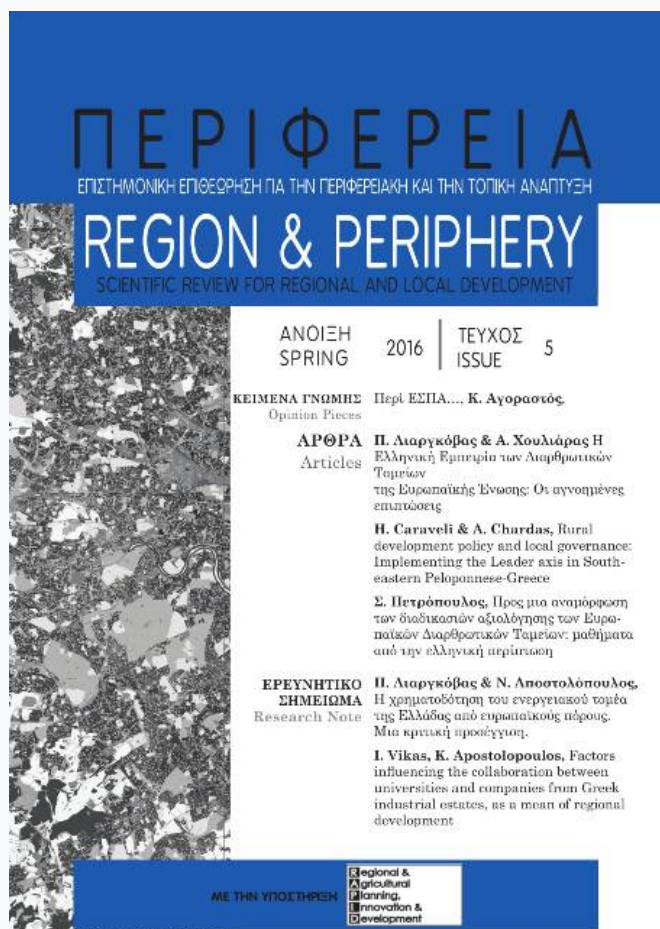


## Περιφέρεια | Regional Integration: Politics, Economics, Governance

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Παράγοντες ενίσχυσης της συνεργασίας μεταξύ των πανεπιστημίων και των επιχειρήσεων των Βιομηχανικών Περιοχών της Ελλάδας, ως μέσο προώθησης της περιφερειακής ανάπτυξης

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## Factors influencing the collaboration between universities and companies from Greek industrial estates, as a mean of regional development

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### Abstract

The industrial estates of Greece and their companies create poles of regional development and local innovation centers. The development of collaboration between universities and local business centers can benefit the local economy and society. The current research, spreads in 100 companies from 19 industrial estates of Greece. It aims to indicate important factors that influence the collaboration between universities and companies from greek industrial estates. The data were collected during 2013, through a structured questionnaire. Selected variables from the questionnaire were used in order to build a logistic regression model.

The results indicate that the degree of collaboration between universities and companies is positively influenced by the number of employees in the company and by the degree of collaboration between the company and the local administration institutions. On the other hand, it is negatively influenced by the size of the industrial estate that the company operates and by the lack of company's information knowledge.

**KEYWORDS:** Industrial Estates, Universities, Synergies, Clusters, Regional Development

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### Περίληψη

Οι Βιομηχανικές Περιοχές της Ελλάδας και οι επιχειρήσεις που τις αποτελούν δημιουργούν πόλους περιφερειακής ανάπτυξης και τοπικά κέντρα καινοτομίας. Η ανάπτυξη της συνεργασίας μεταξύ των πανεπιστημίων και των τοπικών επιχειρηματικών κέντρων μπορεί να ωφελήσει σημαντικά την τοπική οικονομία

και κοινωνία. Η παρούσα πρωτογενής έρευνα, επεκτείνεται σε 100 επιχειρήσεις από συνολικά 19 Βιομηχανικές Περιοχές της χώρας και αναδεικνύει ορισμένους σημαντικούς παράγοντες ενίσχυσης της συνεργασίας των πανεπιστημίων και των επιχειρήσεων. Η έρευνα διενεργήθηκε το 2013 μέσω δομημένου ερωτηματολογίου και αντλήθηκαν συγκεκριμένες μεταβλητές για τη δημιουργία ενός μοντέλου πολλαπλής γραμμικής παλινδρόμησης.

Από τα αποτελέσματα φαίνεται ότι ο βαθμός ανάπτυξης συνεργασίας μεταξύ επιχείρησης και πανεπιστημίου επηρεάζεται θετικά από τον αριθμό των εργαζομένων της επιχείρησης και τον βαθμό ανάπτυξης συνεργασίας μεταξύ της επιχείρησης και οργανισμών της τοπικής αυτοδιοίκησης. Αντιθέτως επηρεάζεται αρνητικά από την έλλειψη πληροφόρησης και από το μέγεθος της Βιομηχανικής Περιοχής στην οποία είναι εγκατεστημένη η επιχείρηση.

**ΛΕΞΕΙΣ-ΚΛΕΙΔΙΑ:** Βιομηχανικές Περιοχές, Πανεπιστήμια, Συνέργειες, Clusters, Περιφερειακή Ανάπτυξη

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## 1. Introduction

Universities have a very important contribution to the economical and social situation of a country. The collaboration between education and business leads in the flow of knowledge and can create the ideal conditions for the promotion of new technology and innovation (Bektas & Tayauova, 2014). The promotion of new knowledge in companies is a factor that enhances their competitiveness and productivity. There is a positive relationship between the flow of knowledge and the economic development.

Universities may be a part of a wider cluster and can develop their collaboration relationship with local businesses and local industry (Ostergaard, 2009). This way they contribute to the local regional development and create local innovation centers. The collaboration between universities and companies leads to the flow of knowledge and creates positive conditions for the promotion of innovation (D'Este & Patel, 2007). The relationship that is made helps the company develop its Research and Development department and benefit from the technical support and the expertise knowledge (Grossman et al., 2001). Despite this it can't be taken for granted for every case that this collaboration will increase innovation and make a profit for the business (Guan et al., 2005).

Research has as a goal the creation and transfer of knowledge. The universities offer to society through research and training. The goal of universities should expand in the transfer of knowledge towards the business world and the society in general. The use of the created knowledge and its adaptation in order to be beneficial, may start in its initial face at the local community where the

university operates. The research activity of the universities should therefore be in accordance with the needs, the conditions and the characteristics of the local economy (Lester, 2005).

## **2. The need for collaboration between universities and business**

The universities offer new technical knowledge which is necessary for the creation of new innovative activities, which focus on the development of new technologies and market products. These innovative activities may have sometimes uncertain results and low demand from the companies. That leads only businesses from particular sectors to develop the transfer of know-how with research institutions (Jensen et al., 2003). Those companies that consider the promotion of innovation as an important part of their business strategy are more likely to develop the collaboration with universities (Veugelers & Cassiman, 2005).

The promotion of knowledge through empirical learning, namely through the every-day operations of the business, may inhibit the collaboration between universities and companies since the benefits of such a collaboration could be considered as minor (Nowotny et al., 2001). The limits between the academic and the business community should be minimized, so that the empirical learning will be connected with the academic learning (Shinn & Lamy, 2006). The universities act as a mean that brings companies in contact with the international academic community (Bramwell & Wolfe, 2008).

There is a widespread concept that universities offer mostly theoretical and general knowledge without focusing on the practical use that will be applied on a business. This has as a result the need of extra training, when an employee firstly enters the market. The new employees tend to have difficulty in team work, low degree of leadership, low degree of self-esteem and a general problem of adapting quickly to a new working environment. On the other hand, their strong theoretical knowledge background gives them the ability to be versatile, innovative and deal with different issues (Alfonso et al., 2012).

There are also qualitative and quantitative differences between universities and employers. The quantitative differences concern the mismatch of the total number of students and the total number of available working positions in certain sectors. The qualitative differences concern the mismatch between the characteristics that the degrees offer to a student and the demands of the labour market. This is observed even at the PhD level, since a PhD focus more often to the academic research than to the market demands. An important issue for the companies is for example the time-limits and the actual profit, but a PhD has a different overall perspective (Mora Valentin, 2000).

The collaboration between universities and companies expands mostly to the participation of private business professionals in university teaching and to the students' internships in companies (Alfonso et al., 2012). The teaching of private business professionals in universities enhances the practical knowledge and delivers experiences from the real working-life to the students. The internships enhance also the education of a student and makes them more competitive in the business world. It represents a great first step in the entrance of the students to the market and it gives the companies an opportunity to make contact with young educated people that can become a valuable part of the company (Gertler & Vinodrai, 2005).

### **3. Industrial Estates, Clusters and the promotion of innovation**

An industrial estate is a geographical area designed to host a number of businesses and is characterized by the common infrastructures and the proximity of the businesses (UNEP, 2001). Within an industrial estate there are favorable conditions for the development of innovation, because of the concentrated high skilled human resources, the intense conditions of competition and collaboration between the companies and the flow of knowledge (Muscio, 2006). This is the reason why industrial estates are also considered as local innovation centers (Coro & Micelli, 2007). The collaboration between an industrial estate and a university may bring important benefits to both partners (Muscio et al., 2012).

The industrial estates contribute significantly to the economic and industrial development. They increase the industrialization rate of the country, they attract private investment, they increase the employment at regional and national level and they promote the development of small and medium enterprises (UNEP, 2001). The industrial estates encourage the more efficient usage of the national resources, through the development of high scale industrial clusters and they achieve economies of scale in the public infrastructure.

They also promote the urban and regional development by preventing one-sided development of particular urban centers, by regulating the flow of industry location, by enhancing the economic base of small and medium towns and by maximizing the efficiency of the utilized land (Maggana-Kakaounaki, 1990:36-40). The industrial estates represent the core of the economic development in the area that they operate and benefit the local society through the increase of the employment and the business activity.

The companies of an industrial estate benefit from the cooperation and the interaction with the neighboring companies. Industrial estates create therefore

the ideal conditions for the creation of clusters. A business cluster is formed by a group of companies that operate in a specific area and interact with each other (Porter, 2003). Universities, research institutions and regional local authorities can also be part of a cluster.

The clusters represent an important factor in the economic development of a region and give the opportunity to small and medium enterprises to be competitive at a local and at an international level. They also contribute in the creation of wider business networks. The study of their function helps the comprehension of the regional development, since it focuses on a group of enterprises (Cortright, 2006).

For the creation of a cluster there are certain requirements like the geographic proximity of the firms, the existence of common interests and the right communication between the partners. The geographical proximity helps the building of lasting relationships and synergies between the companies. Even though the geographic proximity creates some disadvantages like the quick copy of new technologies and new innovative products by other companies, the intense competitive environment and the possible leaving of qualified employees to other companies (Gordon & McCann, 2000), the advantages of the geographic firm proximity are very important for the involved partners and for the creation of a cluster.

Another important element is the creation of new knowledge, since the cluster becomes a knowledge development center (Tallman et al., 2004). The competition between the neighboring companies leads to the evolvement of innovation, in order to remain competitive. The flow of knowledge and information within a cluster and the open approach to new ideas, new technologies and new business relationships and partnerships can lead to improved business efficiency. The main reason for the increase of innovation within a cluster is the quick flow of information and knowledge within it (Dahl & Pedersen, 2004). The external environment plays also an important role for the competitiveness of a cluster. The more stable the economic and business environment the higher will be the effectiveness of the business cluster (Eisingerich et al., 2010).

The most important benefits from the participation of a company at a cluster are the easier access to new technology and new markets, the direct and timely information flow, the improved bargaining ability, the participation in joint funding programs, the easier access to qualified personnel, the development of innovation and increase of the competitiveness. The clusters contribute to the enhanced entrepreneurship and can provide a competitive advantage (Morosini, 2004), in particular to the new businesses that start their operation within it (Gilbert et al., 2008). There is also a positive impact to the local society and local economy with the increase of employment and development.



The success of a cluster can't be taken for granted, because factors like the lack of trust among its members, the difficulty in reaching common targets, the negative approach in the attempted networking and the lack of the required resources may lead to the failure of the cluster. It has also been observed that companies with a low-cost business strategy had a lower success rate within a cluster, than companies that had a differentiation strategy (Canina et al., 2005). The companies that differentiate from each other within a cluster have higher success than those who do not differentiate (Baum & Haveman 1997). New companies that have recently started their operation receive also greater benefits (McCann & Volta, 2011). There are thus various important factors that must be taken into account by companies before they start to operate in a cluster, in order to derive greater benefits from their participation in it.

#### 4. Empirical Research

The research focuses on all companies that are located in the industrial estates of Greece, apart from the firms that are purely commercial or service oriented. The data was collected during 2013, through a structured questionnaire that was addressed to all the relevant companies and the sample includes 100 enterprises from 19 industrial estates of Greece (Thessaloniki, Iraklion, Volos, Patra, Ioannina, Komotini, Tripoli, Larisa, Kavala, Lamia, Drama, Preveza, Alexandroupoli, Edessa, Kefalonia, Kilikis, Xanthi, Serres and Florina and the industrial region of Inofita, Viotia).

The research therefore covered all of the industrial estates of Greece and included companies from different sectors, the majority of which were from the foods and beverages sector (22%) and the metal products sector (21%). Ninety percent (90%) of the firms from the sample are small and medium enterprises. The small and medium enterprises represent the vast majority of firms in the Greek industrial and the food & beverage and metal products sector are the two predominant sectors in the Greek industrial estates (ETVA VIPE, 2012). The number of companies in the sample surpasses the 10% of the total examined population.

In the tables above there are presented the percentages of companies in relation with the number of employees and annual revenues.

Number of Employees	Company Percentage from the Sample
0 - 9	48 %
10 - 49	33 %
50 - 250	14 %
250 and above	5 %

Annual Revenues	Company Percentage from the Sample
until 2 million €	59 %
2 until 10 million €	22 %
10 until 50 million €	9 %
50 million and above €	10 %

## 5. Research Methodology

The main objective of the research is to identify some of the common factors that enhance the cooperation between the companies from the Greek industrial estates and the universities.

Selected variables from the questionnaire were used in order to build a linear regression model. The dependent variable is the degree of collaboration between the companies and the universities, which is a quantitative variable that is measured in a 7-level Likert scale. Although different variables appeared to have a correlation with this dependent variable, the final model included four variables. The effect of other variables to the dependent variable was lowered due to the intercorrelation among the variables of the model.

Four different variables are used as independent variables: the number of employees, the lack of company's information knowledge, the size of the industrial estate where the company operates and the degree of collaboration between the company and public administration institutions. The model will therefore be:

Degree of Collaboration with Universities  $y_i = b_0 + b_1$  number of employees  $+ b_2$  lack of information  $+ b_3$  industrial estate's size  $+ b_4$  degree of collaboration with public administration institutions

It is considered that the degree of collaboration between the companies and the universities is affected by the number of employees of the company, by the lack of information by the company, by the size of the industrial estate where the company operates and by the degree of collaboration between the company and public administration institutions. The first independent variable is the number of employees and is a quantitative variable. The second independent variable is the lack of information by the company. This variable expresses the degree of company's lack of information in relation with development actions, namely if the lack of knowledge and information represents an obstacle for the development actions of the company. It is a quantitative variable measured in a 7-level Likert scale. The third independent variable is the size of the industrial estate. It is a qualitative dichotomous variable, that separates the industrial estates of the sample into large and small, in accordance with the number of the companies that operate in them. For the needs of the current research the



industrial estates that have more than 80 companies are considered as large. Those are the industrial estates of Thessaloniki, Iraklion, Volos, Patra, Ioannina, Komotini and Tripoli. The rest industrial estates of Larisa, Kavala, Lamia, Drama, Preveza, Alexandroupoli, Edessa, Kefalonia, Kilikis, Xanthi and Serres are considered as small. Some of the industrial estates that are considered as large for the standards of Greece, would be regarded as small for the international standards. The fourth independent variable is the degree of collaboration with public administration institutions. This variable expresses the degree in which the company collaborates with the public administration institutions. It is a quantitative variable and is measured in a 7-level Likert scale.

## 6. Results

As it can be implied from the next table there is a statistical significance for all 4 of the independent variables used in the model. The b coefficient and the statistical significance are presented.

	Model
Constant	2,246
Number of Employess	,716 ***
Lack of Information	-,322 ***
Industrial Estate Size	-,882 **
Collaboration with public administration institutions	,342 ***
R <sup>2</sup>	,404

Note: \* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$

The number of employees has been found to be statistically significant at the level of 1% ( $p = 0,003$ ). The coefficient b is positive and shows that companies that have a higher number of employees collaborate more with universities.

The lack of information has been found statistically significant at the level of 1%

( $p = 0,002$ ). The coefficient b is negative and shows that companies that lack information and knowledge, collaborate less with universities.

The industrial estate size has been found statistically significant at the level of 5%

( $p = 0,031$ ). The coefficient b is negative and shows that companies that operate in larger industrial estates, collaborate less with universities.

The collaboration with public administration institutions has been found to be statistically significant at the level of 1 % ( $p = 0,003$ ). The coefficient b is positive and shows that companies which collaborate more with public administration institutions, collaborate more also with the universities.

## 7. Discussion

The model presented above highlights some significant factors that affect the collaboration between companies from industrial estates and universities. This research depicts a quantifiable relation that best describes the degree of collaboration between companies and universities and the specific factors, rather than conclusively indicating that these are the only possible factors affecting. Other factors may play also an important role, but their effect is lowered due to their correlation with other variables of the model.

The number of employees in the company is a factor that is related with the company size and is positively affecting the degree of collaboration with universities. This comes to an agreement with similar studies that highlight the positive relationship between the size of a company and the level of collaboration with universities (Laursen & Salter, 2004). Obviously, when a enterprise has sufficient and numerous employees, it can provide more human resources and time in the development of such a collaboration.

The companies that have a lack of information and knowledge in relation to their development activities have a lower degree of collaboration with universities. This comes to an agreement with similar studies which showed that companies that lacked knowledge in relation to the innovation process had a lower degree of collaboration with universities (Veugelers & Cassiman, 2005). Companies that do not have sufficient information and knowledge about such issues, have a lower degree of collaboration with universities. Therefore, they do not appear to have an open business culture and to emphasize on issues as innovation, development and progress.

The size of the industrial estate affects negatively the degree of collaboration with universities. This means that firms in smaller industrial areas exhibit a greater degree of cooperation with universities and vice versa. The small number of companies makes easier the communication, coordination and cooperation between them and seems to have a positive effect in their collaboration with universities. Smaller industrial estates are mainly located near smaller urban centers and have a greater need for collaboration with universities and other institutions in the nearby region.

The collaboration with local administration authorities affects positively the cooperation with universities. Many cluster synergies involve companies, universities, research institutes, local authorities and other agencies who work together to create networks in models of clusters (Cortright, 2006). There are also many funding programs that require the creation of partnerships between companies, universities, public administration authorities and other agencies.

## 8. Conclusions

The collaboration between universities and businesses can benefit significantly the local community and economy. The industrial estates and the academic institutions promote the regional development and their cooperation can provide significant advantages for the whole region, where they operate. Larger companies and companies that have developed collaboration with other bodies such as local administration authorities, exhibit a greater degree of collaboration with universities. Smaller industrial areas also exhibit a greater degree of collaboration with universities.

The development of cooperation with universities, appears more in companies with the aforementioned characteristics and universities are likely to have more chances in developing collaboration if they target large enterprises, that are located in smaller industrial areas, which have already developed partnerships with other agencies and exhibit the corresponding open corporate culture.

The fact that the Greek State considered the development of new universities and new industrial estates as a mean of regional development had as a consequence the large number of universities and industrial estates that spread all around the country. This incident needs to be exploited both by universities and industrial estates since they represent two main development factors for the region where they operate and their geographic proximity must be capitalized by creating strong bonds of collaboration with each other.

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