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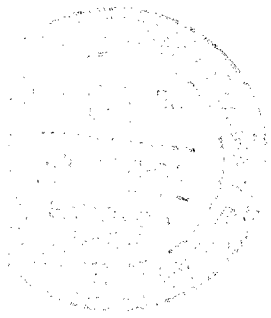

FINAL REPORT:

INNOVATIVE PROCESSES IN SMEs:

SOME CONSIDERATIONS ABOUT THE ARGENTINE CASE

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Introduction

The opening of the Argentine economy, stronger since the early 90's, and growing market globalization have increased the competitive pressure faced by enterprises, specially those with smaller relative size. The new market operation conditions (open markets, globalization and generalization of deregulation processes, and MERCOSUR formation) question the basic axes of the development paths previously followed by SMEs enterprises. The key economic operation conditions existing during the foundation stage of most SMEs have ceased to be present in the past few years. Consequently, in the early 90's a significant part of the Argentine SMEs are beginning to be "affected" by different causes due to the opening process of the economy (Moori-Koenig et al 1993; Gatto & Yoguel, 1994, etc.)[1].

SMEs must be considered economic agents with their own particular features and with highly specific and idiosyncratic economic logics and behavior modalities. Due to the absence of a professional management, enterprise management generally coincides with enterprise ownership. The owner's attributes and characteristics (age, education, strategic programming skills, etc.) come to be very relevant for the selection of the economic behavior that will condition the evolution path of the enterprise. (Quintar 1993, Moori-Koenig et al. 1995). Therefore, SMEs are different enterprises not only for their smaller operative scale but primarily because they operate on the basis of a logic and reasoning different from that of "large" enterprises. They cannot be treated as "large economic agents of a smaller size" (Storey 1986), instead, the salient features of their different logic must be explored. The most outstanding among them are the owner's highly personalized management, excessively focused on factory productive aspects, disregarding those related to administrative organization, marketing, etc., the difficulties the owner faces to obtain information; his imperfect access to the capital market, the insufficient production and distribution scale, the difficulties in gaining access to qualified human resources, the deficient understanding of macro-regulatory changes (Yoguel 1995).

In most of these enterprises, the SMEs development path shared some of the idiosyncratic features of Argentine manufacture industry (high vertical integration, isolation in the productive tissue, technological underdevelopment, insufficient operation scales, etc.). The new regulatory framework makes evident the implicit weaknesses in the previous trajectories and condition the

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[1] "Affected" enterprises are those which have lost internal market share, part of their profitability or which have been displaced towards less dynamic market segments. The impact of the new market operation conditions was particularly important during the first stage (1991/93) because the speed of the macro adjustment enterprises must face was much faster than that of the micro adjustment.

existence of the enterprises. The enterprises are not facing a mere adjustment of the previous productive path but a radical change in the conditions under which they had been functioning. Even those SMEs which had been following a more innovative path are starting to see their future evolution conditioned to the implementation of deep organization changes.

The goal of this work is to analyze the SMEs' "innovative" responses and motivations in face of the new context, the type of innovation implemented, the innovation process itself, the necessary technical and financial requirements and the main obstacles. That is to say, the innovative initiatives which contribute to the strengthening of enterprise competitiveness and which range from quality program implementation to the development of internal activities aimed at the introduction of new products, processes, organizational structures and changes in the links between enterprises and the market.

The specific SMEs' operative functions determine that these innovating processes take up special characteristics which make them different from the way in which they appear in larger enterprises. These distinct features underline both the approach and work hypothesis for this study.

Based on the recent advances in literature on innovation in SMEs (Acs & Audretsch 1988, Malerba 1988, Cohen & Levin 1989, Lassini 1992) and on more general discussions about enterprise innovation theory, this report was designed to capture the SMEs innovation process using "non traditional" indicators. The hypothesis of this work is that innovation processes in SMEs have "informal" characteristics. This is evident in: i) the absence of an exclusive "formal" team to carry out these activities, ii) the lack of a place assigned for that purpose and of a budget that takes into account their financing, and iii) the restrictions to discriminate between innovating activities and the rest of the production functions in the enterprise, which become evident in the difficulty to estimate the expenses involved in "innovations". Moreover, the personnel involved in these activities also conducts other productive and management tasks, and the innovation activities and personnel who carries them out get mixed up with other activities conducted by the enterprise.

Due to these characteristics, the economic indicators usually employed to study innovation activities (eg., spending in research and development, number of registered patents and licenses, number of scientific publications, etc.) do not enable a proper evaluation of the SMEs'innovation effort. This report looks at these activities based on the interpretation and development of a set of indicators which tries to isolate the essential elements featured by the innovation process, that is to say, its goals, work-team mode and style, allocated resources, results achieved, technical assistance and financial needs and its ties to the institutional scientific system.

This report is organized as follows: In the first section there is a description of the set of interviewed enterprises and some of their structural characteristics are presented. Then, there is a review of the results of the field work and an account of the main characteristics of the innovation process in those enterprises, the requested forms of support, and the degree of institutional knowledge of the enterprises. The third and fourth sections present the main results of the field work and the conclusions. After the methodological Appendix, which includes the identification of the sample, the work features of the field work and the variables created on that basis are presented. The sixth section presents a Statistical Appendix.

1. Description of the sample enterprises and of some of their structural characteristics

This section contains a brief description of the sample enterprises in order to provide a framework for the study of the innovative activities undertaken by them. For this purpose, summarized sales, employment and external sales data are included below, as well as the importance of sub-contracting and sales by external order, levels of investment and enterprise performance since 1991 and the competitive advantages pointed out. Tables 1 to 11 of the Statistical Appendix present this information in a more complete and detailed manner.

i) Interviewed sectors: sales, employment and external insertion

The 39 interviewed enterprises belong to the following sectors: Leather (18% of the set), Fine Chemical and Plastic Products (28%), Products and Components for Industry (23%) and Scientific Machinery and Equipment (31%).

The enterprises employ an average of 40 people, have annual sales for about four million dollars and exports approximately one fifth of their production. In turn, three out of every four sample enterprises have sales for less than five million dollars a year (refer to Table 1 in the statistical annex). The Leather SMEs have the smallest relative size both in employment and sales. In the rest of the sectors the distribution of enterprises in the sample covers different sizes.

The exports of the sample enterprises account for 11% of the total sales. Less than two thirds of the sample enterprises exports less than 20% of the sales while only 10% exports over 50% of the sales. Taking into account the distribution by sectors, most of the Fine Chemical and Plastic Products firms export less than 20% of the sales.

One fifth of those employed by the SMEs in the sample is technical personnel[2], one third are qualified workers and the rest is non qualified personnel. Metal product enterprises have the highest share of qualified workers (55%); the technical personnel of Leather enterprises having half the weight these enterprises have in the sample. In the case of the chemical and plastic product enterprises, the technical personnel has a lower relative weight than in Metal Mechanical enterprises.

ii) The importance of sub-contracting and of production by order

Subcontracting and outsourcing is almost insignificant in the sample enterprises. Half the enterprises does not sub-contract, while only one fourth of the sample sub-contracts over 50% of the

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[2] These include engineers, chemists, physicists and specialized technical personnel.

production. Within this context, the higher percentage of production sub-contracted by leather enterprises and by enterprises of smaller relative size stands out.

As regards the demand of production by external order (specific clients), the sample enterprises show great heterogeneity and polarization. In half the cases the sales by order account for over 50% of the sales, while in somewhat more than a third of the sample enterprises (38%) sales by order do not exist. Within this framework, the higher weight of sales by order in the Scientific Machinery and Equipment sector is explained by the structural characteristics of demand. Unlike sub-contracting, the percentage of sales by order tends to rise with the size of the enterprise, which is partly explained by the sectorial composition of the sample.

iii) Investment and dynamics level of the enterprises in the last years

During the 1991-1994 period, more than half of the sample enterprises invested less than 20% of the total 1994 sales. Within this framework, the smaller enterprises are also the ones with the lowest investment ratio. Although this coefficient is not too low, specially if compared to the larger enterprises in Argentina, it is relatively insufficient in relation to the external competitive challenges they face.

Enterprise dynamics, measured and evaluated using sales and exports evolution varies significantly according to size and sector, since the start of the opening of the economy in 1991. Thus, while all of the enterprises with sales for over five million dollars had a very positive performance, half the enterprises with sales below one million dollars showed a negative dynamic during the 1991-1994 period.

In turn, all of the Fine Chemical and Plastic Products enterprises and most of the Scientific Machinery and Equipment and Products and Components for Industry enterprises had a good performance. On the contrary, most Leather enterprises had a negative performance during that period.

iv) Competitive advantages of the sample enterprises

The five competitive factors considered <most significant> by the sample enterprises are a) quality (90% of the cases), b) price (60%), c) post sale service (40%), d) design (40%) and e) shipment delivery term (30%). The shipment delivery term and post sale service advantages were more significant in the smaller enterprises, which reflects the their highest operative flexibility.

At sector level, there are significant differences as regards the most important competitive factors, with the exception of quality, which ranks first in all cases. "Design" has a relevant position for Leather and Metal Products, while "price" and "post sale service" are more important among producers of Fine Chemical, Plastic Products and Scientific Machinery and Equipment.

Finally, even though the enterprises point out that "quality" constitutes the main competitive factor, they are not necessarily close to the international standard. Actually, as it will be shown in the next section, the concept of quality these enterprises have is not the same as that of the enterprises in developed countries. In spite of this, this concept of quality has allowed them -so far- to offer products that compete reasonably with the production of foreign competitors. This may be partly explained by the existence of segmented markets and other competitive factors such as "sale services" and "price" which compensate for the quality gaps between these enterprises and the foreign competitors who are close to the international standard.

2. Innovation activities in the sample SMEs

This section presents the different styles adopted by the innovation process in the sample enterprises. First, it deals with the general characteristics of the innovation activities in terms of degree of formality, stability and continuity of the involved team and its financing. Second, it presents the main results of the innovation process in products, processes, organizational structures and new commercial strategies, the training efforts and worker contribution, the factors that drove the enterprise to innovate, the main difficulties and the impact of innovative activities.

Third, it presents the results of activities tied to "quality" undertaken by the enterprises. After discussing worker involvement and training efforts in the development of innovation activities the fourth part reviews the innovative intensity of the sample enterprises. Finally, it presents the forms of support that were required and the degree of institutional knowledge of the enterprises.

2.1. General characteristics of the innovation process

In general terms, field work results show that innovation activities (that is to say the set of efforts the enterprises made in order to develop quality, to create and improve products and productive processes, to introduce organizational changes and modify the type of link with the market), constitutes a process characterized by the development of technical teams which work in a relatively "stable", "continuous" and "informal" manner. In other words, that the enterprises keep a core of people involved in innovation activities over a period of time. Even though these people are also devoted to other productive tasks.

It must be noted that stability primarily means the existence of a basic set of people involved in innovation activities. Enterprises usually incorporate other internal or external people into the teams on a temporary basis, depending on the specific issues the firm has to tackle. The stability of the basic core group may become a great competitive weakness when the enterprise cannot supplement this team's knowledge of specific issues with the knowledge of other internal or external people outside the central core. Since the strategy of the owner is central in the core group's activities, his characteristics affect its evolution, permeability and the degree of openness to create links with other internal or external teams.

The stability of the teamwork is present in almost 80% of the enterprises, regardless of the sector (refer to Table 1).

Table 1. Distribution (%) of the sample enterprises by sector according to the degree of stability and continuity of the "informal" teams devoted to development activities

	Degree of continuity and stability a/ of work team				
	1	2	3	4	Total
Leather Prod.	100	-	-		100
Chem.& Plast.Prod	60	16	18	7	100
Metallic Products	80	7	10	3	100
Scient.Mach.& Equip.	91	2	7	-	100
Total	79	7	10	4	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Notes: a/ 1. Continuous activity and stable team; 2. continuous activity and unstable team; 3. non continuous activity and stable team; 4. non continuous activity and unstable team.

In most cases, the "informal" nature of the innovation processes is also evident in the absence of specific departments in the enterprise to carry out innovative activities[3]. In addition, most of the sample enterprises (two thirds of the set) has no knowledge of the expenses involved in those tasks[4]. However, there are strong differences by sector, the metal mechanical sector having the highest percentage of enterprises which know the amount spent in development[5] (refer to Table 2).

[3] In a way, although most enterprises do not carry out these activities in a research and development department, as it happens in large enterprises, the existence of a "team" implies that it has certain work coherence, human resource availability and some kind of internal hierarchy. These features make the "informal" nature of the innovative activities somewhat "formal".

[4] However, it must be considered that the work-intensive nature of innovative activities and the almost exclusive use of the enterprise's own human resources determines the existence of sunk costs for the enterprises which contribute to the lack of an accurate expense assessment.

[5] Nevertheless, even in those cases, the expense assessment they make is inaccurate.

Table 2. Distribution (%) of the sample enterprises by sector according to degree of knowledge of the amount spent in development between 1991 and 1994

	Amount Spent		
	Knowing	Not knowing	Total
Sectors			
Leather Prod.	14	86	100
Chem.&Plast.Prod	27	73	100
Metallic Prod	44	56	100
Scient.Mach & Equip.	42	58	100
Total	33	67	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Also, the knowledge of the amount spent is not clearly associated to the size of the enterprise (refer to Table 3).

The informal nature and scarce planning in the innovation activities are also evident in that hardly 5% of the enterprises have a planned budget allocated for the development of these tasks.

Table 3. Distribution (%) of the sample enterprises by sales (millions of dollars) according to degree of knowledge of the amount spent in development between 1991 and 1994

	Amount spent		
	Knowing	Not knowing	Total
Sales			
Less than 1	13	87	100
Between 1.1 and 5	45	55	100
Over 5,1	27	73	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

All innovative activities were financed with the firms' own capital (reinvest profits), depending basically on business evolution. This constitutes a limit to the enterprises' own innovative capacity. That is to say, even though the personnel involved has a "sunk cost" for the enterprise, the progress of the innovative activity requires capital for the acquisition of goods and services, both tangible and non tangible, the financing of which depends on the resources available in the enterprise. This characteristic sets a limit to the pace of the innovative activity, which then depends on the evolution of the firms' business cycle. Therefore, even though the activity is of a continuous nature, it becomes more intense and complex in the rising phase and it slows down in the falling phase, where only the sunk costs of the

involved personnel are used. However, in this stage of the business cycle, firms are not keen to encourage new innovative activities.

2.1.1 Degree of circulation of written procedures

The informality in the innovation processes in SMEs is also shown by the modalities of execution of some productive tasks. Only a fifth of the firms uses detailed written procedures and standardized routines for the execution of productive tasks. This percentage is growing among the larger enterprises (refer to Table 4).

Table 4. Distribution (%) of the sample enterprises by sales according to the presence of written procedures.
Written procedures a/

	Written procedures a/			
	1	2	3	Total
Sales				
Less than 1	-	38	62	100
Between 1.1 and 5	26	37	37	100
Over 10	20	60	20	100
Total	21	45	34	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Note: a/ 1 presence of written procedures; 2 partial presence of written procedures; 3 marked scarcity of written procedures.

Table 5. Distribution (%) of the sample enterprises by sector (written procedures) according to the presence of written procedures (sector)

	Written procedures a/			
Sector	1	2	3	Total
Leather Prod.	-	-	100 (54)	100
Chem.& Plast.Prod	36 (50)	45 (28)	19 (15)	100
Metallic Products	33 (38)	33 (16)	34 (23)	100
Scient.Mach. & Equip.	8 (12)	84 (56)	8 (8)	100
Total	(100)	(100)	(100)	

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Note: a/ 1 presence of written procedures; 2 partial presence of written procedures; 3 marked scarcity of written procedures.

The productive features of the different sectors influence the degree of usage of written procedures. Unlike the other sectors, where several firms use some written procedure, all of the leather enterprises use no written procedures (refer to Table 5).

2.1.2 Worker involvement and training efforts in innovation activities

In order to carry out innovation activities, the enterprises had to - in general - make important training efforts for the personnel[6] involved in those activities. However, there was great heterogeneity among them.

Field work shows that almost one third of the sample enterprises made important training efforts; over half of the employees took innovating activity-oriented training courses. The 20% of the sample in which between one fifth and half of the people employed were involved in training activities comes second. Finally, little less than 40% of the enterprises had less than one fifth of the personnel involved in training courses (refer to Table 6).

Table 6. Distribution of the sample enterprises by sector according to training efforts

	Training efforts a/					
Sectors	1	2	3	4	5	Total
Leather Prod.	-	-	-	29	71	100
Chem.& Plast. Prod.	36	18	9	9	28	100
Metallic Prod.	44	22	11	-	22	100
Scient.Mach.&Equip.	33	33	17	8	8	100
Total	31	21	10	10	28	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Notes: a/ 1 enterprises in which 50% of those employed were involved in quality development-oriented courses and took courses for development activities[7]; 2 Between 21 and 49% of those employed were involved in quality courses and took courses on development; 3 between 21 and 49% of those employed took quality courses but did not take courses to conduct development activities; 4 less than 20% of those employed were involved in quality courses and took courses on development; 5 less than 20% of those employed took quality courses but did not take courses for development.

[6] The "training effort" variable is defined on the basis of the percentage of people involved in quality courses and in the necessary training to carry out innovative activities.

[7] Training courses undertaken by the enterprise personnel to enhance the development of some innovative activity phases. The most important are CAD courses (in some cases CAD-CAM), quality, management, strategy design, marketing and data base usage.

The intensity of training in the enterprises does not depend on their relative size. Some other factors, such as type of business management and strategic development skills, seem to be much more relevant. Furthermore, it may be seen that while most of the enterprises with sales for less than one million dollars make small efforts (63%), those with great training efforts are predominant among the enterprises with more than five million dollar sales.

Table 7. Distribution (%) of the sample enterprises by sector according to training efforts

	Typ. training effort			
Sales	**1+2**	**3**	**4+5**	**Total**
< 1	25	12	63	100
1.1 - 5	45	15	40	100
>5	82	-	18	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Notes: Refer to Note in Table 6

Field work reveals that the training efforts are somewhat related to the presence of written procedures of productive activities and to the use of efficiency techniques and indicators[8]. Finally, training efforts are not tied to enterprise performance in the last years or investment levels since the start of the economic opening. In this context, doubts exist about the possibility of rises in enterprise productivity and competitiveness in the medium term through training and soft technology introduction processes which are not accompanied by a complete and rational updating of process technology.

[8] The training effort/procedure formalization correlation coefficient is 57%.

2.2 Development of products, processes, organizational structures and new types of links to the markets

2.2.1 Characteristics of the work team, training efforts and worker contribution

The workforce involved in "development activities" makes up an average of about 11% of the total people employed in the sample enterprises. However, less than one third of this group of personnel carries out these jobs exclusively, which accounts for 3% of the total employment in the sample. Out of the total personnel devoted to "development", half are technicians and little less than one third are engineers, chemists and physicists.

The "formal" explicit participation of qualified workers in development activities is very small, 11% of the personnel devoted to innovations and only 1% of the employed personnel in the sample. The rest of the personnel involved in development is constituted by other professionals and, to a smaller extent, by personnel from outside the enterprise.

As regards sectors, Leather stands out for the absence of engineers and the higher presence of qualified workers (28% of the total personnel involved in development) and of other professionals (22%). In Fine Chemical and Plastic Products there is a greater involvement of engineers, chemists and physicists (43%) and in Scientific Machinery and Equipment technicians are markedly present (60%) and workers are almost absent (only 3%).

Approximately half the sample enterprises lack personnel **exclusively** devoted to development. In only one fifth of the enterprises over 50% of the personnel devoted to development is exclusive. However, this percentage is influenced by data from producers of machinery by order, which have productive characteristics requiring a more significant presence of development tasks (refer to chart 8).

Table 8. Distribution of the sample enterprises by sector according to the importance of the personnel involved exclusively in development activities

	Proportion of personnel exclusively for development					
	0	1-10	11-20	21-50	>51	Total
Leather Prod.	42	14	14	14	14	100
Chem.& Plas. Prod.	66	-	22	11	11	100
Metallic Prod.	45	-	22	22	11	100
Mach.& Equip.	50	-	8	-	42	100
Total	51	4	15	10	20	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

In most cases, workers made important "informal" contributions to the development activities. In this context, participation is highly significant in Leather and relatively less important in Chemical and Plastics. In the first case, it may be explained by the craftmanship nature of the activity and in the second, specially fine chemical producers, by the technical requirements which leave little space for worker participation. On the other hand, worker participation is almost exclusively focused on new product improvement and development and to process improvement of incremental type.

Table 9. Worker contribution (%) by sector

Sectors	Contributions a/			
	1	2	3	Total
Leather Prod.	86	14	-	100
Chem.& Plast.Prod	36	36	28	100
Metallic Prod	78	-	22	100
Scient.Mach. & Equip.	67	25	8	100
Total	64	21	15	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Note: a/ 1 they participate in development activities both in the cases where there are incentives for participation and in the rest; 2 they do not participate and there are incentives and 3 they do not participate and there are no incentives.

The enterprises' interviews suggest that SMEs carry out development activities not only individually but also with the cooperation of other economic agents they have interrelationships with. It must be noted that the opening of the economy partly changed the enterprises' functioning guidelines and led them to consider intermediate and new forms of outsourcing[9] and enterprises relationships. This new attitude is evident in the participation of clients (44% of the sample enterprises), consulting firms (41%), suppliers (38%) and other enterprises (31%) in product, process, organizational structure and new market link development, which

[9] The concept makes reference to those organization types which are placed between the "hierarchy" (total vertical integration of the firm's functions) and "the open market" transactions. These intermediate forms refer to the different modalities to develop some operational functions related to enterprise management (ie: precompetitive developments, joint commercialization, joint production of components, etc.).As regards these issues, refer to:i) Williamson, O. (1986), "Market and Hierarchies", Mac Millian, New York; ii) Aoki, A. (1984), *The Co-operative game theory of the firm*, Claredon Press, Oxford.

together with "quality" constitute the core of the innovative activities.

In this context, it is interesting to note how little communication enterprises have with "public institutions" to carry out these activities. The tendency to cooperate among private agents in innovating activities and the little presence of public institutions show that the public support supply and the enterprises' demand do not meet. This point will be discussed later on. (refer to 2.5).

In terms of sectors, Leather enterprises are the most active in the area of cooperation with clients and research centers; Chemical, Plastic and Metal product enterprises are the ones who contract more external consultors. Licences are only used by Chemical, Plastic and Scientific Machinery and Equipment enterprises. In this last group of enterprises, there are significant links with the clients due to the characteristics of their production (refer to Table 12 of the statistical appendix).

2.2.2 Results of development activities

Among the innovating activities the most outstanding are product improvement efforts (92% of the enterprises). Nevertheless, new product development (72%) and new process improvement and/or incorporation (70%) activities are also important. It is interesting that organizational (50%) and product marketing related (56%) developments are less relevant[10].

The results also indicate the predominance of innovative activities of incremental type. The main reasons for this are: i) the lower costs associated to product and/or process "improvement" activities, in relation to the higher relative "profitability" of innovative activities as compared to other alternative financial investments which were usual before the opening of the market (financial, inflationary benefits, etc.) and; ii) the need to make changes in the product mix in order to improve the competitive position and/or stay in the market. It means that productive innovation is considered as much more important than that connected with organizational developments, reflecting partly the insufficient strategic capacities resulting from the type of SMEs' management.

[10] Even though the heterogeneity of the innovative activities undertaken by the SMEs limits the possibility of the required period to complete the different activities, the development of a new product requires an average of about a year, product improvement takes five months, new processes and/or improvements take about nine months and organizational changes almost two years.

This situation is specially evident in Leather, where innovative activities are basically limited to "product improvement". In Chemical and Plastic Products, new product introduction (91%), process innovation (100%) and organizational improvement (73%) activities stand out. In the Scientific Machinery and Equipment and Metal Product sectors the relevant activity is process innovation. In this last sector, innovations related to product marketing are also significant (refer to Table 9).

However, it must be noted that there is strong heterogeneity among enterprises regarding the complexity degree of these activities in terms of allocated resources, development period, technological level achieved, originality degree and previous existence in the market, etc.

Table 10. Distribution (%) of the sample enterprises by sector according to development activities

Sectors	Development Activities				
	Mew Prod.	Improv.Prod	Proc.	Organiz.	Market
Leather Prod.	43	100	14	43	43
Chem.& Plast.Prod	91	100	100	73	64
Metallic Prod.	78	88	67	56	78
Mach.& Equip	92	92	83	50	50

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

As may be seen in Table 11, "new product development" and "product improvement" activities are highly significant for all sizes of enterprise. On the contrary, process development and organizational improvement are more relevant among enterprises of larger size. As regards new marketing methods, it must be noted that they are still in their beginnings in most enterprises with no significant differences in degree of implementation according to size.

Table 11. Distribution (%) of the sample enterprises by sales (millions of dollars) according to development activities

Sales	Development Activities				
	New Prod.	Improv.Prod	Proc.	Organiz.	Market
Less than 1	88	88	25	12	50
Between 1.1 and 5	70	90	80	60	60
Over 5.1	91	100	91	73	55

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

2.2.3 Factors which induced enterprises to innovate and main difficulties

i) Factors which drove development activities

Product and process innovation, new organizational structure and product distribution activities were driven by a set of factors. **There is no single relevant factor which can explain innovative development in SMEs.** Also, the enterprises had difficulty in pointing out the most important determinants of the innovative process with accuracy. This may be explained by the absence of a "innovative culture" in most of the enterprises, by the difficulties they have in decoding the new market signals and by a certain lack of knowledge about the competitive positions they seek to achieve.

In the present competitive context, the most determining factors for development and innovative activities were : a) "the need to adapt to new quality and/or regulation standards", b) "the access to new markets", c) "quality improvement", d) "market share growth" and e) "production costs reduction" (refer to Table 11).

However, differences stand out among sectors. Thus, leather and metal product enterprises give priority to the "new market access". The "quality improvement" goal has a greater influence over the metal products and chemical and plastic products enterprises. This last group of enterprises also conducted development activities aimed at "increasing" their market share.

Table 12. Distribution (%) of the enterprises in the sample by sector according to the most relevant factors which drove development

	Most relevant factors a/b/				
Sectors	**1**	**2**	**3**	**4**	**5**
Leather Prod.	44	71	14	43	14
Chem.& Plast.Prod	55	36	55	36	45
Metallic Prod.	44	67	56	33	22
Mach. & Equip	42	33	33	33	42
Total	49	49	41	36	33

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Notes: a/ 1 Need to adapt to new quality and or regulation standards; 2 Access to new markets; 3 Quality improvement; 4 Increasing market share; 5 Reducing production costs;
b/ In this chart the percentage in each cell refers to the proportion of sample enterprises (sector) which indicates the most relevant factor which drove the innovation process.

Smaller enterprises chose the "need to adapt to new quality and/or regulation standards" and "access to new markets" as

determining factors for innovative activities. Larger enterprises on the other hand, are influenced by the whole set of surveyed factors (refer to Table 13).

Table 13. Distribution (%) of the enterprises in the sample by sales according to the most relevant factors which drove development

	Most relevant factors a/				
Sales	**1**	**2**	**3**	**4**	**5**
< 1	50	75	38	38	13
1.1 - 5	55	45	55	30	40
>5	36	36	18	45	36

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Notes: a/ 1 Need to adapt to new quality and/or regulation standards; 2 Access to new markets; 3 Quality improvement; 4 Increasing market share; 5 Reducing production costs;

ii) Main difficulties encountered by the enterprises to conduct development activities

As mentioned when discussing the driving factors for development activities, the enterprises had difficulties in pointing out the main restrictions they faced with accuracy. The type of predominant management (basically oriented towards production, centered on the owner and with his active participation in the innovative process) tends to displace innovation and development activities to a secondary position within the enterprises' strategy in spite of the fact that they appear as a primary objective in their evolution path.

Within this framework, the absence of financing constitutes the main restriction for SMEs to carry out "development activities and limits the possibilities of other development than "incremental". Moreover, self-financing of innovation activities affects their pace and so intensity acquires a procyclic nature. Thus, the recessive stages of the cycle, during which enterprises would have more time to carry out "non incremental" development activities, coincide with the moments of greater economic difficulty to finance them.

As regards the rest of the factors which limit the innovation process, they are widely distributed among the firms and none of them is selected jointly by more than 30% of the enterprises. The Leather and Metal Product sectors face significant restrictions as regards "access to the raw material and components market", while chemical and plastics enterprises have strong difficulties with the

high costs involved in development (refer to chart 14). It is worth mentioning that very few enterprises said they had technological and/or information problems to introduce innovations. This may be explained by the fact that most of them perform simple developments which do not require radical changes over the previous technological path. That is to say, the necessary technological process to adapt new products only requires incremental developments from the one previously used.

Table 14. Distribution of the sample enterprises (%) by sector according to type of difficulty faced to carry out development

	Most relevant difficulties a/			
Sectors	**1**	**2**	**3**	**4**
Leather Prod.	71	-	43	-
Chem.& Plast.Prod.	82	45	9	18
Metallic Prod.	78	22	44	22
Scient.Mach.& Equip.	83	33	17	-
Total	80	28	26	23

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Notes: a/ 1 Lack of financing; 2 High costs involved in development; 3 Difficulties in gaining access to the market of raw materials and non commodities components purchased abroad; 4 Little exigency from clients.

Summarizing, financing and development costs appear as the most restrictive factors for larger enterprises (refer to Table 15).

Table 15. Distribution (%) of the sample enterprises by sales according to the most relevant difficulties.

	Most relevant difficulties a/			
Sales	**1**	**2**	**3**	**4**
<1	63	13	26	13
1,1-5	75	30	35	10
>5	100	36	-	-

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Notes: a 1 Lack of financing; 2 High costs involved in development; 3 Difficulties in gaining access to the market of raw materials and components; 4 Little exigency from clients.

2.2.4 Impact of the product and process development and organizational activities on enterprise profitability and costs

Most of the sample enterprises (70%) pointed out the main reason for conducting development activities was to continue staying in the market. This shows, in some respect, a passive attitude as regards development activities which could be seen as a defensive strategic behavior that started to gain importance since the start of the process of economy opening (1991). As a result of this situation, most of the sample enterprises experienced no positive effects on the profit margin because the increased external competitive pressure forced them to lower prices in a proportion higher than the reduction in costs derived from innovating activities. In addition, they had to apply a lower mark up than they used to before the opening process of the economy to the new products introduced to the market. Hardly a little more than one third of the enterprises that introduced innovations to "stay in the market" also achieved greater benefits[11].

On the contrary, about 80% of the enterprises that introduced innovations due to other motivations (39% of the cases) achieved rises in profitability, showing the ability to respond actively to the macro regulatory framework changes which started in the 90's. (refer to Table 16)[12].

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[11] Most of the enterprises that increased their profitability with the introduction of innovations, which were also motivated by the need to stay in the market under the new competitive conditions are metal/mechanical. Some enterprises stand out among them (dosage pumps, turnkey plants for the food industry, industrial ovens, components for the petrochemical industry, etc.). They have been making significant changes in process technology and production organization since the 80's. These enterprises, which had acquired an important external insertion in the 90's, had to introduce quality and development programs in order to maintain their position both in the internal and the external market.

[12] In this group, where there are no metal mechanical enterprises, some chemical and plastics enterprises stand out (metal surface treatment products, insulating tape, acrylic plates, among others) and to a smaller extent, leather enterprises (braided belts) These enterprises have been able to respond adequately to the new market conditions and send abroad a significant part of their output and/or have a dynamic relation with larger enterprises with a good technological level.

Table 16. Distribution of the sample enterprises by effect of the innovations on profitability and costs, according to "wether they said that it allowed them to stay in the market"

	Impact on profitability and costs a/				
	1	2	3	4	Total
It allowed to stay in the market	28	8	32	32	100
Not associated to the need to preserve the market	64	18	9	9	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Notes: a 1/ profitability increase and cost reduction; 2 profitability increase without cost modification; 3 no profitability modifications and cost reduction; 4 no modifications.

In terms of sectors, it may be pointed out that the particular characteristics of each sectoral market have influenced the development of these activities as much as the "personal" attitudes of each enterprise towards them. Thus, most of the chemical and plastic product enterprises experienced positive effects on profitability and costs, while only one fourth of the scientific machinery and equipment enterprises managed to increase profitability and reduce costs (refer to Table 17).

Table 17. Distribution of the enterprises by sector according to impact on profitability and costs a/

Sectors	Impact				
	1	2	3	4	Total
Leather Prod.	29	13	29	29	100
Chem.& Plast.Prod.	70	10	20	-	100
Metallic Prod.	38	-	38	24	100
Scient.Mach.&Equip.	25	8	16	51	100
Total	41	8	24	27	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Notes: a 1/ profitability increase and cost reduction; 2 profitability increase without cost modification; 3 no profitability modifications and cost reduction; 4 no modifications.

Finally, there is a positive relation between enterprise size and the increase in profitability and cost reduction. In over half the larger enterprises, development activities had a positive impact, while this is true of less than one third of the smaller enterprises (refer to chart 18).

Table 18. Distribution (%) of the sample enterprises by sales (millions of dollars) according to impact on profitability and costs

	Impact on rentability and costs				
Sales	**1**	**2**	**3**	**4**	**Total**
Less than 1	29	14	14	43	100
Between 1.1 and 5	35	5	30	30	100
Over 5.1	55	18	18	9	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Notes: a/ 1 profitability increase and cost reduction; 2 profitability increase without cost modification; 3 no profitability modifications and cost reduction; 4 no modifications.

2.3 Quality

2.3.1 Work Team

The staff involved in the enterprises' quality activities (including those who also perform other tasks) amounts to almost the third part of the total employees of the sample firms. Those responsible for quality management[13] represent 12% of the involved personnel, and there is a significant dispersion among enterprises. This implies that, while half of the enterprises stated they had only one employee in charge of quality, others (13%) declared that there was no one person responsible for those activities and the rest reported more than one person in charge.

In general, the greatest proportion of people involved in quality -most of them enterprise's employees- corresponds to metal products manufacturing enterprises (51% of the sector's employees) and chemical and plastic products enterprises (37%). The other two analyzed sectors show percentages of quality assigned personnel which are below this average.

It is worth noting that there is a direct association between the existence of written manufacturing procedures and the number of employees involved in the enterprise's quality development. Thus, while enterprises with no written manufacturing procedures have less than a fifth of their employees dedicated to quality activities, in the enterprises that do have written procedures the percentage of staff assigned to quality development is highly superior (50%).

Sixty seven per cent of the sample enterprises had to train their personnel committed to quality development tasks. Nevertheless, at present only 47% of those enterprises are involved in training programs. In this context, it should be remarked that there are strong heterogeneities among enterprises: i) 41% of the enterprises have conducted or are currently conducting training courses for the development of quality systems, ii) 28% of the enterprises have not carried out in the past and are not carrying out at present quality courses, and iii) the remaining cases correspond mostly to those enterprises that have taken courses.[14]

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[13] In most firms, the responsibility for quality tasks lies on the same person who is in charge of production. In all cases, even in those enterprises with a unique person responsible for quality, the owner has a decisive influence upon the development of such activities.

[14] In this extremely heterogeneous context it is worth mentioning the existence of different sources used by the enterprises to carry out quality tasks implementation. Most external courses taken by the enterprises were conducted by specialized private institutions and/or entrepreneurial chambers. Those courses were attended by the people in charge of production and quality and a significant number of enterprises owners. It should be noted that those

At sectoral level, it becomes clear the lack of training activities in leather product manufacturing, the continuous nature of training in metal products manufacturing enterprises, the high proportion of machinery and equipment manufacturing enterprises that carried out courses and the reduction in the ratio of chemical/plastic and machinery and equipment enterprises currently conducting quality training courses (refer to Table 19).

Table 19. Proportion of sample enterprises per sector that have conducted or are currently conducting training activities

Training activities Sectors	Have conducted	Current.conducting
Leather Prod.	0	14
Chem.& Plast. Prod	73	45
Metallic. Prod.	67	67
Scient.Mach. & Equip.	92	58
Total	46	67

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Quality control performed by the enterprises' non-skilled workers is not related to the existence of written procedures for productive tasks development. This may imply a certain overestimation of the declared quality efforts. Thus, while in almost two thirds of the enterprises having written procedures to perform productive tasks, non-skilled workers are in charge of quality control, three quarter of the enterprises lacking written procedures also perform quality control. The second case gathers almost 40% of the enterprises in which workers perform quality

attending the courses generally make an internal diffusion of the acquired knoledge. A small number of enterprises also conducted internal courses using specialized consultants which allow them to advance faster in the quality system implementation. Some enterprises mentioned the existence of a wide supply of specialized consultants who do not take into account SMEs specificities, which are the basis for those enterprises to carry out quality programs.

control, the lack of written procedures poses doubts on the nature of the mentioned control (refer to Table 20).[15]

[15] If, for the above purposes, those firms lacking written procedures are excluded from the positive answers of the quality control variable, only in 40% of the panel's firms, non-skilled workers perform control quality activities.

Table 20. Distribution (%) of sample enterprises per existence of written procedures to perform productive tasks (workers participation in quality control activities), according to the participation of workers in quality control (existence of written procedures to perform productive tasks)

Quality Control	Existence of Written procedures		Total
	Total o Partial	Non-existent	
Yes	66 (100)	61 (61)	75 (39)
No	34 (100)	39 (75)	25 (25)
Total	100 (100)	100 (66)	100 (34)

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

2.3.2 Using Techniques and Performance Indicators

In order to perform an evaluation of the diffusion level of certain production management tools, which may be used as proxy of quality advancements, the people in charge of quality in the enterprises were asked on the usage of the ten **Techniques**[16] and the eight **Performance Indicators**[17], specially selected for this purpose.

In general terms, the use of organizational techniques by the enterprises in the sample is scarce and the proportion of enterprises using relatively complex techniques is small. Besides, the implementation of such techniques is, in some cases, partial and located only in some phases of the productive process. It should be noted that in most cases, the enterprises started using these techniques after 1990, these being their first advances in the quality field, as a result of strategies aimed at maintaining themselves in the market through new operation procedures.

[16] The techniques and quality norms of interest were the following: "Problem-analysis tools", "Preventive maintenance", "Quality circles", "Statistical Process Control", "Mode analysis and failure effect", "Cells Production", Just in Time", "ISO 9000", "TQM" and "Kan Ban".

[17] The indicators used in the survey were the following: "Average lead terms", "Productivity evolution", "Scrap percentage", "Proportion of discarded final products", "Stock rotation:, Percentage of rework time", "Evolution of processing products", "Other indicators".

The strong heterogeneity of these enterprises is shown by the fact that almost a third of them uses less than 20% of the studied indicators and techniques, a quarter of the enterprises use more than 40% of such indicators and techniques (refer to tables 21 and 22). At sectoral level, in the leather product sector there is little use of techniques and indicators: three quarters of the enterprises use less than 20% of the total amount. In the chemical and plastic product sectors there is a significant use of such elements: half of the enterprises uses more than 40% of the studied indicators.

Table 21. Distribution (%) of the sample enterprises by sector according to the number of techniques and indicators used

	Percentage of used techniques and indicators				
	< 20	21-30	31-40	> 41	Total
Leather Prod.		71			
0	29				
	0	100			
Chem.& plast. prod.		9		36	
9	46				
	100				
Metallic Prod.		33			
22	12				
	33	100			
Scient.Mach.& Equip.	25	9			
50	16				
	100				
Total		30			
18	26				
	26	100			

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

The most used techniques are: "Problem-analysis Tools", "Preventive Maintenance", "Quality Circles" (refer to Table 18 of Statistical Appendix). On the other hand, techniques such as JIT, TQM and KAN-BAN are implemented by less than 5% of the enterprises. Finally, only one enterprise of the sample had the ISO 9002 certification.

The average use of relatively simple performance indicators is more spread among enterprises, although it does not exceed the 55% in the sample. The most important indicators are: "average lead term", "productive evolution" and "scrap percentage". These elements are used in almost half the enterprises (refer to Table 18 of the Statistical Appendix).

Table 22. Distribution (%) of the sample enterprises by sector according to the number of techniques and indicators used

	Org. Techniques												Indicators						
E	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	•			•									•		•				
2				•															•
3	•																		
4	•			•									•			•			
5		•	•										•		•	•			•
6																			
7	•		•	•									•		•	•	•		
8	•				•										•		•	•	•
9			•	•					•				•	•					
10	•	•	•	•	•														•
11					•								•	•	•				
12			•														•	•	
13	•	•	•				•						•	•	•	•			•
14	•	•	•	•	•								•	•	•	•	•	•	•
15	•			•									•	•	•				
16	•	•								•			•		•	•	•	•	•
17	•				•								•	•	•		•	•	•
18	•	•	•	•	•					•			•		•				•
19			•	•	•						•								
20		•		•	•									•		•			•
21																			
22												•							
23	•	•		•									•	•	•			•	•
24	•	•	•	•	•	•				•			•	•	•	•	•	•	
25	•			•	•								•	•	•	•	•		•
26	•	•			•		•								•	•		•	•
27					•										•	•	•		
28										•	•		•			•	•	•	•
29			•	•	•				•			•	•			•	•	•	
30				•															
31				•						•	•		•	•				•	•
32																	•		
33					•									•					•
34				•					•			•						•	
35				•							•			•		•	•	•	•
36		•		•	•											•	•	•	•
37	•		•	•									•						•
38	•		•	•	•			•			•		•	•		•		•	•
39	•				•				•			•		•			•		•
T.	19	11	13	22	17	1	2	1	2	5	5	4	20	15	16	21	16	15	21

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Notes on Table 22

E: Enterprises	1-7 Leather Products; 8-18 Chemical/Plastic Products; 13-27 Metallic Products; 28-33 Scientific Machinery and Equipment
Techniques:	1) Problem-analysis Tools; 2) Statistical Process Control; 3) Quality Circles; 4) Functional Polyvalence; 5) Preventive Maintenance; 6) Total Quality Management; 7) ISO 9000; 8) KAN-BAN; 9) Just In Time; 10) Mode Analysis and Failure Effect; 11) Cells Production; 12) Others
Indicators:	13) Production Scrap Percentage; 14) Final Products Rework Percentage; 15) Percentage of Discarded Final Products; 16) Average Lead Term; 17) Stocks rotation; 18) Processing*/; 19) Productivity changes**/

*/ This indicator estimates the quantity and value of products in process which are in different stages of the manufacturing process. The value has been estimated in terms of units equivalent to the final product.

**/ It refers to the estimation (and its comparison among different periods) of the firm's productivity.

There are, however, strong sectoral differences[18] in the level of techniques and indicators usage (refer to Table 19 of the Statistical Appendix). Thus, for example, in the Leather sector only the use of "Problem-solving Tools" is relevant (60% of the cases) while the other techniques are almost not used. In the chemical and plastic product sectors almost three quarters of the enterprises use "Problem-solving Tools" and in almost half the cases it is supplemented with the use of other techniques (Preventive Maintenance, Quality Circle and Statistical Process Control). In the case of metal product manufacturing enterprises, two thirds of them use "Preventive Maintenance", while approximately half of the enterprises use "Problem-solving Tools" and "Statistical Process Control". Finally, in the case of capital goods manufacturing enterprises, the "Preventive Maintenance" appears as the most used technique, even if it is used in only 44% of the enterprises.

As regards the Indicators, 50% of the Leather enterprises use "Scrap percentage", while "Average Lead Term" and "Percentage of discarded final products" are used in less than half the cases. In the Fine Chemical and Plastic Product sectors, the most used indicators are "Scrap percentage" (73%) and "Productivity change" (64%). In the Metal Product manufacturing enterprises, the most important are "Average Lead term" (55%) and "Percentage of discarded final products" (55%). Finally, the most used indicators among capital goods manufacturing enterprises are "Average lead terms" (83%) and "Productivity change" (67%).

The field work information also shows that those enterprises having written procedures to perform productive tasks, use a greater number of production organization techniques and performance indicators than those not having them (refer to Table 20 in the Statistical Appendix).[19] Thus, more than 60% of the enterprises with written procedures use "Problem-solving tools", "Process statistical control", "Preventive maintenance" and the set of indicators, while the use of those elements by the enterprises not having written procedures is remarkably inferior.

Among those enterprises using up to three techniques and indicators there is a predominance of enterprises with no written procedures (66%). Inversely, the majority of the enterprises using

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[18] It should be noted that specific sectoral characteristics of different goods (process technology, size of product manufacturing series, the different quality-related regulation requirements, etc.) determine the use of some techniques and indicators and the non-applicability of some others.

[19] The use of written procedures is positively related to the employment of organization techniques and to the use of efficiency indicators. The coefficient of correlation between the use of written procedures and the use of techniques and indicators is 34%.

more than six techniques and indicators, have written procedures (80%) (refer to Table 23).

Table 23. Distribution (%) of sample enterprises by number of used techniques according to the existence level of written procedures

Qty.of performance techniques and indicators used				
	Up to 3	4	5	Over 6
Written Procedures				
Total or Partial	33	86	80	67
Non-existent	14	20	100	100
Total	100	100		

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Table 24. Distribution (%) of sample enterprises by number of techniques used according to the existence level of written procedures

Nbr. of performance techniques and indicators used			
	Up to 3	4-5	Over 6
Written Procedures	**Total**		
Total or Partial	15	23	62
Non-existent	61	8	31
			100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

In general, the implementation of techniques and indicators have required the training of their users, establishing the basic needs of training required to use them correctly and efficiently. **In fact, the enterprises performing the greatest training efforts** (refer to Methodological Appendix) **use the highest proportion of techniques and indicators.** Thus, the enterprises in which more than 50% of the employees were involved in training courses oriented towards quality development and which have conducted

development activities use 44% of the total techniques and indicators involved. On the contrary, those enterprises in which less than 20% of the employees have taken training courses oriented towards quality development use, in average, a fifth of the total techniques and indicators considered (refer to Table 25).

Table 25. Distribution (%) of sample enterprises by type of training effort according to percentage of techniques and indicators used on 100% of the mentioned techniques or indicators

Typ. training effort a/	1	2	3	4	5
Techniques	33%	20%	14%	17%	15%
Indicators	67%	54%	50%	66%	33%
Tech. + Indic.	44%	31%	26%	33%	21%

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Notes: a/ 1. enterprises in which more than 50% of employees were involved in quality oriented courses and performed courses related to development activities; 2 between 21 and 49% of the employees involved in quality courses and having performed development courses; 3 between 21 and 49% of employees involved in quality courses but who have not performed development courses; 4 less than 20% of employees involved in quality courses and having performed development courses; 5 less than 20% of employees involved in quality courses but who have not performed development courses.

In turn, the ratio of techniques and indicators utilized increases among those enterprises with greater number of skilled personnel (engineers, chemists, physicists and technicians). It is worth noting this relationship since the rate of engineers and technicians in the enterprises' total number of employees is not related to the firms' employment size but to the characteristics of the enterprises and sectors studied. Thus, the enterprises that have up to four specialized technicians use an average of less than a fourth of the techniques, and those having more than 10 use slightly less than 40% of the total techniques and indicators (refer to Table 26).

Table 26. Proportion of techniques and indicators used according to the number of specialized technicians

Engineers/chemists/physicians/technicians

Average use (%)	Up to 4	Between 5 and 10	Over 11
Techniques	19	28	
Indicators	31	46	
Total	23	31	

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

The majority of the enterprises with written procedures perform a strict quality control of suppliers. These included a written notice of the rules for acceptance or rejection of inputs. On the contrary, the enterprises lacking written procedures did not provide their suppliers with inputs evaluation criteria. Additionally, only a third of the enterprises which control their suppliers have written procedures for productive task development.

Table 27. Distribution (%) of sample enterprises by type of written procedure according to the level of suppliers quality control

Written Procedures	Suppliers control a/ 1	2	3	Total
Total	86	14	0	100
Partial	55	39	6	100
Non-existent	8	69	23	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Notes: a/ 1 Enterprises control, anticipate in writing the criteria used to accept inputs and choose suppliers who have adopted quality-ensuring measures and/or those who meet demanded quality levels; 2 they control but do not anticipate in writing and, 3 they do not control.

Finally, **almost all the firms mentioned the lack of financial resources as the major obstacle for conducting quality development activities** (60% of the cases). Other obstacles -in decreasing order- were the difficulties to change the enterprise's culture (30%) and the lack of institutional support (30%). At sectoral level, in the case of leather products, there is little knowledge

of new techniques and methods (60%); in the case of chemical/plastic product enterprises, the main obstacles are the restraints of financial resources (82%), and, among the metal product enterprises, the lack of knowledge on new techniques and methods (33%).

It should be remarked that the use of techniques and indicators is a relatively new phenomenon, which, in most cases, started in the last years. In that sense, it is worth noting that, in general, there are implementation problems, a certain degree of ignorance about the potentialities of techniques and indicators for competitiveness improvement and a predominance of partial applications, related only to some stages of the productive process. Additionally, some sectors face enterprises' demands with a low degree of requirement exigence and/or they have just started to require the fulfillment of minimum quality standards. Finally, in several cases the inadequate volume size in which products are manufactured prevents the use of techniques requiring greater productive scales (processes statistical control, productivity evolution, mode analysis and failure effect, etc.).

2.3.3 Some notes on functional polyvalence used by the sample enterprises

More than half of the sample enterprises mentioned the use of "functional polyvalence" among the most applied quality techniques. However, this technique was excluded when considering the frequency of techniques and indicators used by the firms, due to its being considered in an unusual way. Amongst SMEs, the "functional polyvalence" is associated with the possibility of having the workers operate different machines and equipment with no general idea about their "involvement in the process". A greater involvement of workers requires a previous training and intensive participation of such workers in the operation process. In fact, the degree of association between the use of this technique and the qualification efforts is very low.[20]

Table 28. Distribution of sample enterprises according to workers contribution by usage of "functional polyvalence"

	Workers
involvement a/	

[20] There is no correlation between use of functional polyvalence by firms, and the training efforts. On the contrary, the "functional polyvalence" is associated, amongst the industrial economy theoreticians, to an increment in the qualifications of the workers through their continuous training.

Functional Polyvalence	1	2	3	4	Total
Use	68	5	27	-	100
Do not use	35	17	13	35	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Note: a/ 1 They control quality during the production process and contribute in the developments performed by the enterprise; 2 They control quality but do not contribute in the developments performed by the enterprise; 3 They do not control quality and contribute to the development conducted by the firm; 4 both answers are negative; 4 both answers are negative.

The use of functional polyvalence shows, however, a certain association with the involvement of the worker in quality and development issues. Thus, more than two thirds of the enterprises which mentioned the use of functional polyvalence, have declared that the workers control quality during the production process and contribute in the development carried out by the enterprises. On the contrary, amongst the enterprises not using this technique, only a third stated that their workers were involved in quality and development subjects (refer to Table 28).

2.4. Innovative intensity of the sample enterprises

For the purpose of estimating the innovative intensity of the studied enterprises, an indicator combining seven variables was built, based on the information gathered through field work.

This indicator was defined taking into account the international debate on the estimation of SMEs innovative process.

There is an increasing acceptance of the fact that traditional indicators are not sufficient to estimate SMEs innovative intensity (research and development expenditures, patents, scientific publications, etc.). Thus, there was a growth of international consensus on the need of using other indicators which encompass the set of elements explaining the innovative phenomenon (Meyer-Krahmer, 1984; Malerba, 1993; Lassini, 1986; etc.). These were approached through different methodologies by different authors. While some of them focus the estimation on the "innovative product", or on the input; others use measures that combine a set of input, output and qualitative indicators.

In the first case, Meyer-Krahmer (1984) defines the "innovative intensity" broadly as the contribution of the new

products introduced by the enterprise to the total output during a certain period of time. That is to say, the definition focuses on the output; e.g. the introduction of products involving improvements or completely new products. In a more rigorous sense, it refers to those products which are not only new to the enterprise but that include new specific uses as well.

In the second case, Lassini (1992) measures the informal R&D activity using the ratio of resources oriented mostly towards other activities (production, commercialization and costumer services, management and organization) but which perform innovative activities.

In the third case, in an analysis on the innovation process in the SMEs of Emilia Romagna (Italy), Nomisma (1993) suggests the use of an indicator synthesizing different relevant data in the innovative process[21]. This indicator contemplates the use of inputs, output and others qualitative indicators.

The seven variables used in this paper are "proxies" of the elements determining the innovative activity.

1) Training effort (refer to variable xiv of item 5.3.2 in the Methodological Appendix)

2) Workers' involvement in quality and development (refer to variable vi of item 5.3.2 in Methodological Appendix)

3) Percentage of engineers in relation to the total personnel performing development tasks. The definition of this variable was not included in the report. It is based on the variable xxiv of item 5.3.1 in the Methodological Appendix where there is a classification of personnel involved in innovation activities. The number of engineers and technicians is divided by the personnel involved in development tasks.

4) Characteristics of development activities: Refer to variable xi of item 5.3.2 in the Methodological Appendix

5) Cooperation for development: Refer to variable xi of item 5.3.2 in the Methodological Appendix

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[21] The most significant input indicators are: i) existence of R&D department in 1992; ii) R&D department contributions during the stages of the innovation process conducted by the enterprise. The output indicators used are: share of innovative products in 1992 sales; ii) introduction of significant product innovations during 1989-1992 and; iii) the use of patented innovations. Among other indicators, they use: i) the importance of innovating process in the sector's competitive behavior, ii) the importance of product innovation in the innovative strategy of the enterprise during previous years; iii) patented innovations; iv) efforts for the development of projects involving new products and v) use of public funds for R&D activity.

6) Number of areas performing innovative activities. Refer to variable xxi of item 5.3.1 in the Methodological Appendix.

7) Number of weighted areas performing development activities.[22]

Each variable of the indicator was ranked between the values 1 (maximum level) and 5 (minimum level). For instance, for variable 1 (training effort), those firms complying with item 1 of the definition are assigned value 1; those complying with point 2 are assigned value 2; and so on up to those firms complying with point 5, which are assigned value 5. With some specificities, the same procedure is applied to the six other variables.

Finally, the indicator is estimated through a simple average of the values assigned to each variable. The firms with an average inferior to 2.3 have a "high" innovative intensity, those with an average between 2.31 and 3 have a "medium" intensity and those with an average superior to 3 are considered of "low" innovative intensity.

While more than a third of the sample enterprises have a high level of innovation, regarding the average, the remaining enterprises show medium indexes (26%) and/or low (38%) (refer to Table 30). **In this context the sectoral differences are very clear.** Thus, while all leather products manufacturing enterprises have a low innovative intensity, two thirds of the chemical and plastic products manufacturing enterprises have high indexes (refer to Table 29). In the metal-mechanic sector there are significant differences in innovative intensity in favor of capital goods manufacturers.

Table 29. Distribution of sample enterprises by sector according to innovative intensity

Innovative intensity a/ Sectors		**High**
Medium	**Low**	
Leather Prod.		-
-	100	

[22] The number of areas where enterprises conduct development activities, in turn, is contrasted with the existence of personnel dedicated exclusively to such activities. Thus, when there is no exclusive development personnel, the mentioned product is divided by four. When the exclusive development personnel is less than 30% of the total personnel dedicated to development activities, it is divided by three. When the exclusive personnel ranges from 31% to 50%, it is divided by two. When the ratio is between 51% and 80% is divided by 1.5; when it is between 81% and 99% it is divided by 1.3. Finally, the product remains unaltered if all the development personnel is exclusively dedicated to those activities. In this way, more relevance is assigned to those firms in which the stable team tends to be exclusive.

Chem./Plast. Prod.			64			
9		27				
Metallic Prod.					22	
44			34			
Scient.Mach.& Equip.			42			
42		16				
Total					36	
26			38			

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Note: a/ Refer to footnote 19.

The innovative intensity is significantly superior among larger enterprises. Hence, while 88% of the enterprises with a total sales volume of less than one million dollars had a low innovative intensity, almost three quarter of those with a total sales volume of more than five million dollars had a high innovative intensity. This may imply the existence of a required minimum threshold for an autonomous development of innovative activities (refer to Table 30).

Table 30. Distribution (%) of sample enterprises by sales volume (millions of dollars) according to innovative capacity

Innovative intensity a/ **Sales**			
Medium	**Low**	**High**	
Less than 1	-	12	88
Between 1 and 5	30	35	35
Over 5	73	18	9
Total	36	26	38

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Note: a/ Refer to footnote 19.

The data of the sample does not allow the distinction of differentiated behaviors in the innovative intensity of the enterprises with dissimilar investment levels[23] from the opening of the economy (1991) onwards. The lack of a positive association between their innovative intensity and investment efforts may be explained by the elements of informality and incremental nature in

[23] The concept of "investment level" refers to the ratio "amount of investment on tangible and intangible assets in 1991-1994", divided by 1994 output. In that sense, this indicator measures the size of the investment on the firm. However, the incorporation of tangible and/or intangible assets is a necessary but not sufficient condition for the development of the firm's innovative activities.

the innovative processes conducted by SMEs, which underestimate the expenditure involved in development activities. In general, these enterprises do not consider the contributions of the "informal" team assigned to these tasks as an investment. In fact, there are some enterprises in the sample that have successfully carried out significant innovative activities and have recorded a very reduced "formal" investment[24]. Hence, the use of traditional indicators to measure the innovative intensity of SMEs (i.e. investment level) are insufficient due to the specific characteristics of their innovative process.

To summarize, the sample enterprises data support the hypothesis that sectoral characteristics and enterprise size are determining when evaluating their innovative intensity. This intensity increases in larger enterprises and in those belonging to the chemical/plastic sector. On the other hand, the investment level of the 1991-1994 period and the enterprises' foundation year do not have a clear relation with the enterprises' innovation degree. This would imply that the reactions of the enterprises when facing the macroeconomic changes occurred at the beginning of the decade were dissimilar and were not associated to the technological experience derived from their trajectory.

Furthermore, there should be noted that SMEs' innovative intensity basically depends on the modalities assumed by their management and the "personal" characteristics of their entrepreneurs. In almost all the studied cases, the owners have a central role in the execution of innovation activities conducted by the enterprises: the professional qualification of the entrepreneurs, their technical training throughout time, their continuous involvement with productive tasks and the centralized and "family-like" approach to enterprise management strongly characterizes the initiatives and outcomes of the innovation process. Thus, the innovative intensity -which summarizes the

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[24] On the contrary, it is worth noting that amongst the enterprises with the greatest investment coefficient and medium innovative intensity, there are two that have introduced significant changes in the process technology used in the last years and they have a good competitive position. In these cases, the high investment coefficient, explained by the acquisition of CNC equipment, is not associated to a high innovative intensity due to the product characteristics and the elevated degree of automatization of the productive process. In the example the indicator shows a "medium" innovative intensity of two enterprises which had incorporated automatized process technology (CC equipment). That is to say, although they had a "modern" process technology, they do not comply with the set of conditions required to those firms classified as having "high innovative intensity". In fact, the sole incorporation of technology through the acquisition of capital goods does not necessarily imply that there is an effort on the part of the firms, based on the accumulation of technical and organizational capabilities, bringing about increases of productivity and efficiency. This effort creates the space for generating incremental innovations as regards products and production processes (Chudnovsky and Lopez, 1995). In that sense, the use of credit for equipment acquisition does not necessarily imply an increment in the firms' innovative intensity.

enterprise's innovation activities- reaches different levels and results depending on the "personal" capabilities of the group of people managing the enterprise.

2.5. Support needs and degree of institutional knowledge

Almost two thirds of the enterprises declared that financing was the most important contribution to conduct innovation activities. In a context of significant differences at sectoral level, the remaining support activities required are judged as less important. This shows in the fact that the demand relative to each support form policy involves less than a fourth of the sample enterprises in all cases. For the majority of these enterprises, except for the financing, there is no unique central factor but different restrictions due to the sectoral and individual specificities of the enterprises.

The importance of the financial requirements to conduct the innovative activities declared by the enterprises, poses some doubts upon the evaluation performed by these enterprises regarding their restrictions and problems. Actually, this situation reveals that most enterprises ignore or underestimate their main obstacles to develop these activities and to transform innovation in an effective axis of competitiveness. Even though the financial problem is a key aspect for the innovative activities management of the enterprise, its being the only reference shows a very partial vision of the innovative process, a poor evaluation of the complexity of its implementation and an insufficient appreciation of the necessary systemic interactions. Further to the difficulties SMEs have to cooperate with external agents, these enterprises seems to misunderstand the relevance of operating in an environment favorable to innovation, that will ease the performing of innovative activities and will diminish their risk.

It should be remarked that the use of exclusively financial support mechanism does not constitute an autonomous and effective stimulus for planning, starting and developing innovative activities. The availability of financial tools, in general, helps to reduce the cost of already devised innovative activities and, in most cases, in the process of implementation. The support to the enterprises' innovative activities should be the result of an institutional environment favorable to these activities. On the contrary, at present the enterprises tend to operate in isolation, with only partial contacts with the institutional environment and/or the productive system in which they operate.

Moreover, the sample enterprises show a very limited knowledge of the institutions providing services which are directly or indirectly related to innovative activities (refer to Table 22 of the Statistical Appendix). INTI and IRAM are the exceptions. They are known by more than 70% of the enterprises although they are not necessarily used. In spite of this formal identification, the

enterprises' opinion about INTI's performance is not exactly heterogeneous. There is quite a significant set of enterprises that have expressed complains ranging from the high costs of the supplied services to their inadequate quality.

The entrepreneurial industrial and trade CHAMBERS occupy the fourth place amongst the support institutions, although with strong inter-sectoral differences. Thus, the leather, chemical and plastic enterprises are much more related to the services supplied by their corresponding chambers than the metal-mechanic manufacturers who, in general, operate in a more isolated way and, in most cases, mentioned the deficiency of the services supplied by the chambers.

The enterprises' degree of information about the other institutions, specially those providing financial services to promote innovation from the Inter American Development Bank (FONTAR, SECYT) or which facilitate the access to such services (UBATEC) is limited. Finally, the institutions supplying services related to entrepreneurial development and/or quality are virtually unknown.

The level of mismatching between enterprises and support institutions, mentioned above, is the outcome of problems springing both from the services supply and from the demand. On the one hand, there is a strong heterogeneity in the services and there is a lack of an adequate attitude to reach the central mass of users, who, on the other hand are provided with scarce information. Frequently, the institutions behave as if the conditions were that of the perfect competition model: adequate information, free access to markets and complete rationalization of economic agents. That is to say, it is assumed that economic agents can enhance the use of the supplied services.

On the contrary, if it is accepted that there are multiple agents and that both their microeconomic features and their history (know-how and capabilities accumulated through time) influence the menu of possible reactions, the entrepreneurial answers tend to differ. This is specially relevant in the case of SMEs. They constitute a strongly heterogeneous set, full of both enterprises with the ability to successfully adapt and adjust themselves, and enterprises with scarce possibility of doing so and surviving adequately when faced with changes in the rules of the game. These characteristics become key elements to be taken into account in the design of the institutional innovation supply and intervention modalities.

On the demand side, SMEs show management problems reflected in their impossibility to take advantage of the services supplied by different institutions. Moreover, there is strong specificity of the enterprises' demand and a lack and/or scarcity of "intermediate institutions" to decode support requirements.

3. Main outcomes of the field work

SMEs' innovation activity (products and processes development, introduction of new organization forms, relationship with the market and implementation of quality systems) constitute an idiosyncratic process characterized by:

i) its incremental nature,
ii) the SMEs lack of specific departments devoted exclusively to these activities,
iii) the informality -even though they have certain stability and continuity- of the work teams,
iv) the lack of a specific budget,
v) the ignorance and undervaluation of involved costs,
iv) the self financing and pro cycle feature.

The idiosyncratic characteristic of SMEs innovative activities and the peculiarities of their management impair the comparison of the outcomes of these activities with the resources assigned to them. Actually, the results of innovative activities are associated neither with the number of people involved nor with the amount spent on them.

The informality of SMEs innovative activities shows in the fact that only one third of the people are devoted exclusively to those activities. There is also a scarce formal participation of workers; however, in most cases (66%), they have performed significant "informal" contributions. In turn, the staff involved in quality is a third of the employees, with strong sectoral differences and greater proportions in the chemical, plastic and metallic products sectors.

The enterprises concentrated their innovation strategies basically in the "enhancement of existing products", the "introduction of new products and processes" and the development of "quality activities". The lighter weight of innovative activities such as the "organizational changes" and the "new forms of relationships with the market" are explained, partially, by the excessive importance put on the production problems. It should be noted that process developments and organizational improvements are more important amongst larger enterprises.

Although the sample data show that enterprises interact with other economic agents to carry out innovative activities (clients, suppliers, other enterprises, research centers, consultants, etc.) it is worth mentioning that these activities are in a very preliminary stage and with specific actions that imply neither a continuous involvement nor an intensification of the relationships in the long run.

In order to develop innovative activities, half the enterprises of the sample performed significant staff training

efforts. These efforts have been more significant in the case of larger enterprises. In general terms, the enterprises which have carried out the most significant training efforts are those with a greater level of formal procedures and which use a greater number of indicators and techniques for production organization and control.

It should be mentioned that such efforts, even though important, are still insufficient in relation to the competitive challenges the enterprises face. In that sense, the training efforts performed by the enterprises are associated neither to the performance of the last years, nor to the level of investments carried out at the beginning of the 1990s. These aspects limit the long term efficiency of the training efforts and, therefore, of the innovative activities. This seems to explain why training activities and soft technologies introduction contribute only partially to the strengthening of the enterprises' competitiveness if they are not conducted in the framework of a coherent updating strategy with a global vision of the enterprise.

The innovative intensity of the sample enterprises[25] depends, largely, on the characteristics and "individual" capabilities of their entrepreneurs and on the type of management (centralized and family-like). Thus, the enterprises' innovative intensity varies according to the knowledge and professional experience accumulated by the owners through time, to their attitude towards the innovative process, and to their evaluation of the competitive relevance of the innovative activities.

Furthermore, the sample enterprises' data supports the hypothesis that the different sectoral characteristics and the size of the enterprise are closely related to the innovative intensity. The innovative intensity is greater, in fact, in the Fine Chemical and Plastic Products sectors and increases amongst larger enterprises. This could imply the existence of a minimum threshold required for the autonomous development of innovative activities.

On the contrary, enterprises' investment and foundation year do not have a clear relationship with their degree of innovation. This may mean that the reactions of the enterprises when facing macroeconomic changes and the liberalization of economy were different and, in most cases, they were not associated to the technological trajectory derived from their years in business.

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[25] The enterprises innovative intensity is measured through an indicator summarizing training efforts, the workers' involvement in the innovative process, the participation of qualified personnel, the innovative activities areas and products, the existence of exclusive personnel for such activities, and the degree of cooperation with other agents (refer to Methodological Appendix).

The information collected during the survey show that the innovative activities implemented from the 1990s onwards, were performed, basically, following "defensive" strategies. This becomes clear in the fact that in 70% of the enterprises were seeking only their maintenance in business; while, on the other hand, only the remaining 30% shows an increase in its income profit and a reduction of its costs. Among the chemical and plastic products enterprises there is a great number of enterprises which managed to increase their rentability and reduce costs, while only one fourth of the scientific machines and equipment enterprises show the same situation. Also, amongst larger enterprises the proportion of profit increment and cost reduction cases is greater than amongst the smaller ones.

The use of organizational techniques and production performance indicators among the sample enterprises is scarce and, in most cases, faces strong implementation problems. The proportion of enterprises using relatively complex techniques is small, and there is a certain degree of ignorance of both the techniques and indicators used[26], and their potentiality for competitiveness improvement. Also, the application of such techniques is, in a great number of cases, quite partial and restricted to certain parts of the productive process stages. It should be mentioned that in most cases, the use of techniques and indicators is still a very incipient phenomenon since enterprises started using such techniques after 1990. Thus, these are their first steps in the field of quality. These strategies, mostly adaptive, are the answer of the enterprises to the new "environment" and in the majority of cases aim at maintaining themselves in the market.

In this context, there are marked sectoral differences in the use of techniques and indicators. Some sectors face a demand with low degree of technological requirements and/or that only recently started requiring the fulfillment of minimum quality standards. In many cases, the insufficient size of the series prevents the use of techniques requiring greater manufacturing scales (processes statistical control, productivity evolution, mode analysis and failure effect, etc.).

The use of techniques and indicators have a positive relation regarding both the specialized technical personnel[27] employed and the performed training efforts. This information seems to show the need of a minimum threshold of technical staff and training tasks

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[26] For instance, the "functional polyvalence" used by the panel enterprises is not associated to the continuous training of workers, although it is closely related to their involvement with quality control and new products and processes development.

[27] Engineers, physicists, chemists and technicians.

for these techniques and indicators to be used. Additionally, it should be noted that those sample enterprises having written production procedures use a larger number of production organization techniques and performance indicators, and perform a strict quality control of products and/or suppliers services.

The financial needs are the main obstacle mentioned by these enterprises as a restriction for the development of innovative activities. Although the importance and magnitude of their financial needs are clear, it may also be a sign of their weakness to evaluate their necessities and a certain degree of ignorance regarding the aspects of innovative processes (technological aspects, human resources requirements, need of joining networks, etc.). The other obstacles considered are less important, mainly different types of restrictions due to sectoral and individual specificities. In relation to quality there are, also, difficulties to change the enterprise's culture and the lack of institutional support.

Finally, enterprises ignore, in most cases, the existence of innovative support institutions. This, on the one hand, is the expression of the institution's failure to develop positive relationships with SMEs and the lack of an operational attitude allowing the diffusion of supplied support services. On the other hand, the enterprises fail to profit from the services of these support institutions due to their management problems and the strong demand specificity.

4. Conclusions

Most Argentine SMEs have faced, since the launching of the structural reforms at the beginning of the 1990s, a strong growth of competitive pressure and an increasing "environmental" uncertainty. In that sense, the "new environment" which characterizes Argentine economy from the 1990s influences the maturative path of the enterprises and their type of feasible strategic responses.

One of the enterprises' strategic answers in view of the new scenario has been to increase, comparing with the past, the importance assigned to the "innovative" activities seeking for competitiveness. This reaction is supplemented, in some cases, with other strategies such as the increase of the external markets(Gatto, 1995; Moori-Koenig and Yoguel, 1995) and the development of entrepreneurial cooperation forms (Yoguel, 1995; Gatto, Ferraro, 1994).

Even if it is too early to perform a complete balance of the effectiveness of the "innovative" activities performed by the studied firms since, in most cases, such activities have been intensified during the last four years, it should be remarked that, in general, they are defensive actions to survive in the new conditions and/or maintain the enterprises's position in the market. Given the challenges they must face in the new competitive conditions, the innovative actions implemented so far seems highly insufficient. In turn, due to the embryonic nature of many of such activities, the level of consistency among them is still limited.

The central importance given by the enterprises to financing restrictions is a clear evidence of this. The fact that there is almost a unique reference to these problems reflects a very narrow vision of the innovative process complexity and an inadequate evaluation of the need of interacting, systemically, with other economic agents. In that sense, the enterprises seem not to appreciate and understand the importance of an environment favorable to the innovation, which facilitates the performing of innovative activities and reduces their risk.

The enterprises mentioned the need of having qualified consultants who may assist in the designing of a plan to enhance their technological capabilities. Therefore, a key aspect is the professional profile necessary to develop this type of consulting tasks. Namely, the "consultant" required should not start from standard recommendations but adapt them to the needs and starting points of the enterprises and their competitive context. Since, in general, the consultants devoted to innovation consulting services (specially in the field of quality) provide standardized products to situations characterized by their different technological level,

the task of training consultants to perform these services and stimulate the demand seems vital.

Although, due to the size of the sample, it is not possible to present a typology of innovative situations, we can distinguish a reduced set of firms, which managed to internalized the uncertainties of the "new environment" through more dynamic "innovative" strategies and are now on a much more coherent technological path allowing them to profit from past experiences. These enterprises have a successful exporting record and/or a dynamic behavior in the domestic market. In both cases, they have profited from the economic liberalization incorporating a greater amount of imported inputs in their production function.

These enterprises perform the key stages of the innovative process in isolation, although in the last years there have appeared trends oriented towards a greater inter-entrepreneurial relationship, specially with clients and suppliers. This joint activities are, partly, the outcome of a greater comprehension of the fact that the innovative process needs the interaction and supplementation of all economic agents. This new entrepreneurial attitude is, as we mentioned, very preliminary and shows a lack of counterparts with which the enterprises can interact and learn. Moreover, this contrasts with the lack of knowledge and effective relationships the enterprises have with the institutional support system. In that sense, this system acts as if the enterprises, specially SMEs, were rational agents having complete information and the knowledge needed to specify clearly their demand and profit from the supplied services. In turn, the supplied services are designed, frequently, without taking into account the operative modalities and specificities of the enterprises. Actually, there is a mismatching between the support tools supply and the demand for innovative activities development, which shows that both the enterprises and the support institutions operate in independent -and, therefore, non-supplementary- sub-spaces.

Summarizing, on the one hand, the supply has not been designed to stimulate the demand -as if such demand were already established and aware of the process- and, on the other hand, the demand cannot be clearly set forth so as to be understood by the support institutions. Finally, it is worth mentioning that in order to improve the relationship between enterprises and the institutional support system, the presence of "translators" capable of connecting these "sub-spaces" (so far, too independent) would be extremely valuable.

5. Methodological Appendix

5.1 Sample identification and description of research stages

The starting point was a data base of 180 SMEs made in 1994 by ECLAC to study SMEs exports and marketing. The basic enterprise data compiled by ECLAC were year of foundation, sales, employment, import coefficient, production destination, commercial channels, the degree to which they were affected by the economic opening, the enterprises' competitive factors, the degree of external insertion and the main difficulties the enterprises faced in their exports strategy. A classification of enterprises with different degrees of external approach was created for that study (Moori-Koenig and Yoguel, 1995). Most of the enterprises gave priority to the domestic market, while in less than one third of the cases, exports represented over 40% of the sales.

The availability of such a data base was of great significance in the selection of the enterprises to be interviewed. Previous experience with the enterprises would reduce rejection percentages and the existence of a situation classification allowed to reduce the size of the sample without affecting the degree of representativity.

Out of the total enterprises in the record, about 100 belonged to the leather, plastics, fine chemical, metal products and components for industry and scientific and professional machines and equipment sectors. Fifty enterprises were selected at random. The selection conditions were the following:

i) The weight of each sector had to be equal to the one it had in the record.

ii) The selected enterprises had to respect the weight of each group in the classification in relation to the whole record. (Moori- Koenig and Yoguel 1995)

5.2 Interviews

After the selection, a fax was sent to each of the fifty selected enterprises explaining the project and requesting an interview. Telephone calls were then made to the enterprises and the interviews were arranged between July 24 and August 18. There was explicit rejection in only three cases. Thirty nine of the forty seven enterprises left were interviewed because eight enterprises were interested in the study but could only arrange appointments after September 10.

This is the final sector distribution:

a) Leather:	7 enterprises [26]
b) Fine Chemical and plastics:	11 enterprises[27]
c) Metal products:	9 enterprises[28]
d) Professional and scientific machines and equipment:	12 enterprises[29]

The average time for each interviewed was 2.5 hours, including in most cases a visit to the industrial plant. Most interviews were conducted by two people, so that the objective information surveyed could be complemented with the interviewers' vision. The guiding questionnaire could be completed in all the interviews and there was an excellent response form the enterprises, which had great interests in knowing the results of the study.

5.3 Creation of a data base of the main variables

Simultaneously with the field work, a data base was designed where all data from the interviews was collected. At the same time, a set of variables were estimated as a result of combining different questions and some were included directly from questions in the form. The following are the variables and the ones created ad-hoc.

5.3.1 Variables taken directly from the field work

i) 1994 sales
ii) Employment in 1994
iii) Industrial sector
iv) 1994 Exports
v) Foundation year

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[26] In the Leather sector enterprises manufacture: Handbags, Briefcases, Backpacks, Wallets, Belts and Suitcases.

[27] The following products stand out among the chemical and plastics enterprises: Bacteria, Sulphur chloride paraffin, Special phenol for metal treatment, Veneer, Colorants, Flavors, Essences, Lubricants for mechanical elements, Acrylic plates, Packaging, Extrusion profiles, PVC insulating tape, Plastic accessories, Bathroom fittings, and Casts and dies.

[28] The metal product sample enterprises manufacture the following products: Fire and fire engine systems, Centrifugal pumps, Industrial burners, Photoreceptor cylinders, Solenoid valves, Cells for electronic scales, Dosing pumps, Collectors for electrical engines, etc.

[29] The scientific machinery and equipment producers manufacture: Packaging machines, Kitchen equipment, Bottling lines, Fruit and vegetable packing lines, Polishers, Special equipment, Blister packing machines, Industrial Ovens, Tampographic and serigraphic machines, Neonatal equipment, X Ray diagnosis equipment, Measurement equipment.

vi) Percentage of production by order in 1994
vii) Percentage of sub-contracted production in 1994
viii) Variation of production by order between 1991 and 1994
ix) Variation of sub-contracted production between 1991 and 1994
x) Enterprises' competitive advantages
xi) Use of production organization techniques
xii) Use of production performance indicators
xiii) Use of external personnel for quality control
xiv) Existence of calibrated measurement equipment
xv) Client support for quality control
xvi) Factors which limit quality management
xvii) Existence of quality courses
xviii) Quality programs financing manners
xix) Export proportion in sales
xx) Tangible assets proportion in investments
xxi) Existence of product development, product improvement, new processes and improvements, organizational changes and new ways for gaining access to the market[30].
xxii) Cases in which development introduction is aimed at staying in the market.
xxiii) External personnel involved in development
xxiv) Financing for development
xxv) Existence of a development budget
xxvi) Factors driving the execution of "innovative" activities
xxvii) Main difficulties to conduct innovative activities
xxviii) Personnel involved in innovative activities due to qualification
xxix) Existence of training activities for quality and development
xxx) Main features of the most relevant product developed by the enterprise
xxxi) Advantages of the most relevant product developed by the enterprise for the final consumer
xxxii) Sources of information consulted by the enterprises for the search for equipment, new processes and new products.
xxxiii) Degree of knowledge about institutions linked to the quality and development issues
xxxiv) Forms of support indicated by the enterprises
xxxv) Existence of new projects to conduct innovative activities
xxxvi) Factors limiting new project implementation

5.3.2 Variables created from the combination of different questions

i) Dynamics: 1) increase in sales and exports between 1991 and 1994 with no decrease of total output between 1994 and 1995; 2) increase in sales and exports between 1991 and 1994 with sales and

[30] Since developments are sometimes difficult to compare, there may be some problems in comparing the number of innovations in products, processes, organizational changes and new ways for gaining access to the markets in a direct manner.

exports falls between 1994 and 1995; 3) stable or decreasing sales between 1991 and 1995.

ii) Written procedures: Questions II.2, II.13 and II.15 combined; 1) presence of written procedures; 2) partial presence of written procedures; 3) marked scarcity of written procedures.

iii) Proportion of people involved in quality in relation to total number of employed people.

iv) Degree of supplier quality control: 1) they do control, and anticipate the raw material acceptance criteria in writing and/or select those suppliers who take steps to guarantee quality or adapt to the quality levels demanded by the enterprise; 2) they do control and do not anticipate standards in writing; and 3) they do not control.

v) Proportion of people who took quality courses in the enterprise

vi) Worker involvement in quality and development issues: 1) They control quality during the production process and contribute to the development being conducted by the enterprise; 2) They control quality but do not contribute to the development being conducted by the enterprise; 3) They do not control quality but contribute to the development being conducted by the enterprise; 4) Both answers are negative.

vii) Knowledge about the amount spent in development activities: 1) they know, 2) they do not know[31].

viii) Investment coefficient (investment amount between 1991 and 1994 with respect to the 1994 sales): 0) they do not know; 1 between 1 and 10%; 3) between 21 and 40%; 4) over 41%.

ix) Development activity features: 1) activities conducted in a continuous manner by a stable work team; 2) continuous activities and unstable work team; 3) discrete activities and stable team and 4) discrete activities and unstable team.

x) Development impact: 1) profitability increase and cost reduction; 2) profitability increase without cost modification; 3) no profitability modifications and cost reduction; 4) no modifications.

xi) Cooperation for development: Degree of participation of clients, suppliers, other enterprises, public and/or private research centers, external consultants and use of licences.

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[31] The qualifications of the person answering the question influenced the creation of the amount spent variable.

xii) Knowledge: 1) there are manufacturing secrets which may be appropriated by competitors and which are essential for sustaining the enterprise's competitive advantages; 2) there are secrets but they are not essential; 3) there are no secrets.

xiii) Worker participation in development: 1) they participate in development activities and there are incentives for participation; 2) they participate and there are no incentives; 3) they do not participate and there are incentives and 4) They do not participate and there are no incentives.

xiv) Training efforts: 1) Over 50% of the people employed in the enterprise were involved in quality development-oriented courses and took courses to carry out development activities; 2) Between 21 and 49% of those employed in the enterprise were involved in quality development-oriented courses and took courses to carry out development activities; 3) Between 21 and 49% of those employed in the enterprise were involved in quality development-oriented courses but did not take courses to carry out development activities; 4) Less than 20% of those employed in the enterprise were involved in quality development-oriented courses and took courses to carry out development activities; 5) Less than 20% of those employed in the enterprise were involved in quality development-oriented courses but did not take courses to carry out development activities.

xv) Innovative intensity of the enterprises. This indicator is a simple average of the following variables: 1) Training effort; 2) Worker involvement in quality and development; 3) Participation of engineers in relation to the total personnel conducting development activities; 4) Development activity features; 5) Cooperation for development; 6) Number of areas where innovative activities are conducted; 7) Weighted number of areas where innovative activities are conducted [32].

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[32] The number of areas where innovative activities are conducted is in turn compared against the existence of personnel exclusively devoted to development activities. Thus, when there is no exclusive personnel, this figure is divided by four. When the exclusive personnel is less than 30% of the overall development personnel, it is divided by three. When exclusive personnel ranges between 31 and 50%, it is divided by two. When the proportion ranges between 51 and 80%, it is divided by 1.5; between 81 and 99%, by 1.3. Finally, the figure remains the same when all the development personnel is devoted exclusively to these activities. This way, greater relevance is assigned to those enterprises in which the stable team tends to be exclusive.

6. Statistical Appendix

Table 1. Distribution (%) of sample enterprises according to sales volume by sectors

Sector	Sales volume 1<	1,1-5	>5,1	Total
Leather Products	57	29	14	100
Chemical and Plastic Prod.	9	55	36	100
Metallic Products	22	56	22	100
Scient. Mach. and Equip.	9	58	33	100
Total	21	51	28	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Table 2. Distribution (%) of sample enterprises by percentage of subcontracted production according to sector

Sector	% subcontracted 0	1-20	21-49	>50	Total
Leather Products	14	14	43	29	100
Chemical and Plastic Prod.	100	-	-	-	100
Metallic Products	33	33	11	23	100
Scient. Mach. and equip.	17	67	8	8	100
Total	45	31	24	24	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Table 3. Distribution (%) of sample enterprises by percentage of subcontracted production according to sales volume

Sales	% subcontracted 0	1-20	>21	Total
Less than 1	36	13	51	100
Between 1,1 and 5	45	35	20	100
Over 10	45	36	19	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Table 4. Distribution (%) of sample enterprises by percentage of sales by direct clients' order according to sector

	% sales by order				
Sector	0	1-20	21-49	>50	Total
Leather prod.	29	14	14	43	100
Chemical and Plast.	46	8	-	46	100
Metallic Prod.	44	12	-	44	100
Scien.Mach. and Equip	33	-	-	67	100
Total	38	8	3	51	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Table 5. Distribution (%) of enterprises by percentage of subcontracted production according to sales volume (million dollars)

	% sales by order			
Sales	0	1-20	>21	Total
Less than 1	50	13	37	100
Between 1,1 y 5	40	-	60	100
Over 10	27	18	55	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Table 6. Distribution (%) of sample enterprises by exports

	Exports (% of sales)				
Sector	10<	11-20	21-50	>51	Total
Leather prod.	28	16	28	28	100
Chemic.and Plast.	46	36	9	9	100
Metallic Products	33	23	33	11	100
Mach. and Equip.	33	25	42	-	100
Total	36	26	28	10	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Table 7. Distribution (%) of sample enterprises by investment coefficient (amount of investment between 1991 and 1994 regarding 1994 sales)

	Sales (million dollars)			
Investment Coefficient	1<	1,1-5	>5,1	Total
Less than 10	31	46	23	33
Between 11 and 20	24	38	38	21
Between 21 and 40	18	55	27	28
Over 41	-	71	29	18

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Table 8. Distribution (%) of enterprises according to performance during the 1991-95 period by sales volume

	Sales (million dollars)			
Performance	1<	1,1-5	>5,1	Total
High	25	45	50	42
Stable	25	30	50	34
Low	50	25	-	24
Total	100	100	100	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Table 9. Distribution (%) of the enterprises according to performance during the 1991-95 period by sector

	Sector			
Performance	Leather	Chem.Plast.	Metal.	Mach.& Equip.
High	43	64	50	25
Stable	14	36	13	50
Low	43	-	37	25
Total	100	100	100	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Table 10. Distribution (%) of enterprises by sector according to competitive factors

Factors	Leather	Chem/Plast.	Metal.Prod	Mach.&Equip.
Quality	100	100	78	92
Price	28	55	22	58
Post-sales assist.	28	55	22	58
Design	71	-	55	42
Lead Term	43	45	22	8

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Table 11. Distribution (%) of enterprises by sales volume according to their competitive advantages

	Sales (million dollars)		
Factors	1<	1,1-5	>10
Quality	100	85	100
Price	63	60	55
Post-sales assist.	63	35	45
Design	63	20	55
Lead Terms	38	25	27

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Table 12. Participation of enterprises by sector according to their relationships with other agents (percentaje affirmative answers)

	Sectors				
	Leather	Ch/Pl.	Metal.	Mach.& Equip.	Total
Clients	57	36	22	58	44
Suppliers	43	27	44	42	38
Other enterp.	29	36	22	33	31
Research Cent.	43	27	33	25	31
Consultants	14	54	56	33	41
Patents	-	27	-	25	15

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Table 13. Participation (%) of enterprises by sales according to their relationships with other agents

	Sales		
	1<	1.1-5	>5.1
Clients	50	45	36
Suppliers	38	40	36
Other firms	13	30	46
Research Cent.	25	30	36
Consultants	-	45	64
Patents	-	15	27

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Table 14. Proportion (%) of enterprises by sector according to the importance of the factors limiting new developments

	Sectors a/				
	1	2	3	4	Total
Factors					
a) Human Resources					
- Scarcity in the enterp.	0	17	0	8	10
- Training difficulties	0	18	0	8	8
- Contracting costs	14	18	11	25	18
- Difficulty to contr. qualif.	14	9	11	8	10
- Difficulty to get consult.	0	0	0	0	0
b) Equipment and Technology					
- High Cost	0	18	44	0	15
- Lack of technol.information	0	18	22	0	10
- Lack of Know-How	14	0	11	8	8
c) Others					
- High commercial risk	14	9	22	17	15
- Lack of financing	86	18	33	58	46
- Lack of support for innov.	43	36	22	25	31
- Lack of technol. support	29	9	0	8	10

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Notes: a/ 1. Leather Products, 2. Fine chemical and Plastic Products, 3. Metallic Products, 4. Scientific Machines and Equipment.

Table 15. Proportion of enterprises of each sector by restrictions to carry out quality enhancements

	Leather	Ch/Pl.	Metal.	Mach.& Equip.	Total
A	60	9	33	8	20
B	57	82	33	58	59
C	30	50	10	20	30
D	10	20	10	8	10
E	30	50	20	20	30
F	0	18	0	8	8
G	30	20	10	30	20

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Notes: A lack of knowledge on new techniques and methods; B lack of financial resources to acquire technology and conduct corresponding training; C difficulties to change the enterprise culture; D employees educational level; E lack of institutional support; F scarce supply of specialized consultants; G others.

Table 16. Distribution of sample enterprises by foundation year according to their innovative intensity

	Innovative Intensity a/			
	High	Medium	Low	Total
Foundation Year				
Before 1960	42	18	42	100
Between 1960 and 1973	36	43	21	100
Between 1974 and 1985	33	22	45	100
After 1986	25	-	75	100
Total	36	26	38	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Table 17. Distribution of sample enterprises by investment coefficient (%) according to innovative intensity

	Innovative Intensity			
Investment Coefficient (%)	High	Medium	Low	Total
Lower than 10	36	7	57	100
Between 11 and 20	43	57	-	100
Between 21 and 40	38	15	47	100
Over 41	20	60	20	100
Total	36	26	38	100

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Table 18. Most used organization techniques, ordered by frequency of appearance amongst enterprises

a) Techniques	**Nbr.**	**%**
Problem-solving Tools	19	49
Preventive Maintenance	17	43
Quality Circles	13	33
Processes Statistical Control	11	28
Mode Analysis y Failure Effect	5	13
Cells Production	5	13
Other techniques	4	10
JIT	2	4
ISO 9000	2	4
TQM	1	2
Kan Ban	1	2
b) Indicators		
Average lead term	21	54
Productivity evolution	21	54
Scrap Percentage	20	51
Percent.of discarded final products	16	41
Stocks rotation	16	41
Percentage of Re-work time	15	38
Processing products evolution	15	38
Other indicators	2	5

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Table 19. Distribution of techniques by sector ordered according to frequency of appearance in the total

	Sectors			
	Leath.	Ch/Pl	Met.Pr.	Mach.
Techniques				
Functional Polyvalence	58	45	55	67
Problem-solving tools	58	73	44	25
Preventive maintenance	-	55	67	42
Quality Circles	28	55	22	25
Processes Statistical Control	14	45	44	8
Mode Analysis and failure effect	-	18	11	16
Cells Production	-	-	11	33
Other techniques	-	-	11	25
JIT	-	9	-	8
ISO 9000	-	9	11	-
TQM	-	-	11	-
Kan Ban	-	-	-	8
Indicators				
Average lead term	43	27	55	83
Productivity evolution	28	64	44	67
Scrap Percentage	58	73	33	42
Percent. of discarded final products	43	73	55	-
Stocks rotation	14	45	44	50
Rework time percentage	-	55	44	42
Processing product evaluation	-	45	33	58
Other indicators	-	9	11	-

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Table 20. Proportion of sample enterprises using different techniques and indicators according to relevance of written procedures in productive tasks

	Written procedures		
	1	**2**	**3**
Techniques			
i) Problem-solving Tools	**100**	22	54
ii) Processes statistical control	**75**	20	8
iii) Quality circles	38	40	23
iv) Functional polyvalence	38	**60**	**62**
v) Preventive maintenance	**63**	50	23
vi) TQM	13	-	-
vii) ISO 9000	25	-	-
viii) Kan Ban	-	-	-
ix) JIT	-	11	-
x) Mode analysis and failure effect	-	22	8
xi) Other Techniques	13	17	-
Indicators			
xii) Scrap percentage	**63**	44	23
xiii) Rework time percentage	**63**	39	23
xiv) Percent.of discarded final products	**88**	17	46
xv) Average lead term	**75**	61	31
xvi) Stocks rotation	**63**	39	31
xvii) Processing products evolution	**75**	44	8
xviii) Productivity evolution	**88**	56	31
xix) Other indicators	13	6	-

Source: Authors' tabulation based on CEPAL/IDCJ interview results.

Notes: 1 presence of written procedures; 2 partial presence of written procedures; 3 marked scarcity of written procedures.

Table 21. Distribution of enterprises (% of each sector's total) according to importance of required support

	Sectors a/				
	1	2	3	4	Total
Financing	71	64	44	67	62
Processes development	29	0	44	33	26
Support for quality programs	14	55	11	17	26
New technologies information	14	9	44	25	23
Training	14	27	33	8	21
Quality certification	0	45	11	17	21
Products development	0	18	22	17	15
Support for quality validation	14	9	11	25	15
Technological support	14	9	0	33	15
Others	14	18	11	0	10

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Note: a/ 1. Leather Products, 2. Fine Chemical and Plastics, 3. Metallic Products and 4. Capital Equipment and Scientific Tools.

Table 22. Institutions knowledge by sector (percentaje of affirmative answers)

	Sector a/				
	1	2	3	4	Total
Inti	71	100	89	92	90
Iram	29	100	78	67	72
Conicet	29	82	56	58	59
Camara	71	73	33	33	51
Iacc	0	55	22	33	31
Secyt	0	45	11	17	21
Fontar	0	36	33	8	21
Ubatec	0	45	22	0	18
Empretec	0	27	0	0	8
Fundece	14	9	0	0	5
Fundation for Quality	0	18	0	0	5

Source: Authors' tabulation based on CEPAL/IDCJ interview results.
Note: a/ 1. Leather Products, 2. Fine Chemical and Plastics, 3. Metallic Products and 4. Capital Equipment and Scientific Tools.

7. Main Institutions

IRAM (Instituto Argentino de Racionalización de Materiales): Argentine Institute for Material Rationalization. It certifies products according to its own norms.

CONICET (Consejo Nacional de Investigaciones Científicas y Técnicas): National Council for Scientific and Technical Research. It supports basic research development.

CAMARAS EMPRESARIALES: Entrepreneurial Chambers. These institutions group enterprises belonging to the same sector (first level). In turn, there are second and third level chambers that group first level institutions.

IACC (Instituto Argentino Control Calidad): Argentine Institute for Quality Control. It is the nucleus of the old quality institutions generation established in the 1950s.

SECYT (Secretaría de Ciencia y Tecnología): Secretariat of Science and Technology. It depends on the National Presidency and is in charge of issuing national policies in the area of science and technology. It also performs the orientation, coordination and promotion activities required for their development.

FONTAR (Fondo Tecnológico Argentino): Argentine Technological Fund. It operates with a credit line from the Inter American Development Bank. It aims at promoting the technological updating of domestic enterprises and supporting projects of public institutions which provide technological services to the productive sector.

UBATEC: In this commercial society participate the Municipality of Buenos Aires, the University of Buenos Aires and the Argentine Industrial Union. It aims at supporting the private sector in the area of technology.

EMPRETEC: This is the United Nations' program for new enterprises promotion.

FUNDECE (Fundación para la Calidad y la Excelencia): Private Foundation for Quality and Excellence. It admits only the highest executives of the enterprises and develops limited actions. The IPACE, an annex of this institution, includes enterprises' managers and personnel directly involved in quality development.

Bibliography

Acs Z.J. y Audretsch D.B (1988), "Innovation in Large and Small Firms: an Empirical Analysis", in *American Economic Review*, September.

Acs Z.J. y Audretsch D.B (1995) OECD, Washington, *Tecnology, productivity and innovation*, submitted at High Level Workshop on "SME's: Employment, Innovation and Growth.

Aoki, A. (1984); *The Co-operative game theory of the firm*, Claredon Press, Oxford.

Azzone G. y Cainarca G.C., (1993) "The strategic role of quality in small size firms", in *Small Business Economics.*

Chudnovsky, D. and Lopez, A., *¿Política tecnológica en la Argentina: Hay algo más que Laissez-Faire?*, CENIT, August 1995.

Cimoli M. y Dosi G., (1994) "De los paradigmas tecnológicos a los sistemas nacionales de producción e innovación", *Revista de Comercio Exterior*, Mexico, Nº 8, 1994.

Cohen W. y Levin R. (1989), "Empirical studies of innovation and market structure", in Schmalensee R. y Willig R. (Ed), *Handbook of industrial organization*, North Holland.

Gatto F., (1995) "Las exportaciones industriales de pequeñas y medianas empresas", en Kosacoff (Ed) *Hacia una nueva estrategia exportadora*, Universidad de Quilmes.

Gatto F and Yoguel G, (1994) "Las Pymes argentinas en una etapa de transición productiva y tecnológica" in Kosacoff (Ed) *El Desafío de la competitividad*, Alianza.

Lassini A. (1992), "Il ruolo dell'attivita' di R&S per lo sviluppo della competitivita' delle PMI", in Onida F., Viesti G. y Falzoni A.M. (ed.), *I Distretti Industriali: crisi o evoluzione*, Egea

Lundvall B.A y Johnson B., *Sistemas nacionales de innovación y aprendizaje institucional*; Comercio Exterior, Nº 8, August 1994.

Malerba F. (1988), "La dinamica di lungo periodo della ricerca e sviluppo dell'Industria italiana", in *Rivista di Politica Economica*, pg. 1-30

Meyer-Krahmer F. (1984), "Measuring innovations output", *Research Policy*.

Moori-Koenig V, Quintar A y Yoguel G, (1995) *Estrategias, gestión empresarial y posicionamiento competitivo en las Pymes*, CEPAL, mimeo.

Moori-Koenig V, Yoguel G., y Gatto F. (1993), *Reflexiones sobre la competitividad de las empresas Pymes en el nuevo escenario de apertura e integración, La situación de las firmas metalmecánicas*; Integración Económica Series, Working Paper Nº IE/03, Secretaría de Programación Económica, Bs Aires.

Moori-Koenig V. y Yoguel G. (1995), *Perfil de la inserción externa y conducta exportadora de las pequeñas y medianas empresas industriales argentinas*; Working Paper Nº 65, CEPAL, Bs Aires.

Nomisma-Laboratorio di Politica Industriale (1993), *Innovazione e Ricerca. Potenzialita' e Vincoli del Sistema Industriale dell'Emilia-Romagna*, Nomisma

Quintar,A.(1993) *Pequeños y medianos empresarios industriales metalmecánicos de Rosario.* Working Paper No. 38. CFI-CEPAL Program, Buenos Aires.

Santarelli E., y Sterlacchini A. (1990), "Innovation, Formal vs Informal Resarch and Development and Firms Size: Some evidence from italian manufacturing firms", *Small Business Economics*; 1990.

Storey D., (1986), "The economics of smaller business: some implications for regional economic development", en Amin y Giddard (Ed) *Technological change, industrial restructuring an regional development*, Londres.

Williamson, O. (1986); "Market and Hierarchies", Mac Millian, New York.

Yoguel G. (1995) *Reestructuración económica, integración y pymes: el caso de Brasil y Argentina*, División de Desarrollo Productivo y Empresarial de la CEPAL and Oficina de CEPAL Bs Aires, mimeo.