

The role of universities in supporting local agroindustry

The case of the Piceno district in Italy

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Abstract: *This paper analyses the role of universities in supporting local agroindustry using the case of the Piceno agroindustrial district in Italy. Emerging countries' comparative advantages, made stronger by increased international trade and the rediscovery of local traditions and typicality, do not signify that there will be a less knowledge-intensive agroindustry in the future. On the contrary, only those SMEs with consolidated competitive advantages, based on knowledge embodied in highly-qualified employees, will be able to exploit the new comparative advantages made available by delocalization and take full advantage of the economic potential of typicality. Peripheral universities play a first-mover role in training and creating dynamic linkages with local governments and local agroindustry.*

Keywords: *agroindustry; industrial district; local universities; competitive advantages; comparative advantages; Piceno*

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Theoretical background

The role of universities in supporting agroindustry districts (Becattini, 1991) and clusters (Porter, 1998) has been less studied than the role of universities in supporting high-tech clusters (Garnsey and Heffernan, 2005; Wonglimpiyarat, 2005; Bellini and Ferrucci, 2002; Branscomb, 1999; Saxenian, 1994),¹ based on the assumption that higher education is a less critical production factor in agroindustry than in high-tech industry.

The economic dynamics in the agroindustry have increasingly challenged this assumption: agroindustry competitiveness has become dependent on science,

technology and knowledge as never before (Cafferata and Cerruti, 2005), and for many clusters and districts universities are the main providers of those commodities, especially through the people they educate and inject into the local production system. University education and research has thus moved to centre-stage in the policy debate about agroindustry development (Brimble and Doner, 2007).

The competitiveness of agroindustry districts is less and less based on Ricardian 'comparative advantages' deriving from the available natural resources, local typicality, cheap labour and productivity. Rather, it is increasingly dependent on the ability to gain and preserve 'competitive advantages', exploiting the

comparative advantages that already exist or regardless of any comparative advantage (Porter, 1990).²

The global dimension of markets, the need for the worldwide marketing of local products, international competition and an accelerated rate of innovation by competitors all require appropriate qualified people with the competences and scientific skills needed to manage agroindustry production systems, to comply with complex European regulations, and to take full advantage of new science-based opportunities and advanced management practices (Sankaran and Mouly, 2007).

A comparative study (Tavoletti and Te Velde, 2007) of flower clusters in Italy (the Liguria Region) and the Netherlands (Westland) highlights how the historical trend of competitive advantages prevailing over comparative advantages (Porter and Van der Linde, 1995) is being corrected by the renewed importance of comparative advantages, especially in those companies that have already consolidated their competitive advantage through their superior human resources and technology. The best examples of the delocalization abroad of production by the most dynamic Dutch flower companies reveal that their comparative advantages, gained through aggressive delocalization policies, combine with their existing home-based competitive advantages in a kind of 'Helix' ascending process (Leydesdorff and Etzkowitz 1996; Zheng and Harris, 2007). Each takes the dominant role from time to time, but from a stronger position resulting from previous gains on both fronts.

The competitive advantage framework developed by Porter (1998) has dominated the managerial debate for years, with human resources as its core asset (Pfeffer 1994). On the other hand, the renewed academic interest in the *comparative* advantages of nations, regions and local systems (Rodríguez-Clare, 2007) has been generated by large emerging countries which have proved themselves able to translate their endogenous resources into powerful competitive advantage in international markets.

These trends have been investigated in depth in relation to the wine industry (Zanni 2004; Hussain *et al*, 2007), and a general scenario is emerging in which firms trading on local typicality may achieve international commercial success only through their human resources and their ability to exploit and transform their given natural and environmental advantages into sustainable and lasting competitive advantages.

This renewed interest in human resources in the agroindustry points to higher education institutions and universities as the most appropriate institutions for supplying the right people with the capability of applying and developing knowledge (Manimala, 1997).

In many regions and agroindustry districts, universities are actually the only institutions that can provide the creation and transfer of knowledge and they are also of course the main providers of advanced education and the suppliers of workers with an international perspective. Consequently, in peripheral and rural areas local communities and public policy makers tend to have greater expectations regarding the role of universities in economic development. It is, indeed, in such areas that the most interesting examples of university–agroindustry linkages can be found and where universities generate significant growth (Florax, 1992; Falconer 2007).

In peripheral areas entrepreneurial universities play a primary role in the economic development of newly-born industrial districts, as consultants during the start-up phases of district steering committees and as producers of applied knowledge through education and sponsored scientific research (Clark, 1998; Laine, 2008).

Our investigation suggests that in Italian industrial districts the development of university–agroindustry linkages is not a spontaneous process. Theoretical discipline-based academic knowledge, typical of traditional university education – the so-called 'Mode 1' (Gibbons *et al*, 2001) – cannot simply be applied to those local and traditional production systems that are so typical of the 'made in Italy' brand, especially in light of the skills employees require.

As an illustration, in Central Italy, university education has traditionally been the main channel for public employment (Neave *et al*, 2000), and only a small percentage of university graduates have entered the very productive small and medium-sized enterprises (SMEs) operating in the region, which represent the backbone of the Italian economy.

The need for a virtuous relationship between university and industry in Central Italy is attributable to three main factors, bearing in mind that regional policy is increasingly important:

- graduate unemployment, due to the widening of higher education opportunities and the lack of knowledge-intensive job opportunities (Tavoletti, 2004, p 2);
- the low competitiveness of firms in the face of increased competition from emerging countries with strong comparative advantages and because of the lack of knowledge-intensive research-based innovation; and
- the financial crisis challenging the national government and universities and causing increased competition between universities for students and funding (Kwiek, 2006).

Table 1. Unemployment rates (%) by geographical area and qualification (2001).

	North-West	North-East	Centre	South
Degree and doctorate	5.6	7.9	14.1	28.0
High school	3.8	3.6	9.8	27.3
Professional training	4.1	3.2	8.3	26.6
Secondary school	5.9	4.0	10.5	24.7
Primary or no school at all	11.1	5.8	14.5	35.6
<i>Total</i>	<i>5.0</i>	<i>4.3</i>	<i>10.6</i>	<i>26.8</i>

These three factors have produced in regional economies a university–industry–local government relationship – a regional version, in other words, of the Triple Helix model (Leydesdorff and Etzkowitz, 1996) that was conceived without reference to regional or territorial demarcation. In peripheral regions, however, the development of such a virtuous relationship needs dynamic initiatives and dedicated policies (Tavoletti and Lazzeretti, 2005).

New challenges for Italian universities

Universities are now perceived to have a leading role in regional development with the growing importance of ‘regional innovation systems’ (Cooke, 2004) and local policies. At the same time, there has been critical change in higher education itself: a new paradigm of knowledge production; regional graduate unemployment; and greater financial autonomy for universities.

How, then, are these changes influencing the relationship between university and industry, and in particular in agroindustry districts? In the past few years there has been a real boom in university education, in terms of both overall national budgets and graduates. Often the expansion has been accompanied by an increase in the financial resources per student (OECD, 2007, p 184), despite the significant growth in student numbers (the only exceptions are countries that experienced a very rapid increase in student numbers – 30% or more between 1995 and 2004 – such as Brazil, the UK and some Eastern European countries).

Judging from the situation in, for example, the USA, Japan and the UK, the expansion trend is set to continue and the current average (about one-third of the student age population gains a university qualification) is likely to be exceeded (OECD, 2007, p 38).

Various factors mean that the rapid expansion of higher education will not be complemented everywhere by the availability of suitable employment opportunities for graduates (OECD, 2007, p. 11):³ in Italy, these factors include a constant drop in the number of wage-earners in large industry over the last few years,

the financial constraints of the central and local public sectors, which previously absorbed the majority of graduates, and the productive specialization of Italian SMEs, which is often unrelated to university research projects.

The result is uncomfortable: graduate unemployment is growing, and policies are oriented towards investment in higher education (Wolf, 2002). The data leave little room for doubt that this is indeed the case. Gambardella (2005), referring to the studies by Nickell and Bell (1996), highlights the peculiarity of the Italian case:

‘In comparison with other developed countries, the Italian unemployment percentage is smaller among less qualified workers rather than among qualified workers. Furthermore, if the other developed countries need to solve the problem of unskilled unemployment, in Italy the unemployment percentage is higher for workers holding a high educational qualification rather than for the less qualified ones, a unique case among the countries studied by Nickell and Bell.’ (Gambardella, 2005, p 89.)

According to the latest data published by the Italian National Statistics Institute (ISTAT), divided by geographical area and educational qualification, in Central Italy the unemployment rate for people aged 25 to 34 who are unschooled or hold only a primary-school certificate, is 14.5%, just 0.4% higher than the unemployment rate for university graduates, including doctoral graduates. In all Italian macro-areas, the unemployment rate among secondary-school certificate holders is smaller than it is among graduates (see Table 1).

That the situation in terms of employment and salaries is constantly worsening is also clear from the results of a survey carried out by the AlmaLaurea Interuniversity Consortium (CIA, 2005):

- A year after receiving their degree, 54.2% of graduates had found a job (this figure was 57.5% in 2000, 56.9% in 2001 and 54.9% in 2002);

- 27% (25% in 2002) were continuing with the activities they had started before graduating.
- Graduates still looking for work had increased from 20.1% in 2001 to 24% in 2002 to 25.8% in 2003.
 - As a consequence, many graduates were accepting jobs that were unfit for their qualifications and had to wait a long time before they were granted an open-ended contract (ISTAT, 2006).
 - In 2003 the unemployment rate among graduates who started to look for work at least four weeks before being interviewed and were willing to start work within 15 days (ISTAT classification) was 19.2%. This percentage had grown steadily since 1999 (+ 0.2% from 1999 to 2000, +1.2% from 2000 to 2001, +1.5% from 2001 to 2002, +0.5 from 2002 to 2003).
 - On a national basis, 'The advantage of graduates with respect to upper secondary-school certificate holders dropped from 7.4% in 2002 to 5.5% in 2003'.
 - Three years after graduating, 73% had found work (75% in 2002 and 77% in 2001).
 - Three years after graduation, the unemployment rate was 9.2% (7.9% in 2002, 6.2% in 2001).
 - After a year graduates earned a monthly salary of €969 (-4.5% compared to €1,015, 2002); after three years their salary amounted to €1,160; after five years it had risen to €1,250. From 2000 to 2002, the real growth rate was 0.1% compared to 2.5% in France and 2.3% in the UK (OECD). Italy was ranked 23rd in this respect in the OECD rankings.

Furthermore, the constant perception of low and uncertain salaries after graduation tends to reduce the estimation of earnings over a whole lifetime, impairing graduate careers and the 'comprehensive private internal rate of return from tertiary education'⁴ (OECD, 2007).

Nevertheless, such data do not seem to discourage investment in university education, and fuel specialized education:

'In the case of new graduates, for more than 105 out of 110, and above all for those who were awarded honour degrees, employment shrinks to very low levels. Their academic success fuels more ambitious expectations [...] Most young people who continue their studies come from well-cultured families at a high social level, or have been very smart students [...] Such values are increasing with respect to the previous survey (in general +4 percentage points, in some cases even + 7 percentage points) [...] This leads to complex questions and doubts within the whole university system – all the more so as it is

important to consider the very late age at which on average Italian students graduate: 28!' (Almalarea 2005, p 5.)

It is therefore essential to verify how this employment and education scenario relates to regional development policies, which are earmarking most of their budgets for territorial resources: tourism, typicality food products, agroindustry.

A first possible conclusion is that regional development policies are investing in sectors that cannot offer a future in terms of employment to new highly-educated generations: a debate that has recently developed in France and the UK concerning the EU budget earmarked for agricultural policies supports this fear. If it is indeed the case, regional policies need urgently to change course in favour of other economic sectors, because public policies that increase graduate unemployment are socially and politically unacceptable. Alternatively, perhaps attention to those agricultural sectors has the potential not only to support an ecological balance in the region and farming incomes, but also to offer real and significant job opportunities.

In this scenario, of mass university education and territory-linked regional policy, in many regions the relationship between universities and agroindustry becomes as important as the relationship between universities and high-tech industry. Confining the role of the university to that of a 'high-level consultant' to agroindustry clusters and districts and to coordination committees will not answer the growing problem of graduate unemployment.

In fact, it can be argued that agroindustry SMEs are in serious need of people with a university background and with the competences to enhance and exploit regional comparative advantages, so that they can be translated into market competitive advantages. There is plenty of evidence to suggest that 'the development of skills wanted by industry is possible alongside the desirable knowledge outcomes of a university' (Jones, 2005, p 25). To increase agroindustry competitiveness, efforts must be directed not only towards product innovation, through science and technology, but also towards a development of human resources and relationships between the decision making centres of companies and institutions.

Many university faculties across Europe are concerned to produce graduates who are able to contribute to such development (Tavoletti and Lazzarotti, 2006; Tavoletti, 2007), but this requires them to move beyond their disciplinary limits and to focus through interdisciplinary cooperation on the preparation of people for specific careers.

From this perspective, the boom in postgraduate courses, such as Master's degrees, provides a great opportunity. Thanks to such programmes, it is possible to design completely new education courses, career-oriented rather than discipline-oriented, in which, through structured internships, students are offered 'active learning outside of the classroom' and experience 'a new realm of learning' (Heriot *et al*, 2007, p 427). Moreover, Master's students with temporary placements in companies create a practical connection between university studies and the labour market 'which promotes the formation of trusted relationships and builds social capital for further cooperation' (Carayannis *et al*, 2000, p 477).

Given that in general universities find it difficult to acquire adequate funding for their activities, this social capital often becomes a valuable basis for future profitable research synergies. Increasingly, a university's relationship with the business world makes a crucial difference in the competition for the best students and financial resources, and may even increase academic freedom: 'the advantage is gaining greater academic freedom. If we can get funds outside of government funding, it gives us more financial autonomy.' (Currie *et al*, 2003, p 64.)

The emergence of knowledge production Mode 2 (Gibbons *et al*, 2001) makes the traditional division of labour between fundamental and applied research largely irrelevant, and with it the functional distinctions between academic and industrial research. According to the knowledge production Mode 2 theory, discipline-based academic knowledge, typical of university education, is increasingly reliant on application for its own development: 'relevance (local) and excellence (global) can actually be pursued at the same time. Mode 2 of knowledge production, as Gibbons *et al* (1994), would call it, is finding its institutional forms.' (Rip, 2002b, p 128.) In this new context it is much easier for universities to produce the kind of knowledge that is relevant both to the local economy and to the global search for new knowledge:

'post-modern universities will include overlaps and alliances with centres (of excellence and relevance), public laboratories of various kinds (themselves on the move!) and various private organisations managing and performing research. The boundaries between the university and the outside world are porous, and such 'porosity' is sought explicitly.' (Rip, 2002a, p 6.)

Paradoxically, the weakness of some regional systems constitutes an opportunity, and may draw the attention of the entrepreneurial class to the potential of university

education to provide a service to society. In fact, it has been shown that at times of crisis in economically peripheral areas it is possible to catalyse innovation at the local level (Cooke and Morgan, 1998).

By way of illustration, the following section describes the Ascoli Piceno agroindustry district and the role played by the local universities.

Hypothesis and methodology

We have analysed the actual current relationship between universities and agroindustry districts by concentrating on the case of a 'peripheral'⁵ area of Central Italy with a strong agroindustrial vocation and a high concentration of universities. This is the Piceno district, in the Marche Region, and its 'University Pole' which has supported the development of the local agroindustry district through tertiary education courses and Master's and research programmes dedicated to local industrial needs.

The hypothesis we have tested in the Piceno agroindustry district is that, in peripheral regions, universities can have a first-mover role and a significant impact on local development policies: they may help to build competitive advantages by leveraging the comparative advantages that are already available in the region. In spite of its obvious limitations, this case is reasonably representative of how higher education can be connected to peripheral agroindustrial districts.

The case is based on secondary sources, interviews with local companies and a number of open-ended interviews with local opinion leaders.

The Piceno agroindustry district: employment and higher education

The agroindustry district of the province of Ascoli Piceno comprises 26 municipalities in a territory of 341 square kilometres, with a maximum distance from the coast of 20 km. The area was officially acknowledged only in 1999 (Regional Deliberation No 259 of 29 July 1999), when it was added to three other industrial districts of the Marche Region: footwear (Fermo and Macerata), furniture (Pesaro) and the mechanical sector (Fabriano). In the last census by the Italian National Statistics Institute (ISTAT), there were 95,274 people resident in the district (with a positive growth rate of 3.5% in 1991–2001), without taking into consideration inhabitants of neighbouring municipalities which were dependent on the district for jobs or other business-related reasons. San Benedetto del Tronto is the most populous municipality (43,550 inhabitants)

Table 2. Main specializations in the Piceno agroindustry sector.

	Enterprises (%)	Employees (%)
Fish processing and preservation	10.0	14.2
Fruit and vegetables processing and preservation	4.0	27.4
Production of beverages and wine	7.5	6.3
<i>Total</i>	<i>21.5</i>	<i>7.9</i>

and, along with other coastal towns, records a significant increase in population in summertime.

There are 645 firms in the agroindustry sector of Ascoli Piceno and Fermo, employing 3,451 people. There are 259 firms based within the district and these employ 1,622 people (ISTAT, 2001 census on industry and services). Firms with one or two employees account for 44.2% of the total, and those with between three and nine employees make up a further 46.2%. Thus just 9.6% of the district's firms (just some 24 companies) employ more than nine people. Eleven of these 24 enterprises employ 10 to 49 people, eight employ 50 to 199, and five employ more than 200.

The main specializations within the overall agroindustry sector are shown in Table 2. Other specializations include quality pasta, dairy products and the production of vegetable oils and fats.

After the 1999 Regional Deliberation, the COICO Steering and Coordinating Committee was created. COICO, with no independent legal status, is intended to act as a coordinating channel for all the actors in the agroindustry district. The organization receives regional funding to promote the development of the district. Since it does not have independent legal status, the Province of Ascoli Piceno performs the function of treasury.

The Steering and Coordinating Committee of the Ascoli Piceno agroindustry district includes local authorities, economic public authorities, trade and professional associations, trade unions, service companies, research centres, universities, schools and credit institutes.⁶ Fifteen of these members serve on the Executive Committee, which takes care of general administration: it draws up the development programme for submission to the Assembly, directs the deliberations of the Assembly, defines the organization of the COICO, and in an emergency exercises the powers of the Assembly.

Seven members make up the Presidential Committee. It is possible to appoint both a Technical Committee and a Scientific Committee to support the decisions of the Executive Committee.

Without an infrastructure of its own, COICO is reliant on the contribution of its members to carry out its functions. Its headquarters are based at a member's premises. The COICO office of San Benedetto del Tronto has just one part-time employee who deals with secretarial tasks.

Among the projects of COICO are:

- 'Supply Chain Traceability' for product and supply chain certification;
- 'Employment Pact' for promoting job-matching and supporting operator training;
- 'Cluster Logistics Development' for coordinating existing logistical structures and promoting 'soft' infrastructures; and
- 'Area Marketing – Local Productions' for promoting quality and regional brands and production protocols.⁷

One of the main projects in which COICO has participated is the 'Territorial Pact for Agriculture and Fisheries' (2001), which involves local authorities, trade associations, credit institutions and enterprises and is coordinated by the Province of Ascoli Piceno through Piceno Sviluppo SpA.

From the outset, the district could count on capital funding of approximately €680,000 (€500,000 when it was established and the rest in two disbursements of €150,000 and €30,000), but other initiatives begun before the birth of the district played a key role.

To assess the impact of universities on agroindustry, we studied graduate employment in the district. We carried out eight structured interviews, thus covering one-third of the most significant employers (remember that just 24 firms in the district have more than nine employees). We omitted the less significant examples, which we deemed to be less relevant to graduate employment (Figure 1).

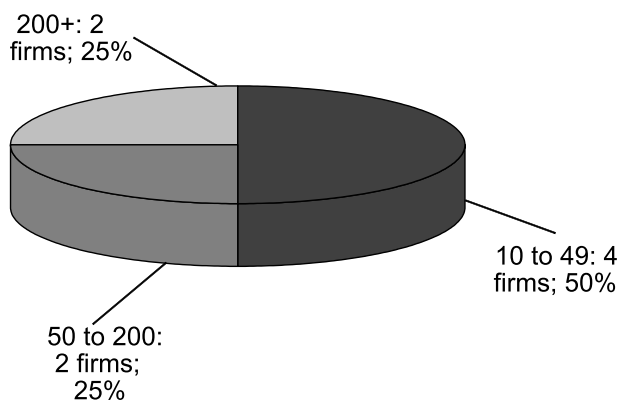


Figure 1. Size of responding organizations (number of employees).

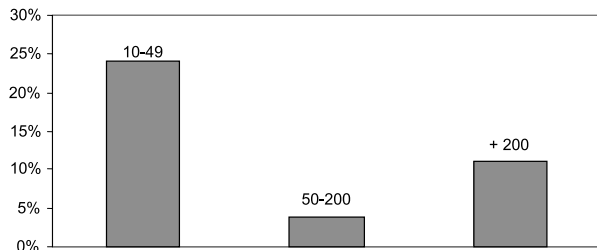


Figure 2. Graduates as a percentage of employees, by size of organization (number of non-seasonal employees).

We considered the selected sample to be adequately representative of the 24 firms with over nine employees. In one case, the use of seasonal employees shifted the company interviewed from the first size category in the major employers (10 to 49 employees) to the second (50 to 200 employees). In the other cases the use of seasonal employees did not affect the category.

Six of the eight firms interviewed worked in the field of food processing, one in the distribution sector and one was engaged in applied research for agroindustry.

In the firms interviewed, employees with a university degree accounted for 11% (87 of 810) if we exclude seasonal employees, and 8% if we include them (87 of 1,037). The breakdown by dimensional class is shown in Figure 2: graduates make up 24% of the workforce in companies with 10 to 49 employees, 4% in those with 50 to 200 and 11% in those with over 200.

If we add in seasonal employees, one of the firms shifts from the first size category to the second, so the percentage in the first category is reduced and the other classes remain substantially unchanged (Figure 3): the proportion of graduates decreases from 24% to 14% in companies with 10 to 49 employees, rises from 4% to 5% in those with 50 to 200, and remains at 11% in those with over 200. The remarkable decrease in the first category relates to the absence of graduates among seasonal employees. The slight increase in the second category is caused by the addition to it of another firm. The stability of the third category may be explained by the absence of seasonal staff in large firms.

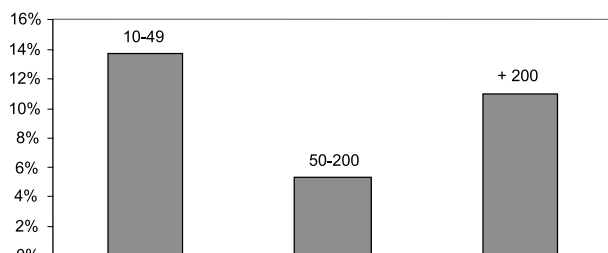


Figure 3. Graduates as a percentage of employees, by size of organization (number of employees, including seasonal employees).

Most graduates are to be found in the small companies, those with 10 to 49 employees, confirming that in the sector under consideration smaller firms are better able to absorb staff with tertiary education.

Excluding the agroindustry research company, assigned to the first category, does not affect the profile of the smaller companies in this respect. The better performance of the larger companies compared to those with 50–200 employees (11% and 4%, respectively, with seasonal staff, and 11% and 5% without seasonal staff) is due to the presence of the distribution company in the third category.

If both the agroindustry research and the distribution companies are excluded, leaving processing companies only, an inverse ratio emerges between size and the presence of graduate staff (Figure 4): the proportion of graduates is 19% in the companies with 10–49 employees (18 graduates in absolute terms), 4% in those with 50 to 200 (8 graduates) and 2% in those with over 200 (4 graduates).

Since the small companies of the Piceno agroindustry sector absorb the highest number of graduates, both in percentage and in absolute terms, the implication is that universities – traditionally oriented towards large companies – should adjust their educational programmes and themes in favour of these smaller enterprises.

Figure 5 summarizes the enterprises' assessment of the skills and aptitudes of the graduates employed. The results are substantially the same for all size categories. In the survey, interviewees were asked to assign a score on a scale of zero to five: (0 – 'no skill'; 1 – 'poor'; 2 – 'fair'; 3 – 'good'; 4 – 'quite good'; 5 – 'excellent').

The interviewee was then asked to assign a score on a scale of zero to five to the skills that were thought to be more important to the company: (0 – 'not important'; 1 – 'not very important'; 2 – 'important'; 3 – 'quite important'; 4 – 'very important'; 5 – 'fundamental'). The results are shown in Figure 6 and they represent the skills that employers demand of graduates.

Obviously, if we ask about the desirable skills, firms will tend to classify all skills suggested as 'important' at the least and many of them as 'very important'. However, it is very interesting that the top-rated skill

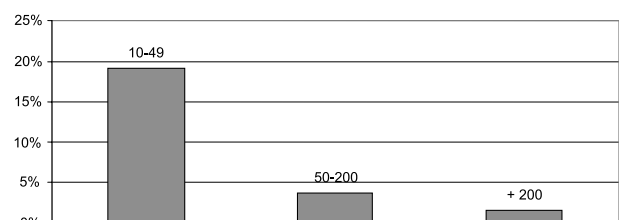


Figure 4. Graduates as a percentage of employees, by size of processing company.

was 'teamwork' (4.86). 'Showing initiative', 'problem solving' and 'organizational skills' (4.57) are judged as 'fundamental' or 'very important', as are 'job-related skills' (4.57) – more so than 'practical skills' (3.86). Such results show that firms in the industrial district

appreciate 'high social interaction skills' more than sector-specific skills. Similarly, firms deem 'management skills' (4.43) and 'organizing own learning/development' (4.14) either 'very important' or 'fundamental'.

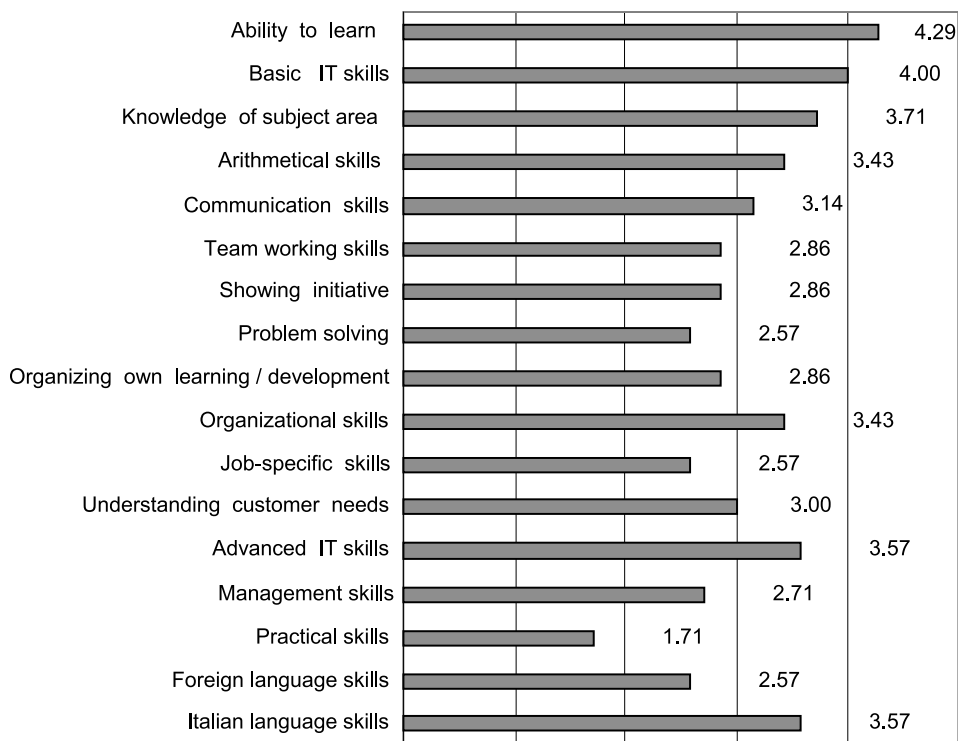


Figure 5. How employers rate the skills of graduates.



Figure 6. Attributes employers consider the most important to their organization.

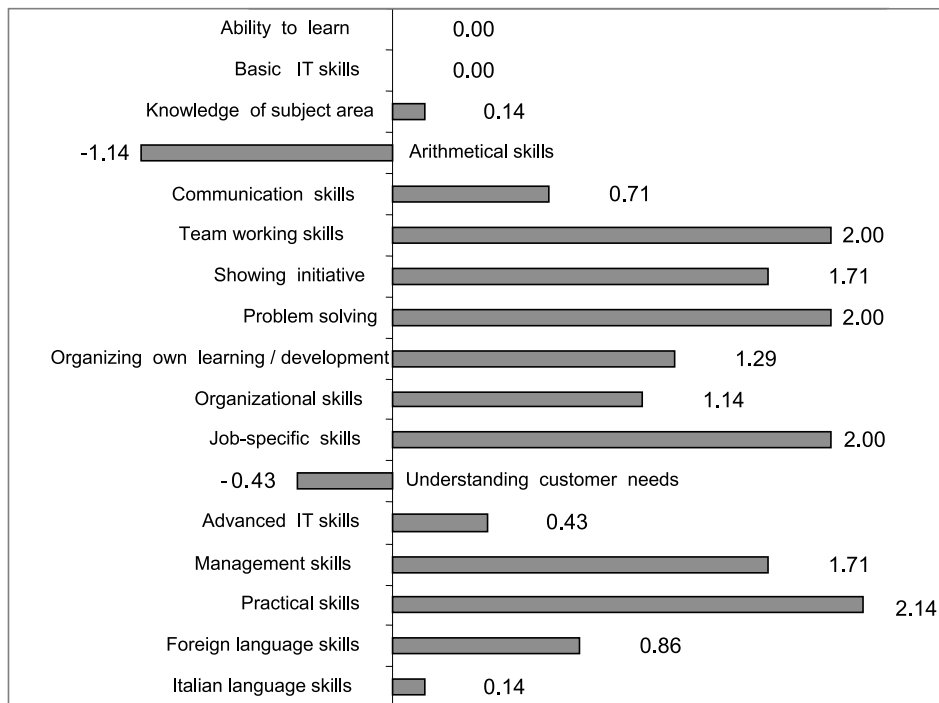


Figure 7. Differences between the attributes employers consider the most important and the attributes they rate in their graduate employees.

It must therefore be a matter of concern for universities that the skills requested by companies are those that, in the opinion of the companies, are least developed: teamworking skills (2.86), showing initiative (2.86), management skills (2.71), problem solving (2.57), practical skills (1.71), job-specific skills (2.57), organizing own learning/development (2.86). These skills are based on strong social abilities or on practical and entrepreneurial competences.

However, not all graduate skills are appreciated by companies: 'understanding customers' needs' and 'arithmetical skills' were considered excessive to their actual requirements. Understanding customers' needs (3.00 on the supply side, 2.57 on the demand side) did not seem very important to the companies, which rarely had their own marketing channels and often did not interact with the end customers; arithmetical skills are not important for the sector (Figure 7).

Among the skills that the firms appreciated but would have liked to have been better developed were: 'knowledge of subject-area' (3.71 on the supply side, 3.86 on the demand side), 'communication skills' (3.14 on the supply side, 3.86 on the demand side), 'advanced IT skills' (3.57 on the supply side, 4.00 on the demand side), 'Italian language skills' (3.57 on the supply side, 3.71 on the demand side). Thus the results highlight a demand for skills that relate to the traditional content of

tertiary education; although appreciated, these skills were judged in general to fall somewhat short of requirements.

'Foreign language skills' were rated as poor (2.57 on the supply side, 3.43 on the demand side) in the light of requirements, although the gap was not very wide, reflecting the fact that the district is not particularly internationalized.

The skills accorded very high rates by both the supply and demand sides were 'ability to learn' (4.29) and 'basic IT skills' (4.00). New generations tend not to owe their basic IT skills to universities, which often lack up-to-date PC equipment, but the excellent rating and high demand for the ability to learn suggest that the method if not the content of traditional higher education, based on the development of critical and learning abilities, is still very much appreciated by companies.

The above analysis underscores several key factors:

- there is great appreciation by companies of graduates' ability to learn, reflecting their approval of the traditional methods used in university studies;
- there is a perception that graduates' practical, entrepreneurial and social skills, rated either very important or fundamental to the company's survival, are poor; there is generally a positive perception of

the traditional content-related aspects of tertiary education, although graduates are thought to be falling slightly below requirements in this respect.

Similar conclusions have also been reached in other regions, emphasizing the importance to SMEs of 'generic skills' as opposed to 'core skills' (McLarty, 2005, p 35).

Role of universities in supporting the agroindustrial district

Piceno University Pole – strategy and organization

The Piceno University Pole has endeavoured to tackle the shortcomings noted above. In doing so, it has avoided a weakening of traditional academic culture in developing the responsiveness of higher education to industrial needs. Thus it has aimed to address the critical issues referred to at the end of the previous section (specifically, poor practical, entrepreneurial and social skills) without losing the assets bestowed by traditional higher education methods. The fact that our survey indicated that companies still expected graduates they employed to have followed a traditional academic education indicates a key reason to avoid a trade-off between greater responsive to industry and a weakening of the traditional quality of tertiary education. The strategy adopted by Piceno University Pole in its first-mover role in the district is described below.

The strategy adopted by the Piceno University Pole has been considered, in more theoretical terms, as one that might be appropriate for addressing the problem of intellectual unemployment in Central Italy (Tavoletti, 2004). This strategy requires a rethinking of the traditional concept of 'knowledge' such that it is regarded as something that can be accumulated by individuals in the same way as capital (Becker, 1993) and consequently as having the potential to produce 'positional competition' (Hirsch, 1976; Marginson, 1997). The concept also needs to be reformulated in accordance with new methodological assumptions (Maturana and Varela, 1980) to interpret its social and context-linked nature as the 'ability to produce an effective action in a consensual domain' (Te Velde, 1999, p 5). From this perspective, knowledge becomes something that can be generated exclusively through the interaction between individuals at a particular time and in a particular place and social context.

Before describing in detail the strategy followed by the Piceno University Pole, an outline of its organization will be useful. Of the provinces of the Marche Region, Ascoli Piceno is the only one that does not have its own university. The Università Politecnica delle Marche (formerly the University of Ancona) in the

province of Ancona specializes in engineering, medicine and economics. In the province of Macerata there are the University of Macerata (dedicated mainly to the classics, law, politics and economics) and the University of Camerino (mainly technical and scientific studies). This completes the list of universities in the Marche. The Libera Università degli Studi di Urbino (classical studies) has an independent role.⁸

The policy makers of the Ascoli Piceno Province have set up a consortium of local public authorities: the Province of Ascoli Piceno, the Municipality of Ascoli Piceno, the Municipality of San Benedetto del Tronto, the Municipality of Offida and the Municipality of Spinetoli, with the affiliated partnership of the Fondazione Cassa di Risparmio di Ascoli Piceno.⁹ The purpose of this Piceno University Consortium is not to create a fifth university in the Marche region, in which the higher education situation is already overcrowded and fragmented¹⁰ (the university of Teramo, the northern-most province of Abruzzo, is just thirty kilometres away from Ascoli Piceno). Rather, the purpose is to generate more bargaining power with neighbouring universities in order to promote educational and research activities that match local production needs.

Thanks both to financial incentives from the member institutions¹¹ and to its function as the only reference point for tertiary education policy in the region, the Piceno University Consortium has attracted branches of three of the four universities in the Marche Region: the University of Camerino,¹² the Università Politecnica delle Marche¹³ and the University of Macerata.¹⁴ Thus, through the Piceno University Consortium, a correspondingly strong Piceno University Pole and a 'dispersed university' have been created, covering three municipalities in an area of 30 km × 6 km, with approximately 4,000 students and a resident population of about 170,000. About half this area, and more than half of its population, are in the Piceno agroindustry district.

Key benefits

The Piceno initiative has brought several key benefits to its community. First, it has been possible to set up advanced education activities without the need for the expensive bureaucratic structure of a university. Consequently it was possible to focus investment exclusively on education and research, while the central administrative costs were incurred by the universities which established offices in the area.

Second, the Piceno University Consortium (CUP) has had significant influence on the universities with regard to which research activities are undertaken, which courses of study are set up in the area, and what the contents of Master's courses should be. This

influence stems from the support offered to the universities in penetrating new markets (fundamental in achieving the criteria set by the national university system for resource allocation); the quality of the financial resources offered by the CUP, which are much more flexible than is typical for university budgets in Italy (which are increasingly rigorous and dominated by a few priority items); and the buildings that were made available to the universities.

The growing autonomy of universities and the new educational provision driven by Master's courses have enabled the creation of new educational routes designed around specific local production requirements – there are, for example, Master's courses in agroindustry supply chain technologies, the management of agrofood systems and environmental resources, food industry operations and environmental health sciences. There are also degree courses in nutritional biology, law and food security and law and science for nature and the environment. These educational programmes were specifically thought out by the CUP to support agroindustry. There are also degree programmes in architecture, industrial and environmental design, concentrating on technologies for the preservation and restoration of cultural property held in the municipality of Ascoli Piceno, an area rich in architectural heritage and with a lively building sector. A Master's course in tourism economics and management is offered in support of local tourism (tourist attractions include the national parks of Monti della Laga and Monti Sibillini, historical monuments in Ascoli Piceno and the seaside resorts of San Benedetto del Tronto and Grottammare).

This general tailoring of education to local needs was facilitated by the nature of the region itself. The financial weakness of universities and the peripheral position of local systems in areas that are not very attractive to external investors discourage institutions from developing educational courses with a purely academic approach. The universities in the area have thus been more or less obliged to adjust to the needs and requirements of their local community, and this adjustment has found expression in the consortium of public authorities.

The third key benefit is that it has been possible to negotiate with universities the development of educational routes that are built around careers rather than a subject of study. Thus the emphasis is on, for example, the generation of agrofood supply chain experts, nutritional biologists, conservationists and restorers, industrial designers and agrofood system managers. These career-driven courses relate closely to the local economy and include specific work-experience projects. There has consequently been much interaction with local small firms, which now seem more inclined to hire recent graduates, helping to develop those

qualities which, in their view, tend to be in need of attention: team working skills, using one's own initiative, management skills, problem solving skills, practical skills, job-specific skills and organizing one's own learning/development.

ASTERIA: a conduit for university–industry cooperation

ASTERIA (the Agency for Technological Development and Applied Research) has played a fundamental role in building university–industry linkages. This limited company was set up in 1998 on the initiative of the CUP, virtually as a branch of the Consortium that was specifically dedicated to the agroindustry sector. The idea behind it was that, as a joint-stock company, it would have greater operational flexibility and it was also thought that the company would be able to attract more private-sector organizations than the CUP members themselves.

At first ASTERIA was a single-member company of the CUP. The number of its members has gradually increased, however, to the extent that it now includes all the main policy makers of the agroindustry district (municipalities, province, region, banks, universities, trade associations, service companies, major industries). ASTERIA operates CETRIA, a regional laboratory specializing in science and technology transfer to agroindustry and the fish industry. CETRIA is based in a modern 10,000 m² building. The laboratory, fitted with €5,000,000 worth of equipment, constitutes a fundamental connection between local companies and local universities. Students and researchers use it, and companies consult CETRIA for analysis and research projects.

ASTERIA has exploited the opportunities afforded by Decree Law No 297 of 27 July 1999, relating to the reorganization of science research regulations. Now, small enterprises that lack the necessary know-how can obtain substantial financial help and arrange tailor-made research projects. Tax credits have been the most successful instrument within the scope of the Law and these credits have attracted contributions for research of at least €3,000,000.

ASTERIA has played a fundamental role in the following phases of research project development:

- the arrangement of research projects designed to match the needs and requirements of companies in relation to process and product innovation;
- the search for companies interested in developing a project, even if they are not ASTERIA members;
- the submission of the project to the Italian Ministry of University and Research (MIUR) and relevant administrative management on behalf of the applicant company; and

- the performance of the research activity commissioned by the company when it has received the research grant.

The main limitation of the initiative has been that many enterprises have not been able to design appropriate proposals or projects for scientific research oriented to process and product innovation. Many have been attracted by the financial opportunity but have taken a passive approach to research projects designed and developed by ASTERIA. There is also evidence, in the Italian case, that public financial programmes for SMEs can have mixed effects in the long term. 'Government aid allows firms to have a higher level of technology,' write Maggioni *et al* (1999, p 287). 'However,' they add, 'government funding gives rise to entrepreneurial start-ups which are not fully efficient.'

The achievement of a virtuous circle

The main result of the initiative is that, for the first time in the district, albeit with obvious limitations, a virtuous relationship has been developed between companies, local universities and government support for scientific research.

All participants have benefited: the activities of the ASTERIA research centre have expanded; small companies can access scientific research, benefiting from it financially and in terms of innovation; local universities can create a practical connection with industry; the national government has means for sponsoring productive innovation in SMEs, which are difficult to reach and often unable to obtain research funds directly; and local policy makers have the merit of having started a virtuous cycle.

The impact of tax credits for scientific research, through ASTERIA, is especially important with respect to graduate employment. Smaller companies (10–49 employees) offer the best job opportunities in both absolute and percentage terms. These firms, rather than the larger ones, have been the target of the research and innovation initiative described in this article, and this has led them to hire increasing numbers of graduates.¹⁵

Conclusion

In conclusion, in the Piceno agroindustry district universities have played a leading role in fostering educational routes favourable to graduate employment and to the promotion of research in support of SMEs. SMEs, rather than the larger companies, have proved especially able to make use of employees with higher education degrees and to interact with local universities.

The development strategy described here focused on human resources and was promoted by local universities

that, aware of the implications of mass higher education, found a way of increasing the interaction between companies and local higher education institutions and making educational programmes highly relevant to local firms and their productive and workforce needs. In achieving this, they fostered the social interaction abilities of students, enhanced their entrepreneurial and practical skills, improved their work prospects, developed a culture of high-level education in the area and improved the quality of new recruits available to local businesses.

Woollard *et al*, examining the contributions to regional development and growth that UK higher education institutions could make through their 'third mission' activities, reached a similar conclusion: 'universities need to enhance employer-led curriculum development both through the creation of new businesses and by improving university–business links' (Woollard *et al*, 2007, p 387).

However, such a strategy carries with it the unavoidable price of a change in traditional subject-based tertiary education, because of the difficulty of assessing and monitoring increasingly flexible and varied educational programmes in the context of ever-stronger links between universities and industry.

The increasing competition between regions will reveal whether they are able to benefit from their better qualified workers by transforming their comparative advantages into durable competitive advantages, without going back to a new 'middle age' of small workshops and a focus on regional typicality – useless for local development and the competitiveness of the regional agroindustry. We also need to see whether universities located in agroindustry districts will be able, without distorting their fundamental nature, to offer both high-value applied research and good employment prospects to a mainly university-oriented generation.

Notes

¹We endorse Porter's definition of a 'cluster' as a 'geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities' (Porter, 1998, p 199), but we also accept Becattini's (1991, p 84) notion (which can be traced back to Alfred Marshall) that an 'industrial district' is a cluster with additional social features: 'in order for the industrial district phenomenon to develop, it is necessary that such a population of small firms merge with the people who live in the same territory and who, in turn, possess the social and cultural features (social values and institutions) appropriate for a bottom-up industrialization process'.

²One major legacy of Porter's diamond is, in fact, a clear and sharp distinction in the debate between 'comparative advantages', based on cheap labour and climate, and 'competitive advantages', based on the diamond as a whole:

'According to the standard economic theory, factors of production – labour, land, natural resources, capital, infrastructure – will determine the flow of trade . . . This doctrine, whose origins date back to Adam Smith and David Ricardo . . . is at best incomplete and at worst incorrect' (Porter, 1990, p 78). Thus the old Ricardian 'comparative advantages' are not really part of the diamond itself, because the side of the diamond called 'factor conditions' relates to those factors that nations are able to create. Porter himself highlights this contrast, as noted by Davies and Ellis (2000, p 1190): 'broad distinctions are drawn between "basic" factors like climate and unskilled labour and "advanced" factors which have to be created, like computer scientists and communication infrastructures'.

³It is certainly conceivable that at least some of the new graduates end up doing jobs that do not require graduate skills and that they obtain these jobs at the expense of less highly qualified workers. Such a crowding out effect may be associated with a relative rise in unemployment among people with low qualifications (as higher-qualified workers take their jobs), but also potentially with a reduction in the pay premium associated with tertiary qualifications (as a risen graduate supply outstrips any rise in demand for graduate skills.) (OECD, 2007, p 11.)

⁴This is an OECD indicator that measures the economic return of investment in higher education. It takes into account matriculation fees and forecasted future earnings, examined as a function of the unemployment probability of individuals, less any support measures for study.

⁵This example may be deemed 'peripheral' because of its geographical position, far from the main economic agglomerations of Italy.

⁶Specifically, it comprises: ten municipalities; two Comunità Montane (local authorities for specific mountain areas); the Chamber of Commerce; three employers' organizations; four craft associations; two trade associations; three cooperative associations; three farmers' associations; six trade unions; six service and research companies; four credit institutions; one university; one professional association; one upper secondary school; and two manufacturers' associations.

⁷In particular, the COICO contributed to the establishment of the I Frutti dei Piceni (Piceni Fruits) Consortium and the DALMARE di San Benedetto del Tronto OP manufacturers' association. It also contributed to an application for Protected Geographical Indication (PGI) status for the 'Macerata Green Cauliflower' (Cavolfiore Verde di Macerata) and the 'White Cauliflower of the Marche' (Cavolfiore Bianco delle Marche) and helped to develop the Environmental Action Programme for Sustainable Development (ASSO).

⁸It should also be noted that the newly established Province of Fermo, whose institutions have yet to start work, hosts a branch office of the Università Politecnica delle Marche.

⁹This is a private foundation whose main purpose is to use its own capital and earnings to promote local economic, social and cultural development.

¹⁰There are four universities in the Marche region, which has a resident population of 1,470,581 (ISTAT, 2001 census).

¹¹The budget of the Piceno University Consortium for sponsoring the Piceno University Pole has increased from 350,000,000 lire (€180,760) in 1997 to the current € 3,000,000.

¹²The University of Camerino created study programmes in architecture, industrial and environmental design, technologies for the preservation and restoration of cultural property, law – food security and law, mathematics and business and technology applications, biology, nutritional biology, geological sciences, sciences and technologies for nature and the environment, information technology, and a Master's programme in agroindustry supply chain technologies – all in the municipalities of Ascoli Piceno and San Benedetto del Tronto.

¹³The Università Politecnica delle Marche set up a degree course in economics, markets and business management in San Benedetto del Tronto.

¹⁴The University of Macerata set up degree programmes in political science – the analysis of public politics and territorial

systems, life sciences for high-school teachers, and Master's programmes in agrofood systems and environmental resource management and in innovation in public administration – all in Spinetoli.

¹⁵In the wine sector a key role is played by VINEA, a manufacturers' association established in 1979 and a member of ASTERIA. VINEA's members account for 40% of the wine production of the provinces of Ascoli Piceno and Fermo (in their turn accounting for 50% of the total production in the Marche region). VINEA runs the Enoteca Regionale delle Marche and the 'School of Wine' and has been training oenologists and sommeliers for years.

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