

NEW TENDENCIES IN REGIONAL AND URBAN DEVELOPMENT IN EUROPE

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UNIVERSITY AND ECONOMIC RESTRUCTURATION
IN POSTINDUSTRIAL METROPOLIS:
THE CASE OF MADRID METROPOLITAN REGION

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1.- The university answer to the latest tendencies of the metropolis.

The most dynamic metropolis think about promoting technology creation and development as the modernization instrument for all kind of activities, specially the innovative ones (specialized manufacturing and advanced services). It is also considered the best way to generate more wealth, employment and to get greater protagonism and competitiveness in the present stage of economic globalization.

These activities require specific spatial, environmental and infrastructural characteristics, besides greater labor force specialization and qualification. The development of the most advanced services and the "high technology" industry can not put aside base research and adequate technical and professional education; the importance of the university must intend a greater level in these aspects. As it is said by SEVARY,A. (1986), the University as a development agent is dealing with obvious limitations, in spite of which it can play an interesting animation, creation and development function, together with its training activities. T. SAINT-JULIEN (1991, p.207) resembles the technopoly concept to the advantages the agglomerations could obtain from the proximity between higher education centers (universities and advanced technical schools) and the entrepreneur business conglomerate.

The University must fit in with the present postindustrial metropolitan society, reorientating research and instruction to the new social priorities (BARTOLOME,M. 1990). It should be capable of encouraging a "university -city symbiosis", that means a greater university integration in the physical, social and economic space (VALENZUELA,M. 1991). Consequently, it could channel its effort to give an answer to the needs of the productive system in new and advanced knowledge and highly educated workforce. All these would be very useful in the case of formerly industrial regions to adapt themselves to new fuctions.

In order to maximize the relation between technological development and productivity, is very suitable the university become a flexible institution, closely related with the economic and social agents and able to fit its training and researching activities to the social requirements, altogether with an accentuated interest to the scientific-technological production (CASTELLS,M. 1989).

On the other hand, the enterprises are being considered nowadays as a potential source of economic resources and as a desirable partner in specialization courses and practice stages for the students (QUINTANILLA,M.A. 1989), mostly when the universities suffer periods of budgeted cutting. This present reality leads them almost unavoidably to their local surrounding in order to get funds, increasing at the same time their ability of working in collaboration with the local business from an entrepreneurial perspective (VAN DER MEER,E.G. 1992). Going further in our discussion, there are many practical advantages of all kind the university obtains from its outward activity, together with the urgent need the academic activity has of linking itself with its own social and economic environment; that would make possible to break endemic positions of isolation with the risks of lowering the quality and nimbleness of its scientific production (PINCHAMEL,P. dir. 1973 p.49). All this kinds of arguments has supported the university opening to a "partnership system" dynamic so spread nowadays in the public administration -enterprises relationship.

2.- The spanish institutional framework of university - enterprise cooperation.

Accommodating the industrial- services sector to the late technological changes requires an active partnership of the universities; they are expected to be able to generate a new scientific knowledge with applications to the productive industrial sector and, as educational institutions, to provide high quality specialized professional courses. The spanish University has been very recently orientated to the enterprises

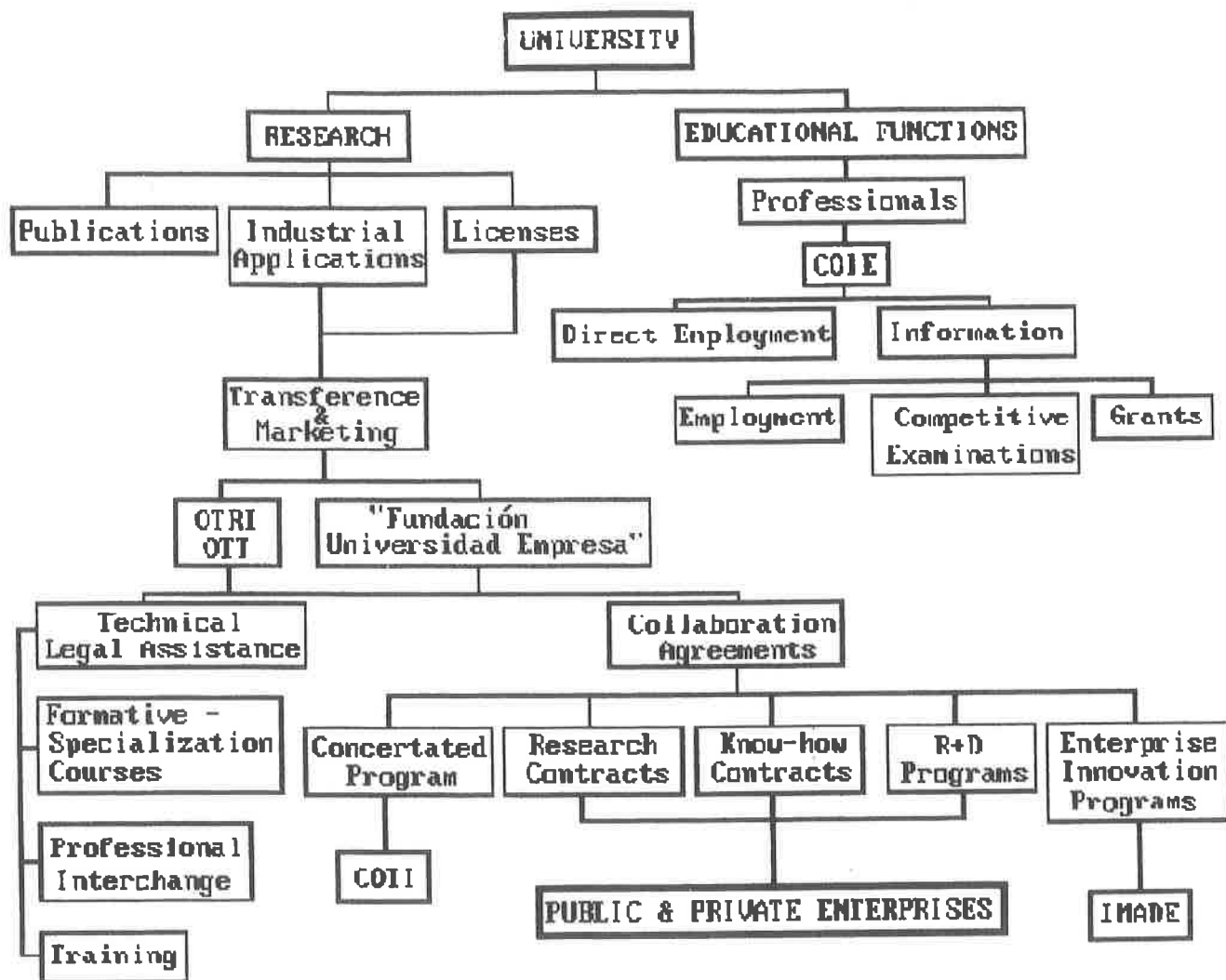


Fig. 1 University - economic system relationship as shown by Madrid universities experiences.

CDTI : "Centro para el Desarrollo Tecnológico e Industrial".
Technological and Industrial Development Center.

COIE : "Centro de Orientación e Información del Empleo".
Employment Information and Orientation Center.

IMADE: "Instituto Madrileño de Desarrollo".
Development Madrid Institute.

OTRI : "Oficina de Transferencia de Resultados de la Investigación".
Research Results Transfer Office.

OTT : "Oficina de Transferencia de Tecnología".
Technology Transference Office.

and simultaneously the enterprises are turning to the university. This relationship has arrived to produce some types of partnership as shown in Figure 1.

The 1983 University Reform Law ("Ley de Reforma universitaria", Chap.11), as much as the ruling Scientific Research and Technological Development Plan ("Plan de Investigación Universitaria Científica y Desarrollo Tecnológico"), intends to increase university - enterprise relations for a better profit of human resources and researching potential. There was a previous effort of university and enterprise approximation in the creation in 1973 of the University - Enterprise Foundation ("Fundación Universidad - Empresa") as initiative of the Madrid Chamber of Commerce and the University, with the aim of increasing the relations between universities and different enterprises and institutions in matters related to research and training (See fig. 5).

The Research Transfer Offices (OTRI) were thought as specialized offices dealing with the linkage between universities and enterprises. They have already been created in quite a number of public universities and are coordinated and supported in those functions by the Technology Transference Office (OTT), which is integrated in the National Secretary of the R+D Plan and also connected with the Research Result Transferring Incentive Program (PETRI). The OTT collaborates with the General Scientific and Technological Research Direction in the negotiation of a Researchers Interchange Program between industry and Research Public Organizations (OPIS). On the other hand, the European Community COMETT Program for university - enterprise Cooperation also works in this direction.

3.- University Structure of Madrid.

During the last two decades, the five public universities located in Madrid have undergone a great academic and spatial expansion, linked with the demographic dynamics, the economic development and the political change occurred in 1975. The only

university existing in Madrid before 1968 was the "Complutense" situated at the northwest border of the urban built up continuum in its own University Campus; it was planned by Alfonso XIII during the twenties. In the late sixties the Universidad Autónoma was created under the functionalist criteria (peripheral and isolated campus) and suffering of certain political suspiciousness.

The "Universidad Politécnica", though academically segregated, shares from the seventies the historic university campus with the "Universidad Complutense"; in the same decade (1976) the XVth century born University of "Alcalá de Henares"¹ was refounded. An ambitious program of regenerating its historic heritage has been undertaken to allocate the university centers (AA.VV. 1990). The latest born university has been the "Universidad Carlos III"², conceived as a requalification instrument for the metropolitan periphery ; it is one of the actions undertaken to redistribute the central functions, located traditionally in the municipality of Madrid. The creation of the University "Carlos III" belongs to a regional program not finished yet. The Open University (UNED) also has its headquarter in Madrid, although its students are spread all over the nation.

The main numbers of the Madrid university system can be found in Table I and Map 1. The private universities, just created, and the Catholic Church ones have not been considered in this paper, due to the lack of information about their relations with the enterprises. These relations, in any case, would be quite different from the public ones, as these universities themselves are, on an important way, private enterprises.

¹ "Alcalá de Henares" is the main city of the active industrial corridor of the Henares Valley.

² This university is located in Getafe, one of the municipalities belonging to the Metropolitan Southwest "corridor".

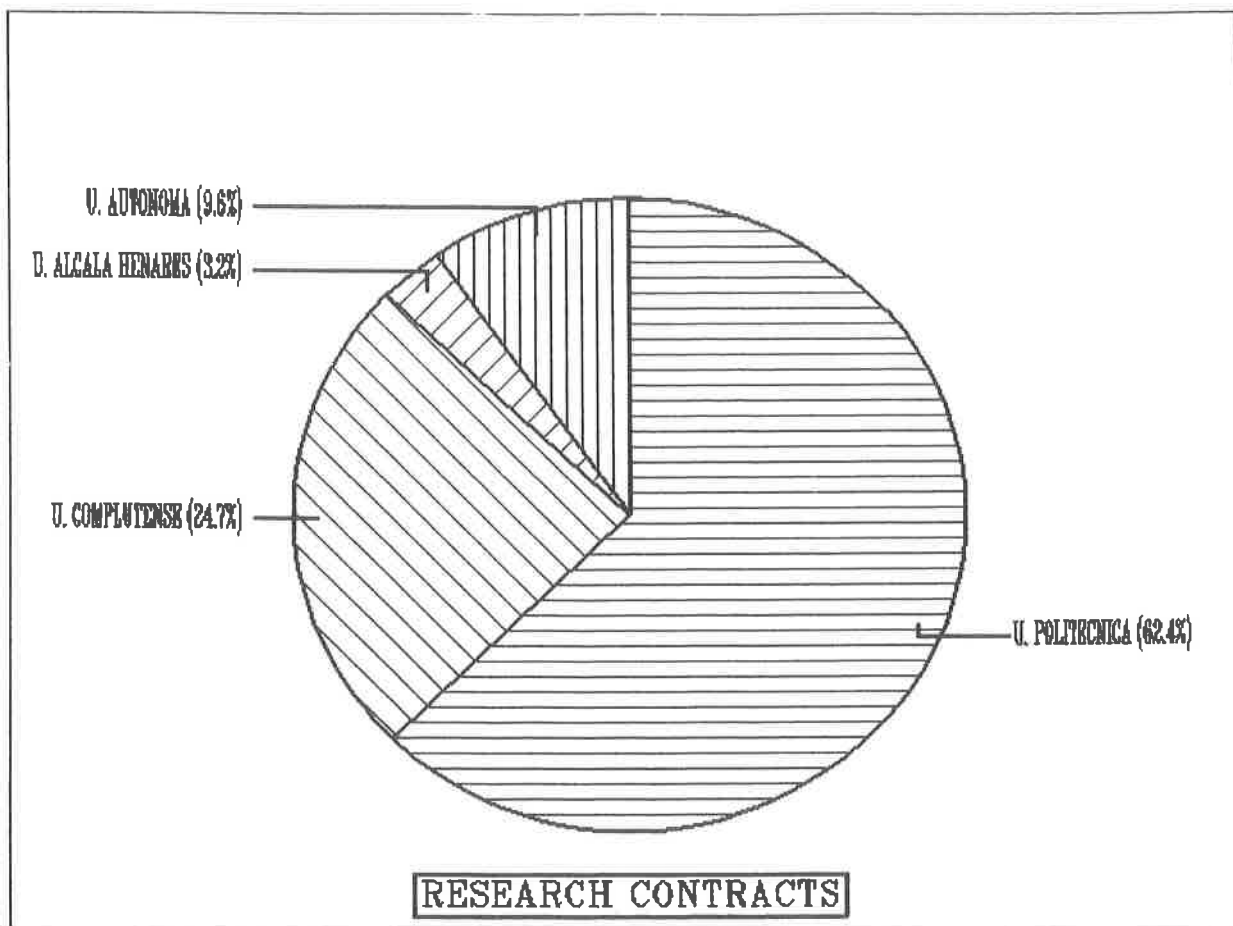


Fig. 2 Public Universities located in Madrid.

Source: Guía de la Universidad 1991. Consejo de Universidades Secretaría General.

Table I

Public Universities located in Madrid

	UNIVERSIDAD ALCALA HENARES	UNIVERSIDAD AUTONOMA	UNIVERSIDAD CARLOS III	UNIVERSIDAD COMPLUTENSE	UNIVERSIDAD POLITECNICA
CENTERS	13	19	2	59	24
STUDENTS	12.015	30.381	1.967	113.821	45.509
ACADEMIC STAFF	874	1.764	166	5.324	3.005

Source: Guía de la Universidad 1991. Consejo de Universidades. Secretaría General.

Public Universities in Madrid:

- (A) UHA: Universidad de Alcalá de Henares
- (B) UAM: Universidad Autónoma de Madrid
- (C) UC III: Universidad Carlos III
- (D) UCM: Universidad Complutense de Madrid
- (E) UPM: Universidad Politécnica de Madrid
- UNED: Universidad Nacional de Enseñanza a Distancia (Open University)

4.- Case study: a decade of collaboration between the enterprises and the universities at Madrid level.

The empiric case chosen has been supported by the study of the research agreements signed between departments and schools of the Madrid universities and enterprises located in this metropolis and negotiated by "Fundación Universidad Empresa" from 1978 to 1991 .

The relationship between university and enterprises is justified not only by the number and qualifications of the academic institutions, but also by the dynamism of the economic agents acting in Madrid. As a matter of fact, more than 12 p.c. of the Spanish population is concentrated in the Madrid Urban Region, which means about 1,5 p.c. of the national territory, contributing with about 17 p.c. to the national Gross Domestic Production (GDP). More than 75 p.c. international companies operating in Spain are headquartered in Madrid and most financial institutions (banking, credit, insurance, etc.), as well as the rest of advanced producer services locate their head offices in this metropolis.

4.1.- Sources discussion.

Accessibility to the information and the possibilities of obtaining the proper data have weighted on our decision to select this case. "Fundación Universidad Empresa" has let us consult some specific data³ of the 1.448 collaboration agreements signed during the period previously established. This information has been complemented with other sources about the size of the enterprises (sales volume and number of employees) (DUNS, 1991; DICODI, 1989, EDINDA, 1988) and in order to chose an updated classification of economical activities (DUNS, 1991). Unfortunately, as it will be underline later on, the information obtained has not always been complete in certain aspects.

³ Date of the agreement, enterprise or organization the contract has been made with, terms of the agreements, university departments or schools related with the research contracts and the subject of the agreements.

4.2.- Empiric evidences perceptions about the relationship between universities and the Madrid economic system.

The research being undertaken until now let us obtain some basic results which will be shown next. A first approach finds out that most of the agreements are orientated to an applied research (61 p.c.) or mixed (basic and applied research) with 23 p.c.; their economic effects to the universities are not too outstanding, as 70 p.c. of the agreements do not overtake the amount of three millions and only 4 p.c. overcomes the amount of twenty-four millions; even so, they make possible some significative economic help for the experimental departments, which are majority in the "Universidad Politécnica" due to its own academic structure; as a matter of fact, the "Universidad Politécnica" concentrates 61 p.c. of the agreements, closely followed by the "Universidad Complutense de Madrid" (24,3 p.c.) and the "Universidad Autónoma de Madrid" (9,5 p.c.). Anyway, these data become more expressive if they are related with the size of the universities in number of centers, students and teachers (Table I).

The distribution about academic specialities is also very uneven, as shown in Table II and Figure 3. The enterprises clearly prefer the advice of technical or engineering departments; among them, Telecommunication alone takes 35,2 p.c. (320) of the agreements, followed by Industrial Engineering 10,6 p.c.; there is nothing similar in the basic sciences, even those which have experimental background (Physics, Chemistry, Medicine, Biology, etc.); they only reach a very second level representing between 3 - 4 p.c. of the contracts (between 25 - 35), the same of the most appreciated of the Social Sciences, (Economic and Business Administrations). The relevance of the other university centers is merely testimonial nowadays.

Acording to the enterprises involved in the research agreements it is clear that they mostly belong to the advanced Industrial Sector (42,7 p.c.); they are nearly twice the ones belonging to the productive service sector (19,5 p.c.); it is

Table II

Research contracts by universities and degrees

1.- Universidad Politécnica de Madrid. (Technical University).

ARCHITECTURE	1	NAVAL	5
AERONAUTICS	35	TELECOMUNICATIONS	320
AGRICULTURE	31	CIVIL ENGINEERING	4
ROAD, CANALS & PORTS	19	ECONOMIC & BUSINESS ADMINISTRATION	1
INDUSTRY	91	PHYSICS	1
MINING	2	CHEMISTRY	1
FORESTRY	16	COMPUTERING	31

2.- Universidad Complutense de Madrid

BIOLOGY	9	MEDICINE	20
ECONOMICS & BUSINESS ADMINISTRATION	7	ODONTOLOGY	2
PHYSICS	27	PSICOLOGY	5
GEOLOGY	27	VETERINARY	13
JOURNALISM	3	ENVIRONMENTAL STUDIES	3
MATHEMATICS	5	EDUCATION	1
POLITICAL SCIENCE & SOCIOLOGY	10	COMPUTERING	2
CHEMISTRY	35	OPTICS	1
PHARMACY	45	STATISTICS	1
GEOGRAPHY & HISTORY	2		

3.- Universidad Autonoma de Madrid

ECONOMIC & BUSINESS ADMINISTRATION	19
HUMANITIES	5
MEDICINE	8
PSICOLOGY	2
MOLECULAR BIOLOGY CENTER	2
ENVIRONMENTAL SCIENCES	50

4.- Universidad Alcala de Henares

ECONOMIC & BUSINESS ADMINISTRATION	2
MEDICINE	1
SCIENCES PHARMACY	23
PHARMACY	2

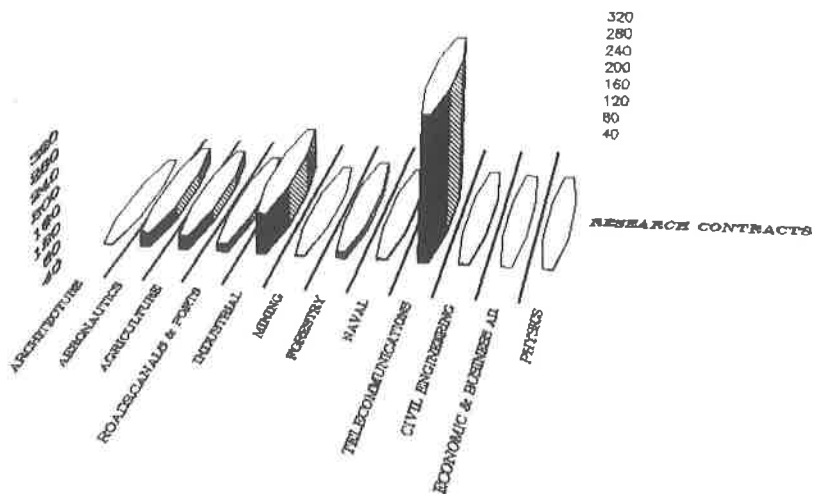
5.- Universidad Carlos III

SOCIAL SCIENCES & LAW	1
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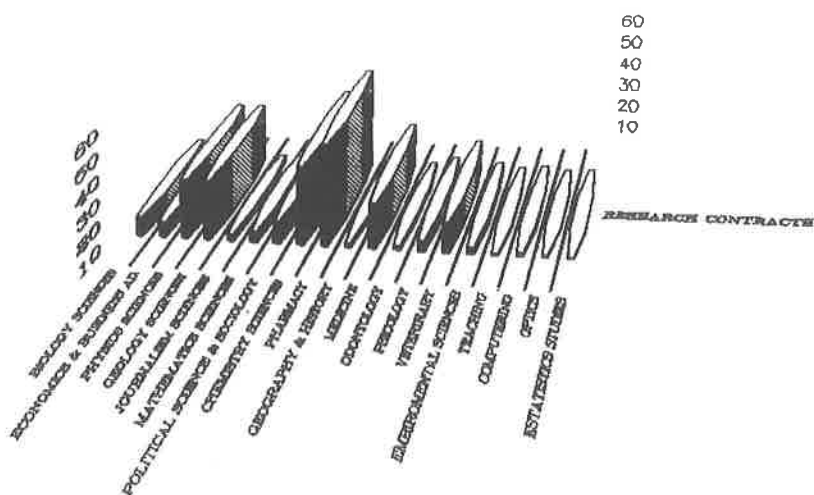
6.- UNED

INDUSTRY	5
ECONOMICAL & BUSINESS ADMINISTRATION	1
PHYSICS	2
PSICOLOGY	2
ENVIRONMENTAL SCIENCES	1
PERMANENT EDUCATION	1

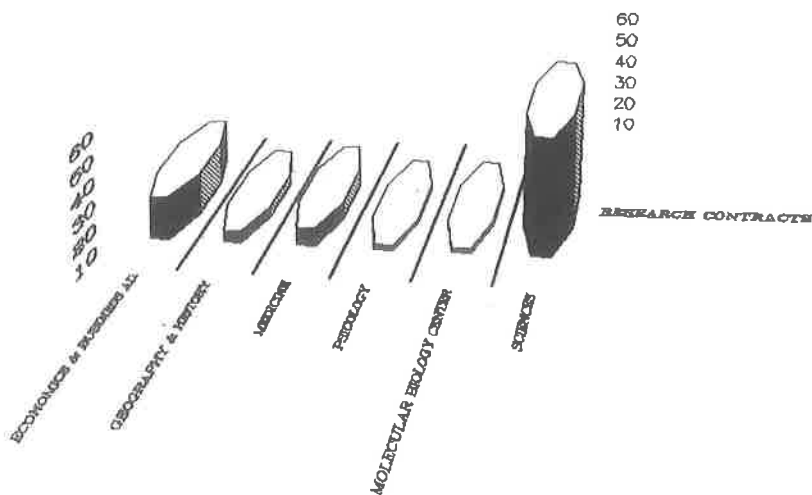
Source: "Fundación Universidad-Empresa" (University-Enterprise Foundation).



"Universidad Politécnica de Madrid" (Technical University).



"Universidad Complutense de Madrid".



"Universidad Autónoma de Madrid".

Fig. 2 Research contract distribution by Universities 1 and Specialities.

Source: "Fundación Universidad Empresa".

reasonable in the case of Madrid that 20,2 p.c. of the contracts comes from public administrations (local, regional and national), being Madrid a metropolis whose origin as a big city is caused by its status as Spain political capital. An economic approach to the enterprises considered in this research is given by the sales volume (although the information available only comprises a bit more than half of the agreements). Bearing in mind the accessible data (Table III and Figure 4), it can be deduced that there is a majority of medium enterprises (42,2 p.c.) with a sales volume between one and five billions pesetas; anyway, there must be underlined some concentration of big enterprises (between fifty and five hundred billions pesetas) in the manufacture, transportation, communication and public sectors. The data referring to the employment information of the enterprises lead to similar conclusions; although there is a predominance of small enterprises (265 out of 461 have less than 300 employees), 173 enterprises have more than one thousand employees.

A deeper analysis of the enterprise size under the criteria of sales shows a primacy of the great enterprises in the Manufacture Sector, Transportation and Public Services Sectors as shown in Table IV and Figure 5. Our main target with this research is to discuss how the universities, through these agreements of collaboration with the enterprises, act as a dynamization and restructuration agent of the Madrid economy, reorganizing simultaneously the productive space. Table IV shows clearly that the relation of the advanced producer services with the universities modifies, in certain way, the primacy the service sector has reached historically in Madrid up to now, as the largest number of research agreements belongs to the manufacture sector (387 contracts), followed by services (177 contracts) and public agencies (177 contracts).

On the other hand, it has been observed that a significative number of research contracts with the manufacture sector is concentrated in the more innovative branches such as chemical

Table III

Enterprise classification by activities and sales volume

MILLIONS PTAS.	UP TO 100	101- 1.000	1.001- 10.000	10.001- 25.000	25.001- 50.000	50.001- 100.000	100.001 250.000	250.001- 500.000	Morethan 500.000
AGRICULTURE, LIVESTOCK	-	2	1	-	-	8	-	-	-
MINING	-	-	8	-	-	-	-	-	-
CONSTRUCCION	3	1	2	-	5	1	-	-	-
INDUSTRY	-	30	143	48	7	40	1	1	1
TRANSPORTATION & COMMUNICATION	-	2	2	6	2	3	8	25	1
WHOLESALE	1	4	1	2	2	-	-	-	-
RETAIL	-	-	-	1	-	-	-	-	-
BANKING, INSURANCE REAL STATE	-	2	1	-	1	-	-	-	-
BUSINESS SERVICES	-	16	47	-	-	-	-	-	-
GOVERNMENT	-	1	2	-	-	-	-	-	-

Source: "Fundación Universidad-Empresa"

* Note: No information available about the other 489 research contracts.

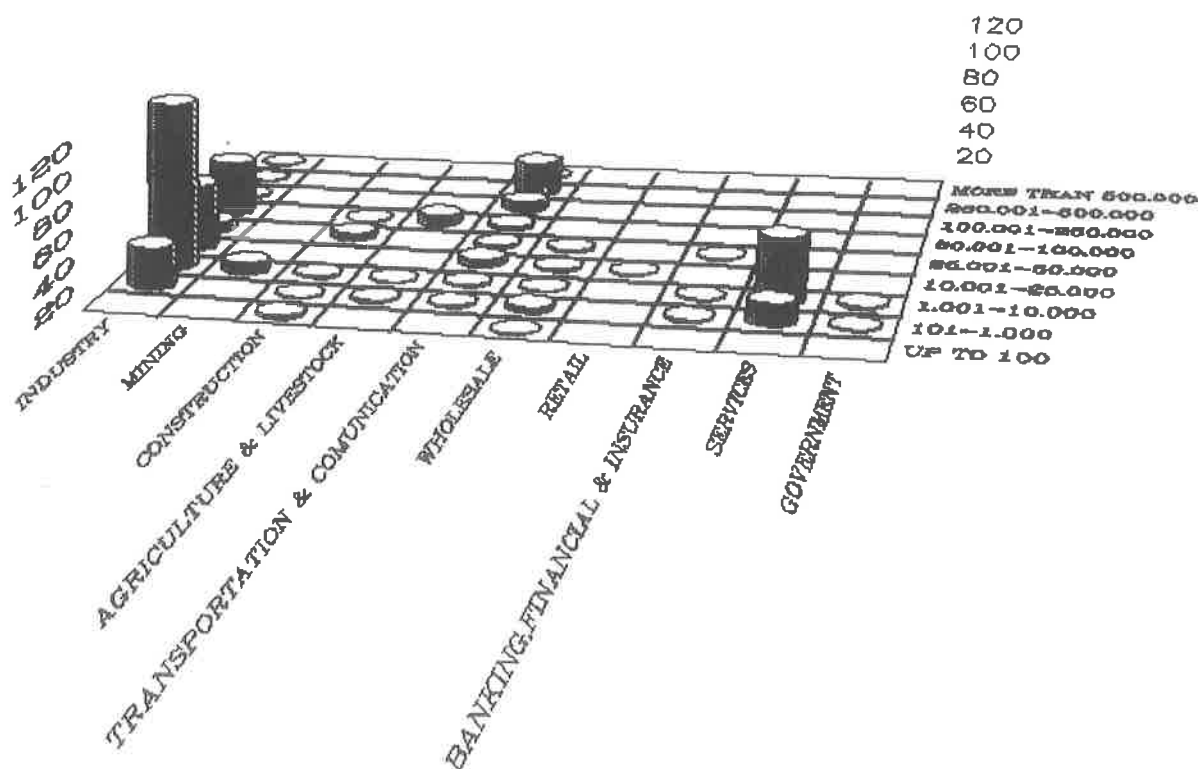


Fig. 4

Enterprises classification: Activities and sales volume.

Source: "Fundación Universidad-Empresa"; see references for more information.

*Note: No information available about the other 489 research contracts.

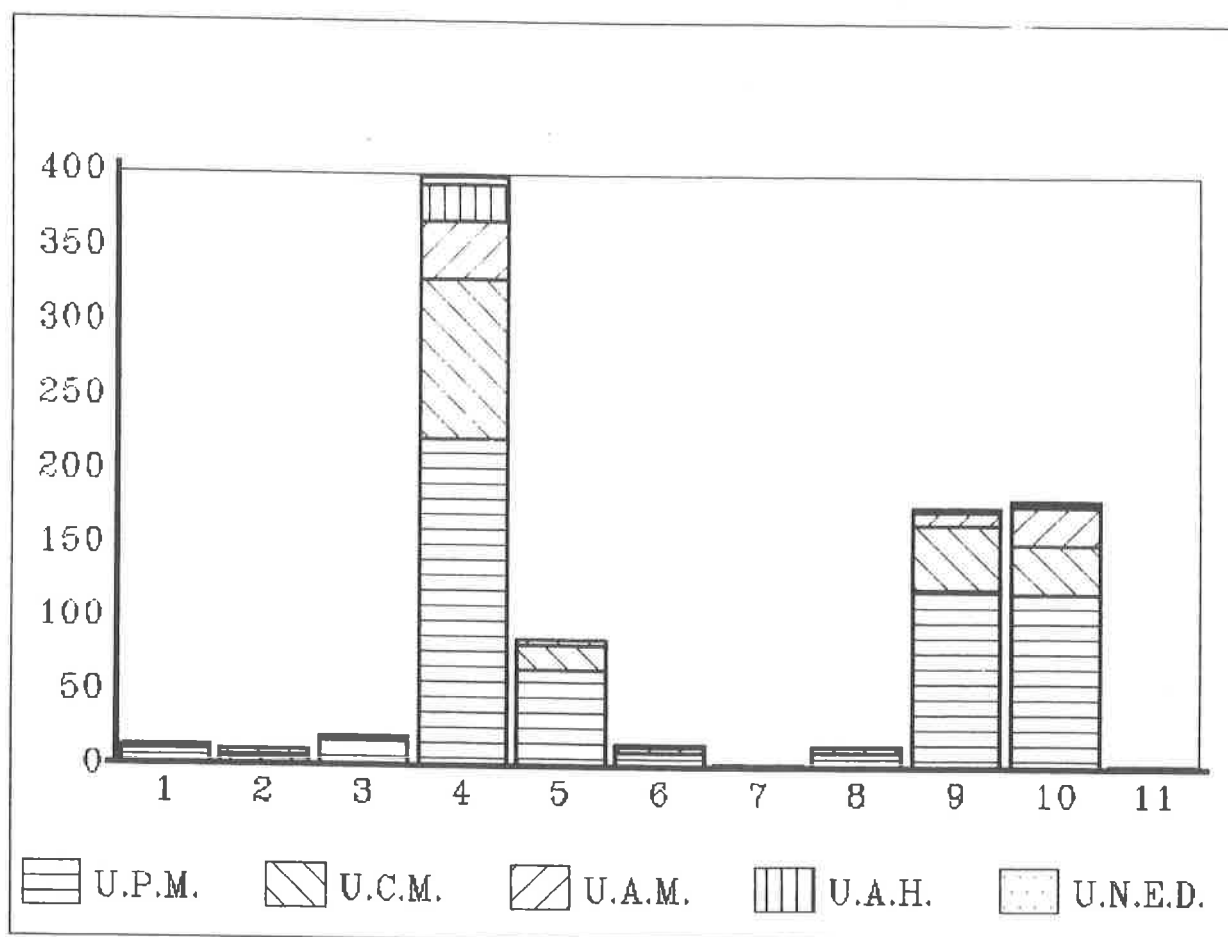


Fig. 5 Research contracts by universities and activities.

Source: "Fundación Universidad Empresa" (University - Enterprise Foundation).

- 1.- Agriculture, livestock and forestry.
- 2.- Mining.
- 3.- Construction.
- 4.- Industry.
- 5.- Transportation and communication services.
- 6.- Wholesale.
- 7.- Retail.
- 8.- Banking, insurance, real state services.
- 9.- Business services.
- 10.- Government.
- 11.- Miscellaneous.

Table IV

Research contract by universities and activity structure

	UPM	UCH	UAM	UAH	UC III	UNED	Others	Total
Agriculture,Livestock	9	2	-	-	-	1	-	11
Mining	-	5	4	-	-	-	-	9
Construction	16	2	-	-	-	-	-	18
Producer Services	113	39	10	-	1	2	-	165
Restoration & Repair	1	-	-	-	-	-	-	1
Leisure & Sports	-	-	-	-	-	-	-	1
Personal & Health	-	1	-	-	-	-	-	3
Educational & Training	5	3	-	-	-	-	-	6
Membership-Organisat.	1	1	-	-	-	-	-	1
Total Services	120	44	10	-	1	2	-	177
Transportation & Communications	65	17	4	-	-	-	2	88
Wholesale	9	4	-	1	-	-	-	14
Retail	-	-	-	1	-	-	-	1
Banking, Insurance & Real State	9	4	-	-	-	-	-	13
Paper Products	-	1	-	-	-	-	-	1
Publishing & Printing	-	-	-	1	-	-	-	1
Chemical Products	2	80	30	24	-	1	-	137
Petro-Chemical	-	1	-	-	-	-	-	1
Ruber, Plastic, Other	-	3	-	-	-	-	-	3
Construction Material	8	-	-	-	-	-	-	8
Iron & Steel	-	1	-	-	-	-	-	1
Metal	2	-	-	-	-	-	-	2
Machinery	8	-	-	-	-	-	-	8
Electric Machinery	154	13	4	-	-	4	-	175
Transport Equipment	27	6	2	-	-	-	-	35
Measure, control & Analysis Tools	4	1	2	-	-	-	-	7
Miscellaneous	5	-	-	-	-	-	-	5
Food, beverages	-	2	-	-	-	-	-	2
Timber	1	-	-	-	-	-	-	1
Total Manufacture	211	108	38	25	-	5	-	387
Central Administrat.	104	19	20	1	-	3	-	147
Autonomic Administr.	10	11	4	-	-	-	1	26
Local Administration	4	4	2	-	-	-	-	10
Total Government	118	34	26	1	-	3	1	183
Miscellaneous	1	1	-	-	-	-	-	2

Source: "Fundación Universidad-Empresa" (University-Enterprise Foundation).

*Others: Several departments and/or universities are engaged.

laboratories (15,1 p.c.), electric machinery and computerizing sector (with 175 research contracts, 19,2 p.c. of the total). It is clear indeed, that relationship university - industry is orientated to the technological process improvement. In the same direction, producer services (engineering, legal consulting, accounting, insurance services) surpass other services in research agreements (18,2 p.c.). Relationship with public management supports and increases the bureaucratic importance of Madrid as seat place for the three administrations ruling in Spain (Local, Regional and Central). The greatest part of the research agreements are signed with the Central Administration agencies (147 out of 183), which shows that the fact of nationwide bureaucracy being located in Madrid is strengthened by the collaboration with the universities.

The analysis of the research contract spatial distribution tries to find out some way of spatial preferences and if the spatial organization of Madrid economy is supported or modified by these spatial preferences. Table V and Map 2 show the geographical distribution of research contracts by administrative divisions and universities. No clearly tighter relationship of universities with their near surrounding can be deduced from them, with the exception of Chamartín district, where there seems to be some kind of positive relation caused by the proximity of the "Universidad Politécnica" and the "Universidad Complutense". The relationship between the municipalities of Alcobendas and the "Universidad de Alcalá" and the "Universidad Autónoma" comes to the same conclusion. However, the spatial information gathered for our research (enterprise head offices), shadows in some way the geographical expressivity of the location. Consequently, none of Madrid universities has an area of activity physically related to its innovative capacity, though two scientific parks created by "Alcalá de Henares" and "Carlos III" universities are now in program.

The spatial information is shown in Table VI and Fig. 6: the Madrid Urban Core (seven out of twenty-one Madrid districts as

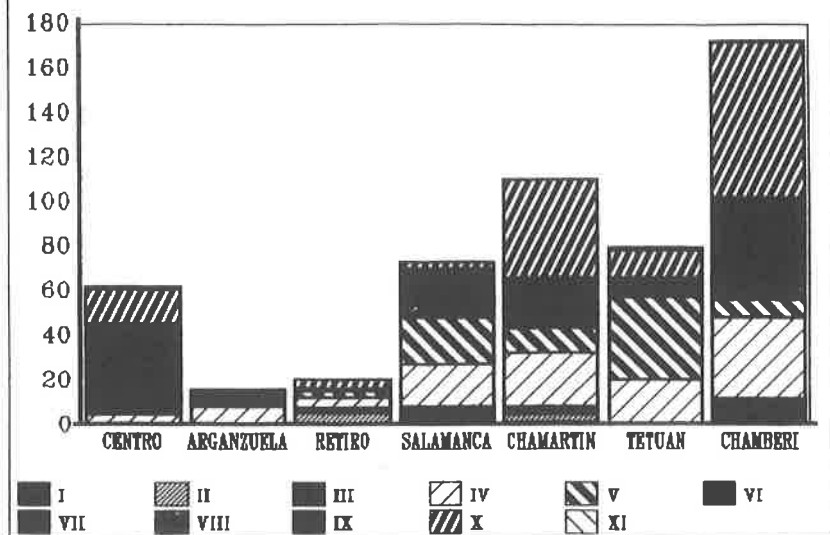
Table V

Geographical location of research contracts at Madrid
Regional level

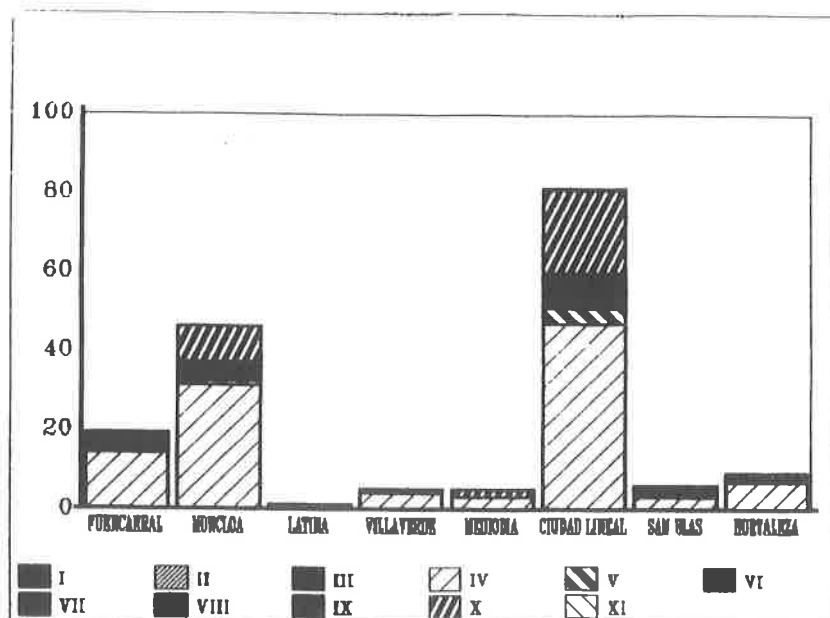
	UPM	UCM	UAM	UAH	UC III	UNED	Other*
CENTRO	36	17	8	1	1	-	-
ARGANZUELA	8	6	-	1	1	-	-
RETIRO	11	6	2	-	-	1	-
SALAMANCA	39	33	5	-	-	1	-
CHAMARTIN	70	20	20	2	-	1	-
TETUAN	51	22	5	-	-	1	2
CHAMBERI	127	32	13	-	-	1	-
FUENCARRAL	10	4	2	1	-	2	-
MONCLOA	28	14	3	-	-	-	1
LATINA	1	-	-	-	-	-	-
VILLAVEVERDE	4	1	-	-	-	-	-
CIUDAD LINEAL	61	11	6	2	-	2	-
SAN BLAS	4	1	-	-	-	3	-
HORTALEZA	5	4	-	-	-	-	-
ALCOBENDAS	19	35	17	18	-	-	-
ALGETE	2	-	-	-	-	-	-
ARANJUEZ	1	2	-	1	-	-	-
ARGANDA DEL REY	10	-	-	-	-	-	-
COLMENAR VIEJO	3	1	2	-	-	-	-
COSLADA	1	-	-	-	-	-	-
MÓSTOLES	1	1	-	-	-	-	-
SAN FERNANDO DE HENARES	6	1	-	-	-	-	-
SAN SEBASTIAN DE LOS REYES	3	-	-	-	-	-	-
TORREJON DE ARDOZ	21	4	-	-	-	-	-
TRES CANTOS	29	4	3	1	-	-	-

Source: "Fundación Universidad-Empresa" (University-Enterprise Foundation).

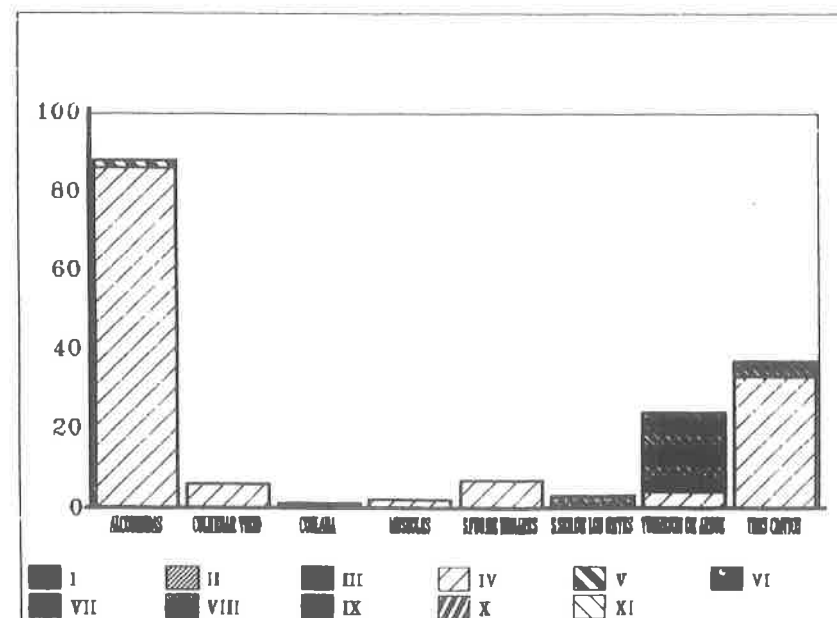
* Others: Several department and/or universities are engaged.



Urban Core (Central Districts).



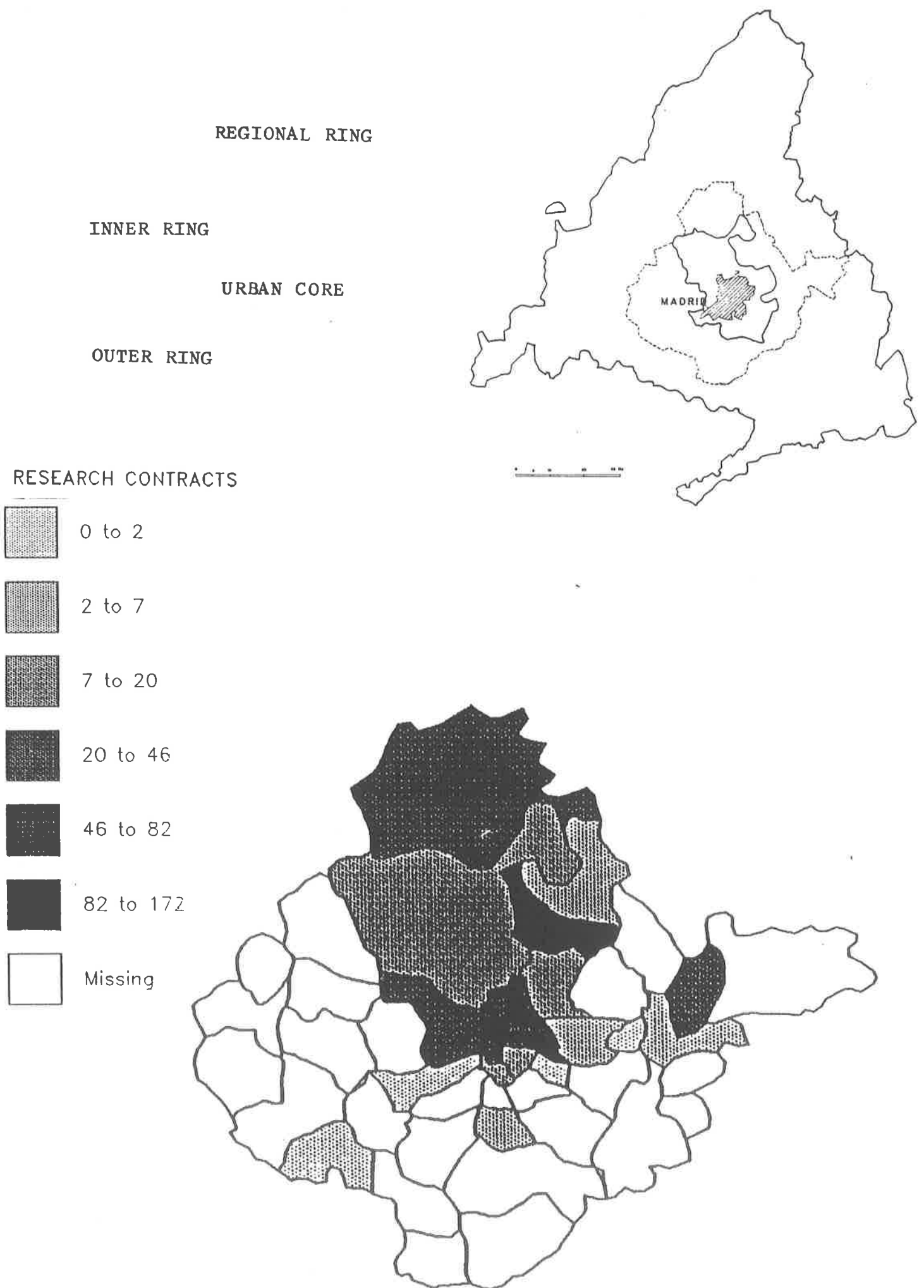
Inner Ring (Pericentral Districts).



Outer Ring (Metropolitan Municipalities).

Fig. 6: Research contracts in Madrid Metropolitan Region.

* See Figure 5 for activities.



MAP 2. RESEARCH CONTRACTS DISTRIBUTION BY URBAN DISTRICTS (Urban Core and first ring) and municipalities (outer ring)

Table VI

Research contract by location and activities.

	1*	2*	3*	4*	5*	6*	7*	8*	9*	10*	11*	TOTAL
CENTRO	-	-	-	4	-	-	-	2	39	16	1	62
ARGANZUELA	-	-	-	8	-	-	1	-	6	-	-	15
RETIRO	-	5	2	5	3	-	-	-	1	4	-	20
SALAMANCA	1	-	7	19	21	1	-	5	16	5	-	75
CHAMARTIN	1	3	4	24	11	2	-	-	21	44	-	110
TETUAN	-	-	-	20	37	1	-	-	8	12	1	79
CHAMBERI	8	1	2	37	8	2	-	6	38	70	-	172
URBAN CORE	10	9	15	117	80	6	1	13	109	151	2	523
FUENCARRAL	-	-	-	14	-	4	-	-	1	-	-	19
MONCLOA	-	-	-	31	1	-	-	-	5	9	-	46
LATINA	-	-	-	1	-	-	-	-	-	-	-	1
VILLAVEVERDE	-	-	-	4	-	1	-	-	-	-	-	5
CIUDAD LINEAL	1	-	-	47	4	3	-	-	6	21	-	82
SAN BLAS	-	-	-	3	-	-	-	-	3	-	-	6
HORTALEZA	-	-	1	7	-	-	-	-	-	1	-	9
INNER RING	1	-	1	107	5	8	-	-	15	31	-	168
ALCOBENDAS	-	-	-	86	2	-	-	-	-	-	-	88
COLMENAR VIEJO	-	-	-	6	-	-	-	-	-	-	-	6
COSLADA	-	-	1	-	-	-	-	-	-	-	-	1
MOSTOLES	-	-	-	2	-	-	-	-	-	-	-	2
S.FERNANDO DE HENARES	-	-	-	7	-	-	-	-	-	-	-	7
S.SEBASTIAN DE LOSREYES	-	-	-	-	-	-	-	-	3	-	-	3
TORREJON DE ARDOZ	-	-	-	4	-	-	-	-	20	-	-	24
TRES CANTOS	-	-	-	33	-	-	-	-	4	-	-	37
OUTER RING	-	-	1	138	-	-	-	-	27	-	-	168
ALGETE	-	-	-	2	-	-	-	-	-	-	-	2
ARANJUEZ	-	-	-	4	-	-	-	-	-	-	-	4
ARGANDA DEL REY	-	-	-	10	-	-	-	-	-	-	-	10
REGIONAL RING	-	-	-	33	-	-	-	-	4	-	-	16

Source: "Fundación Universidad-Empresa" (University-Enterprise Foundation).

*(See Figure 4 for activity names)

shown in Map 2) concentrates more than 50 p.c. of the contracting enterprises. The remaining ones are shared between the inner (pericentral) and outer (metropolitan) rings; only a small number of agreements are located out of the metropolitan area (regional ring).

It may be useful to analyze the research contract classification by economic activities and their location following the large areas designed in Map 2, as long as this distribution modifies the one obtained with the general information for Madrid as a whole. Therefore, on the Urban Core of Madrid Municipality the service sector is still deeply present, specially the bureaucratic branches, showing resistance to the moderate decentralized efforts. At the same time, the importance of producer services (200 researching contracts) is much greater than the manufacture sector (117 contracts). The situation is quite the opposite in the remaining districts of Madrid Municipality (inner ring) and the metropolitan ring (outer ring), where the relations with the universities are mostly concentrated in the manufacture sector. The district named "Ciudad Lineal" and the municipality of "Torrejón de Ardoz" are the only two exceptions; in both cases are located outstanding military premises.

5.- CONCLUSIONS

Universities have played quite significant role (but far from the priority of other causes) in the productive restructuration process occurred in Madrid during the eighties. Bearing in mind the already discussed information, some considerations must be underlined:

1.- Universities have made in the eighties a substantial contribution to technological amelioration of Madrid industrial structure; our survey has found out that the effects are widely spread both on traditional madrilian activities as chemist laboratories and on other very recently incorporated to the

Madrid economy as electronics. Consequently, the Madrid manufacture sector, strongly affected by the crisis during the seventies, has been helped by the universities in their aim of technological modernization.

2.- The service sector has also been favored through the relation with the universities as the postindustrial tendencies have strengthened in this metropolis.

3.- On the opposite side, universities have also been supported bureaucratic activities. Due to the role played by Madrid both as National and Regional Capital, these bureaucratic activities are still quite important.

4.- There are no significative effects on productive activities redistribution under a spatial point of view: the university research agreements are still supporting the centralisation of the most dynamic activities.

5.- There are no obvious signs of a close relationship with the spatially nearest enterprises, which demonstrate that Madrid operates as an economic entity.

6.- Finally, there are no specifically designed area for university activities (Scientific or Technological parks), but some projects are under way in the vicinity of "Alcalá" and "Carlos III" universities.

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