The SMEs Performance by the New Technologies Application: The Case of Olive-Oil in Puglia

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Abstract

Since the facility for exchanging information and sharing knowledge increases both the competitiveness of companies and worker productivity, the opportunities that information and communication technology (ICT) offers for small and medium enterprises (SMEs) cannot be neglected. From the SMEs, operating in traditional sectors, generally located in the South, we have selected those in the olive-oil sector, to measure the use of ICT and, in particularly, the development of E-commerce. The aim of this paper is to show the application and development of Internet and E-Commerce in the olive-oil sector of Puglia and to verify if companies are creating new network-like relations which can from a local productive system. In the first part theoretical aspects of competitive advantages from the New Technologies adoption are analyzed; in the second the results of a descriptive analysis based on a data-set of information at the firm level built up integrating interviews and balance sheets are discussed.

Keywords: *SMEs Performance, ICT, Olive-Oil of Puglia, Local system, Knowledge, E-Commerce*

Introduction

The causes of deterioration in Italy's economy are multifaceted and can be attributed to increases in output costs, scarcity of exports of high-tech goods and slow-down in productivity, which between 1995 and 2001 increased by only 1.2% in manufacturing compared to 3.5% in the rest of Europe. The Italian position is further worsened in the global context by the competition from China and the East Asian countries in traditional sectors, such as, textiles and the footwear, but also in less traditional sectors, such as precision tools. The Italian economy is struggling to recover its position based on a model of specialisation based on sectors that use non-specialist labour, with high costs and low productivity and compete with nations that have the same model but lower wages. Consequently, Italy seems destined to lose this struggle because it cannot take advantage of the mechanisms of endogenous growth based on technological learning and innovation that depend on investments in human capital.

The comparative disadvantage of Italy has its origins in its typical capitalism, with poor development of the stock exchange, separation between banks and enterprises, widespread family proprietorship, and the role of the State, whose welfare does not produce the same effects as innovative Schumpeterian activities. These elements in a low

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innovation context based on the difficulties of obtaining risk capital in a national financial scene that is neither bank-centric nor market-oriented make it difficult for SMEs to drive the Italian economy.

Within this national and international context the position of Southern Italy's economy seems very fragile, despite SMEs in Southern Italy being more active than those in the Centre and the North of the country. In the period 1996-2003 GDP for the South, at ruling prices, grew by an annual average rate equal to 1,7%, versus 1.4% for the Centre and the North. Thus, in the general stagnation of the economy, the South is showing a better performance. However, this does not indicate recovery because in a situation when the general economic system worsens, the South receives public transfers which help its performance. In fact, in the worse recessions in the national and international economy and, between 1996 and 2002, the South showed faster growth, which was based on European funding.

In this paper we investigate, theoretically and empirically, whether, in a traditional sector such as agriculture and food, which is the sector that offers the greatest opportunities for the South to compete in quality, the adoption of ICT enables more efficient production processes and/or commercialisation.

Based on the fact that information exchange and knowledge sharing, which characterise the new economy, increase the competitiveness of companies and the productivity of workers, the opportunities offered by ICT for small and medium enterprises cannot be ignored. Among the SMEs in the South operating in traditional sectors, we have selected firms active in the olive-oil sector, the most typical product of the Puglia region. The survey questionnaire aimed at deriving information on the use of ICT and, particularly, the development of E-Commerce. The purpose of this study is to show that innovation, applied to traditional business sectors, can improve performance and lead industrial organization towards models in which cooperation and integration prevail.

Adoption of New Technologies and SMEs

Changes in production technology have often been considered to be independent of the production function and time-dependent, and associated with investment and capital accumulation. These aspects can be manifestations of a phase of expansion in the production cycle, that is positively correlated with increased demand. On the other hand, they can become an anti-cyclical function or be connected to non-economic variables. The changes that lead to development are the introduction of a new good or a new production method, not necessarily based on a scientific discovery (Schumpeter, 1971). For instance, they can be a new form of marketing, access to a new source of raw or semi-finished materials or a new industrial organization.

The distinction between invention and innovation makes it clear that if research contributes to innovation, the value that is derivable from it cannot be ensured without the entrepreneur's initiative. Consequently, if competitors dominate in product/process innovation or marketing, this will not create better value for the consumer or greater competitive advantage for the enterprise. So, given that business is the engine of innovation, it is not feasible to invest in R&D if the technical progress is a public good characterized by non-rivalry and non-exclusiveness.

The neoclassical models of development (Solow, 1957) using constant returns-to-scale production functions, with positive and diminishing marginal productivity, deal

with technical progress as an exogenous parameter that prevents zero growth. In this way, any economic system, bearing in mind its institutional specificities, can follow its own path to growth and converge to equilibrium. The attempt to exceed the limits of this theory assumes that technical progress is endogenously produced, but not appropriable (Arrow 1962)[1]; considers that human capital, like any other physical capital, can be accumulated over time to produce "self-sustained" growth (Lucas, 1988, 1993); and identifies an activity involved in technical progress that is directed at developing knowledge, which when incorporated into the physical capital, will produce increasing returns (Romer, 1990)[2] .

Therefore, technical progress is an impure public good because it is appropriable and exclusive; this means that, according to Schumpeter, the time needed for innovation dissemination, combined with imitation capacity, reduces monopoly power, but leads to further innovation. This, therefore, would seem to be why it is believed that higher expenditure in R&D and in the adoption of the new available technologies will remedy the low productivity and poor competitiveness of the Italian economy. As proof of this, the Lisbon European Council of 2000 recognized the need to strengthen the innovation process; and the Barcelona Council of 2002 published a roadmap for investment in research of 3% of EU GDP by 2010. This objective is designed to reduce Europe's gap with the USA and Japan, which respectively invest 2.7% and 3% in R&D. In March 2003 the European Commission (EC) recommended member states to take account not only of the technological innovation to be derived from expenditure on R&D, the driver of the knowledge-based economy, but also innovation related to industrial organization and marketing. Innovation based on ICT plays a crucial role and the Internet is the most evident of these, whose increasingly sophisticated software is allowing enterprises to experience new forms of internal organization and redefine their value chains.

So, is innovation a feature of large enterprises and if so can the low competitiveness and productivity of the Italian economy be attributed to the medium and small size of its enterprises? According to Schumpeter's idea of an entrepreneur as someone able to create an innovation, the small size of a company is more suitable, in a context where the access to the innovation is free. Small companies can gain access to the market more easily and rapidly, and can compete with companies already operating in the market. In the long run, this form of innovation evolves towards the institutionalized form characteristic of large enterprises, which use strategies to associate R&D expenditure with high scientific content innovations that generate global changes, and with profit maximization, and which have access to markets that are barred to the small innovator-entrepreneur.

In relation to the Italian economy, we cannot assert that there is an irreversible connection between innovation and the enterprise size (Archibugi - Imperatori, 1997), nor can we affirm that in large innovative enterprises, the thrust towards innovation is aimed at consolidating the competitive advantage, deriving from the adoption of new technologies. Rather, it is directed towards achieving new shares of the national market. This is demonstrated by the fact that large Italian enterprises differentiate their activity in sectors that are totally different from their core business. The connection between innovation and enterprise size also cannot be analysed out of its context, that is, without taking account of the concentration of enterprises in a given industrial area (Pavitt, 1984). Knowledge develops and can increase productivity according to the extent of the

information circulation which connects codified knowledge with that present in each productive system.

The knowledge that resides in production systems is generally tacit and is typical of the knowledge in Italian industrial districts. It is present in every person and system, although individuals may not be aware of this or of how the knowledge is formed. Codified knowledge belongs to those who possess specific competences and can be improved, exchanged and transferred. Tacit knowledge cannot be exchanged. Both types of knowledge are based on the labour and learning division, since they can increase productivity and competitiveness only when they are acquired. According to Helpman (1998), ICT is *general purpose technology* or innovations, which possess a remarkable availability to be used both in quantitative and qualitative terms. This results in a new industrial revolution which involves the adoption of new organizational models by enterprises to obtain improvements in efficiency deriving not only from scale economies, but also from other instruments, such as the passage to a modular structure of production (Milgrom - Roberts, 1988), as in the second post-Fordist revolution, or to a structure that integrates enterprises operating in the same field willing to combine cooperation and competitiveness. The advent of IT, which reduces transaction costs significantly, contrasts with the traditional model of industrial organization which evolves into a network where products do not only depend on factors availability, but also depends on the relationships with other enterprises and institutions. Technological revolutions induced by IT affect labour productivity (Aghion - Howitt, 2002) when high levels of human capital develop in an appropriate institutional context. Therefore, it seems important, that for both the transmission of tacit knowledge prevailing at the local and regional levels, and for the transfer of codified knowledge available internationally, the innovative national system plays an important role (Cainelli – Leoncini - Montini, 2003) since, where this is inadequate, the benefits of the innovation on the factor productivity would be insufficient.

Often the application of ICT is limited to the administrative and accounting functions. We believe that a company website serves as an on-line presentation of the enterprise, and also enables on-line commerce and/or the data diffusion, facilitates internal communication (Intranet), and external communication (Extranet), improving and easing relations among the different productive units. Thus, it could prove very valuable for small enterprises operating in mature areas, especially in the economy of Southern Italy. E-commerce has become a reality in some regions of the North, especially in Lombardia; while it is much less frequently found in Southern Italy despite its many advantages for enterprises. These include a reduction in the barriers to market access; greater competitiveness; the possibility to integrate more efficiently internal and external relationships; extension of the typical benefits of automation of the production process; and smoothing of the timing chain which is accompanied by reductions in costs of production. Also consumers can benefit from wider application of these technologies because choice would be increased, expectations about product and/or service customisation could be realised, search and delivery times would be reduced and the lower transaction costs resulting from an easier matching between supply and demand, would be translated into lower prices.

It is therefore necessary to enquire into the reasons why enterprises do not grasp these opportunities. In Southern Italy these can be ascribed to a lack of organization in the industrial district model, the high fixed costs of Internet site creation and use, and

the difficulty in establishing a network of enterprises in an environment which continues to be strongly individual. In addition, and no less important, the shortage of expertise in ICT and, consequently, the need to it would entail further costs.

A possible remedy for this would be a policy that would provide institutional support for enterprises that are important to the regional production system, and to increase their global dimension, all of which would be facilitated by the adoption of on-line commerce. Puglia's enterprises have begun to take advantage of E-commerce calls for bids in an attempt to take the quality jump that should guarantee greater competitiveness and greater possibility to gain new market shares, if accompanied by the development of a research base and investment in human capital (Antonelli - Montresor, 2002).

In the light of these theoretical considerations, it is important for the growth of Southern economy, that policy measures be implemented to overcome the digital divide that separates it from the rest of Italy and of the world. Southern enterprises should be ready to grasp all the benefits offered by digital innovation plans. The empirical analysis is aims at identifying the role played by the Internet in the transformation to a virtual market for enterprises operating in the agriculture and food sector and how this will affect their evolution towards a local productive system and the establishment of a viable network. The descriptive analysis is based on a firm level data-set built up integrating interviews and balance sheets.

Productive Specialization in Puglia

The food, metal, mechanical and textile industries are the most specialized Italian productive sectors and positively contribute to the *Made in Italy* image. Product variety, along with food quality and culture, are associated with national and international demand, which is increasingly interested in the quality-price ratio. As the EU Council pointed out, there has been a shift from the old agricultural system, based on the price-surplus bi-nomial, to a new model based on market- and environment-oriented companies. In this respect, Southern Italy and Puglia are important, based on their typical products of pasta, wine and olive-oil. The analysis of the regional production structure in Puglia (Table 1) shows that the food industry has been in a good position since 1991 (7.61%), reaching a peak of 9.54% in 1996, along with transportation, metal, and mechanical industries, which reached 16.70%, 33.10% and 8.47% respectively in 2001. These results show a structural change which does not affect the on-going leading position of the food sector in Puglia. This position is confirmed by the degree of product specialization, which reached 3.28% in the oil and vegetable and animal fat production in 2001, followed by beverages (2.14%), the processing of corn and starch-based products (1.58%), and the processing and storage of fish (1.16%), as shown in Table 2.

In value, olive-growing is the area that shows the highest portion of national production (36.6%, Inea, 2000). 77% of Italy's olives are grown in the Southern regions. In terms of the number of the local units, and volume and value of production, Puglia is the most important area in Italy with 40% of the national oil production (Inea, 2002). Olive trees are cultivated in many municipalities of Puglia: the Gargano, the coastal areas of Bari and the Salento are the areas with the highest density of olive trees, followed by Murgia, in the province of Bari and the Appennino Dauno in the province of Foggia. However, while the regional food industry has been characterized by a growth in the number of local units, the number of workers has stabilized or even decreased. This is

associated with the growth of self-employment and sole proprietorship and can be seen in the analysis of specialization in the provinces of Puglia. In analyzing the changes in the productive structure in these provinces, we can see (Table 3) that in 2001, Bari, Brindisi and Lecce had the highest degree of specialization in the olive-oil sector, reaching 8.01%, 1.54% and 1.30% respectively.

Given the role of traditional sectors, we want to test the effects of the application and use of the Internet and E-commerce in the olive-oil sector of Puglia and verify their effects on labour productivity and the performance of companies through a descriptive

Table 1. The structural change in Puglia (%)

Sectors	1991	1996	2001
Food, beverage and tobacco	7.61	9.54	6.82
Textile and apparel industry	1.20	2.15	3.00
Tannery, leather	4.05	0.75	0.79
Wood	0.00	0.13	0.58
Paper, press and publishing	3.46	5.00	4.00
Coke, oil refineries	1.68	2.34	2.55
Chemical, synthetic and artificial products	7.34	5.91	6.12
Rubber and plastic materials	2.44	3.06	4.33
Non metallic ores	4.02	4.67	3.69
Metal and metallic products	30.79	25.44	33.1
Machines and mechanic apparatus	12.81	13.1	8.47
Electrical and optical machines	7.40	6.88	5.33
Means of transport	16.5	18.76	16.7
Others	0.70	2.27	4.38
Total	100.00	100.00	100.00

Source: our elaboration ISTAT data 1991,1996,2001

Table 2. Productive specialization in the food and beverage industry in Puglia (%)

Sectors	1991	1996	2001
Prod., proc. and storage of meat and meat products	0.68	0.24	0.01
Processing and storage of fish and fish products	2.81	4.20	1.16
Processing and storage of fruits and vegetables	1.52	0.15	0.39
Vegetal and animal oils and fats	1.47	2.31	3.28
Milk and dairy products	0.3	0.45	1.51
Corn starchy based products	0.21	3.21	1.58
Alimentary food stuff	0.78	0.49	1.46
Other food products	0.80	0.74	1.30
Beverage	2.01	2.2	2.14

Source: our elaboration ISTAT data 1991,1996,2001

Table 3. Productive specialization in the food and beverage industry in the provinces of Puglia in 2001(%)

Sectors	Foggia	Bari	Taranto	Brindisi	Lecce
Production, processing and storage of meat and meat prod.	0.00	0.02	0.00	0.00	0.12
Processing and storage of fish and fish products	3.37	0.10	0.00	0.00	0.00
Processing and storage of fruits and vegetables	0.21	0.07	0.89	1.77	0.33
Vegetal and animal oils and fats	0.00	8.01	0.00	1.54	1.30
Milk and diary products	0.04	0.32	1.09	0.83	3.97
Processing of corn and starch based products	1.09	3.12	0.00	0.00	0.00
Food stuff	0.00	3.25	0.00	2.64	0.00
Other food products	2.64	0.70	0.00	1.85	0.07
Beverages	0.46	2.75	5.26	1.00	1.68

Source: our elaboration ISTAT data 1991,1996,2001

analysis and a linear regression. Finally, we want to identify the establishment of enterprise networks through E-market places and through B2B (business to business) and B2C (business to consumer) transactions in this specific sector.

Olive-Oil Production in Puglia: Empirical Analysis

The purpose of this study is to verify whether the performance/productivity of firms in the olive-oil productive units of Puglia has increased with the application and the development of possibilities offered by the use of Internet and E-commerce. We also want to examine whether companies are creating new network-like relations to form local productive systems. We present the results of an investigation based on a sample of 56 enterprises registered at the Chamber of Commerce of Bari. The managers of every productive unit in the sample were interviewed. The legal forms that dominate are cooperatives (35.7%), limited liability companies (57.2%) and companies (7.1%). 89.28% of the enterprises interviewed are micro-firms with numbers of regular employees between 1 and 9, 7.14% were small enterprises and 3.58% were medium sized. Many of the employees were seasonal (Table 4). Cooperatives involved several partners.

Table 4. Firms' characteristics

Dimensional classes	Firms	Laborers	Stable Laborers
	%	Average number	Average number
1 - 9	89.28	3.58	2.36
10 - 19	7.14	14.5	6.75
20 - 49	0.00	0.00	0.00
50 - 249	3.58	67.5	12.00
Total	100.00	85.58	21.11

Source: our investigation elaboration

The Data-set

Our empirical analysis is based on a firm level data-set built by integrating interview data and balance sheet data. The information derived from the interviews allowed us to measure the quantitative and qualitative use of personal computers (PCs) and ICT; B2B and B2C transactions; Internet relationships with local corporations, and human capital investment, for 2004. Balance sheet data provided information at firm level relating to the number of employees and total production in 2004. The panel is composed of these two sources.

To perform the econometric exercise we estimated the following linear regression (1) using OLS method:

$$(1)\ LnY_{i,t} = \beta_0 + \beta_1 lnPCFL_{i,t} + \beta_2 CE_{i,t} + \beta_3 I_{i,t} + \beta_4 UK_{i,t} + \beta_5 LOCAL_{i,t} + \beta_6 COMP_{i,t} + \varepsilon_{i,t}$$

where:

- $LnY_{i,t}$ is the log of labour productivity or performance of firm *i* in period *t* given by production i,t /labour number *i,t*;
- $LnPCFL_{i,t}$ is the log of PC medium number for each fixed labour given by PC i,t /Labour i,t;
- $CE_{i,t}$ is the use of a central elaborator and is represented by a dummy that takes the value 1 for use by firm *i*, value 0 otherwise
- $I_{i,t}$ represents Internet use for research and indicates Internet relations with suppliers, Italian and foreign enterprises and customers; it is used a dummy with the value 1 for use by firm *i*, value 0 otherwise;
- $UK_{i,t}$ is the investment in human capital of firm *i* in period *t* for using PC and uses a dummy with the value 1 if used by firm *i*, value 0 otherwise;
- $LOCAL_{i,t}$ represents the Internet relations with public local authorities (such as Regional Agencies, Banks, Chambers of Commerce) and uses a dummy with the value 1 if used by firm *i*, value 0 otherwise
- $COMP_{i,t}$ represents the increasing competitiveness deriving from Internet use and uses a dummy with value 1 if used by firm *i* , value 0 otherwise;
- $\varepsilon_{i,t}$ is the error term.

Some Empirical Results

Our empirical results are presented in Table 5, which gives some interesting evidence about quantitative and qualitative PC and E-commerce use. Many variables are not significant and do not produce effects on firm labour productivity or performance; others, such as investments in human capital and Internet use, are negative as expected. The value of R-squared is not particularly high. This implies that our linear regression explains only a part of the dependent variable - labour productivity. It could mean that in this *traditional pre-industrial product* (Crouch and Farrell, 2001), there are many external variables such as climate, harvest, and olive quality that produce effects. It must also be remembered that SMEs do not have a lot of money to invest in micro technologies.

A really encouraging result is that the companies interviewed all used central elaborators and PCs of which 82% had Internet connections. The effect of central elaboration use on the dependent variable is very important, whereas PC and Internet use did not the same effects. In general, enterprises had 1 or 2 personal computers, only five had 15-20 computers, but few with a number bigger than the employees' one. Many firms had an

average of 1 PC per regular employee. The net investment of firms is not elevated and it is not really sufficient, if we consider all employees. Another interesting result, which allows us to assess the quality of Internet use, is the spread of Web Intranet and Extranet sites (48.21%) to advertise the location of the enterprise and its produce, and provide online contacts. While some entrepreneurs experienced benefits from website use, others did not or had yet to set it up. In some cases, and particularly in Salento, there is an infrastructural problem because there is no ADSL connection in the area. The use of a web site does not depend on enterprise size due to its generally small cost and the ease of installation. However, access to the Internet is often a problem and requires some extra investment, due to the constant diffusion of viruses that damage computers and the security needed for financial transactions.

Table 5. Linear regression estimates

Dependent Variable	**Method**	**Variable**	**Coef.**	**Robust Std. Err.**	**t**	**P>t**
lnYi,t	Least Squares					
		lnPCFL	.076	0.238	0.32	0.748
		CE	1.078	0.268	4.02	0
		I	- .857	0.668	- 1.28	0.205
		UK	- .764	0.362	- 2.11	0.04
		LOCAL	.486	0.310	1.57	0.123
		COMP	.465	0.278	1.67	0.10
		const	11.374	1,240	9,17	0
N. of obs.	56					
R-squared	0,258					

The relations with suppliers, farmers and farm workers are mostly managed locally through personal acquaintance and established respect (face to face communication); sometimes, mainly in cooperatives, suppliers and customers were also partners. Partners in cooperatives may directly transfer the olives to the oil mills. Because in many cases, customers do not vary, access to the Internet is superfluous; however, it is often used for personal reasons, for research, for updating in relation to laws and for e-mail. As the olives are grown locally, relations with suppliers are mostly face to face although for relations with other enterprises (53.57%) and with customers (60.71%) this is not the case. From our interviews, it was clear that enterprises using the Internet to manage relations with suppliers, enterprises, and customers and for marketing operations, but this variable was not significant in the regression because their number is very small. Relations managed via the Internet are mainly with Italian enterprises with a few being with foreign enterprises. These contacts are aimed at selling the product through E-commerce or becoming known in Italy and other countries, and also for collaboration and information exchange. Some of these enterprises, but still a small number (9.61%), are part of a regional or a national network. The product is sold directly to Italian enterprises, which later distribute it to other countries through established commercial contacts. Other enterprises, including some in suburban locations, have built groups based on cooperative arrangements, to promote Puglia oil. Finally, market surveys to enable expansion into

foreign countries are numerous.

The enterprises seem to be oriented to exploiting the possibilities offered by the Internet to improve their offering for existing as well as potential customers through better communication and exchange of information. They receive orders based on mail contacts or offer all the three services of orders, distribution and delivery over the Internet. However, the percentage of the enterprises that do not use Internet or offer few Internet based services, is high. Those that did not use Internet or use it only for E-mail and maintain traditional relations with Regional Agencies, Banks, Chambers of Commerce, do not E-Commerce and ICT as offering the potential to improve their competitiveness. Nevertheless, the data show that over 53.57% of the enterprises interviewed stated that Internet use increased their competitiveness for several reasons: it advertised their company abroad, it improved their organization, knowledge, communication, information and research. Knowledge and information no longer have geographical boundaries as a result of the Internet. Even the most sceptical entrepreneurs recognized its capacity to simplify procedures, to make communication easier, to be a "reservoir" of information and to provide better working conditions. Thus, this variable is significant in the regression and has a positive relation to labour productivity, but investment in human capital for PC and other program use is poor.

Although these results are preliminary, it can be seen that the enterprises interviewed despite being small, had all invested in ICT, confirming that firms in traditional sectors are really interested in the evolution of the market, in the new requirements of the demand, improving the supply of their product. A quite significant result from the survey, is that even though enterprises are in the preliminary phase of the E-commerce implementation, they have already improved some phases of the production process through, for instance, the automatic weighing of the olives; or creation of groups of enterprises to improve information, to be more efficient and more present in the Italian and foreign markets and to require orders with customers. On the basis of these initial results, we can say that the online services in the olive-oil sector are actually given inside and outside the enterprises, involving heterogeneous functions with the common objective of improving the position of these enterprises in the market. The net management costs do not appear to be a barrier to the development of the E-market.

Conclusions

The need for a better infrastructure to enable wider dissemination of the new ICTs is clear. Some companies in the olive oil sector are using the Intranet and E-commerce and creating a network with others, but investment in human capital and R&D are low. Higher expenditure on R&D and the adoption of new technologies would compensate for the low productivity and poor competitiveness of firms in the olive oil sector. The theoretical and empirical investigation of companies that are involved in innovation, show increased competitiveness and performance at both domestic and international levels.

We believe that companies' innovation processes should be stimulated and strengthened by exploiting both tacit and codified knowledge. Companies should be encouraged to form networks, which seem the most appropriate industrial organization model to realize firm integration. Because the Italian production specialization model, particularly in the South, is based on mature areas that do not use highly qualified manpower this

would seem to be the only way to improve competitiveness. This model reveals one of the limitations of an export-oriented economy. To combine innovation and internationalisation, using a system where companies cooperate and integrate to acquire new market share and to strengthen existing share, would constitute the winning card.

Notes

[1] According to Arrow, productive activity produces experience that in the long run becomes knowledge and, therefore, learning useable by everyone without supporting any costs. The existence of economies external to the single enterprise, but internal to the industrial area, already singled out by Marshall to justify the validity of the hypothesis of perfect competition in long run, are employed by Arrow to explain that the connection between running productivity and capital goods production, occurred in the past and was estimable through the learning bend, in which increasing returns to scale occur, notwithstanding the decreasing returns from capital factors.

[2] The three fundamental hypotheses that the theory of the endogenous growth builds on, as identified by Romer, are that: 1) technical progress is endogenous to the economical system, because it is generated by market incitement; 2) technical progress is the main factor to accumulate and to grow; 3) the production units should include in their fixed costs the costs of innovation.

References

Aghion P. P.-Howitt P.(2002), "Wage Inequality and the New Economy", Oxford Review of Economic Policy, Vol.18, pp.306-323

Antonelli G. – Montresor A. (2002), *Le risorse umane* in Quadrio Curzio A. - Fortis M. and Galli G. (edit by), La competitività dell'Italia, Il Sole 24 Ore, Milano.

Archibugi D.- Imperatori G. (1997), (edit by), *Economia globale e innovazione. La sfida dell'industria italiana*, Donzelli, Roma.

Arrow K.J. (1962) "The Economic Implication of Learning by Doing" Review of Economic Studies, Vol. 29, pp. 155-173.

Cainelli G.- Leoncini R.- Montini A.(2003), "Spatial Knowledge Spillovers and Regional Productivity Growth in Europe", Quaderni IDSE, CNR, Milano, n. 4.

Crouch C. and Farrell H., (2001), *Great Britain: Falling through the Holes in the Network Concept, in Local Production Systems in Europe: Rise or Demise?* in Crouch C. – Le Galès P. - Trigilia C. - Farrell H, Oxford University Press, Oxford, pp.154-205.

Helpman E. (1998), (edit by), *General Purpose Technologies and Economic Growth*, Cambridge MIT Press.

Lucas R.E. (1988) "On the Mechanism of Economic Development", Journal of Monetary Economics, Vol. 22, pp. 3-42;

Lucas R.E. (1993), "Making a Miracle", Econometrica 61, Vol. 2, pp. 251-272.

Milgrom P.-Roberts R. (1988), *The Economics of Modern Manufacturing: Products, Technology and Organization*, Centre for Economic Policy Research, Stanford.

Pavitt K. (1984) "Sectoral Patterns of Technical Change. Towards a Taxonomy and a Theory" in Research Policy, Vol.13, pp.343-374.

Romer P.M. (1990), "Endogenous Technological Change", Journal of Political Economy, Vol. 98, pp.71-103.

Schumpeter J.A. (1971) "Teoria dello sviluppo economico", Sansoni, Firenze (ed. or. Theorie der wirtschaftlichen Entwicklung, Dunker und Humblot, Leipzig, 1912).

Solow R.M. (1957) "Technical Change and the Aggregate Production Function" Review of Economic and Statistics, Vol. 39, pp. 312-320.