However, the business sector often represents a channel through which public governance affects economic performance, which has largely been neglected in the existing literature. In this context, not much is known about the role of public governance in promoting research and development (R&D) in the business sector in the EU. Therefore, this article aims to explain the interaction between the public and business sectors in a cross-national setting by investigating the relationship between different public governance practices and business R&D activity. The aim is to be achieved by applying a multiple regression analysis on a cross-sectional dataset of EU member countries. The empirical results show the following. First, they reveal that, in general, public administration in the EU is predominantly based on neo-Weberian state rather than New Public Management governance practices. Second, they reveal that public governance practices have important implications for business R&D activity. They show that impartiality, accountability and efficiency enhance business R&D activity in the EU, while closeness deteriorates it. The findings of the article are especially beneficial for contemporary governments and policymakers to establish appropriate public governance and policy practices in the future.

*Keywords:* *business sector, EU, neo-Weberian state, New Public Management, public governance, R&D activity*

*JEL: H11, O38*

## 1 Introduction

In a society, the public sector, together with public governance, play an important role (Ropret et al., 2018). Precisely, the public sector delivers goods and services, redistributes income through mechanisms such as taxation or social security payments, and the ownership of assets or entities. On the other hand, effective governance provides better service delivery in order to achieve a higher quality of life for citizens. Contrarily, weak governance can deteriorate the investment environment and increase risks related to investment decisions in the business sector (Thanh and Hoai, 2019). It is therefore not surprising why good governance has often been used to explain the good economic performance as well as the well-being of a society over the last decade. Although the relationship between public governance and economic growth is well established in existing literature, most empirical studies ignore the fact that the business sector often represents a channel through which public governance affects economic performance. Namely, investment activity in the business sector represents a main part of the market economy. This is also supported by a recent opinion in literature that business investment is more directly associated with economic growth than public investment is (Ghura, 1997; Khan and Reinhart, 1990). Therefore, it is inevitable to establish such governance that ensures a more attractive investment environment for the business sector, especially in terms of R&D investments which are expected to be the most important investments in the future.

As not much is known about the role of public governance in promoting R&D activity in the business sector in the EU, the main aim of this paper is to establish the relationship between public governance and R&D activity in the business sector by considering different public governance practices in the EU member countries. Accordingly, the paper contributes to existing literature in the following way. It explains the interaction between the public and business sectors in a cross-national setting by investigating the relationship between public governance practices and business R&D activity. The remainder of this paper is structured as follows. After the introduction, a brief literature review and the theoretical framework are presented. The following section describes the data and research methods. In the next section, the empirical results are presented. The paper ends with a discussion and conclusion in which the main findings are summarized.

## 2 Literature review and theoretical framework

In existing literature there are not all too many papers that examine governance with regard to promoting R&D activity in the business sector in the EU member countries. One group of authors examined the relationship between good governance and economic growth (Knack and Keefer, 1995; Barro, 1996; Kaufmann et al., 1999; Hall and Jones, 1999; Kaufman and Kraay, 2002). They found a positive relationship between good governance indicators and economic growth. For the good governance indicators, they used six Worldwide Governance Indicators: 1) voice and accountability; 2) political stability and

the absence of violence; 3) government effectiveness; 4) regulatory quality; 5) the rule of law; and 6) control of corruption (World Bank, 2007, p. 2). The role of good governance is to ensure that the entities in a country always act in the public's interest. This can be achieved by a strong commitment to integrity, the rule of law, openness and comprehensive stakeholder engagement. The basic principles of good governance theory include accountability, control, responsiveness, transparency, public participation, economy, efficiency and etc. The main goal of this theory is to treat people not merely as customers or consumers, like in New Public Management, but as citizens. Moreover, "the citizens have the right to hold their governments to account for the actions they take or fail to take" (Ekundayo, 2017, p. 154).

Therefore, it is important that countries establish good governance that ensures a more attractive investment environment for the business sector (Aristovnik and Obadić, 2015; Ravšelj and Aristovnik 2018a; Ravšelj, 2019). One of the possible solutions is investment in R&D. It also matters for economic growth (Aghion and Howitt, 1992; Griffith et al., 2004; Inekwe, 2015; Ljungwall and Tingvall, 2015).

There are quite a number of studies as well as empirical evidence in existing literature regarding the effects of public R&D support, but the results vary. One group of authors (Branstetter and Sakakibara, 1998; Aerts and Schmidt, 2008; Czarnitzki and Lopes-Bento, 2011; Doh and Kim, 2014; Ravšelj and Aristovnik, 2018b) found positive effects of R&D support on firm performance and R&D investment, while other authors (Klette and Møen, 1999; Guan and Yam, 2015) did not find any effect produced by public R&D support. In a study by Guo et al. (2018) the effects of public R&D subsidies and how the governance of such grants influences those effects was examined on the basis of a case in China. Based on an analysis of a firm-level panel dataset between 1998-2007 they found that after receiving public R&D support, supported firms experienced a significantly higher increase in productivity than other firms. Petrin (2017) examined the impact and effectiveness of government support for R&D and innovation in the EU, OECD countries, China and Taiwan. The results showed that "the effectiveness of government support is greater when targeted to R&D expenditure and it diminishes with respect to its impact on firm innovation activities and macroeconomic outcomes that are the end goal of policy intervention" (p. 31). In addition to the aforementioned research, Capron (1992); Capron and Van Pottelsberghe (1997); David et al. (2000) also examined the effects of public financing on business investment in R&D activity. In the majority of EU member states, governments use fiscal incentives as direct support for public and private companies to encourage investment in R&D activity and innovation. The process of innovation promotes technological progress, but also endogenous economic growth.

To face the problems related to an ageing society, social security and healthcare costs, youth unemployment and public service infrastructure, governments can find a solution by means of public sector innovation. According to the Expert Group on Public Sector Innovation established by the Europe-

an Commission (2013), public sector innovation is defined "as the process of generating new ideas, and implementing them to create value for society either through new or improved processes or services" (p. 9). Based on their research they also found enabling factors that limit the development of innovation throughout Europe's public sector. These are innovation governance and public sector reform; diffusion and scaling up of good practices; smart regulations and responsive administrations; technology adoption; innovation procurement; funding issues, organizational learning and institutional innovation. Moreover, they found four broad categories of barriers to public sector innovation. These are "weak enabling factors or unfavorable framework conditions; lack of leadership at all levels; limited knowledge and application of innovation processes and methods; and insufficiently precise and systematic use of measurement and data" (p. 15). The characteristics of innovation in the public sector include networked governance, community governance and collaborative innovation. Arundel et al. (2019) found that a possible solution for public sector innovation needs to be greatly supported by the government for the data collection of a research program. If the public sector is oriented towards innovation, this can be reflected in greater national competitiveness, especially in the case of intensive interaction with an innovation-oriented business sector (Porter and Stern, 2002).

In the line with economic theory, four different public governance practices are considered in this paper. These are two Neo-Weberian State (NWS) (impartiality and closedness) and two New Public Management (NPM) practices (accountability and efficiency). These two concepts are namely considered to have different aims. On the one hand, the primary aim of the NWS is to focus on quality issues, and particularly issues relating to legality and equal treatment. Moreover, under this theory, the government remains a strong steering and regulating presence within society. In addition, government is steadily modernizing, professionalizing and seeking improved efficiency. On the other hand, the primary aim of the NPM is to increase flexibility and efficiency. The main attributes of NPM according to Gruening (2001) can be categorized as either undisputed or debatable. Examples of undisputed attributes are budget cuts, separation of provision and production, user charges, customer concept, vouchers, competition, freedom to manage, separation of politics and administration etc. The debatable attributes are legal budget constraints, improved regulation, democratization and citizen participation etc. This is also the reason why the NWS is more oriented towards input and processes, whereas the NPM is more output-oriented (Bringselius and Thomasson, 2017).

According to Weberian public administration, public administration should act impartially and public sector employees should be "personally free and subject to authority only with respect to their impersonal official obligations" (Weber, 1968, p. 333). The impartiality of public administration ensures that the rules are consistent and generalizable, which consequently enhances fairness and justice (Guy Peters, 2010). The aforementioned is often reflected in enhanced trust, which can lead to more innovative public administration (Fukuyama, 1995). Moreover, impartiality also has a beneficial effect on public

sector employees' motivation so that they perform their work better, which can ultimately be reflected in positive spillover effects on the society and the business sector, as well (Guy Peters, 2010). Furthermore, the shift from a supply-side towards a demand-side approach over the last decades can encourage business R&D activity (Edquist and Zabala-Iturriagagoitia, 2012; Petersen et al., 2016). In this context, impartial public administration provides the conditions for the business sector to feel free to ask for public support for R&D investment (Suzuki and Demircioglu, 2017). Similarly, the NWS emphasizes professionalization of public administration, which is closely related to impartiality (Pollitt, 2008). According to the theoretical framework, the following research hypothesis is proposed:

– Hypothesis 1: Impartiality as a NWS public governance practice is positively associated with business R&D activity.

Weberian public administration is often considered to have a closed bureaucratic structure (e.g. France and Spain), which limits discretion and motivation in the decision-making process. This system is characterized by formalized entries and promotion, internal promotion, strength of seniority rules and special labor laws that regulate the public sector. Contrarily, open bureaucratic structures (e.g. the United Kingdom) strongly resemble management in the business sector, since they allow flexibility (Dahlström and Lapuente, 2012). Accordingly, the aforementioned characteristics of an open bureaucratic structure stimulate the motivation to innovate, while the characteristics of a closed bureaucratic structure reduce the motivation to innovate. In general, open bureaucratic structures provide a variety of opportunities for interaction between the public and business sectors as well as public-private partnership and consequently for enhancing R&D activity in the business sector, while this is not the case for a closed bureaucratic structure. In the context of the NWS, authority is exercised through a hierarchical structure (Pollitt, 2008). Therefore, the following research hypothesis is proposed:

– Hypothesis 2: Closedness as a NWS public governance practice is negatively associated with business R&D activity.

Following the traditional aspect of accountability, where politicians and civil servants are liable to elected authorities, accountability within the NPM was established. This type of accountability is a shift from the political to the managerial sphere and from input and processes to output and outcomes (Fatemi and Reza Behmanesh, 2012, p. 42). Moreover, the main emphasis is on getting results and achieving goals. This can be improved by increasing the competencies of public institutions in a way that they create new and innovative products or services in parallel with business R&D activity. Accordingly, our proposed research hypothesis is:

– Hypothesis 3: Accountability as a NPM public governance practice is positively associated with business R&D activity.

Within the traditional approach of public administration, greater emphasis has been placed on rules and procedures, whereas the NPM approach is more

focused on the attainment of results and outputs. Therefore, the NPM encourages the government to concentrate on the efficient production of quality services (Manning, 2001). To achieve this, adopting private sector styles of management practices, especially the R&D activity of the business sector, is inevitable. Therefore, our proposed research hypothesis is:

– **Hypothesis 4: Efficiency as a NPM public governance practice is positively associated with business R&D activity.**

## 3 Data and research metods

The paper is focused on evaluating the relationship between public governance and R&D activity in the business sector by considering different public governance practices in the EU member countries. This paper utilizes a dataset which has been compiled from three different data sources. The first data source is the Quality of Government (QoG) Expert Survey, which contains information on the structure and behavior of public administration in different countries (Dahlström et al., 2015). The second data source is the QoG Basic Dataset, which consists of a wide variety of different variables at the national level from numerous different data sources (Dahlberg et al., 2019). The third data source is the Global Competitiveness Index Dataset 2015-2016, which contains information about the competitive landscape of different economies and provides a unique insight into the drivers of their economic growth (WEF, 2015). The aforementioned data sources, which are based on the opinion of academic and practical experts, are merged to create a comprehensive cross-sectional dataset of the EU member countries. Due to the availability of data, the latest available data for 2015 is considered in the empirical analysis.

The empirical analysis includes different types of variables, namely the dependent variable, independent variables and control variables. The dependent variable considered in the empirical analysis is business R&D activity at the national level of the EU member countries. It is derived from the individual indicator provided by the Global Competitiveness Index Dataset 2015-2016 and denoted as company spending on R&D. Actually, it is derived from the following question: "In your country, to what extent do companies invest in R&D?" Experts were asked to answer this question using a scale from 1 (do not invest at all in R&D) to 7 (invest heavily in R&D). The higher values of this variable indicate higher level of business R&D activity.

The empirical analysis employs four different independent variables, capturing different public governance practices, which can be recognized within the public administrations in the EU member countries. The independent variables capturing the NWS and NPM public governance practices are calculated as an average of the individual questions, where all of the independent variables are derived from the QoG Expert Survey Dataset. For the individual questions, experts were asked to answer these questions using a seven-point scale from 1 (hardly ever) to 7 (almost always).

As regards the NWS public governance practices, the first independent variable is impartially. It is constructed from the following two questions: 1) "Gen-

erally speaking, how often would you say that public sector employees today, in your chosen country, act impartially when deciding how to implement a policy in an individual case?"; and 2) "Public sector employees strive to follow rules." The higher values of this variable indicate more impartial public administration. The second independent variable is closedness. It is constructed from the following two questions: 1) "Entry to the public sector is open only at the lowest level of the hierarchy."; and 2) "The terms of employment for public sector employees are regulated by special laws that do not apply to private sector employees." The higher values of this variable indicate more closed public administration.

As regards the NPM public governance practices, the third independent variable is accountability. It is constructed form the following two questions: 1) "Citizens and media actors can track the flow of government revenues and expenditures"; and 2) "When found guilty of misconduct, public sector employees are reprimanded by proper bureaucratic mechanisms". The higher values of this variable indicate higher accountability of public administration. The third independent variable is efficiency. It is constructed from the following two questions: 1) "The salaries of public sector employees are linked to appraisals of their performance"; and 2) "Public sector employees strive to be efficient." The higher values of this variable indicate higher efficiency of public administration.

For the purpose of controlling other relevant factors that are expected to influence business R&D activity at the national level, control variables were taken into account. Due to a relatively small sample of EU member countries, it was not possible to consider a large number of control variables in the empirical analysis. Accordingly, control variables are limited to three crucial factors. The first control variable is government procurement of advanced technology products. It is derived from the following question: "In your country, to what extent do government purchasing decisions foster innovation?" Experts were asked to answer this question using a scale from 1 (not at all) to 7 (to a great extent). A higher level of this (incentive) variable indicates that a government fosters business R&D activity to a greater extent. The second control variable is human resources (availability of scientists and engineers). It is derived from the following question: "In your country, to what extent are scientists and engineers available?" Experts were asked to answer this question using a scale from 1 (not at all) to 7 (widely available). A higher level of this (infrastructure) variable indicates better availability of human resources. These two variables were obtained from the Global Competitiveness Index Dataset 2015-2016. The third control variable is government fractionalization. It is derived from the government fractionalization index provided by the QoG Basic Dataset, which measures "the probability that two deputies picked at random from among the government parties will be of different parties" on a scale of 0 to 1. A higher level of this (political competitiveness variable) indicates higher government fractionalization. A summary of all variables used in the empirical analysis is presented in Table 1.

Table 1: A summary of variables considered in the empirical analysis

| Variable | Scale | Source |
|---|---|---|
| Dependent variable | | |
| Business R&D activity | 1-7 | Global Competitiveness Index Dataset 2015-2016 |
| Independent variables | | |
| Administrative impartiality | 1-7 | QoG Expert Survey |
| Administrative closedness | 1-7 | QoG Expert Survey |
| Administrative accountability | 1-7 | QoG Expert Survey |
| Administrative efficiency | 1-7 | QoG Expert Survey |
| Control variables | | |
| Government procurement | 1-7 | Global Competitiveness Index Dataset 2015-2016 |
| Human resources | 1-7 | Global Competitiveness Index Dataset 2015-2016 |
| Government fractionalization | 0-1 | QoG Basic Dataset |

Source: authors' elaboration.

The impact of public governance practices on business R&D activity in the EU is estimated on the basis of a cross-sectional dataset of the EU-27 member countries (except Luxembourg), for which the data of all relevant variables is available. Given the nature of the variables considered in the empirical analysis, an ordinary least squares (OLS) regression analysis is employed. Due to the expected high correlations among the independent variables capturing public governance practices, each main independent variable of interest (public governance practice) is considered separately in the empirical analysis. The estimation is performed in two consecutive steps. In the first step, only the bivariate relationship between public governance practices and business R&D activity is estimated. In the second step, control variables are considered in order to check for other relevant determinants of business R&D activity at the national level as well as to check the robustness of the empirical analysis. The estimated multiple regression models are summarized and presented by Equation (1).

$$Business\ R\&D\ activity_i = \alpha_0 + \beta_1 Public\ governance\ practice_i + \beta_n Control\ variables_i + \varepsilon_i \quad (1)$$

Accordingly, business R&D activity is the dependent variable, $\alpha_0$ is the constant term, public governance practices is the independent variable (administrative impartiality, closedness, accountability and efficiency). These are followed by the control variables (government procurement, human resources and gov-

ernment fractionalization), and , $\varepsilon_i$ is the disturbance term. In this context, it is expected that public governance practices have important implications for business R&D activity by considering other relevant determinants of business R&D activity at the national level.

## 4 Empirical results

The paper is focused on estimating the impact of public governance practices on business R&D activity in the EU. Table 2 presents the descriptive statistics, namely the mean, standard deviation, minimum and maximum values for the variables considered in the empirical analysis. The comparison between the mean values of the main independent variables of interest provides interesting insights, based on which the popularity of individual public governance practices within the EU can be established. First, it reveals that impartially is the most prevalent public governance practice. Further, it exhibits that closedness and accountability are medium prevalent public governance practices. Finally, it shows that efficiency is the least prevalent public governance practice. Considering the NWS (impartiality and closedness) and NPM (accountability and efficiency) public governance practices together, the comparison reveals that, in general, public administration in the EU is still predominantly based on NWS rather than on NPM public governance practices.

Table 2: Descriptive statistics

| Variable | Mean | Std. Dev | Min | Max |
|---|---|---|---|---|
| Dependent variable | | | | |
| Business R&D activity | 3.970 | 0.922 | 2.751 | 5.549 |
| Independent variables | | | | |
| Administrative impartiality | 5.302 | 0.702 | 4.000 | 6.167 |
| Administrative closedness | 4.513 | 0.679 | 2.769 | 5.647 |
| Administrative accountability | 4.705 | 0.916 | 2.400 | 6.083 |
| Administrative efficiency | 3.775 | 0.805 | 2.300 | 5.231 |
| Control variables | | | | |
| Government procurement | 3.344 | 0.456 | 2.579 | 4.277 |
| Human resources | 4.517 | 0.591 | 3.480 | 6.060 |
| Government fractionalization | 0.379 | 0.243 | 0.000 | 0.743 |

Source: authors' elaboration, based on applied database.

Table 2 shows the correlation matrix, where Pearson correlation coefficients between variables considered in the empirical analysis are presented. Simple correlations between the dependent variable (business R&D activity) and the main independent variables (impartiality, closedness, accountability and efficiency) preliminarily support the proposed research hypotheses. As regards the correlations between the dependent variable (business R&D activity) and the control variables (government procurement, human resources and government fractionalization), they are also in line with the initial expectations. Due to the high correlations among the independent variables capturing public governance practices, an individual consideration of public governance practices is necessary in the empirical analysis. Moreover, the correlations between the independent variables and control variables do not indicate any strong linear relationship. This suggests that there is no issue of multicollinearity in the data.

Table 3: Correlation matrix

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Business R&D activity | 1 | | | | | | | |
| 2 | Administrative impartiality | 0.757*** | 1 | | | | | | |
| 3 | Administrative closedness | -0.502** | -0.509** | 1 | | | | | |
| 4 | Administrative accountability | 0.705*** | 0.799*** | -0.428* | 1 | | | | |
| 5 | Administrative efficiency | 0.703*** | 0.780*** | -0.508** | 0.763*** | 1 | | | |
| 6 | Government procurement | 0.767*** | 0.605** | -0.365 | 0.510** | 0.017** | 1 | | |
| 7 | Human resources | 0.577** | 0.377 | -0.174 | 0.323 | 0.298 | 0.431* | 1 | |
| 8 | Government fractionalization | 0.052 | 0.270 | -0.124 | 0.302 | 0.290 | 0.152 | 0.134 | 1 |

Note: 1) Significance: *p<0.05; **p<0.01; ***p<0.001.
Source: authors' elaboration, based on applied database.

The results of empirical analysis for the relationship between public governance practices and business R&D activity are presented in Table 4.

Table 4: The empirical results for the relationship between public governance practices and business R&D activity

| | **NWS MODELS** | | | | **NPM MODELS** | | | |
|---|---|---|---|---|---|---|---|---|
| | **Impartiality model** | | **Closedness model** | | **Accountability model** | | **Efficiency model** | |
| | **Model 1** | **Model 2** | **Model 3** | **Model 4** | **Model 5** | **Model 6** | **Model 7** | **Model 8** |
| Independent variables | | | | | | | | |
| Administrative impartiality | 0.994*** (0.172) | 0.484** (0.163) | | | | | | |
| Administrative closedness | | | -0.681** (0.235) | -0.315* (0.150) | | | | |
| Administrative accountability | | | | | 0.709*** (0.143) | 0.340** (0.116) | | |
| Administrative efficiency | | | | | | | 0.805*** (0.163) | 0.341* (0.153) |
| Control variables | | | | | | | | |
| Government procurement | | 0.839** (0.251) | | 1.065*** (0.244) | | 0.934** (0.238) | | 0.881** (0.277) |
| Human resources | | 0.367* (0.166) | | 0.435* (0.178) | | 0.384* (0-167) | | 0.430* (0.176) |
| Government fractionalization | | 0.695 (0.374) | | 0.876*** (0.396) | | 0.652 (0.380) | | 0.712* (0.403) |
| Constant | -1.301 (0.918) | -3.319*** (0.830) | 7.044*** (1.072) | -0.464 (1.278) | 0.634 (0.683) | -2.735*** (0.789) | 0.931 (0.628) | -2.473** (0.834) |
| Number of observations | 27 | 27 | 27 | 27 | 27 | 27 | 27 | 27 |
| $R^2$ | 0.573 | 0.802 | 0.252 | 0.768 | 0.497 | 0.800 | | 0.773 |
| Adjusted $R^2$ | 0.556 | 0.765 | 0.222 | 0.726 | 0.477 | 0.763 | | 0.732 |

Note: 1) Significance: *p<0.05; **p<0.01; ***p<0.001. 2) Standard errors in parentheses.

Source: authors' elaboration, based on applied database.

From the empirical results, it is evident that public governance practices play an important role in business R&D activity. First, the regression coefficient for administrative impartiality is positive and significant (see Model 1 and Model 2), suggesting that impartiality as an NWS public governance practice is positively associated with business R&D activity. This implies that administrative

impartiality, which is often reflected in consistent and generalizable rules, which enhance fairness, justice and trust, increase the motivation of public sector employees to be innovative within public administration, which can also have positive spillover effects on business R&D activity. Moreover, the shift from a supply-side towards a demand-side approach has led to the business sector being dominant in society. This confirms the first research hypothesis (Hypothesis 1), stating that impartiality as an NWS public governance practice is positively associated with business R&D activity. Second, the regression coefficient for administrative closedness is negative and significant (see Model 3 and Model 4), suggesting that closedness as an NWS public governance practice is negatively associated with business R&D activity. This implies that administrative closedness limits discretion and motivation in decision-making processes, flexibility, interaction between the public and business sectors as well as public-private partnerships, which can have adverse impact on business R&D activity. This confirms the second research hypothesis (Hypothesis 2), stating that closedness as an NWS public governance practice is negatively associated with business R&D activity.

Third, the regression coefficient for administrative accountability (see Model 4 and Model 5) is positive and significant, suggesting that accountability as an NPM public governance practice is positively associated with business R&D activity. This implies that administrative accountability, which in the context of the NPM resembles the managerial sphere in the business sector by emphasizing results and goals, can encourage the creation of new and innovative products or services in parallel with business R&D activity. This confirms the third research hypothesis (Hypothesis 3), stating that accountability as an NPM public governance practice is positively associated with business R&D activity. Finally, the regression coefficient for administrative efficiency (see Model 7 and Model 8) is positive and significant, suggesting that efficiency as an NPM public governance practice is positively associated with business R&D activity. This implies that administrative efficiency, by emphasizing results, outputs, efficient production of quality services and consequently private-sector styles of management practices, stimulate business R&D activity. This confirms the fourth research hypothesis (Hypothesis 4), which states that efficiency as an NPM public governance practice is positively associated with business R&D activity.

As regards the control variables, the empirical analysis shows that government procurement, human resources and government fractionalization are positively associated with business R&D activity, while only the regression coefficient of government fractionalization is not significant in each model (see Model 2 and Model 6). Nevertheless, the empirical analysis suggests that government procurement of advanced technology products represents an incentive driver of R&D activity in the business sector. Furthermore, it suggests that human resources are also very important for R&D activity, since they represent one of the infrastructure determinants in the business sector. Finally, government fractionalization, which measures political competitiveness, also seems to have important implications for business R&D activity.

## 5 Discussion and conclusion

In all EU-27 member countries innovation, especially digital innovation, should be accelerated in the public sector. Moreover, the benefits will be of both a financial and non-financial nature. For example, the financial benefits are the ability to increase the efficiency and reduce the costs of public services by creating e-government services, while the non-financial benefits are numerous, i.e. leadership and innovation skills in the public sector; attractiveness of the public sector as a place to work for highly talented people and trust in government. Therefore, the connection between the public and private sectors is necessary to achieve all these goals.

The interaction between the public and private sectors is very important and consequently both sectors should cooperate with each other and complement one another. Good governance is nowadays namely one of the important determinants of good economic performance, while the role of the private or business sector should not be neglected, since it represents a transmission channel through which public governance practices can be reflected in overall national competitiveness and economic performance. Despite the increased interest in the field of public administration, there is a lack of cross-national empirical evidence investigating the interaction between the public and private sectors. Therefore, the paper attempts to illuminate this relationship by investigating the relationship between different public governance practices and business R&D activity in the EU.

The results of the empirical analysis reveal that public governance practices play a very important role for business R&D activity in the EU-27 member countries. The empirical results show interesting outcomes. First, they reveal that, in general, public administration in the EU is predominantly based on NWS rather than on NPM public governance practices. Second, they reveal that public governance practices have important implications for business R&D activity. Namely, they show that impartiality, accountability and efficiency enhance business R&D activity in the EU, while closedness deteriorate it.

Public administration should pursue modern public governance practices, since they stimulate the private sector and R&D activity. However, not all NWS public governance practices are problematic. What is especially problematic is closedness, meaning that, in practice, decisions are made without consulting the public. Hence, governments should create practices of good public governance where new forms of politics, and layers of governance, both internationally and locally, emerge. Therefore, the interaction between the public and private sectors is very important for the creation of governance innovation. To achieve this, changes are inevitable, especially within institutional forms of government and organizational forms and arrangements for the planning and delivery of services to citizens. All of this can only be achieved by appropriate administration reforms. The history and current politics of every EU-27 member country plays a crucial role in shaping commitment to reforms. Reforms should consist in reforms of public tasks and services, organizational reforms, legal reform and technical reforms, i.e. e-government.

The findings of this paper are especially beneficial for contemporary governments and policymakers in order to establish appropriate public governance and policy practices in the future. Despite the interesting insights regarding the interaction between public governance practices and business R&D activity, some limitations should be recognized and acknowledged. This research is limited by the publicly available data for all the EU member countries. Therefore, we could not conduct a more detailed analysis. A recommendation for future research is to observe a longer time period for all the EU member countries and to expand the analysis by other variables.

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