The Rise of a District Lead Firm: The Case of Wam (1968–2003)*

ABSTRACT:
In recent times one major development in several industrial districts in Italy has been the emergence of new hierarchical structures that led to the rise of lead firms. These are firms that – contrary to canonical district firms which tend to remain small – pursue size growth, invest in marketing, distribution and R&D, reorganize their subcontracting networks, and become international by establishing commercial subsidiaries and production facilities abroad. However, the history of lead firms remains largely unexplored. This article contributes to filling this gap by examining the case of one such lead firm: Wam, a company set up in 1968 in the mechanical engineering district of Modena, and which at the beginning of the 21st century had become the world leader in the production of bulk material handling and dust filtration machinery. The article focuses in particular on the strategy of growth and internationalization that this company has pursued and its effects in both the foreign subsidiaries and in the Italian industrial district it originated from.

One key element of Italy’s good economic performance since the 1960s has been the success of those production systems that economists call «industrial districts» [henceforth IDs]. These are clusters of small and medium-sized firms that exploit external economies of scale and economies of specialization generated by the division of labour between firms and flexible production organization within them.¹ This peculiar model of economic development was considered as the natural evolution of Italy’s industrial history after the 1970s, when both private and the state-owned big business experienced a long lasting crisis.²

However, since the 1990s competition from low-wage countries and the increasing spatial fragmentation of production have posed a new challenge to the Italian IDs. In fact, fragmentation implies that external linkages interpenetrate territorially embedded production systems at multiple levels and in multiple ways, which potentially challenges the established imagery of IDs as knots of thick localized ties in a dispersed global net-

In the face of this challenge, many Italian IDs started to outsource production to low-wage areas, and especially to Central-Eastern Europe and East Asia. Because of the small size of many district firms, this process developed mostly through simple subcontracting, frequently transferring to a foreign context sourcing from enterprises that used the same types of machines that were previously employed in the district, or pushing former sub-contractors to establish their plants abroad in order to reduce costs. The participation of East European countries, including Russia, as well as of India and China, in the international consumption market, with their high growth rates, provided a further incentive to transfer manufacturing production abroad, this time through foreign direct investments [henceforth FDIs]. IDs involved in de-localization of production significantly reduced the number of companies – principally of smaller subcontractors – and the level of manufacturing employment, with a negative impact on the connected technical skills. This selection eliminated low performers and marginal firms operating only on a low-cost, low-price basis while non-marginal firms adopted strategies based upon high value added, positioning themselves at the top of the value chains, strengthening quality and design.

As a result, many Italian IDs became less self-contained and more integrated into global supply chains and knowledge exchange networks. Crucial to this process was the adoption of the «new pragmatic disciplines» of «learning by monitoring» which facilitate cooperation in design and production across organizational and geographical boundaries by making tacit knowledge explicit: benchmarking, simultaneous engineering, procedural quality assurance standards, just-in-time logistics, «root-cause» error detection and correction analysis, and so forth. At the same time, successful Italian IDs became increasingly dependent on lead firms that control «groups», that is multiple legally distinct firms held together by ownership relations, whether through cross-shareholding or by all belonging to a single subject or family.

These are companies that – contrary to «canonical» district firms which tend to remain «small» – pursue size growth, offer a wide range of products and extend their markets, often acquiring other firms both within and outside their ID of origin. Lead

7 We define «canonical» district firms as the firms characteristic of the «canonical» model of ID defined by Becattini in the late 70s that contributed so much to revitalize the notion
firms introduce complex innovation that results in fundamental changes in the entrepreneurial formula and in the organizational model of the firm. At the same time, such innovation requires a high level of formal knowledge (transferable and, therefore, available to the firm outside the ID) that can be contextualized inside the firm.8

Since the 90s lead firms tended to play a paramount role in orchestrating the activity of several Italian IDs. They selected and re-qualified ID subcontractors by promoting an upgrading of their competences. Learning through the relationship with a lead firm helped many subcontractors to upgrade their technical and organizational capabilities and extend their potential market outside their ID. Lead firms also explored new commercial avenues and invested in R&D. Their role became more relevant to provide IDs with international market access, strategic leadership, and resources. Lead firms also prompted a growth of business services in many IDs.9 IDs with a strong presence of lead firms were the most inclined to international success. In fact, in recent years some district lead firms experienced an accelerated internationalization process with the establishment of commercial subsidiaries and production facilities abroad. Now these companies hold a dominant position in well-defined world-sized market niches – i.e., machine tools and other durable goods, clothing, luxury goods, and other branches of the so-called «Made in Italy»10 – while at the same time maintaining deep roots in their ID of origin.11
The emergence of lead firms did not undermine the need for collective local institutions within the IDs, even though it altered the functioning of those institution. A good case in point is that of Emilia-Romagna, where Confindustria – the business association mainly representing lead firms – lobbied to force Ervet (the region’s development agency) to become more market-oriented while, at the same time, the setting up of the «Regional System of Industrial Research, Technology Transfer and Innovation», by aiming to establish a bridge between research institutions and the business community, was principally targeted at meeting the demands of lead firms.¹²

There are also some cases in which the local institutional founts of external economies have been transposed beyond the local level. In fact, these actions did not merely give support to the district’s lead firms in the implementation of their de-localisation strategies. They also aimed to encourage the development of long-term relations and commercial, socio-cultural and institutional exchange between production systems that are located in different national contexts but that are of similar or complementary profile in terms of production activities and processes of innovations.¹³ Amongst the more promising examples in this respect are the union of industrialists of Treviso, which has opened an office in Timisoara, and the Italian Association of Tilemaking Machinery Producers (mainly clustered in the area of Sassuolo) which maintains a presence in the tile-making district of Castellon, Spain.¹⁴

In spite of their increasing importance, existing literature lacks – with a few exceptions – in-depth studies of Italian district lead firms’ histories. This article aims to contribute to filling this gap by examining the case of one of such lead firm: Wam, a company set up in 1968 in the mechanical-engineering ID of Modena, which at the beginning of 21st century had established itself as the world leader in the production of bulk material handling and dust filtration machinery. Drawing on Wam’s archive, interviews with Wam’s managers and a number of other sources, this article deals in particular with the strategy of growth and internationalization that this company has pursued and its effects in the host nations and its ID of origin.

In particular, after presenting an overview of the history of the Modena mechanical engineering ID, that represents the context within which Wam developed, this article deals with the birth of the company, the acquisition of market leadership in Italy and the establishment of manufacturing subsidiaries in Italy. Some sections are then devoted to analyse Wam’s internationalisation strategy, which involved the establishment of both trading and manufacturing subsidiaries abroad. Within this context, the US and

¹² Alberto Rinaldi, *The Emilian Model Revisited: Twenty Years After*, in: *Business History* 2 (2005), 244-266. The new local collective public services that successful IDs developed in recent years differ from traditional public goods not only in their target and content but also in that they are so idiosyncratic and mutable that they had to be in effect co-designed by their client users if they had to be useful at all. See Charles F. Sabel, *Bootstrapping Development: Rethinking the Role of Public Intervention in Promoting Growth*, in: Victor Nee/Richard Swedberg (eds.), *On Capitalism*, Palo Alto 2007, 305-341.


Chinese subsidiaries are described in detail. The introduction of automation and ICT at Wam plant in Italy as well as the company’s R&D, innovation activity and performance are investigated too. The article then analyses the relations of Wam with the Modena mechanical engineering ID, in which the company is located. The final section concludes.

The Modena mechanical engineering ID

When IDs made their big splash in the international economic literature in the early 1980s, the Modena mechanical engineering ID was, along with the Prato textile district, the archetypical industrial district. Even now the Modena ID remains a useful setting to analyse the biggest questions and drivers of changes of IDs. The origin and the first expansion of mechanical engineering in Modena date to the two decades that preceded World War I and were led by the mechanisation of agriculture in the Po Valley. The 1911 industrial census recorded 467 mechanical engineering firms employing 2,272 people in the province of Modena, mainly producing agricultural equipment. The industry’s next spurt occurred in the late 30s and early 40s and was triggered by the military expenditures of the fascist government. According to the census that was carried out between 1937 and 1939, Modenese mechanical engineering firms had risen to 1,591 with 5,779 employees.

After the end of World War II the industry faced a deep crisis due to the cut of government orders for armaments. As a consequence, the firms that had grown during the war had to downsize and resorted to massive redundancies, which hit both skilled and unskilled workers. The 50s and 60s saw the birth and expansion of a new generation of mechanical engineering firms, often founded by former laid-off workers or by spin-offs from existing companies. These new firms were small in size and specialized in new fast-growing market niches, such as irrigation and industrial pumps, motor cultivators, mowers, earth moving machinery, dumpers, gear reducers, spare parts for agricultural machinery, sports cars, white goods, hydraulic equipment, packaging machinery, ceramic tile machinery, tooling machines and many other products whose demand was growing very fast in the years of the «golden age». As a result, mechanical engineering firms in the province of Modena grew steadily from 1,687 in 1951 to 3,682 in 1971, while at same time employees rose from 10,605 to 30,365.


16 Thus, for example, the Modena mechanical engineering ID was one of the production systems targeted by Global Components, the research project funded in 2007 by the Alfred P. Sloan Foundation aimed at analysing the impact of offshore outsourcing on the industrial component sector in the United States and in some high wage key comparison economies in Europe.
Since the late 60s most Modenese mechanical engineering firms started to resort to a larger extent to outsourcing to local subcontractors. As a result the level of vertical integration of individual firms decreased and in the 70s the industry assumed a district structure by which only a proportion of the firms produced finished goods, while the others worked as subcontractors for the former. Most firms specialised in the execution of only one or few phases of the industry typical of the district. Moreover, as both subcontracting firms and subcontractors were numerous and small in size, none of them had the strength to dominate the other. Subcontractors could easily switch clients, and vice versa. As a result, relations between firms specialised in the same stage of the production process became very competitive, while cooperation characterised the relations between firms specialised in complementary phases of the production process. The 70s were the years of the big spurt of the district, whose success drew the attention of international scholars.

As a result, in 1981 mechanical engineering firms in the province of Modena had had risen to 3,941 with 42,460 employees. The 1982/83 downturn prompted a restructuring of the district with the massive introduction of automation and computer-based technologies (numerically controlled tooling machines, FMS, CAD-CAM systems, computer-aided robots, and so on). The recovery started in 1984 and the rest of the 80s were a new phase of steady growth. As a result, in 1991 the district accounted for 4,057 firms and 45,961 employees.\textsuperscript{17} The 90s saw a further expansion of the district. In 2001 firms had risen to 4,539 employing 53,169 people. However, growth occurred as structural change was under way. In fact, Modenese mechanical engineering firms had been reshaping their relations and roles in order to move away from an «horizontal» district model towards a «vertical» one. The «horizontal» model referred to the situation typical in the 70s and 80s when a relatively large percentage of firms in the district either had relationships with the end-users of their products or could reasonably develop such relations. In a «vertical» model there is, by contrast, far more place for lead firms functioning as gatekeepers for the access of district products to their end-users.\textsuperscript{18}

A sign of the move towards a «verticalization» of the district came from the data on exports. While the province counted just 20 firms with more than 250 employees, those firms accounted for 69 per cent of the export sales of Modenese mechanical engineering firms in 2005. Likewise, while it was not unheard of for smaller firms to have invested in production facilities abroad, this was a step taken by a strong majority of district’s larger firms. There is evidence also of a trend towards increasing formality in relations between firms, with significant growth in firms acting as part of groups. Grouping proved to be an organisational form capable of coupling the flexibility characteristic of district small firms with the need to achieve critical mass for some shared functions. While it is not common for subcontractors to be in groups, some 60 per cent of final firms with 20 or more employees were members of groups in 2005.

\textsuperscript{17} On the history of the Modenese mechanical engineering industry in the 20\textsuperscript{th} century, see Giuliano Muzzioli, \textit{Modena}, Rome-Bari 1993 and Alberto Rinaldi, \textit{Distretti ma non solo. L’industrializzazione della provincia di Modena}, Milan 2000, 101-128.

\textsuperscript{18} Margherita Russo/Josh Whitford, \textit{Industrial districts in a globalizing world: a model to change or a model of change?}, Department of Economics, University of Modena and Reggio Emilia, WP 615 (July 2009), 6.
However, the rise of groups and lead firms did not involve a disembedding of these firms from the rest of the district. Rather, the most common strategy was to invest abroad to export technology, therefore bypassing the difficulties of entering into those countries with a finished product. In fact, many of the firms that invested in facilities abroad simultaneously invested in the district. While there was some offshoring of component supply, this was not a major point of tension in the district. With the exception of three companies that were part of the Fiat group – which had a strong supply base in the Turin area – around 70 per cent of components purchased by Modenese mechanical engineering firms were purchased from suppliers located within the Emilia-Romagna region. And, what is perhaps more important, Modenese final firms continued to rely heavily on local subcontractors for generating that stream of incremental innovations so central to their global strategies.

In recent years, a particular strength of the Modenese mechanical engineering ID has been its firms’ collective ability to place themselves in a strong intermediate position in global value chains. This means that the products in which the district specializes are sophisticated components sold to other industrial users (above all Germany) and that are in many cases tailor-made to the particular needs of those users. Thus, from the perspective of many Modenese producers, the rapid industrialisation of parts of the low wage world (especially of China) has not just been a threat. It has also created an important new market for Modena’s producers of machine tools, hydraulic equipment, industrial gearboxes, and other goods.19

The birth of the company and the acquisition of the competitive advantage

Wam was set up in 1968 as owner-run company by Vainer Marchesini, at that time a 22-year-old technician who in 1965 had taken a diploma at Modena technical school and then had spent three years by working at Ime, a local concrete batching plant manufacturer.20 In the beginning, Wam worked with only three employees in a garage near Modena as a subcontractor which produced cement screw conveyors for concrete batching plants.21 At that time, the screw conveyor was a typical custom-built product. Every batching plant manufacturer had his own trustworthy locksmith, from whom he ordered the screw conveyors he needed. Every screw conveyor differed from the others in length, diameter, slope, capacity, positioning of the inlet and outlet spouts, and so on. Customers gave Wam a drawing of the screw conveyor that they ordered. Wam in turn outsourced the production of nearly all the screw conveyor’s components to local subcontractors, usually blacksmiths and very small

19 Ibid., 6-9.
20 Archivio della Cancelleria del Tribunale di Modena, Registro delle Imprese, Imprese in vita, n. 8952, Wam Spa.
21 A screw conveyor consists of a helical flight fastened around a pipe or solid shaft, mounted within a tubular or U-shaped trough. As the screw rotates, material heaps up in front of the advancing flight and is pushed through the trough. Particles in the heap next to the flight surface are carried part way up the flight surface, and then flow down on the forward-moving side of the heap. A screw conveyor has an electric motor with an incorporated gear reducer which transmits motion necessary for the functioning of the whole system (see Figure 1).
Figure 1: Cement Screw Conveyor

Source: Wam.
mechanical-engineering firms. Within its own shop Wam carried out only the final phases of the screw conveyor’s manufacturing process: it ground the components that had been shipped by its subcontractors, assembled them and made the final testing of the screw conveyor.22

From 1977 to 1980, Wam undertook a systematic study of the cement screw conveyor, its components and applications. The aim was to find those configurations that could best improve the performance and functionality of the screw conveyor and lay the foundation for standardized production. The result was a re-design and re-engineering of the product, that was now subdivided into modules which could be standardized and combined together in a wide range of ways. As a consequence, product customization was maintained, but at the same time module standardization enabled the company to gain economies of scale and achieve a decisive competitive advantage over the artisans who produced the screw conveyor in a traditional way.23

Besides, Wam designed and constructed most of the production equipment that it needed to manufacture the screw conveyors according to new product design, which at that time was not available on the market. This equipment often consisted of one-off products for the manufacturing of which Wam also heavily relied on local subcontractors.24 Within a few years, the new modular product design was applied to other industries and modified according to their requirements. Thus, after cement came screw conveyors for asphalt industry, lime and plaster works, dehydrated sludge, animal feed and flour mills as well as screw feeders for the chemical, the food and the glass industry. At the same time, other components for batching plants, such as butterfly valves, slide valves and dust (silo venting) filters were added to Wam’s product range.25 Such a strategy enabled the company to realize those economies of scope that come «from opportunities to use existing production, marketing, and research facilities and personnel by developing products for new and more profitable markets».26 The implementation of such a strategy enabled Wam to grow from seven employees in 1973 to 27 in 1978 and to 59 in 1980. In the same year Wam became a joint-stock company named «Wam spa».27

The manufacturing subsidiaries in Italy

In 1978 Wam set up its first subsidiary – named Sp.Eco – to further realize economies of scope. Sp.Eco was localized near Wam’s headquarters and specialized in the production of solid-liquid separation equipment: screen presses, screw compactors, grit classifiers, concrete reclaimers and heavy-duty screw flighting.28 In 1981 Wam was one of the first small-sized firms in Emilia-Romagna to create a R&D laboratory specializing in both pure and applied research concerning powdery and granular materials, as well as

22 Vittorio Caprari (Wam’s Works Manager from 1968 to 1999), Interview (23.11.1999).
24 Stefano Baraldi (Wam’s General Manager), Interview (23.6.2009).
25 Caprari, Interview (23.11.1999).
27 Archivio della Cancelleria del Tribunale di Modena, Registro delle Imprese, Imprese in vita, n. 8952, Wam spa.
28 Michael Grass (Wam’s Communications Manager), Interview (2.11.1999).
the development of bulk solids handling and processing equipment. In the 80s, Wam established another three subsidiaries, all of them localized inside the Modena mechanical-engineering ID: Map (1983) for the manufacturing of industrial mixing equipment; Analysis (1986) specialized in weight control feeders production; and Rotex (1987) that produced rotary valves, loading bellows, flexible helix conveyors and level monitoring equipment.

At the head of these subsidiaries Marchesini appointed some experienced managers who had been working with him at Wam for many years. Each of these individuals was given a minority shareholding in the subsidiary that he managed. At the same time, the parent-company Wam spa retained several functions essential to the subsidiaries’ activity, such as accountancy, personnel sales and purchasing management.29

Since the mid-80s Wam added to this internal growth strategy, characterized by the creation of legally autonomous companies controlled by the Wam spa itself, an external growth strategy, with the acquisition of a few companies specialized in complementary products. The aim was to have access to knowledge and competences relevant to Wam’s growth strategy and to broaden the Wam group’s product range. The first acquisition occurred in 1985, when Wam took over Agritec of Modena, a company specialized in the production of bulk solids discharging equipment.30 In 1998 Wam acquired Oli of Milan, that produced vibrators. In the same year Oli was transferred to Modena next to Wam’s headquarters to exploit synergies with the other companies of the group.31 In 1999 Wam acquired Roncuzzi of Ravenna, a company founded in 1901 which specialized in the manufacturing of bucket elevators and chain and belt conveyors used to handle bulk material in ports. In the same year, another acquisition was Tecno Cm of Modena, a small firm specialized in the production of components in polyurethane, which for a few years had been working as a subcontractor for Wam.32

The conquest of the domestic market’s leadership

In 1981, Wam had established itself as the market leader in Italy for cement screw conveyors with a share of about 40 per cent (Table 1). Wam’s leadership was further strengthened in the following decade and in 1991 its market share had risen to 60 per cent. However, in 2000, it had decreased to 50 per cent, eroded by the competition of some small firms that had been founded by former Wam employees inside the Modena mechanical-engineering ID who had adopted the same modular product design originally developed by Wam. The production volumes of these competitors were much lower than Wam’s (the largest of them produced no more than 300 screw conveyors a year against 10,000 of Wam). Therefore, they could not realize the same scale economies as Wam, but also their overheads were lower. Nevertheless, in 2003 Wam’s market share went up again to 55 per cent.

29 Grass, Interview (11.11.1999).
30 Claudio Sgarbi (Wam’s Administration Manager), Interview (30.3.2000).
31 Verbali del Consiglio di Amministrazione (VCA) (27.3.1998), in: Archivio Wam.
The conquest of the domestic market leadership for dust filters was slower but more linear. If we look at round dust filters (silo venting filters) – Wam’s main product line in this sector – we observe that Wam’s market share in Italy grew gradually from 20 per cent in 1981 to 40 per cent in 1991, 50 per cent in 2000, and 60 per cent in 2003. In addition to screw conveyors and dust filters, which were the company’s more important products,33 Wam became the market leader in Italy also for other components of batching plants, such as butterfly and slide valves, mixers and vibrators, and screw conveyors for other industries, such as chemicals, food, glass and plaster works as well as the treatment of dehydrated sludge.34

The establishment of commercial subsidiaries abroad

The expansion on the domestic market was complemented, in 1977, by the first sales abroad, directed at France and West Germany.35 Since then, exports have grown rapidly and to an increasing number of countries. Exports rose from 31 per cent of the company’s turnover in 1981 to 52 per cent in 1990 and to 63 per cent in 1998.36 In the mid-80s Wam decided to establish commercial subsidiaries in those foreign countries

33 In 1999 screw conveyors accounted for 40% of Wam’s turnover, dust filters for 20%, and the rest of the product range for the remaining 40%. See Vendite in quantità e valore negli ultimi due esercizi ed in quello in corso (2000), in: Archivio Wam.

34 Ibid. Valves are the product that Wam manufactures in larger volume, i.e., 40-50,000 a year.

35 Grass, Interview (2.11.1999).

whose markets were large or promising enough to justify such an investment. The aim of this strategy was to further explore those markets, acquire a finer knowledge of their potential, build stronger ties with local actors and provide customers with faster post-sale assistance. The first foreign subsidiary was Wam France, that was set up in 1984. Then other commercial subsidiaries followed in Germany (1986), UK (1987), USA (1987), Singapore (1989), Denmark (1992), Japan (1994), Belgium (1995), Australia (1996), Thailand (1996), India (1998), Brazil (1999), Holland (1999), Switzerland (1999), Finland (2001), Chile (2003), Korea (2003) and Spain (2003).37

This strategy enabled Wam to rapidly expand its sales in the European market, where it became the leader for both cement screw conveyors and round dust filters (in this latter case with the exception of the UK). As we have seen, both of these products were components for batching plants and shared some overlapping and related technologies as they treated the same materials.

As it is shown in Table 1, in 2000 Wam had a market share for screw conveyors of 70 per cent in France and Germany and 60 per cent in the UK, whilst the corresponding figures for round dust filters were 50 per cent in France, 20 per cent in Germany and ten per cent in the UK. The circumstance that market shares for screw conveyors were higher than those for dust filters was due to two principal reasons: on the one hand, Wam started later to invest substantially in the expansion of dust filter production, which occurred only in the late 80s, after the Černobyl nuclear disaster in 1986 had prompted greater attention to environmental problems; on the other hand, to the different nature of competition in the two sectors.

In fact, competition for screw conveyors was somewhat less tight, being constituted – both in Italy and abroad – by a multitude of very small firms whose technological and commercial capabilities were much inferior to Wam’s. On the contrary, the world market for dust filters was characterized by stiffer oligopolistic competition. Here Wam faced a limited number of competitors, some of which were larger in size and had a strong commercial organization: Dce and Airmaster (UK), Infa-Staub and Ts (Germany), Fda (France), Griffin and Flex-Clean (USA). Some products of these competitors were technologically superior to Wam’s, whose main competitive edge was constituted by lower production costs (and prices).38 As we have seen, since 1987 Wam had also been setting up commercial subsidiaries in a number of extra-European countries. However, in contrast to what had happened in Europe, that move turned out to be largely ineffective in penetrating those markets.

In the 80s and 90s the largest extra-European markets for bulk material handling and dust filtration machinery were the USA and Japan. Wam opened a commercial subsidiary in the USA in 1987. However, at that time «nobody wanted our screw conveyors, even if we had gifted them. This was due to the fact that no American batching plant manufacturer was prepared to wait eight weeks for the delivery of a screw conveyor: the time it would take to manufacture it in Italy and transport it by sea to the USA».39

38 William Fantini (Wam’s General Manager), Interview (26.4.2000).
39 Vainer Marchesini (Wam’s Chairman and Ceo), Fare impresa in Italia, Stati Uniti e Cina, presentation given at the Faculty of Economics, University of Modena and Reggio Emilia (2.12.2003).
Besides, high transport costs made Wam screw conveyors uncompetitive in terms of price in the American market.\textsuperscript{40} Thus, Wam USA’s activity was limited to the commercialization of small quantities of filters (whose transport costs could be reduced by shipping these products semi-assembled), valves and other fittings for batching plants.\textsuperscript{41}

Also Wam Japan (founded in 1994) focused on the commercialization of the two products that had lower transport cost: dust filters and valves. The selling of screw conveyors manufactured in Italy was not attempted either, for the same reasons as in the USA. The penetration of the Japanese market was nonetheless extremely difficult even for dust filters and valves. In fact, Wam’s market shares have always been very low: no more than three per cent for filters and no more than eight per cent for valves. Wam products were more cost-effective, but their quality was lower than that of the Japanese products. And this amounted to a big competitive disadvantage as Japan was the most demanding market in the world for quality. Moreover, Wam’s penetration in Japan was also hindered by cultural barriers and by the structure of the Japanese mechanical-engineering industry: «the Japanese market is very closed: many of our potential clients speak only Japanese and are constituted by companies linked or belonging to the large keiretsu operating in that country, to which also our Japanese competitors are tied».\textsuperscript{42}

The establishment of manufacturing subsidiaries abroad

Sales in extra-European countries soared only after Wam could establish its own production facilities there. The first step in this respect took place in 1995 with the setting-up of Shanghai Wam – Wam’s subsidiary in the People’s Republic of China – that, differently from the company’s other foreign subsidiaries, operated since inception as a manufacturing unit. Such a choice was to some extent imposed by the Chinese authorities who were not interested in acquiring goods but rather know-how and saw in this solution the way to have access to Wam’s technology.\textsuperscript{43}

In the beginning, the idea was to produce fabricated components and machined parts in China to be assembled at the Wam plant in Italy. Shanghai Wam was set up as a joint-venture with a Chinese partner. Wam spa from Italy provided the production equipment and trained the Chinese personnel. Production started in 1996 and in January 1997 Shanghai Wam shipped its first components to the Wam factory in Italy. In March 1998 Wam spa took full control of Shanghai Wam.\textsuperscript{44} Since then the main goal assigned to Shanghai Wam was changed too. Shanghai Wam had now to operate not only as a subcontractor for Wam spa in Italy, but also and foremost as a producer of finished goods – especially cement screw conveyors and round dust filters – for the Chinese market that in the 90s started to grow very fast.\textsuperscript{45} Thus, in 1999 Shanghai Wam manufactured the first dust filters for the Chinese market, which were followed

\begin{itemize}
\item \textsuperscript{40} The screw conveyor is a product which is very difficult to ship: it is very cumbersome and its handling and transport costs are very high.
\item \textsuperscript{41} Grass, Interview (16.11.1999).
\item \textsuperscript{42} Fantini, Interview (30.4.2004).
\item \textsuperscript{43} Grass, Interview (16.11.1999).
\item \textsuperscript{44} VCA (25.3.1998), in: Archivio Wam.
\item \textsuperscript{45} Grass, Interview (30.4.2004).
\end{itemize}
one year later by the first cement screw conveyors. By 2003 Wam had become the market leader in China for both products, with a share of 40 per cent for cement screw conveyors and 20 per cent for dust filters (see Table 1).

In 1999 Wam set up another two joint-ventures in China. The first one was established by the subsidiary Sp.Eco for the production of water screw pumps and screw compactors for the wastewater sludge purification plant of the Chinese city of Chengdu. The second one was instead established by Wam’s other subsidiary Oli in Shangyu for the production of components for vibrators. In this case the aim was offshoring: vibrators were a standardized product and Wam realized it was more profitable to resort to this newly-created joint-venture in China for the provision, at a much lower cost than in Italy, of most of their components (amounting to about 80 per cent of the value of the finished product) while the final assembly was maintained in Italy.46

In 1995 Wam’s subsidiary in the United States also started a manufacturing activity by installing an assembly line for dust filters, with semi-assembled components being shipped from Italy. In 1998 Wam USA moved from its original location in Gainesville, FL, into new and larger premises in Lawrenceville, GA. Here the company constructed a new factory with warehouse facilities which produced screw conveyors and dust filters for the American market.47 In 2002 Wam opened a second manufacturing unit in the United States, located in Fort Worth, TX. Since then, the Lawrenceville plant has specialized in the production of screw conveyors and dust filters made to the European Union standard, demand for which was also growing very fast in the United States. Conversely, the Fort Worth plant produced screw conveyors to the traditional North-American standard established by Cema (Conveyor Equipment Manufacturers Association).48

The implementation of the Cema standard, which dated back to the 30s, had made screw conveyors a commodity in the USA. As a consequence, the domestic market was dominated by a number of North-American large scale producers which were much bigger than Wam. Thus, Wam immediately realized it had no chance to compete with these companies in the market of standardized Cema screw conveyors. Therefore – and in contrast with the strategy pursued in Italy and elsewhere in the world – Wam decided to specialize its Fort Worth plant in the design and manufacture of custom-made screw conveyors, thereby carving out a niche in the Cema market.49

Undertaking production in situ enabled Wam to soon become the leader in the United States for the pre-cast segment of the cement screw conveyor market with a 40 per cent share in 2003.50 Wam established its own presence also in the US market for dust filters, with a share that in the same year amounted to ten per cent (Table 1).

In 2002 Wam set up a manufacturing subsidiary in Romania specialized in the supply of heavy-duty fabricated components, and mechanical and engineered polymer compo-

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46 Ibid.
47 Grass, Interview (16.11.1999).
48 Marchesini, Fare impresa (cf. n. 39).
49 Grass, Interview (5.6.2009).
50 Most Cema standard screw conveyors in the USA are manufactured for agriculture, a sector in which Wam does not operate and in which the market leader is the Martin Company, whose production is 70% standardized and 30% custom-made. In the USA Wam produces almost exclusively cement screw conveyors and, among these, screw conveyors for precast concrete batching plants, to which the market share reported in the text is referred (ibid.).
nents to the Modena assembly plants. In addition, dust filters, bag openers and mixers for the Romanian market were added to the product range. In 2003 Wam established a manufacturing subsidiary also in Croatia, which produced bolted silos, an alternative product with respect to traditional welded silos. The goal was to supply the world market by relying on the Wam group’s commercial organization.

The introduction of automation at Wam plant in Italy

In the 90s, Wam’s production rose from about 5,500 to 10,000 screw conveyors and from 2,000 to 6,000 filters. An important part in making possible such an increase in production was played by the investments the company carried out in the automation of the Modena plant. The advent of automation in turn prompted a further increase in the company’s level of vertical integration. At the end of the 80s Wam resorted to outsourcing for machined parts and metal sheet fabricated components, while tubular bodywork manufacturing had been brought in house since the late 70s. At the beginning of the 90s, the availability of new automated punching machines for metal sheet cutting pushed Wam to transfer this phase of the production process in-house. A new production department was created for it — named «fabrication department» — and placed upstream of the production cycle. As a result, in-house production capacity was increased with the realization of economies of scale that enabled the company to achieve lower production costs.

Thus, in 1990 Wam acquired a combined plasma cutting and punching machine, while a numerically controlled punching machine was purchased in 1992. In the three following years another three automatic machines were installed in the metal fabricating department: a welding robot, a numerically controlled folding machine and a laser cutting machine. Between 1997 and 2000 another two laser cutting machines, two numerically controlled folding machines and three spinning lathes for cold forming of metal sheets were added. The introduction of automatic machinery and the ensuing production increase in the fabrication department pushed Wam to expand also the production capacity of the downstream departments: pipe and spout cutting and welding, painting, and assembly. Thus, in 1994 a robot for plasma cutting and welding of screw conveyors was installed in the welding department, which was followed in 1995 by a numerically controlled grooving machine for inlet and outlet spouts. Another two robots for plasma cutting and welding of screw conveyors were added between 1998 and 2000.

The introduction of robots in the welding department was a troublesome event because at that time there were no robots available on the market that were designed to

51 Marchesini, Interview (26.10.2004).
52 Grass, Interview (30.4.2004).
53 Fantini, Interview (30.4.2004).
54 As a Wam manager remembers, «the subcontracting artisan firms we relied on were too small to afford the investments necessary to introduce these new automatic machines. Therefore, we decided to transfer this process-

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cut and weld screw conveyors. Thus, «we searched among 6–7 robot distributors and saw which robot could best suit our needs. We eventually chose a Motoman robot. Three of our staff went to their distributor in Modena to attend a training course to learn how to programme and use this robot. At the same time, we brought with us some pieces of screw conveyors that were used to develop a dedicated software to make that robot actually cut and weld screw conveyors. That software was developed by them according to the needs expressed by Wam. As our robots can cut and weld pipes of five different diameters they are much more flexible than those used, for example, in the welding of the body of the cars in the auto industry».

In 2000 Wam introduced also a painting robot, while the final assembly still remained a very labor intensive task. However, this was speeded up by the fact that for every component a computer releases all the documents necessary for production management. Moreover, a small machining department was created in 2001 after Wam took over the Lgm Company, one of its major suppliers of mechanical components within the Modena ID. The advent of automation was accompanied by an increased attention to quality standards. As a result, in 1994 Wam spa received the Uni-En-Iso 9001 quality certification for the procedures adopted internally.

The introduction of ICT

By the end of the 90s, the most sophisticated application of ICT at Wam was represented by the configurator: a software capable of configuring a product (screw conveyors, valves, filters, and others) by following the user's answers to a succession of questions put by the computer. The first configurators appeared on the market in the 70s to serve the demand of very large customers. Between the late 80s and early 90s Wam also tried to introduce a configurator. However, that project failed. That failure was due to the fact that Wam developed software in which the drawing configurator was hard-wired within a programming language. This architecture required a dedicated program for each of the products included in the company’s sales catalogue. However, such a solution could not meet the needs and the capabilities of Wam, which at that time was a small firm with a very diversified product range.

Thus, that project was soon abandoned and after a few years Wam began to look for a different solution. To that end, in the mid-90s Wam started a collaboration with a software house in the neighbouring town of Reggio Emilia and with Democenter, one of the real service centres set up by the regional government of Emilia-Romagna.

58 Ibid.
59 Ibid.
60 VCA, 2.10.2001, in: Archivio Wam. Since the late 70s Lgm had been an exclusive supplier of Wam and over the course of time had become Wam’s main supplier of lathed components. Its acquisition was part of Wam’s strategy to bring in-house and off-shore to its Chinese subsidiary the manufacturing of standardized machined components. In fact, after the takeover most of Lgm’s tooling machines where transferred to Shanghai Wam. See Grass, Interview (23.6.2009).
61 Stefania Medici, Manuale assicurazione qualità, 1995, 1, in: Archivio WAM.
62 The setting-up of real service centres was, in the 80s and 90s, the major industrial policy action of the Emilia-Romagna region. The provision of real services involved offering companies the services they needed, rather than financial incentives, to prompt innova-
This collaboration led in a few years to the development of a new configurator targeted at Wam’s needs. The major novelty was that this new software functioned within an operating system which did not need to be re-programmed for every product that had to be configured. Thus, the company’s engineering staff could easily insert in the configurator the specifications of all products included in the sales catalogue which constituted the database that had to be used by the commercial department in the management of the orders received. This platform could be installed on a personal computer and enabled its user to configure nearly all Wam products and accessories without the need to write an ad hoc programme for each of them.63

R&D and innovation

As we have seen, in 1981 Wam was one of the first mechanical-engineering companies in Emilia-Romagna to set up an R&D laboratory. Since then, Wam has invested on average two per cent of its annual turnover in R&D. The company developed both pure and applied research and participated at a number of international research programmes funded by the European Union.64 At the beginning of the 21st century Wam’s R&D laboratory had a staff of about ten people. Research concerned in particular:

1. The behaviour of granular materials when being conveyed or mixed;
2. The interaction of bulk solids with container and conveyor casing materials;
3. Innovative construction materials for the manufacture of equipment components for screw conveyors, dust filters, industrial mixers, flow intercepting valves, and others.
4. New technologies and production processes for the manufacture of screw conveyors, dust filters, industrial mixers, flow intercepting valves, and others.65

At that time, the most innovative and promising R&D field concerned the use of polyurethanes for the manufacturing of some components of the screw conveyors (above all special helical flights) and of the cartridges of dust filters.66

Over the course of time, the activities of the R&D laboratory led to the registration of numerous patents. The first patent was registered in 1977. From then to 2003 Wam
was granted about one hundred patents, in connection with about 50 inventions. Apart from Italy, Wam patents were extended to a wide number of countries, including the USA, Germany, France, UK, Japan, China and Brazil.67

Wam Inc. (USA) at the beginning of the 21st century

Wam’s manufacturing plants abroad were designed by a special unit of the company’s headquarters in Italy. As a result, the lay-out of these factories resembled that of the Wam plant in Modena, even though there were some differences concerning the levels of vertical integration and the type of machinery installed. In fact, the factories abroad were largely equipped with the machinery that had been dismantled from the Modena plant to make room for the new computer-aided machines in the 90s.68 This section examines the Lawrenceville plant (the older of the two North American plants) in 2003. In the Lawrenceville plant, differently from Modena, there was neither a machining department (since electric motors and gear reducers had to comply with the US Nema standards and were purchased from North American suppliers), nor a fabrication department (since metal sheet cutting, folding, and welding were also outsourced to North American subcontractors).

The production cycle in Lawrenceville started with the cutting and welding of the pipe, which were carried out with a plasma MIG system which was used in the Modena plant before robot installation. Moreover, in the welding department there were some positioners that assured pipe alignment with the end bearing supports which were of the same type as those used in Modena.

Once the inlet and outlet spouts were welded to the pipe, the product was sandblasted and painted. Differently from the Modena plant, painting in Lawrenceville was not robot-aided, but carried out by the operator using a paint spray gun.

Then the screw conveyor moved to the final assembly. Also in this department there was a difference with respect to Modena. In fact, in Modena the body of the screw conveyor was hung to a chain conveyor and the components were assembled to it as this moved forward. Instead, in Lawrenceville the body of the screw conveyor was placed on a trolley which was pushed forward directly by the operators once the components had been installed. Such a system lengthens by about one quarter the time needed to assemble a screw conveyor but it is more flexible and therefore more apt to the needs of the Lawrenceville plant where production volumes were much lower than in Modena. Lastly, in Lawrenceville there was also a department for dust filter production, which mostly assembled components that were outsourced to North American subcontractors. In this department there was also a plasma punching machine, which produced a part of the metal sheet panels for the body of the filters, while the remaining panels were purchased by local suppliers.69

The organization of the Forth Worth plant was similar to the Lawrenceville one. Thus, there were no computer-aided machines in Wam’s North-American plants and, more generally, production equipment was less sophisticated than in the Modena plant.

68 Marchesini, Interview (26.10.2004).
69 Maurizio Magnoni (Wam’s technician), Interview (4.8.2004).

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Such a circumstance was due to the production runs of the two US plants, which were too small to make an investment in costly and sophisticated computer-aided production equipment profitable. In fact, in 2003 the Lawrenceville plant had a covered surface of 4,000 square meters and 18 employees, while the Fort Worth plant had a covered surface of 8,400 square meters and 26 employees. Their overall production was only about 1,000 screw conveyors and 1,500 filters. Conversely, in the same year the Modena plant had a covered surface of 70,000 square meters, more than 300 employees and produced about 10,000 screw conveyors and 8,000 filters to serve Europe, Northern Africa and the Middle East.\(^70\)

Wam’s headquarters in Modena provided technical support for the optimization of the organization of the production cycle in the two North American plants, as well as for the development of products and production equipment tailored to the needs of the US market.\(^71\) As we have seen, by 2003 Wam had succeeded to become the market leader for screw conveyors for precast concrete batching plants in the United States with a share of 40 per cent and also held a ten per cent market share for round dust filters. This achievement was the result of a fully fledged strategy aimed at capturing the US market. In fact, to be present in the United States with its own production facilities would not have been sufficient for Wam to penetrate that market since American customers pay great attention not only to product quality, quality-price ratio and delivery time, but also to service and post-sale assistance and to product image.

Thus, a marketing strategy was needed too. In this respect, Wam USA decided first of all not to appear as the local branch of a foreign parent-company but as an American company. For that reason in the year 2000 Wam’s subsidiary in the United States was renamed Wam Inc. and applied for membership of Cema.\(^72\) Besides, to promote its products Wam Inc. started to regularly participate at the four main trade fairs in the building and construction industry in the United States, held respectively in Atlanta, Chicago, Las Vegas and Orlando. The technical department and communication centre of Wam’s headquarters in Italy backed up the sales and marketing department of Wam Inc. in the preparation and management of Wam’s showcases at these events.

But, above all, to capture the North-American market Wam created, around its two manufacturing plants of Lawrenceville and Fort Worth, a ramified network of agents and representatives which assured quick post-sale assistance and spare parts delivery throughout the immense territory of that continent. By 2003 such an assistance network numbered 45 service points in the United States and eight service points in Canada.\(^73\)

Shanghai Wam at the beginning of the 21st century

In 2003, the lay-out of the Shanghai Wam’s plant also resembled those of the Modena and the US plants, even if some major differences existed. In Shanghai, differently from both Modena and Lawrenceville, upstream there was a large machining department. This

\(^{70}\) Marchesini, *Fare impresa* (cf. n. 39); Fantini, Interview (30.4.2004).
\(^{71}\) Magnoni, Interview (4.8.2004).
\(^{72}\) Grass, Interview (30.4.2004). After the opening, in 2002, of the Fort Worth plant, the Lawrenceville establishment was named «Wam Inc. Georgia Division» and the Fort Worth one «Wam Inc. Texas Division».
\(^{73}\) Marchesini, *Fare impresa* (cf. n. 39).
had existed since 1995, but it was enlarged in 2001 after Wam took over the Lgm Company, one of its major suppliers of mechanical components within the Modena ID in Italy. After the takeover, most of the Lgm Company’s tooling machines (numerically controlled lathes, mills, drills, and small machining centres) were transferred to the Shanghai Wam’s plant, while the remainder was transferred to the Wam spa’s plant in Modena where a small machining department was established. Thus, custom-built or short-run machined components – for prototypes and products that were manufactured in small batches – were produced in-house in Modena or outsourced to subcontractors within the Modena ID, while long-run components were produced in the machining department of the Shanghai plant, which purchased castings directly from Chinese foundries.

In the Shanghai plant, next to the machining department there was a department where machined components were sub-assembled to make gear reducers, supports and end bearings. These products were partly shipped to Italy and partly assembled in loco into the screw conveyors for the Chinese market. Then, there was the section of the Shanghai plant where the tubular bodywork of the screw conveyor was manufactured. Here, similarly to Lawrenceville but differently from Modena, there was not a fabrication department for metal sheet cutting, folding and welding. The production cycle started with the cutting and welding of pipes and spouts. There was also a department where spirals were folded and welded as well as departments for the painting and final assembly of the screw conveyors, whose technology was similar to that in Lawrenceville.

Lastly, in Shanghai there was a dust filters department, which, differently from the analogous departments in Modena and Lawrenceville, was devoted exclusively to assembly since all metal sheet panels for the body of the filters were purchased from Chinese subcontractors. In 2003 the Shanghai plant had a covered surface of 10,000 square meters and 165 employees who worked on three shifts. In that year production amounted to about 2,000 screw conveyors and as many dust filters. Wages were about ten times lower than in Italy and therefore it was not surprising that the production technology was more labour-intensive than in Modena.

However, this implied that the performance of Shanghai Wam relied perhaps even more on the human factor. Therefore the company paid particular attention to employee training, which took place partly in Modena and partly in China. Great care was devoted to improve the quality of the procedures adopted within the company. In this respect, Shanghai Wam started introducing the Uni-En-Iso 9000:2000 quality system in 2003. To achieve this goal, at the end of 2003 the company launched the «Continuous improvement programmes» in which all employees were encouraged to participate. Within this framework, four «Continuous improvement project teams» were established:
1. «Warehouse control team», to decrease stock volume and speed up stock rotation and reduce cost;
2. «Screw conveyor quality improvement team», to decrease the screw conveyor’s rework and defect rate during the production process;

74 Magnoni, Interview (4.8.2004).
75 On the contrary, work on three shifts was prohibited by both Italian and US legislation.
76 Fantini, Interview (30.4.2004).
77 Marchesini, Fare impresa (cf. n. 39).
78 Grass, Interview (30.4.2004).
3. «Training system upgrade team», to optimize company training system and to obtain an average of 30 hours’ employee training per year;
4. «Vf6-100-Tn valve quality improvement team», to improve the quality of valves and customer satisfaction on this specific item.

Besides, all employees were encouraged to set up quality control teams spontaneously. Monetary and spiritual awards were given for quality control team achievements, e.g. bonuses and wage increases, public praise and «employee of the year» nominations.80

Furthermore, to encourage employees to apply their wisdom and potential, Shanghai Wam enacted the «Innovation award» policy: ten per cent of the cost saved or profits made out of the said innovation within one year after the innovation was proved and adopted would be awarded to the innovator, and administrative praise would be recorded in the employee’s file.81 To achieve leadership in the Chinese market, Shanghai Wam also invested in its sales and marketing organization. To upgrade the professionalism of the sales force the company organized several training courses for its sales staff in cooperation with Cegos, the largest enterprise management consulting company in Europe.82

To promote its products Shanghai Wam started in 2002 to participate on a regular basis at the «International Powder/Bulk Conference & Exhibition» held in Shanghai, the most influential event in this sector in China. The technical department and communication centre of Wam’s headquarters in Italy backed up Shanghai Wam to prepare and manage its showcase at this trade fair.83 Besides, to better serve the regions of China away from Shanghai, in 2003 the company opened up sales offices in Chengdu, Guangzhou and Beijing.84

The Wam group structure

In the beginning, when the first subsidiaries were set up, the manufacturing company Wam spa functioned as the de facto parent-company that held a majority share-holding in all the other affiliates of the group. However, in 1998 a reorganization of the group was needed to financially control the increasing number of affiliates. A holding company – called Wmh Holding and then renamed Wamgroup srl in 2003 – was created to exert control over the entire group. Apart from issuing the group’s consolidated balance reports, the new holding company provided the group with a number of services, such as global cash management to optimize cash flow and the group’s treasury, financial auditing, global schemes for the selection and training of personnel, and global marketing.85

At the end of 2003 the Wam group consisted of 33 companies: six Italian manufacturing companies, 19 foreign manufacturing companies, 7 foreign trading companies,
Figure 2. Wam group development since 1968

Source: Wam.
one Italian real estate company, one Italian service company, and one holding company (see Figure 2 for the evolution of the Wam group’s affiliates over time). At that time, the Wam group’s product range had risen to about 150 items, of which only a few (cement screw conveyors, round dust filters, slide and butterfly valves, vibrators) were produced in large batches, while all the others were produced in small batches or even tailor-made.\(^{86}\) The original company Wam spa was the group’s largest manufacturing company, which was principally devoted to the manufacturing of large batch products for the European market. Besides, Wam spa had a R&D laboratory which served the whole Wam group and developed new production equipment for the whole Wam group. Conversely, the other Italian manufacturing companies – all of them located within the Modena mechanical engineering ID – produced custom-built or small batch products for the world market. The foreign trading companies served their respective countries or geographical areas with the Wam group’s whole product range.

The two largest foreign manufacturing companies (that were also trading companies) operated in the two largest extra-European economies which could not be served through exports from Italy: the United States and China. Thus, Wam’s internationalization strategy was fundamentally aimed at transplanting to those countries the know-how and business model for the manufacturing and commercialization of the large-batch items of its product range that it had originally developed in Italy and Europe with the aim to capture those extra-European markets. Offshoring, although present, was only of secondary importance in Wam’s internationalization and coupled with an increase – and not a cut – in investment and employment in Italy.

It is worth observing that, by going abroad, Wam did not simply finance a number of affiliates in some foreign countries, but transferred over borders an entire business package that included products, processes, experience, reputation, knowledge of where and how to find financing, marketing know-how and networks, trade marks, technology, R&D background, information, and managerial expertise. Moreover, the establishment of foreign affiliates triggered some spill-over effects in the host countries. These included the development of supplier and dealer networks that were not internalized within the Wam group, as well as the training of employees who left the Wam group to go to other firms, thus disseminating skills. A spill-over effect occurred also as domestic businesses in the host countries saw possibilities to imitate the Wam products.\(^{87}\)

Thus, the adoption of a group structure turned out to be an effective solution that enabled Wam to couple the flexibility characteristic of district small and medium-sized firms with the need to achieve critical mass for certain functions shared at the corporate level. As to corporate governance, the Wam group – similarly to most Italian district lead firms and pocket multinationals\(^{88}\) – is still firmly under the control of the founder and his family. The founder directly manages all the strategic activities of the group, with only a small degree of decentralization in the decision-making process to professional managers strictly linked to him and his family.

\(^{86}\) Large batch products accounted for about 60% of the Wam group’s turnover, while small batch and custom-made products accounted for the remaining 40%. Data provided by Wam’s general manager, Stefano Baraldi (30.10.2009).

\(^{87}\) On the effects of the coming of a multinational on the host country’s economy, see Mira Wilkins, *Comparative Hosts*, in: *Business History* 1 (1994), 18-30.

\(^{88}\) Colli, *Pocket Multinationals* (cf. n. 11); id., *The History of Family Business* (cf. n. 11).
Some balance-sheet indexes of Wam performance

Balance sheets of the Wam spa (the Wam group’s oldest and largest company) are available since 1981, while the Wam group’s consolidated balance sheets are available only since 1997. Table 2 reports the number of employees for both the Wam spa and the whole Wam group. Conversely, Tables 3 and 4 report some selected balance-sheet indexes for, respectively, the Wam spa and the Wam group. Because in 1981 Wam spa accounted for nearly all employees, turnover and assets of the Wam group, we can take the former as a proxy for the latter in that year. Thus, we can observe that from 1981 to 2003 employees in the Wam group rose by 14 times (from 68 to 967 employees), while turnover increased, in real terms, by seven times (from 14 to 178 mio. Euro). The faster growth of employment as compared with turnover was principally due to an augmentation of the Wam group’s level of vertical integration.

The two profitability indexes (Roe and Roi) show some differences. Roi oscillates around ten per cent over the whole period considered. The lowest value (5.8 per cent) was observed in 1993, when an international recession occurred, but only three years after it reached the apical value of 14 per cent. The drop in 2003 was mainly a consequence of the revaluation of the euro occurred in that year. In fact, this had the consequence of reducing Wam’s profitability as the company decided not increase its sale prices outside the euro zone in order not to lose market shares, despite factors of production which were purchased mainly in Italy and therefore paid in euro.89

Table 2: Employees at Wam

<table>
<thead>
<tr>
<th>Year</th>
<th>Wam spa</th>
<th>Wam group</th>
<th>Year</th>
<th>Wam spa</th>
<th>Wam group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1968</td>
<td>3</td>
<td>-</td>
<td>1991</td>
<td>120</td>
<td>-</td>
</tr>
<tr>
<td>1973</td>
<td>7</td>
<td>-</td>
<td>1992</td>
<td>137</td>
<td>-</td>
</tr>
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<td>1978</td>
<td>27</td>
<td>-</td>
<td>1993</td>
<td>135</td>
<td>-</td>
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<tr>
<td>1980</td>
<td>59</td>
<td>-</td>
<td>1994</td>
<td>166</td>
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<td>68</td>
<td>-</td>
<td>1995</td>
<td>179</td>
<td>-</td>
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<td>1982</td>
<td>66</td>
<td>-</td>
<td>1996</td>
<td>210</td>
<td>-</td>
</tr>
<tr>
<td>1983</td>
<td>69</td>
<td>-</td>
<td>1997</td>
<td>220</td>
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<td>1984</td>
<td>72</td>
<td>-</td>
<td>1998</td>
<td>224</td>
<td>343</td>
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<td>1985</td>
<td>70</td>
<td>-</td>
<td>1999</td>
<td>218</td>
<td>444</td>
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<td>1986</td>
<td>76</td>
<td>-</td>
<td>2000</td>
<td>257</td>
<td>558</td>
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<td>1987</td>
<td>87</td>
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<td>2001</td>
<td>282</td>
<td>552</td>
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<td>1988</td>
<td>82</td>
<td>-</td>
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<tr>
<td>1989</td>
<td>104</td>
<td>-</td>
<td>2003</td>
<td>332</td>
<td>967</td>
</tr>
<tr>
<td>1990</td>
<td>108</td>
<td>-</td>
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</tbody>
</table>


Roe shows wider oscillations than Roi. In particular, between 1982 and 1988 it exhibited very low values, never higher than two per cent. As it is known, Roe reflects the result not only of a company’s production management but also of its financial management. The low value of Roe throughout most of the 80s was a consequence of Wam’s heavy reliance on borrowed capital (see column 3 in Table 4) at a time when interest rates in Italy were very high, with the result that the satisfactory result from production management was eroded by financial expenses, whose weight on total turnover in the early 80s was above ten per cent. In the mid-90s Roe jumped to about 25 per cent for

Table 3: Wam spa’s selected balance sheet indexes

<table>
<thead>
<tr>
<th>Year</th>
<th>Turnover (1)</th>
<th>Roe (2)</th>
<th>Roi (3)</th>
<th>Debt/equità Ratio (4)</th>
<th>Financial expenses/Turnover (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>13,917</td>
<td>8.2</td>
<td>13.7</td>
<td>3.9</td>
<td>10.7</td>
</tr>
<tr>
<td>1982</td>
<td>12,717</td>
<td>2.0</td>
<td>12.4</td>
<td>3.5</td>
<td>12.1</td>
</tr>
<tr>
<td>1983</td>
<td>10,781</td>
<td>1.3</td>
<td>10.1</td>
<td>4.3</td>
<td>12.1</td>
</tr>
<tr>
<td>1984</td>
<td>9,943</td>
<td>1.5</td>
<td>9.1</td>
<td>4.4</td>
<td>10.6</td>
</tr>
<tr>
<td>1985</td>
<td>10,540</td>
<td>1.7</td>
<td>13.9</td>
<td>4.4</td>
<td>9.9</td>
</tr>
<tr>
<td>1986</td>
<td>11,398</td>
<td>1.2</td>
<td>10.8</td>
<td>5.0</td>
<td>7.0</td>
</tr>
<tr>
<td>1987</td>
<td>12,423</td>
<td>0.9</td>
<td>9.8</td>
<td>5.1</td>
<td>8.9</td>
</tr>
<tr>
<td>1988</td>
<td>15,077</td>
<td>0.2</td>
<td>10.0</td>
<td>7.6</td>
<td>7.6</td>
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<td>1989</td>
<td>20,041</td>
<td>11.5</td>
<td>9.7</td>
<td>7.7</td>
<td>6.7</td>
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<td>15.6</td>
<td>12.1</td>
<td>6.2</td>
<td>6.7</td>
</tr>
<tr>
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<td>18,424</td>
<td>7.2</td>
<td>10.9</td>
<td>4.5</td>
<td>6.2</td>
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<tr>
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<td>21,335</td>
<td>1.7</td>
<td>11.4</td>
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<td>5.8</td>
</tr>
<tr>
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<td>6.7</td>
</tr>
<tr>
<td>1994</td>
<td>23,141</td>
<td>27.4</td>
<td>8.3</td>
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<td>4.6</td>
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</tr>
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<td>15.3</td>
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</tr>
<tr>
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<td>52,374</td>
<td>11.6</td>
<td>13.4</td>
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</tr>
<tr>
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<td>51,292</td>
<td>11.6</td>
<td>6.3</td>
<td>3.0</td>
<td>2.3</td>
</tr>
</tbody>
</table>

(1) Thousands of euro (2003) (2) Net profit/capital owned × 100
(3) Operating profit/invested capital × 100 (4) Invested capital/shareholder’s equity
both the Wam spa and the Wam group as a whole, in conjunction with a reduction in interest rates and a still strong reliance on borrowed capital (which, as it is know, enhances the return on owned capital). However, since 1998 Roe showed lower values (even if always higher than ten per cent) because the Wam group’s debt to equity ratio also decreased.

The relations of Wam with the Modena mechanical engineering ID

Wam’s growth was undoubtedly favoured by the fact that the company was located inside an ID. The training of the company’s founder followed a path common to a whole generation of Modenese mechanical-engineering entrepreneurs. In fact, his training was characterized by an intermingling of formal skills learnt at the city’s technical school and of practical skills learnt on the job at Ime, and by a nurturing of technical and market competences concerning Ime’s business relationships which were favoured by the fact that this company operated inside an ID.  

Moreover, since its foundation Wam built a dense web of relationships with several firms inside the Modena mechanical-engineering ID. We have seen that in the beginning Wam was little more than an assembler which outsourced nearly all the components of its screw conveyors. Since the late 70s, with the development of the new modular product design, Wam brought in-house most of the tubular bodywork manufacturing process. Nonetheless, Wam still relied to a large extent on local subcontractors. In fact, the screw conveyor is an artefact whose production requires both metal fabricating and machining operations. Wam specialized in the execution of a part of the former: cutting of pipe; openings for inlet and outlet spouts, as well as for inspection

Table 4: Wam group’s selected balance sheet indexes

<table>
<thead>
<tr>
<th>Year</th>
<th>Turnover (1)</th>
<th>Roe (2)</th>
<th>Roi (3)</th>
<th>Debt/equity Ratio (4)</th>
<th>Financial expenses/Turnover (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>58,869</td>
<td>25.4</td>
<td>10.4</td>
<td>6.0</td>
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<tr>
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<td>21.3</td>
<td>10.1</td>
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<td>3.8</td>
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<tr>
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<td>22.8</td>
<td>10.8</td>
<td>4.0</td>
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<td>16.2</td>
<td>7.7</td>
<td>3.9</td>
<td>1.9</td>
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<tr>
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<td>10.7</td>
<td>3.7</td>
<td>2.3</td>
</tr>
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<td>8.5</td>
<td>3.6</td>
<td>3.1</td>
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<tr>
<td>2003</td>
<td>96,906</td>
<td>11.3</td>
<td>5.2</td>
<td>3.2</td>
<td>3.2</td>
</tr>
</tbody>
</table>


(1) Thousands of euro (2003) (2) Net profit/capital owned × 100 (3) Operating profit/invested capital × 100 (4) Invested capital/shareholder’s equity
hatches; welding of flanges, spouts and hatches; bending and welding of the screws. Wam used outsourcing to local subcontractors for the remaining part of metal fabricating (cutting, bending and welding of metal sheets), all the machining (on reduction gears and intermediate and end bearings) and the supply of varnishes and helical flights.\(^91\)

In the 70s and 80s, Wam also relied to a large extent on local subcontractors for the manufacturing of components of dust filters and of the production equipment for its own factory. In the 90s, the massive introduction of automation in the Modena plant pushed Wam to bring in-house most of the metal sheet fabrication, thereby increasing its level of vertical integration. However, the company kept relying on local subcontractors for machined parts and for the supply of varnishes. The relationship with the varnish subcontractor became closer in the late 90s when Wam joined it in a common R&D effort to develop new and less polluting varnishes to meet the request of Arpa (the Environment Protection Agency of Emilia-Romagna) to reduce the air emissions of Wam’s painting plant. This partnering led to development of new water-based varnishes and powder varnishes that replaced the traditional solvent-based varnishes for most Wam products.\(^92\)

Conversely, in the 90s Wam strongly expanded its demand for services – such as ICT, software, design, graphics, translations, personnel training, legal advisers, and so on – for which it lacked competences in-house. These external providers were mostly located within the Modena ID. As a result, Wam changed in part its role within the district from a purchaser of manufactured components to a purchaser of services.\(^93\) At the beginning of the 21st century – especially after the acquisition of the Lgm Company – Wam also brought in-house most of the machining. The production of long-run machined components was off-shored to Shanghai Wam in China, while short-run or custom-built mechanical components were partly manufactured at the Wam spa plant in Modena and partly outsourced to local subcontractors. Also the production of machined parts for the production equipment installed in both the Modena plant and in the foreign manufacturing subsidiaries was mostly outsourced to Modenese subcontractors. At the same time, the company increased its demand for consultancies within the Modena ID, especially in the fields of production engineering, business management and informatics.\(^94\)

The overall result has been that since the late 70s Wam progressively increased its level of vertical integration for large batch components which made it rely to a lesser extent

\(^91\) Mariuzzo, Interview (17.3.2000). Thus, Wam, that in the late 70s had opened a machining department where gears for the screw conveyor’s reducer were lathed and toothed, soon realized that it was more cost-effective to outsource gear machining as well as the supply of all other components of the reducer to local subcontractors. After a couple of years, the machining department was closed down and Wam decided to make in-house only the assembly of the gear reducers. See Caprari, Interview (23.11.1999).

\(^92\) Archivio Wam, Progetto dettagliato per la bonifica dei punti di emissione aziendali, 5.8.1998; Progetto di adeguamento degli impianti e dei prodotti utilizzati per la verniciatura, 30.3.2000, in: Archivio Wam; Baraldi, Interview (9.7.2004).

\(^93\) Marchesini, Interview (18.9.2009).

\(^94\) For example, Wam relied on a Modenese consultant for the installation of the company’s ERP; on another consultant (a former manager of Magneti Marelli, another lead firm in the Modena mechanical engineering ID) for the optimization of the screw conveyor’s production cycle in the Modena plant; and on a third consultant for the drawing-up of a business plan for the whole Wam group. See Baraldi, Interview (23.6.2009); Grass, Interview (18.9.2009).
on subcontractors inside the Modena mechanical-engineering ID. At the same time – and especially since the 90s – Wam developed new asset-augmenting relations with a web of other actors in the district, which in recent years have become more relevant to the company's success. Among these – as we have seen – are specialized subcontractors that manufacture customized and short-run components, suppliers of automatic machinery and sophisticated production equipment, consultants, and service providers. However, the most novel and promising relations seem to be those with the local institutions, such as real service centres, vocational training centres, and universities. We have seen that the development of the configurator in the late 90s was made possible by a collaboration with a software house located in the district and with Democenter, one of the real service centres set up by the regional government of Emilia-Romagna.

In the 90s Wam also made an intense effort on personnel training in order to enable its employees to properly use the new computer-aided process technology and comply with the Uni-En-Iso quality procedures. This led, in 1997, Wam spa and the labour unions to sign an agreement that established a training programme which would involve all the company’s employees. Participants were provided with a monetary incentive to attend.95 As the company lacked the resources and competences to manage the training of so many people, the organization of the courses was entrusted to a specialized training centre, certified by the regional government of Emilia-Romagna: Ial of Carpi, controlled by the Catholic union Cisl.96

Lastly, since the late 90s Wam partnered with the University of Modena and Reggio Emilia and with the University of Bologna to host trainees and to carry out applied research programmes. In particular, Wam collaborates with the faculties of economics and engineering of the University of Modena and Reggio Emilia and with the faculty of engineering of the University of Bologna.97

Thus, for example, the collaboration with the faculty of economics of the University of Modena led to the creation of a programme that contains a set of simple guidelines and procedures for the appropriate selection of markets worldwide which are more promising in terms of future growth on a global level. This resulted in a user-friendly ranking pattern that allows an easier comparison between markets which are very different from each other. This analysis is mainly based on some macro-indicators such as GDP, import and trade barriers, but also on some specific industry indicators, such as values and trends in the construction and the mining industry.98

The collaboration with the faculty of engineering of the University of Modena and Reggio Emilia concerned, among other things, a comparison between the theory and experimental practice of sizing a dedusting system. Within this project, tests were conducted at Wam’s Srmp laboratories, aimed at evaluating the performance of cleanable

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96 Fabio Luppi (Wam’s Personnel Manager), Interview (12.7.2000). A Wam manager set out the goals of the training programme: «We thought it was necessary that workers had not only a good knowledge of the screw conveyors and the fabrication and machining operations that must be executed to produce them, but also that they had a good knowledge of the production equipment they had to use on the job, including software and the principal programming languages. Shop-floor personnel are required to know all these aspects of their job as only in such a way they can give that extra special touch that is so important to meet the company’s product quality targets». See Mariuzzo, Interview (23.3.2000).
97 Marchesini, Interview (18.9.2009).
dust filters. Implications for dust filter design were explored. Lastly, the collaboration with the faculty of engineering of the University of Bologna led to joint research on an in-depth analysis of the problem of how to manage animal farming effluents, both from an economic and an environmental point of view. The main objective was to develop an innovative manure treatment process (a screw-type solids-liquid separator) with the aim of reducing both running costs and environmental impact.

Conclusions

This article has presented an in-depth study of an Italian district lead firm: Wam, a mechanical-engineering company located in the ID of Modena. This case study presents both some discontinuities and some continuities with canonical Italian district firms. As to discontinuities, the article has shown that Wam—differently from canonical district firms that tend to remain small—pursued size growth, enlarging progressively its scope. Wam grew via internal growth through investments in production capabilities and the creation of a network of manufacturing subsidiaries within its ID of origin in Italy, but above all through FDIs. Wam’s internationalization strategy consisted basically in transplanting overseas its technology and know-how (and, more generally, its entire business model) for the manufacturing and commercialization of cement screw conveyors and dust filters it had originally developed in Italy, therefore bypassing the difficulty of exporting to those countries. Offshoring, although present, was only of secondary importance in Wam’s internationalization strategy and coupled with an increase—and not a cut—in its investments and employees within the Modena ID.

As to continuities, it is possible to mention the path of the company’s founder: a technician who undertook an entrepreneurial role on the basis of personal experience developed within a larger firm within the district, where he had the chance to realize the presence of a niche which could be occupied and which was not taken into consideration by larger enterprises. Within this framework, the founder’s technical competences and capabilities proved to be crucial to the company’s success, as well as his perception of the market’s needs. And a niche strategy was pursued also in Wam’s internationalization: that is, the company became international by making its original niche a world market in which it faced no large rivals so that it could become world leader while remaining relatively small in size.

A second continuity concerns corporate governance. Despite its growth in size and its becoming a «pocket multinational», Wam remains, like most district firms, to a large extent a personal company, very much in control of its founder, with all the plus sides, in terms of flexibility and commitment, of personal entrepreneurship, but also the risk of innovative lock-in, path dependency and familism that this form of entrepreneurship normally involves. A third, and probably more important, continuity is the persistent relevance of localization. Throughout its history Wam has been a district-located company. However, over the course of time some discontinuities have emerged. Being

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99 Bianca Rimini/Gino Ferretti/Marco Bortolamasi, Sizing of a dedusting system, in: World Cement [June 1997], 56-63.  
100 Wamgroup News 3 (2008), 3.
rooted in the district remains important to the company’s success, but links with the district have changed as the company grew and became international. In the beginning, Wam was little more than an assembler which relied heavily on local subcontractors. Then, since the late 70s the company started to progressively increase its level of vertical integration to exploit its competitive advantage based on a proprietary technology. This made it less dependent on its traditional subcontracting network inside the Modena ID for the supply of large batch components. At the same time, Wam kept relying on local subcontractors for the supply of small batch or custom-built components and expanded its demand for services (ICT, software, and others) which was largely met by local providers. Since the 90s Wam also developed new asset-augmenting relations with local institutions, such as real service centres, vocational training centres, and universities.

This article has also presented a detailed comparison between Wam’s factories in Italy, China and the United States. This has shown that these factories produce the same goods (screw conveyors and dust filters) but differ each from the other as regards both their level of vertical integration and the machinery installed. Such a circumstance seems to confirm that there is not only one way – or a single best way – to organise a production process. The same product can be made in many different ways. And which of these will be preferred does not depend on qualities that are intrinsic in technology, but on other factors, such as the size of the market, customers’ preferences regarding the quality-price ratio, the existence of a network of qualified subcontractors, the presence of standards and regulation, and the relative prices of factors of production.

A final point concerns how Wam’s internationalisation strategy can be generalised among Italian district lead firms. It is certainly true that it was to a large extent affected by the nature of the product (very cumbersome and with a low unitary value) and by the structure of the end-user sector (building construction, which is present and scattered in every part of the world). These meant that the only feasible way to pursue internationalisation was through market-seeking FDIs. However, this model could not be replicable for IDs specialised in other industries – such as footwear or textiles and garments – for which offshoring to low wage countries could be the only way to remain profitable, or for companies specialised in other mechanical engineering products such as sports cars. For example, Modena’s sports car leading manufacturer, Ferrari, followed an internationalisation strategy which was very different from Wam’s and based on exporting a locally manufactured branded and high unitary value product with the support of a worldwide sales and assistance network.

In any case, Wam’s internationalisation strategy can serve as a reference point for those firms operating in markets with similar structures to those Wam operates in. In fact, the most common way for Modenese mechanical engineering firms to invest abroad was to establish production facilities which enabled them to overcome the difficulty of entering those markets with a finished product. This can in turn be the consequence, at least in part, of the fact that one way for district lead firms to exert their leadership is by example, e.g. by having their experience known and possibly imitated by the other firms in the district.

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