Decline and Recovery of the Italian Gun-Making District in the Nineteenth Century. A Comparative Analysis of the Role of Public Authorities and Factories

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Abstract

In the nineteenth century, the production of small arms underwent significant technological change. Faced with new needs, both qualitative and quantitative, governments began to pursue the modernization of production processes through mechanization and vertical integration. These technological advances, chief of which was the American System of Manufacturing developed in US arsenals, had a significant impact on the long-established European gun-making districts, where craft producers had to deal with disturbances and crises. The study focuses on the Italian district and the key factors in its resilience, with a contextual, comparative analysis within a broader framework comprising the UK and Spain. The research demonstrates that public authorities and factories can play a crucial role in determining change and resilience in industrial districts.

1. Introduction

In the course of the nineteenth century, gun-making underwent several fundamental changes. In this period, small arms production played a central role in a series of crucial advances in manufacturing, chief of which was the so-called American System of Manufacturing (ASM). The United States became the world leader in firearms production with growing investments and contribution from federal armories and large firms.[1]

[1] M.R. Smith, *Harpers Ferry Armory and the New Technology: The Challenge of Change*, Ithaca, 1977.

European gun-making districts[2] also took part in this period of extraordinary ferment: Birmingham, Liège, Saint-Étienne, and Eibar, in their different ways, all had to face the challenge of innovation. In Italy, the small arms sector – situated in the modern-day province of Brescia[3] – tried to recover after the period of Austrian domination and take up the gauntlet of innovation. To exploit the well-established armoring skills of the Brescia area, the newly constituted Kingdom of Italy immediately set to work to re-open and enlarge the arsenal, which Austria had closed. The re-opening brought considerable upheaval and change in the industrial district.

The concept of industrial district dates back to Marshall, who described and analyzed specialist British clusters of small and medium-sized enterprises.[4] In the 1970s-1980s, this theoretical framework was revived and extended by the Italian scholars Giacomo Becattini[5] and Sebastiano Brusco[6] to capture the extraordinary

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[2] Apart from the cases analyzed in this paper, other examples of European gun-making districts are Saint-Étienne and Liège. See R. Dubessy, *Historique de la Manufacture d'armes de guerre de Saint-Etienne*, 1900; M. Forissier, *L'Armurerie de Saint-Étienne au XX^e Siècl*e, La Tour du Pin, 2005; B. Bacher, J.F. Brun, É. Perrin, *La Manufacture d'Armes de Saint-Étienne: la Révolution des Machines, 1850-187*0, Clermont-Ferrand, 2014; M. Ansiaux, "L'industrie armuriere liégeoise", in *Les Industries à Domicilie en Belgique*, Brussels, 1899; C. Gaier, *Four Centuries of Liège Gunmaking*, Liège, 1985.

[3] The two main production centers were Gardone Val Trompia – a central Val Trompia village – and Brescia itself, the provincial capital; see D. Montanari, "Produzione d'armi da guerra su commessa pubblica. La vicenda di Gardone Val Trompia nei secoli XVI-XIX", in *Atlante valtrumplino. Uomini, vicende e paesi delle valli del Mella e del Gobbia*, Brescia, 1982.

[4] A. Marshall, *Principles of Economics*, London, 1890; Id., *Industry and Trade*, London, 1919; F. Belussi, K. Caldari, "At the Origin of the Industrial District: Alfred Marshall and the Cambridge School", in *Cambridge Journal of Economics*, 33, 2009, pp. 335-355.

[5] G. Becattini (ed.), *Lo sviluppo economico della Toscana con particolare riguardo all'industrializzazione leggera*, Florence, 1975; Id. "Dal 'settore industriale' al 'distretto industriale'. Alcune riflessioni sull'unità di indagine nell'economia industriale", in *Rivista di Economia e Politica Industriale*, 1:1, pp. 7-21, 1979; Id., *Mercato e forze locali: il distretto industriale*, Bologna, 1987; Id., "Riflessioni sul distretto industriale marshalliano come concetto socio-economico", in *Stato e mercato*, 25:1, 1989, pp. 111-128; Id., *Il bruco e la farfalla. Prato: una storia esemplare dell'Italia dei distretti*, Florence, 2000; Id., "From Marshall's to the Italian 'Industrial Districts'. A Brief Critical Reconstruction", in A. Quadrio Curzio, M. Fortis (eds.), *Complexity and Industrial Clusters. Dynamics and Models in Theory and Practice*, Heidelberg-New York, pp. 83-106; Id., *Industrial Districts: A New Approach to Industrial*

flowering of similar industrial complexes in the central and north-eastern regions of Italy.[7] A series of researchers in different fields soon discovered an array of analogous local and regional production systems around the world. Many were specialized in light, labor-intensive products, but a significant number were also to be found in more technologically demanding and capital-intensive industries.[8]

Economic history has thoroughly documented that industrial districts are the product of an extended historical process often actually rooted in the pre-industrial period. Even before the first industrial revolution, many areas of the European continent were characterized by a concentration of manufacturing activities, a certain degree of specialization in the production of a limited number of goods, and a social environment of strong informal relationships among economic actors. Investigating these areas, historians have regularly found an important role played by guilds[9] and domestic

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Change, Cheltenham, 2004. See also F. Sforzi, "Rethinking the Industrial District: 35 Years Later", in *Investigaciones Regionales - Journal of Regional Research*, 32, 2015, pp. 11-29.

[6] S. Brusco, "The Emilian Model: Productive Decentralisation and Social Integration", in *Cambridge Journal of Economics*, 6:2, 1982, pp. 167-184; Id., *Piccole imprese e distretti industriali*, Turin, 1989.

[7] A. Bagnasco, *Tre Italie. La problematica territoriale dello sviluppo italiano*, Bologna, 1977; Id., "Ancora sul modello delle tre Italie", in *Economia e Politica Internazionale*, 22, 1979; G. Fuà, *Problemi dello sviluppo tardivo in Europa*, Bologna, 1980; Id., C. Zacchia (eds.), *Industrializzazione senza fratture*, Bologna, 1983.

[8] G. Becattini, M. Bellandi, L. De Propris (eds.), *A Handbook of Industrial Districts*, Cheltenham, 2009.

[9] For guilds in economic terms, see B. Gustafsson, "The Rise and Economic Behaviour of Medieval Craft Guilds", in *Scandinavian Economic History Review*, 35, 1987, pp. 1-40; R.D. Putnam, with R. Leonardi, R.Y. Nanetti, *Making Democracy Work: Civic Traditions in Modern Italy*, Princeton, 1993, pp. 163-185; U. Pfister, "Craft Guilds and Proto-Industrialization in Europe, 16th to 18th centuries", in S.R. Epstein, H.G. Haupt, C. Poni, H. Soly (eds.), *Guilds, Economy and Society*, Seville, 1998, pp. 11-24; S.R. Epstein, "Craft Guilds, Apprenticeship, and Technological Change in Preindustrial Europe", in *Journal of Economic History*, 58:3, 1998, pp. 684-713; R. Reith, "Technische Innovation im Handwerk der frühen Neuzeit? Traditionen, Probleme und Perspektiven der Forschung", in K.H. Kaufhold, W. Reininghaus, (eds.), *Stadt und Handwerk in Mittelalter und Früher Neuzeit*, Cologne, 2000, pp. 45-48; M. Raiser, "Informal Institutions, Social Capital and Economic Transition", in G.A. Cornia, V. Popov (eds.), *Transition and Institutions: The Experience of Gradual and Late Reformer*s, Oxford, 2001, p. 231; S. Ogilvie, "The Economics of Guilds", in *Journal of Economic Perspectives*, 28:4, 2014, pp. 169-192.

production in the formation of specialized and fragmented production systems. In other words, the relevance of craft traditions for the rise of industrial districts, in urban and rural contexts alike, has been extensively documented.[10]

Similarly, economic historians have provided evidence of the contribution of factories to the creation and transformation of local production systems. As Belfanti observes, "artisans and pluriactive peasants – rather than proto-industrial peasants – were the actors who created forms of local development based on small businesses, but in many cases the presence of a factory, even though limited to a certain phase of the history of the territory, had a decisive role. The centralized industrial settlement played a fundamental role in the acquisition of technical competence and professional ability on the part of the local workforce: such an apprenticeship constituted a vital passage in the history of local development."[11]

On most occasions, factories were incubators for SMEs, generally with concrete effects after their closure or downsizing, as these traumatic events forced jobless workers to reinvest their technical skills in small new entrepreneurial activities.[12]

This debate on the origins and sustainability of industrial districts has been enriched by inquiries into institutions of governance and mechanisms for managing problems and socioeconomic conflicts in the community. In this strand of research, scholars have focused on the role played by so-called "intermediate institutions"[13]

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[10] A. Colli, "Industrial Districts and Large Firms: The Stubborn Persistence of a 'Weak' Productive Model", in Becattini et al. (eds.), *A Handbook of Industrial Districts*, cit., pp. 58-68. See also A. Guenzi, "Early Industrial Districts. Introduction", in ibid., pp. 3-9; Id., "Le origini corporative del distretto industriale marshalliano. Primi risultati di una ricerca in corso", in *Storia Economica*, 1-2, 2010, pp. 187-203; Id., *Cutlery Trade. Le Origini Corporative dei Distretti Industriali in Europa (secoli XV-XX)*, Turin, 2014; S. Ogilvie, "Guilds, Efficiency, and Social Capital: Evidence from German Proto-Industry", in *Economic History Review*, 62:2, 2004, pp. 286-333.

[11] C.M. Belfanti, "The Genesis of a Hybrid: Early Industrial Districts between Craft Culture and Factory Training", in Becattini et al. (eds.), *A Handbook of Industrial Districts*, cit., p. 15.

[12] G. Tattara, *Il piccolo che nasce dal grande. Le molteplici facce dei distretti industriali veneti*, Milan, 2001.

[13] A. Arrighetti, G. Seravalli (eds.), *Istituzioni intermedie e sviluppo locale*, Rome, 1999.

and governments. The former – crucial in fostering trust and cooperation among local actors, and in providing them with other positive externalities – assumed different roles according to the specific contexts, although some researchers have tried to identify recurrent typologies.[14] The latter certainly had an impact on districts, especially when dealing with such issues as the territorial structure of the banking system, antitrust policy, associational governance and balance between administrative centralization and local autonomy. Ultimately, it has emerged that a crucial aspect in the transformations and performance of the districts is decentralization and devolution of authority from the national to local and regional governments.[15]

This paper focuses on the last two aspects of this historiography: the possible roles of factories and of public authorities in the transformation of industrial districts, at least in certain phases of their life cycle.[16] Analyzing the decline and recovery of the Italian gun-making district in the nineteenth century and contextualizing it in a broader European landscape, the study is intended to show how governments and factories can foster resilience[17] by encouraging entrepreneurship and disseminating skills, technology, and know-how.

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[14] A. Guenzi, "La storia economica e i distretti industriali marshalliani: qualche considerazione su approcci e risultati", in C.M. Belfanti, T. Maccabelli (eds.), *Un paradigma per i distretti industriali, Radici Storiche, attualità e sfide future*, Brescia, 1997; A. Grandi, *Tessuti compatti. Distretti e istituzioni intermedie nello sviluppo italiano*, Turin, 2007.

[15] J. Zeitlin, "Industrial Districts and Regional Clusters", in G. Jones, J. Zeitlin (eds.), *The Oxford Handbook of Business History*, Oxford, 2007, pp. 225-231.

[16] Belfanti, "The Genesis of a Hybrid", cit., p. 17; G. Viesti, *Come nascono i distretti industriali*, Laterza, Rome-Bari, 2003; F. Belussi, S.R. Sedita, "Life Cycle vs. Multiple Path Dependency in Industrial Districts", in *European Planning Studies*, 17:4, 2009, pp. 505-528; F. Belussi, J.L. Hervás-Oliver (eds.), *Unfolding Cluster Evolution*, London-New York, 2017.

[17] "Resilience" is defined by Martin and Sunley as "the capacity of a regional or local economy to withstand or recover from market, competitive and environmental shocks to its developmental growth path, if necessary by undergoing adaptive changes to its economic structures and its social and institutional arrangements, so as to maintain or restore its previous developmental path, or transit to a new sustainable path characterized by a fuller and more productive use of its physical, human and environmental resources." See R. Martin, P. Sunley, "On the Notion of Regional Economic Resilience: Conceptualisation and Explanation", in *Journal of Economic Geography*, 15:1, 2015, p. 13.

To this end, the study compares the Italian case to the British and the Spanish. These two cases were chosen for several reasons: first, in the industrialization process one is a first-mover, one a late-comer (like Italy). Second, they have some significant elements in common, and relevant differences with respect to the Italian district. The common elements are:

1. guild origins,[18]
2. the local producers' struggle with the challenge of mechanization,[19] and
3. the producers' desire for autonomy despite their dependence on government contracts.[20]

At the same time, the differences that make these three cases worth examining concurrently consist in the government approach to the development of the gun-making sector during that period. The United Kingdom, after an initial phase during which public enterprise was a direct competitor of the Birmingham district, pro-

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[18] K. Dunham, *The Gun Trade of Birmingham. A Short Historical Note of the More Interesting Features of a Long-Established Industry*, Birmingham, 1955; C. Urdangarín, J.M. Izaga, K. Lizarralde, *Antzinako Lanbideak-Oficios Tradicionales*, San Sebastián, 1994; J.L. Calvó, *La industria armera nacional 1830-1940. Fábricas, privilegios, patentes y marcas*, Eibar, 1997; C.M. Belfanti, "A Chain of Skills: the Production Cycle of Firearms Manufacture in the Brescia Area from the Sixteenth to the Eighteenth Centuries", in A. Guenzi, P. Massa, F. Piola Caselli (eds.), *Guilds, Markets and Work Regulations in Italy, 16th-19th Centuries*, London, 1998, pp. 266-283.

[19] R. Lumley, "'The American System of Manufactures' in Birmingham: Production Methods at the Birmingham Small Arms Co. in the Nineteenth Century", in *Business History*, 31:1, 1989, pp. 29-43; I. Goñi Mendizabal, "Evolución de la industria armera vasca (1876 y 1969): un enfoque a largo plazo", in P. Pascual Domènech, P. Fernández Pérez (eds.), *Del metal al motor. Innovación y atraso en la historia de la industria metalmecánica española*, Barcelona, 2007, pp. 400-401; P. Bonetti, P. Pagani, *Il movimento operaio in Valtrompia dal 1860 all'avvento del fascismo*, Brescia, 1987, p. 24; M. Del Barba, *Storia del distretto armiero gardonese. Il caso della Vincenzo Bernardelli (1865-1997)*, Brescia, 2008, pp. 26-27.

[20] C. Behagg, "Mass Production without the Factory: Craft Producers, Guns and Small Firm Innovation, 1790-1815", in *Business History*, 40:3, 1998, pp. 1-15; I. Goñi Mendizabal, "Eibar y la industria armera: evidencias de un distrito industrial", in *Investigaciones de Historia Económica*, 6:16, 2010, p. 129; D. Montanari, "L'arsenale della nazione. Zanardelli e il decollo dell'industria armiera bresciana", in S. Onger (ed.), *Brescia 1849. Il popolo in rivolta*, Brescia, 2001.

vided know-how and technological means to the producers who decided to industrialize.[21] Spain liberalized the sector and showed no interest in the Eibar district, as it favored the Oviedo arsenal or the purchase of foreign products in the aftermath of the Third Carlist War.[22] The Kingdom of Italy initially invested in the district with the re-opening of the local arsenal but soon, for political reasons, directed its attention towards other centers.[23] In short, these three industrial districts permit the analysis of different government approaches to the gun-making sector: observing such strategic heterogeneity despite similar district features and problems, the study seeks to determine the effects of public intervention and of factories in the transformation of local production systems.

The rest of the paper is divided into three sections: an analysis of the British and Spanish gun-making districts, contextualizing them in the main transformations and innovations in the nineteenth century; an in-depth look at the Italian case, retracing the decline and recovery of the local production system in Brescia; and lastly, the conclusions, highlighting shared trajectories and divergences in the gun-making districts of the three countries.

2. Small arms districts in Europe

At the beginning of the twentieth century, the structure of the arms industry was similar in almost all European countries. Alongside the government armories, which dealt mainly with logistics and

[21] Lumley, "'The American System of Manufactures' in Birmingham", cit.; J.H. Lewis, *The Development of the Royal Small Arms Factory (Enfield Lock) and its Influence upon Mass Production Technology and Product Design c1820-c1880*, Ph.D. Dissertation, Middlesex University, 1996.
[22] Goñi Mendizabal, "Evolución de la industria armera vasca", cit., pp. 394-395.
[23] D. Montanari, "Nato con Napoleone, chiuso con il ritorno degli austriaci, riaperto dopo l'Unità", in *La Banca Credito Agrario Bresciano e un secolo di svilupp*o, Brescia, 1983; Id., "Giuseppe Zanardelli e il decollo dell'industria bresciana: il caso dell'arsenale di Brescia e di Gardone Valtrompia", in M. Cattini, M.A. Romani (eds.), *Maestri e imprenditori. Un secolo di trasformazioni nell'industria a Brescia*, Brescia, 1985.

technical tests, networks of private companies were in course of consolidation. Almost all these businesses had developed in the nineteenth century and worked mostly, but not exclusively, for military needs. Almost everywhere, in their own countries, these firms were among the largest companies both productively and financially: the general process of vertical integration that developed starting in the 1870s or 1880s affected this sector as well. In addition to these specialized companies, others, which mainly produced civilian products, also operated in the armaments business. These were steel, metallurgical, mechanical engineering, and chemical firms that contributed decisively to the supply of semi-finished goods or particular products.[24]

From the outset European small arms production was characterized by the prominent role of specialized clusters. In these areas of the continent, gun-making developed according to the model of dispersed manufacturing.[25] This organizational framework was the result of the multiplicity of skills – and craftsmen – required to make firearms. In many cases, it was reinforced by processes of institutionalization in the gun-making trades, with the creation of craftsmen's guilds in the seventeenth and eighteenth centuries.

In nineteenth-century Europe, therefore, small arms manufacturing was still dominated by well-defined geographical areas dense with small artisanal businesses.[26] In the production dynamics of these local systems, advancing industrialization and unremitting

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[24] L. Segreto, *Marte e Mercurio. Industria Bellica e Sviluppo Economico in Italia (1861-1940)*, Milan, 1997, p. 23.

[25] F. Braudel, *Civilization and Capitalism: 15th-18th Century*. Vol. II: *The Wheels of Commerce*, London, 1983, p. 300.

[26] S. Colt, "On the Application of Machinery to the Manufacture of Rotating Chambered-Breech Fire-Arms, and other Peculiarities of those Arms (Including Plates)", in *Minutes of the Proceedings of the Institution of Civil Engineers*, 11:1852, 1852, pp. 30-50; M. Cominazzi, *Cenni sulla fabbrica d'armi in Gardone di Valtrompia*, Brescia, 1861; R.I. Fries, "British Response to the American System: The Case of the Small-Arms Industry after 1850", in *Technology and Culture*, 16:3, 1975, pp. 379-385; Gaier, *Four Centuries of Liège Gunmaking*, cit., pp. 126-148; Calvó, *La industria armera nacional*, cit.; Bacher et al., *La Manufacture d'Armes de Saint-Étienne*, cit., p. 53.

pressure from governments, which were the prime customers, improving production processes and products[27] was an enormous challenge. The stiffest challenge came from the United States, where the authorities played a crucial role in the pioneering application of the principles of the ASM.[28] The emergence of mass small arms production using machinery was the result of the vital contribution of federal armories such as Springfield and Harpers Ferry.[29]

In Europe, the introduction of ASM came later and frequently met with resistance from small producers that based their work on craftsmanship and phase specialization. ASM made its way into the production centers of Europe only in the second half of the century, owing to the intervention of public authorities and the foresight of pioneering firms that were striving for growth in scale. The following sub-sections retrace the problems faced and solutions adopted by the British and Spanish districts in coping with the challenge of industrialization and renewed state interventionism.

2.1 Birmingham

Birmingham was known as a manufacturing center by the mid-sixteenth century. The exact date when the gun trade became a separate branch of manufacture is difficult to determine, one suggestion being as early as 1603. There is in fact evidence that trade was underway by the mid-seventeenth century, as the prompt execution of

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[27] Regarding the numerous advancements in small arms and their production in the nineteenth century see G.P. Motta, "Le innovazioni delle armi portatili", in *Il Contributo italiano alla storia del Pensiero - Tecnica*, Treccani, 2013, https://bit.ly/2mocnLd (last visited 2 April 2020).

[28] The first attempts at interchangeability were made in France and Russia; see P. Smithurst, "France, Russia and Early Interchangeability in Firearms", in *Arms & Armour*, 2019, DOI: https://doi.org/10.1080/17416124.2019.1660468.

[29] M.R. Smith, "Army Ordinance and the 'American System' of Manufacturing, 1815-1861", in Id. (ed.), *Military Enterprise and Technological Change: Perspectives on the American Experience*, The MIT Press, Cambridge, 1985; Id., *Harpers Ferry Armory and the New Technology*, cit.; D.A. Hounshell, *From the American System to Mass Production, 1800-1932*, Baltimore, 1984; J.L. Rosenbloom, "Anglo-American Technological Differences in Small Arms Manufacturing", in *Journal of Interdisciplinary History*, 23:4, 1993, pp. 683-698.

a contract secured from the Ordnance Office in 1689 would appear to indicate.[30]

The organization of the gun trade in the West Midlands city involved the interplay of three groups: contractors, small masters and artisan-workmen who coordinated teams of apprentices. As Behagg observes, "the craft system of production in Birmingham was able to adapt its structures to meet the increased demand, so obviating the need for fixed capital investment in an industry in which the market was extremely unstable. Innovation took place by a process of 're-drafting custom' so that mass production could be achieved without the growth of the factory or the descent into sweating. Central to this process was the realignment of the relationship between the small business man and the craft-producer within the workshop."[31]

More specifically, in wartime the gunmakers of Birmingham maintained high levels of production, without any high-risk investment of capital, concurrently adopting four strategies: "increasing the multiplier effect of gun barrel making by increased investment in large plant; establishment of a contractors' 'cartel'; re-negotiation of apprenticeship regulations, particularly where bottlenecks in production were identified; and the introduction of the 'bounty' system into the workshop."[32]

By the end of the eighteenth century, Birmingham had become the leading arms-producing center in the world and the largest gun-making district controlled by anti-Napoleonic forces. In the period 1804-15, a total of 1,827,889 muskets and pistols were produced for the Board of Ordnance in Birmingham, compared with just 845,477 made by government factories and other London industries. These figures were brought up as part of a protest against the establishment of a government factory in Birmingham in 1816, and the project was eventually abandoned. In the middle of the nineteenth

[30] Dunham, *The Gun Trade of Birmingham*, cit., p. 5.
[31] Behagg, "Mass Production without the Factory", cit., p. 5.
[32] Ibid., p. 9.

century, gunmakers in Birmingham were still the most significant source of arms in the world: a large portion of the military firearms used in the Kaffir and Crimean Wars were produced in the district.[33]

Despite these impressive results and large production capacity organized on a flexible basis,[34] the relationship between the Birmingham gunsmiths and the Board of Ordnance was not an easy one. The authorities frequently complained of low quality and inability to fulfill all the contractual obligations, while the private producers found government complaints and intransigence highly oppressive. The production system was unable to embrace the technological challenge of mechanization, owing to the gunmakers' disinclination for innovation and the hurdles to modernization created by the Board. The latter's reluctance to grant long-term supply contracts, refusal to supply product calibers and models, and extremely rigid product control standards were all factors that did not help private producers to shift from a labor-intensive to a more capital-intensive production model.[35]

The turning point came in the 1850s. The Great Exhibition of 1851, where American producers such as Colt or Robinson & Lawrence exhibited their products, the British government commissions' visits to US arsenals, and the 1853 Exhibition of Industry in New York decisively turned the attention of British authorities toward the ASM. In 1854, Parliament set up an ad hoc committee to study the most efficient and economical way to supply the army with weapons. England was waging the Crimean War, and for some years the Board of Ordnance had been struggling to procure muskets through the traditional channels. The committee was accordingly assigned to evaluate – in political, economic and technological terms – the Board's proposal to establish a production plant on the model

[33] Dunham, *The Gun Trade of Birmingham*, cit., p. 9.
[34] J.D. Goodman, "The Birmingham Gun Trade", in S. Timmins (ed.), *The Resources, Products, and Industrial History of Birmingham and the Midland Hardware District*, London, 1886, pp. 387-395.
[35] Fries, "British Response to the American System", cit., p. 385; Lewis, *The Development of the Royal Small Arms Factory*, cit., p. 328.

of the American armories of Springfield and Harpers Ferry. Auditions were held with technicians and producers (Samuel Colt, Joseph Whitworth, George Wallis, James Nasmyth, Gage Stickney, Richard Prosser, John Anderson) who had direct knowledge of the American factories, including the two government arsenals. In light of the information gathered and the deterioration of the relationship with the Birmingham craftsmen, the committee recommended limited manufacture of small arms under the Board of Ordnance itself and, tacitly, endorsed the Board's intention not only to model its armory after Springfield and Harpers Ferry but also to equip it with American-made machinery.[36]

The committee recommended that the new manufacturing principles be introduced in an existing plant at Enfield. The Americans tendered for the production machinery for the Enfield rifle as follows: Ames of Chicopee Falls, Massachusetts, to supply 23 Stock Making Machines costing $41,230 including delivery; Robbins & Lawrence of Windsor, Vermont, to supply 61 milling, 17 drilling and 38 other machines costing $41,244, and Ames to supply gauges costing $5,600. Small wood, sheet metal and paper card working and cap making machinery were also tendered via Robbins & Lawrence. All these tenders were eventually accepted. Between 1 January 1854 and 31 March 1858, £352,583 was spent at Enfield, including £142,622 in wages. In 1854, the royal arms factory started using machinery for stock working, and, by 1858, Enfield 1853 rifles could be made entirely with standardized components.[37]

The success of the Enfield arsenal prompted the Board of Ordnance to move towards still more selective parameters, which were hard to satisfy on a craft basis, and Birmingham's private producers soon realized that their quasi-monopoly had been broken. They had to devise a defensive strategy, and a group of the most important local entrepreneurs decided to join forces to create a factory that could meet the challenge of standardization: the Birmingham Small

[36] Hounshell, *From the American System to Mass Production*, cit., pp. 17-25.
[37] D. Williams, *The Birmingham Gun Trade*, Stroud, 2009, p. 83.

Arms Co. Ltd, founded in 1861. The shareholders also maintained separate manufacturing facilities prior to the voluntary liquidation of the firm as a consequence of problems with the manufacture of cartridge cases for Prussia. The business was reconstituted in 1873 as Birmingham Small Arms and Metal Co. Ltd. (BSA), with John Goodman as chairman.[38]

One of the new company's first actions was to order stock-making machinery from the Ames Manufacturing Co. in the US, the bulk of the other machinery, including metal working machinery, from Greenwood of Leeds, and engines and shafting from Hick and Son of Bolton. The first gun made by BSA was a short Enfield rifle musket for Turkey. After an initial period of coexistence of craft and mechanized production, the group increasingly implemented mechanized manufacture with significant results already in the 1870s. By the turn of the century production was fully mechanized.[39]

Even though the government did not invest in BSA, its role proved to be crucial to its mechanization, for two reasons. First, supplies for the royal arsenals made a significant contribution to the emergence of domestic machinery suppliers. Domestic machinery, produced by firms like Greenwood and Batley, was prevalent: out of the 2,324 machines bought by BSA in the nineteenth century, under 7% were imports. Public investment in Enfield was at the origin of British production of machinery for small arms. Second, the War Office took a strong, proactive approach. After convincing Birmingham producers to embrace the factory system, the Office sustained BSA with orders and know-how. In particular, Enfield and its employees were encouraged to help BSA by supplying it with calibers and product models, as well as allowing its technicians to visit the government factory to study its machinery. In other words, in sharp contrast to past practices, the public authorities now helped

[38] Ibid., pp. 96-98.
[39] R.I. Fries, *A Comparative Study of the British and American Arms Industry, 1790-1890*, Ph.D. Dissertation, Johns Hopkins University, 1972, pp. 315-370; Lumley, "'The American System of Manufactures' in Birmingham", cit., pp. 38-39.

district producers who were willing to modernize their firms. They abandoned impositions and restrictions and provided firms in Birmingham with know-how, tools, machinery, and experts.[40]

From this moment on, even while a significant portion of the district retained artisanal production methods, other companies – e.g. the National Arms and Ammunition Co. Ltd, and Grenfell & Accles Ltd – adopted mechanization and initiated vertical integration.[41]

2.2 Eibar

Eibar is a large town in Gipuzkoa, a province in the autonomous Basque country in northern Spain. Gun-making there dates to the late fifteenth century, and throughout early modern times it retained strong links with the orders of the Real Fábrica of Placencia de las Armas. The Real Fábrica acted as administrative center contracting production out to guilds, which then redistributed the work amongst specialized workshops and checked that their products were up to the standards.[42]

Things began to change at the end of the eighteenth century, when the crown decided to build a new arsenal in Oviedo. In the complex interplay of the market, this new establishment was increasingly favored, and Fábrica of Placencia de las Armas was driven progressively to the margins. On 2 June 1860, a royal decree liberalized armament production, freeing it from guilds and other intermediaries, and obliged the Fábrica to serve as testing ground for the arms manufactured by private producers. Five years later, the Fábrica was definitively closed.[43]

These developments did not terminate the relations between the government and the private Basque gunmakers. Military demand continued to be essential to the development of production in the

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[40] Lumley, "'The American System of Manufactures' in Birmingham", cit., pp. 35-37; Lewis, *The Development of the Royal Small Arms Factory*, cit.
[41] Williams, *The Birmingham Gun Trade*, cit., pp. 103-106.
[42] R. Larrañaga, S. Gorrochategui, *500 años de armería vasca*, Eibar, 1990.
[43] Calvó, *La industria armera nacional*, cit.

years following: companies such as La Euscalduna, Guerediaga, Astola y Cía., and Orbea Hermanos obtained orders that enabled them to modernize and raise output levels. But this process of development was halted by the outbreak of the Third Carlist War and not resumed when it ended. Instead, large stocks of arms on hand, combined with fears of possible renewed enemy occupation of the factories, led the government to terminate the production of military weapons in the Basque Country.[44]

In the light of these many hurdles, the local gun-making industry demanded the establishment of a government factory in Eibar to ensure stable orders and lay the foundations for mechanized production. Its spokesmen viewed Liège and its Fabrique Nationale as a model: they wanted public investment to start up a factory capable of handling wartime demand and encouraging the development of a modern private gun-making industry. These demands were not satisfied, however, and a series of other initiatives towards similar objectives failed for lack of capital. Therefore, the district had no alternative but to concentrate, still more closely, on the dispersed factory system.[45]

The lack of government orders and the international treaty ban on exports of weapons to countries at war prompted the Eibar producers to specialize in commercial weapons, especially hand guns. Despite this vocation for production of pistols and revolvers, there was still a total absence of vertically integrated businesses: unlike the United States, the Basque county was characterized by the lack of large firms. The district's structure had hardly changed at all from the time of the Royal Factories, dominated by small workshops with the coordination of a few assembling firms, which acted as contractors and were mainly located in the town of Eibar. Exploiting their

[44] E. Fernández de Pinedo, "De la primera industrialización a la reconversion industrial: la economía vasca entre 1841 y 1990", in L. Germán, E. Llopis, J. Maluquer de Motes, S. Zapata (eds.), *Historia Económica Regional de España, siglos XIX y XX*, Barcelona, 2001; Goñi Mendizabal, "Evolución de la industria armera vasca", cit., pp. 393-394.
[45] Goñi Mendizabal, "Evolución de la industria armera vasca", cit., pp. 402-403.

patents and brands, these businesses outsourced specific production phases and then assembled the gun parts internally.[46] In Becattini's terms, they were "pure entrepreneurs."[47] Given the district's features and market conditions, they would generally design a specific product (revolver with a brand) and outsource production phases to the local workshops (their own included).

This outsourcing system involved different types of product and company. Relations were not one-way and could be both vertical and horizontal, but it was hard to draw a definite distinction between authentic manufacturers and simple marketers. Some entrepreneurs had no workshop but commissioned the manufacture of the weapons to other local businessmen, who might outsource the production themselves. During World War I Gabilondo y Urresti, with a single brand – RUBY – and a small workshop in Eibar, was chosen to produce France's standard military pistol. Given the magnitude of this order, the company decided to settle in Elgoibar to start manufacturing, and as it could not handle it on its own, it outsourced a share of the production to workshops in Eibar, Elgoibar and Gernika-Lumo. The huge demand for automatic pistols meant that the technical specifications imposed on Gabilondo y Urresti were extended to the other manufacturers, which began receiving significant orders, regardless of the outsourcer's contract. Thus the RUBY pistol became the characteristic product of the Eibar industrial district and in fact came to be known as the Eibar-type gun.[48]

Internationalization took on exceptional importance as local firms sought to deal with the saturation of the domestic small arms market. Eibar businesses adopted a strategy that was well suited to their small size and limited mechanization. Essentially, they kept prices low, even to the detriment of quality, supplying clients with imitations of foreign models labeled with exotically named brands to conceal their Spanish origin. This approach benefited from the

[46] Goñi Mendizabal, "Eibar y la industria armera", cit., p. 109.
[47] Becattini, "Riflessioni sul distretto industriale", cit., p. 117
[48] Goñi Mendizabal, "Eibar y la industria armera", cit., p. 111.

support of the only public body still present in the district, namely the Eibar town council. The council not only become a significant network hub between actors of the production system; also, crucially, it helped to source information on foreign competitors and solve thorny diplomatic-trading issues.[49]

The development of the Eibar district was fostered by the arrival of the telegraph in 1883 and the railroad in 1887.[50] Further important transformations driven by the development of the arms industry were the replacement of hydraulic energy with electricity and rapid population growth, from 5,013 inhabitants in 1887 to 6,583 in 1900 and 10,121 in 1910.[51] The gun trade led to the establishment of a technical drawing school in the nineteenth century, intended to enable local pupils to develop skills that were fundamental to gun-making.[52]

In the Spanish gun-making district, large, vertically integrated businesses did not emerge until later, in the first half of the twentieth century. A series of new norms on the possession and handling of firearms constituted a significant impediment to the activity of small gun-making businesses, which contracted significantly in the 1920s and 1930s. Finally, in 1941 and 1944, two new legislative measures established that the entire production cycle for hand guns had to be carried out in a single factory. Only the three leading firms were in a position to satisfy this new requirement: Unceta y Cía. de Gernika, Bonifacio Echeverría de Eibar, and Gabilondo y Cía. de Elgoibar.[53]

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[49] I. Goñi Mendizabal, "Imitación, innovación y apoyo institucional. Estrategias de penetración en los mercados internacionales de las empresas vascas durante el Siglo XX", in *Revista de la Historia de la Economía y de la Empresa*, 2, 2008, pp. 207-236; Id., "La internacionalización de la industria armera vasca 1867-1970. El distrito industrial de Eibar y sus empresas", in *Información Comercial Española*, 849, 2009, pp. 79-95.
[50] G. Mújica, *Monografía histórica de la Villa de Eibar*, Eibar, 1984.
[51] E. García Manrique, *Eibar, inmigración y desarrollo urbano e industrial*, Zaragoza, 1961
[52] Goñi Mendizabal, "Eibar y la industria armera", cit., p. 121.
[53] Goñi Mendizabal, "Evolución de la industria armera vasca", cit., pp. 422-424; Id., "De Esperanza y Unceta a Astra-Unceta y Cía., Una empresa armera ante el mercado internacional", in *Revista de Historia Industrial*, 40, 2009, pp. 40-51.

3. The Italian case

The present-day Italian gun-making district arose in early modern times as a chain of skills along the Mella river; its main production centers were Gardone Val Trompia and Brescia. The leading actors in this local production system – characterized by phase specialization – were masters and merchants, who frequently fought for control of the orders of the Republic of Venice.[54]

Following the battles between guild master craftsmen and merchant-entrepreneurs that marred the eighteenth-century firearms sector, a new phase began in 1797 with the proclamation of the Repubblica Bresciana and its annexation to the Cisalpine Republic. Production came under Napoleon's control and soon became a branch of French military organization. On 29 December 1806, Viceroy Eugène Beauharnais visited the Brescia area and decided to open a royal arsenal there with two seats, one in the city of Brescia and the other in Gardone Val Trompia. The objective was to consolidate the position of the specialized local industry within a system of government contracts and overcome the backwardness of the local system.[55]

The situation changed again in 1815, when the Austrian Empire took control of Brescia. As demand stagnated, the major valleys of the province had to deal with the steady downsizing of the iron-working sector, while the government decided to reorganize the local gun-making business. Towards the end of 1818, it adopted a number of measures that had a negative impact on the district, most notably:

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[54] M. Morin, R. Held, Beretta. *La Diniastia Industriale piu Antica al Mondo / The World's Oldest Industrial Dynasty*, Chiasso, 1980; Belfanti, "A Chain of Skills", cit.; L. Mocarelli, G. Ongaro, "Weapons Production in the Republic of Venice in the Early Modern Period: The Manufacturing Centre of Brescia between Military Needs and Economic Equilibrium", in *Scandinavian Economic History Review*, 65:3, 2017, pp. 231-242.

[55] D. Montanari, "Le armi della Repubblica. Le fabbriche militari bresciane dalla Serenissima all'Italia napoleonica", in D. Montanari, S. Onger, M. Pegrari (eds.), *1797. Il punto di svolta. Brescia e la Lombardia veneta da Venezia a Vienna (1780-1830)*, Brescia, 1999; R. Bohn, R. Jaikumar, *From Filing and Fitting to Flexible Manufacturing*, Hanover-Delft, 2005, pp. 35-37.

1. the suspension of production at the Gardone arsenal, which was downgraded to the status of warehouse;
2. the closure of the artillery headquarters in Brescia;
3. the exclusive reservation of military supply contracts to three merchant-entrepreneurs, namely Crescenzo Paris, Giuseppe Franzini and Antonio Beretta.[56]

Restricting contract awards and limiting exports, Austria established rigid control over a strategic sector, situated in a geographical area which they feared was less secure than others. Local producers sought to offset these difficulties by producing hunting arms, but the situation nevertheless degenerated significantly over the next three decades. The Brescia metalworking sector was slow to innovate, and it also had to deal with the less than excellent quality of the raw materials from Dongo and the natural disasters that struck Val Trompia (above all the Mella river flood in 1850). Controls by the governmental authorities were tightened still further in the aftermath of the First Italian War of Independence. In the following decade, military contracts were held to bare subsistence levels, and in 1857 activities ceased altogether.[57]

For the Italian arms industry, including this gun-making district, the years after national unification constituted a crucial, extraordinarily transformative period. The new authorities of the Kingdom of Italy were well aware that a mid-sized power like Italy had to support its national industry, especially the sectors that were relevant to military production (steel, shipbuilding, mechanical engineering). This awareness strengthened in the 1880s, which historians have identified as a pro-industrial turning point. The decade was marked by two crucial strategic choices: the establishment of Società Italiana delle Acciaierie, Fonderie e Alti Forni di Terni in 1884 on the one

[56] G. Marchesi, *Quei laboriosi valligiani. Economia e società nella montagna bresciana tra il tardo Settecento e gli anni postunitari*, Brescia, 2003, pp. 239-241; M. Guizzetti, *La produzione armiera nell'economia valtrumplina tra il 1825 e il 1875*, Graduation Dissertation, Università degli studi di Brescia, a.y. 1994-1995.
[57] G. Foccoli, "La cittadella delle armi", in Zucca (ed.), *Antologia Gardonese*, cit., pp. 182-183; Montanari, "Nato con Napoleone", cit.

hand and the introduction of a new tariff in 1887 on the other. The first of these moves signaled the government's recognition of the danger of depending on foreign supplies and public arsenals; at least initially, the state elected not to take direct control of the new entrepreneurial initiative; instead of creating a new government factory, Italy opened up to the private sector, supporting it through a great number of contracts for war materiel. The second move, the new tariff, notably took Italy into the large protectionist group that was emerging in Europe.[58]

3.1 Relaunching the Italian gun-making district

In 1859 Brescia was finally freed of Austrian occupation and annexed to the Kingdom of Sardinia. By the decree of 18 August, Victor Emmanuel II re-opened the arsenal, naming it Fabbrica Erariale di Brescia.[59] A year later (Royal Decree of 17 June 1860) it was placed under a common authority with the other government factories for military procurement.[60] New norms, responsibilities and organizational instructions were laid down, and the government set tariffs for each separate small arms working activity, for a total cost of £5.35 (5.35 lire) per weapon.[61]

The government intended to revive the Brescia firearms industry not only by re-opening the plant under norms similar to those regulating the Turin arsenal but also bringing the private sector into the

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[58] L. Segreto, *Marte e Mercurio*, cit., pp. 20-21; F. Bonelli, "Spesa militare e sviluppo industriale in Italia", in Ministero per i Beni Culturali e Ambientali, *Esercito e città dall'Unità agli anni Trenta*. Atti del Convegno di studi, Perugia, 11-14 maggio 1988, tomo II, Rome, 1989, pp. 1091-1095.

[59] Also called Reale Fabbrica d'Armi. See *Giornale Militare*, 1859, p. 605.

[60] Regarding arsenals in the Kingdom of Sardinia and Kingdom of Italy see: F. Degli Esposti, *Le Fabbriche di Marte. Gli Arsenali del Regno di Sardegna tra Restaurazione e Risorgimento: Organizzazione, Economia, Tecnologia*. Vol. 1 - *Gli stabilimenti piemontesi*, San Marino, 1997; Id., *Le Fabbriche di Marte. Gli Arsenali del Regno di Sardegna tra Restaurazione e Risorgimento: Organizzazione, Economia, Tecnologia*. Vol. 2 - *Gli stabilimenti liguri*, San Marino, 2000; Id., "Stabilimenti Industriali o Falansteri? La Lunga Parabola degli Arsenali", in N. Labanca, P.P. Poggio (eds.), *Storie di armi*, Milan, 2009.

[61] *Giornale Militare*, 1860, pp. 145-146.

market with a piecework system. On 29 September 1860, Camillo Cavour stated: "This new factory was not slow in taking off satisfactorily and prospering as far as could be expected given the deplorable state into which the firearms industry had fallen, abandoned and harassed as it was by the former government. Nevertheless, as production has not yet managed to produce the surplus which current needs require, those demands which have yet to be fulfilled, and defects to be repaired, have been provided for; and it has emerged that the problem was due to delays in the supply of barrels. The government has seen to supplying the various producers with all the means available to it. […] Special barrel workshops will be set up in Gardone, which will be considered subsidiaries of the Brescia factory and subordinate to it. A representative of the Brescia directorate will be stationed there and will be subordinate and answer to the former. The directorate shall seek out two or three workshops to rent in the town, come to an agreement with their owners and send the contracts to the Ministry for approval. The prices of these goods shall be fixed annually by the factory directorate and approved by the Ministry. Forge workers will be required to supply their own charcoal, and in making barrels they will not roll forge but hammer weld. Grindstone working will have to be supplanted by the machine lathes. In order to avoid a lack of work between one contract and another, as a result of a momentary pause, infantry rifles for repair will be sent from the Brescia arsenal to Gardone."[62]

In other words, the gun-making district quickly became an object of great interest to the Kingdom of Italy: together with the Turin factory, it was seen as an essential cog in the mechanism of fitting out an army that would be responsible for unifying the peninsula.[63]

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[62] Ibid., p. 1036 (translation from Italian).
[63] A. Albesio, "Dall'Arsenale alla S.F.A.E.", in Zucca (ed.), *Antologia gardonese*, cit., p. 235. To support Garibaldi's expedition to annex Sicily, the Gardone town council produced 1,000 rifles and organized a collection of funds that involved selling off a forest; see Archivio Storico del Comune di Gardone Val Trompia (hereafter ASCG), box (hereafter b.) 183, file (hereafter f.) 1.

An extensive dossier demonstrates this interest on the part of the new authorities. A report drafted by the Val Trompia town councils at the War Ministry's request is a valuable source of detailed information on the state of local gun-making and the district's efforts to re-organize to serve the new state's demand.

All the buildings for barrel-making were located in Gardone Val Trompia, along with facilities for grinding, boring and leveling. These were usually rented out on condition that they remained available for the owners' own needs. There were ten forges powered by the waters of the Mella river, all either owned or co-owned by the firms that operated them and bearing the names of their merchant class family owners. There were also workshops and smithies dedicated to bellows-worked barrels. Most of these were owned by tradesmen, more rarely by self-employed workers.[64]

Commercial arms were worked autonomously by the individual merchants, whereas those for the government were produced by a business embracing all the plant owners except F.lli Franzini and F.lli Girolamo Bertarini. The former manufactured weapons for the government on its own, while the latter was not a barrel maker. Simone Zambonardi was part of the collective business, even though he did not own any of the premises. About 50 barrels a day were produced for the government, 40 by the collective firm and 10 by F.lli Franzini. According to the dossier, output could have been greater if production for the National Guard had been suspended and the levelers had mastered more advanced manufacturing techniques.[65]

All the craftsmen, numbering about 190, were pieceworkers. There were 42 forgers, 24 borers, 23 grinders, 22 filers, 20 breech, stock and sight makers, and 49 finishers. These were supervised by 10 checkers, who inspected the barrels contracted by the government. Lastly, there were a good number of apprentice forgers and finishers, not precisely counted in the dossier.[66]

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[64] ASCG, b. 69, f. 1, "Prospetto della Fabbrica d'Armi da Fuoco in Gardone", 1860.
[65] Ibid.
[66] Ibid.

A year later, in 1861, the information on Gardone Val Trompia was supplemented by another report giving additional details on barrel manufacturing. It focused on the state of the local forges, local gun-making businesses, machinery, workforce, and salaries.

The businesses involved in barrel-making and trading numbered 15, flanked by several small producers whose exact number was not specified. Production relied mainly on hand tools: 49 drills for barrel boring and grinding, 7 Sarnico grindstones, 12 rolling mills, 25 forges powered by hydraulic bellows, and 7 forges with bellows. The only elements of mechanization were two lathes and three barrel-rifling machines introduced by the government. The government had also begun production of its own, having identified the forges in the area to rent on instructions from the War Ministry, namely:

1. the Fornace forge owned by Bertarini;
2. the Rampinelli forge owned by Moretta;
3. the Mulino forge owned by Ditta Crescenzio Paris.[67]

In 1861, 40,581 barrels were produced, of which 30,796 were for military rifles (8,000 government-made), 2,326 were for various double-barreled firearms, 6,789 for various single-barreled rifles (totaling 9,115 for civilian use, mainly hunting), and lastly 670 pistol barrels. The total value of these was £542,165; they were produced with 41 hydraulic engines, seven windmills, and other, animal-powered engines requiring a workforce of six. The barrels for the National Guard and for private customers were made respectively of cast iron from Val Trompia (worked by Glisenti) and iron mined in the same valley; those for government rifles used iron from the Aosta Valley. In all, 1,814 quintals of Italian iron were used. The fuel employed was charcoal (7,385 quintals) and this too was produced locally.[68]

The total workforce was expanded to 287: 50 forgers, 50 drillers, 50 levelers, 8 lathes operators, 14 grinders, 70 filers, 25 screwers and

[67] ASCG, b. 180, f. 1, "Prospetto di Statistica della Industria Manifattrice nell'Anno 1861 nel Comune di Gardone".
[68] Ibid.

others, and lastly, 20 polishers. Except for the polishers, they were all men. They were all pieceworkers. The best-paid, the forgers, earned from a minimum of £2 to a maximum of £6 per day. Those who earned the least, the polishers, made between £0.75 and £2 per day. Total yearly labor costs came to £240,000.[69]

The people of the nearby villages of Magno and Inzino also worked in firearms production. There were eight flintlock workshops in Magno; these small workshops were often located in their owners' houses and employed a total of 20 workers.[70] Inzino had six forges employing 30 people making flintlocks and cold weapons, as well as nails and farm tools.[71] Lumezzane Sant'Apollonio had eight workshops for military rifle finishings (rods and nosecaps for the royal arsenal), strips for the same type of product, and cold weapons (daggers, sabres and bayonets); 55 workers were employed either in the workshops themselves or at home.[72] In Lumezzane Pieve there were 12 production facilities – forges, and small forges – and 19 workshops (mostly in private homes); the workforce in the firearms sector amounted to 235 people making cold weapons and numerous firearm parts: trigger guards, flintlocks, screws.[73] Lastly, in the village of Marcheno, another 13 workshops produced flintlocks, employing 40 workers, they too often working at home.[74]

Though during the first decade of government by the Historical

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[69] Ibid.

[70] ASCG, b. 69, f. 1, "Prospetto degli individui addetti al lavoro d'armi nella qualità di acciarinai sì di monizione che mercantili del Comune di Magno", 9 March 1860; Archivio Storico del Comune di Magno (hereafter ASCM), b. 28, ff. 1-15, "Prospetto degli operaj addetti alla fabbrica d'armi del Comune di Magno", 1860.

[71] ASCG, b. 69, f. 1, "Prospetto degli Edifici a Fucina esistenti in questo Comune atti a convertirsi ad uso lavoriero d'armi", 9 March 1860.

[72] Ibid., "Prospetto riassuntivo delle Notizie sul numero delle officine per lavoro d'armi esistenti nel Comune di Lumezzane Sant'Apollonio", 10 March 1860.

[73] Ibid., "Prospetto delle Officine, degli Operaj ed Applicati per lavoro d'Armi in Lumezzane Pieve", 7 March 1860. The document indicates that, in addition to the workshops and shops shown, about the same number in the town produced exclusively commercial arms but in case of need could be converted to military production.

[74] Ibid., "Prospetto nominativo di tutte le officine pel lavoro d'armi esistenti nel Comune di Marcheno e nome e cognome degli operai in esse occupati", 1860.

Right the overall impact on production volume was limited, there is no question that the arsenal was important in breaking the cyclical fluctuations that had marked firearms procurement for centuries, in strict relation with military conflict and diplomatic developments. This was accompanied by steady technological advances, owing to which weapons rapidly became obsolete, giving producers new opportunities. As a result the allocation of orders among the various plants was crucial, and political decisions came to be of paramount importance.[75]

A good example of the way in which the public authorities revitalized the district after national unification is the case of the craftsman Vicenzo Bernardelli. In 1865 he left the Franzini firm to establish his own business, working as contractor for the arsenal. Thanks to substantial demand from the army for semi-finished products and from hunters for shotguns, he first enlarged his home workshop and then, in 1883, bought part of a forge called "in Capo a Gardone" from Crescenzio Paris. This progressive enlargement reflected a definite, planned reorganization of his manufacturing activity: the new premises specialized in barrel-making, and the older workshop was converted to firing mechanisms manufacturing.[76]

As is explained in subsection 3.2, Bernardelli was following a path common to other producers as well. The ultimate aim was to acquire the technologies and know-how to manufacture finished firearms in-house. This objective was attained in 1890, when Giulio Bernardelli, Vincenzo's fourth son, joined the company after graduating from the local vocational school. The process of growth was completed in 1908 when the family bought a large plant in a peripheral area of Gardone and relocated the entire production process there.[77]

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[75] Montanari, "L'arsenale della nazione", cit., p. 244.
[76] Del Barba, *Storia del distretto armiero gardonese*, cit., pp. 29-34.
[77] Ibid., pp. 59-60.

3.2 Factories as driving factors

In 1863, a project that was crucial for the transformation of the district was set in motion: namely, the enlargement and enhancement of the arsenal. The government's idea, strongly supported by the municipality of Gardone, was to transform the local arsenal – little more than a center for firearms storage and inspection – into a manufacturing plant.[78] This was a lengthy, complex process, another suggestive instance of the close links between small arms production and the local population.[79]

On 30 November 1863 the Gardone Val Trompia town council resolved to submit what proved to be the first in a long series of petitions to the War Ministry for construction of a state-owned armaments manufacturing plant. This was seen as critical for Gardone and indeed for the entire valley,[80] to ensure a more regular flow of orders for military equipment.[81] This petition presumably reflected the council's intention to maintain close government attention on the negotiations of the Regia Direzione d'Artiglieria for the purchase of the Bertarini forge[82] ("Fornace"). The next month the council

[78] Albesio, "Dall'Arsenale alla S.F.A.E.", cit., p. 236.
[79] G. Becattini, "Beyond geo-sectoriality: the productive chorality of places", in *Investigaciones Regionales - Journal of Regional Research*, 32, 2015, pp. 31-41.
[80] On the importance of military orders and a government factory for the rest of the valley, see the petitions of the Lumezzane Pieve, Lumezzane S. Apollonio, and Carcina town councils in 1864. See ASCG, b. 180, f. 2, letter from the Lumezzane Pieve town council to the mayor of Gardone, 12 June 1864; ibid., letter from the mayor of Carcina to the mayor of Gardone, 12 June 1864; ibid., letter from the mayor of Lumezzane S. Apollonio to the mayor of Gardone, 14 June 1864.
[81] Ibid., f. 1, Gardone town council minutes, 30 November 1863.
[82] From a report by the Giunta Comunitativa di Statistica we know that in 1861 the forge – let to the government at the time – was equipped with "12 ancient animal-powered machines and six motors". By 1863, "24 bores, two rolling mills, a grindstone, a wheel and six fires were powered with the same motors. The new form bores worth £600 each came partly from Turin and partly from the Glisenti foundry in Carcina, and the wheel worth £600 from Turin were all purchases made by the government; now a further 24 bores are being introduced. One of these will be powered by a single engine. For these, in addition to the one remaining engine with which other machines will be powered, 40 more bores will be brought in than there were in 1861. Additional machines, both for rifling and for plating the barrels with iron, work every day at government ex-

passed a resolution to purchase and then cede to the government free of charge the land around this forge, so as to create the conditions for the construction of a facility for military production.[83] This project was supported by local craftsmen, who pledged a fixed monthly contribution of £274.75 for a year, which they paid into the local Cassa di Risparmio.[84]

In 1864, in accordance with the agreement between the military authorities and the owners of the forge, the Parliament of the Kingdom approved the purchase of the Bertarini forge for £32,500,[85] but a positive conclusion to the affair was still distant, and a series of technical and bureaucratic problems arose.[86] The purchase process was interrupted and the military administration began to weigh the possibility of shifting the project elsewhere.[87] The breakthrough did not come until the second half of 1869: from July to November all the thorny questions that had impeded the project were resolved and an agreement was reached between the Gardone Val Trompia town council and the War Ministry. The council pledged the following:[88]

1. to acquire the "Fornace" forge at its own expense and cede it to the government to build the factory;[89]

pense." The report concluded: "If even when there were no machines and no improvements in manufacturing a significant number of barrels were fabricated and these arms won awards at exhibitions in Paris, Munich, London and Florence, how much better might they be in these current times and in the future" (translation from the Italian). See ibid., f. 2, report by Giunta Comunitativa di Statistica, 1864.

[83] Ibid., f. 1, Gardone town council minutes, 26 December 1863; ibid., f. 2, letter from the mayor of Gardone to the directorate of the arsenal, 25 January 1864.

[84] Ibid., f. 1, letter to the Gardone town council, 1863.

[85] *Giornale Militare*, 1865, p. 414.

[86] In addition to problems with water supply, there were difficulties regarding the notarial deed to certify ownership of the forge, which in fact had changed hands many times between 1850 and 1858; see ASCG, b. 180, f. 4, "All. B", 12 February 1867.

[87] Ibid., f. 5, letter from the arsenal's director to the mayor of Gardone, 25 March 1869; Archivio di Stato di Brescia (hereafter ASBS), *Carte Zanardelli*, b. 46, letters of the Gardone town council and Marco Cominazzi to Giuseppe Zanardelli, 28 February 1869.

[88] ASCG, b. 180, f. 5, Gardone town council minutes, 22 August 1869; ibid., Brescia province council minutes, 22 September 1869; ibid., Gardone town council minutes, 26 November 1869.

[89] The estate was the property of Bonaventura Moretti, Giovanni Moretti and Giacinto

2. to ensure that the amount requested by the owners would be reduced by £7,000, i.e. from £32,500 to £25,500;
3. to remove the existing easements over the forge;
4. to guarantee the supply of the water necessitated for the functioning of the new Fabbrica Erariale;
5. to provide £15,000 in cash to be paid within a year of the start of work.[90]

Finally, as the 1870s got under way, thanks to the influence of Giuseppe Zanardelli, a parliamentarian of the Historical Left whose constituency was in Val Trompia, local institutions and producers persuaded the government to invest in provincial manufacturing centers.[91] Thanks to this public investment, the government factories of Brescia and Gardone took on a precise role within the composite framework of government contracts and were crucial to the devel-

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Moretti, the first with 5.72 Jucharts of land earning £44.14, each of the other two with 0.49 Jucharts earning £3.77. The estate thus came to 6.69 Jucharts equivalent to 2.055 Brescian iugera, and its value was estimated at £2,086.50 per Brescian iugera. However, since the sale led to the break-up of the neighbouring estate and required rearranging the entrances, it was agreed that the Gardone town council should pay a third more than the estimated value. The final sale price was thus set at £2,782 per Brescian iugera, or a total of £5,343 of which £4,952 was owed to Bonaventura Moretti and £391 to Giovanni and Giacinto Moretti. See ASCG, b. 382, f. 9.1, report of appraisal, 1 February 1872; ibid., military engineering office minutes, 9 March 1872.

[90] The town council made this offer to favor the government's purchase of another forge, known as "Rampinelli" or "Moretta," with the adjoining Paris-Abeni mill. These talks, too, were lengthy and complex, and unlike those for the Bertarini forge, ultimately they did not produce an agreement. It is likely that the government's motivation for the acquisition of these properties, in part, was to head off water supply problems, as they were located upstream from the Bertarini forge and shared a canal with it. But on 19 August 1869, at a meeting with the mayor of Gardone and an army captain to renegotiate the value of the two properties, the owners (the Moretta brothers) formally refused the sale (unlike Abeni, who had already agreed to lower the price for his mill). It may have been for this reason that the government took the precaution of requiring the council to provide explicit guarantees of water supply from the canals. Whilst the purchase of the two properties fell through, the town council did not feel that it could rescind its offer of £15,000 in cash. See ASCG, b. 382, f. 9.1, term sheet, 28 July 1869; ASCG, b. 180, f. 5, letter from the minister of war to the arsenal's director, 8 July 1869; ibid., letter of the arsenal's director to the mayor of Gardone, 12 July 1869; ibid., minutes, 19 August 1869.

[91] Montanari, "Giuseppe Zanardelli e il decollo dell'industria bresciana", cit.; Id., "L'arsenale della nazione", cit.

opment of local manufacturing specialization. The two plants divided the work between them: "In Gardone they bore, rifle and smooth the barrels, make the breech blocks, the mobile breeches and the tails; in Brescia they finish the job with burnishing and fire coloring; the housing is worked together with the rifle mounts; the sabre bayonet guards and rifles are assembled by joining the various parts together before testing. For the revolving-barrel pistols almost all the parts are made in Gardone, but like the rifles they are assembled in Brescia."[92]

The arsenal played a major role in awarding contracts throughout the entire Val Trompia. In addition to the private Gardone forges, the military directorate also patronized several workshops in Lumezzane, entrusting manufacturers with work on saber blades, mounts, finishings and rifle accessories. This outsourced work was quite significant, employing between a third and a quarter of the total local workforce.[93]

At least for a number of years, the district overcame the problems caused by the volatility of military orders, and the output of the local arsenal increased steadily, peaking at 40,000 pieces in 1883.[94] This increase depended both on technical-manufacturing factors and political dynamics. In 1876, the period of government by the Historical Right ended and the Left came into office. This sanc-

[92] M. Bonardi, *Il ferro bresciano. Note storiche e statistiche*, Brescia, 1889, p. 57 (translation from the Italian).

[93] On the outsourcing strategy, see the arsenal's tender notices for the production of daggers, sabers and various firearm parts in Archivio Storico del Comune di Lumezzane Sant'Apollonio (ASCL), b. 43, ff. 1-3. The importance of the arsenal for the firms of the province, especially the forges in Val Gobbia, is also emphasized in an objection submitted to the Prime Minister and the Ministry of War regarding the decision to subordinate the Brescian armories to that of Terni. The document was drafted by Girolamo Orefici (mayor of Brescia), Giovanni Corridori (council member delegated by the mayor of Gardone Val Trompia), Giacomo Polotti (mayor of Lumezzane Pieve), Marcello Stanchino (representative of Lega dei Lavoratori dello Stato) and Carlo Bonardi (writer); see ASCL, b. 171, f. 3, *Memoriale in Difesa della R. Fabbrica di Brescia-Gardone*, Apollonio, 1911.

[94] ASBS, *Carte Zanardelli*, b. 805, summary table of the small arms production of the Brescia arsenal from 1 January 1872 to 30 June 1884, 4 August 1884.

tioned the rise to power of industrial capital and the progressive marginalization of an agrarian vision, which industrialists felt had neglected their interests.[95] From now on the armaments sector acquired a dual, contradictory structure. On the one hand, it was a paradigm of state incentives for industrial development and import substitution, which the arms sector helped to gradually achieve. On the other, the structural difficulties of a fledgling industrial system, especially in its technologically more advanced segment, weighed heavily on the arms industry.[96]

The new government's approach[97] not only increased production, as noted, and undertook projects for the modernization of the government factory[98] but also furthered the entrepreneurial dynamism that had revived following unification. The traditional relationship with the upper valley and its mines came to an end. The substantial improvements in wire drawings of metal and the introduction of electricity resulted in new systems for the procurement of crucial raw materials. The local steel industry underwent substantial restructuring, local iron and charcoal were progressively supplanted by imported semi-finished steel and coke. Several gun producers increased their energy production by investing in hydroelectricity, first replacing water wheels with turbines and then installing specific generators. The new local energy system was completed in subsequent years with the formation of a consortium for the management of the Mella river waters.[99] Two businesses – Officina Metallurgica Francesco Glisenti (hereafter Glisenti) and Fabbrica d'Armi Pietro Beretta (hereafter Beretta) – took the lead in the district with the industrialization of production and technological innovation.

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[95] Montanari, "L'arsenale della nazione", cit., p. 246.
[96] Segreto, *Marte e mercurio*, cit., p. 22.
[97] On military policy in Liberal Italy see F. Degli Esposti, *Le armi proprie. Spesa pubblica, politica militare e sviluppo industriale nell'Italia Liberale*, Milan, 2006.
[98] ASBS, *Carte Zanardelli*, b. 805, arsenal enlargement projects, December 1885.
[99] P. Bonetti, *I canali industriali di Gardone Val Trompia. Storia del Consorzio sponda destra del Mella*, Roccafranca, 2004.

Glisenti, headquartered in Villa Carcina, was the first integrated steel group in the province. Exploiting its close relations with the political authorities and pursuing process and product innovation, the firm carved out an important role in the government contracting system and became the standard-bearer for a whole series of forges in Val Trompia. Above all, the relationship between Francesco Glisenti and Giuseppe Zanardelli was crucial, giving the company the opportunity to win a succession of orders from the Italian army.[100]

In 1884, with estimated equity capital of £2.5 million, the firm had a workforce of 880 and power of around 600HP. Its factories stretched down the Mella, initiating a complete, fully integrated production cycle. Glisenti had six production units in the valley: a mine in Bovegno, one furnace in Tavernole and two in Zanano, a steel-working and machining plant in Villa Cogozzo, and a plant in Carcina consisting of units for iron and steel production, mechanical construction, and firearms manufacturing. The arms factory, with a capacity of 100 rifles a day, produced 4,000 military and hunting weapons a year. Here, barrel-working was completed with rifling and screw tightening, the mechanism parts were made and all assembly work was done.[101]

Another demonstration of the renewed ferment of the district following national unification is the Beretta firm. This case is extremely interesting, as it highlights how the civilian arms market and local entrepreneurship complemented the government and mil-

[100] Degli Esposti, *Le armi proprie*, cit., p. 150; S. Onger, "Glisenti", in *Dizionario biografico degli italiani*, 57, Rome, 2001, p. 403.
[101] S. Onger, "L'industria privata di armi da guerra. Il caso della Glisenti (1859-1907)", in N. Labanca, P.P. Poggio (eds.), *Storie di armi*, Milan, 2009, pp. 63-65. On Glisenti see also D. Montanari, "Miniere, forni e officine meccaniche: da Bovegno a Carcina il patriota Francesco Glisenti costruisce con tenacia il primo gruppo 'integrato' della storia industriale bresciana", in *La Banca Credito Agrario Bresciano e un secolo di sviluppo*, cit.; G. Marchesi, "Francesco Glisenti e l'inchiesta industriale del 1870-1874", in *I Glisenti. Cinquecento Anni di storia: industria, arte, politica, cultura*, Brescia, 2004; V. Varini, S. Onger, "Cultura imprenditoriale e sviluppo economico lombardo: la famiglia Glisenti tra Otto e Novecento", in *Imprese e Storia*, 32, 2005, pp. 245-283.

itary weaponry. Beretta certainly benefited from government contracts, which emerged as a decisive factor in its growth, but military production was always supplemented by orders for sporting weapons for hunting, target shooting and, later on, skeet shooting.[102]

After unification Beretta carried out an industrial concentration while maintaining its control over a series of forges in the valley. This historic family business began to bring together, in the area of the Manenti forge, all the phases of production, so as to manufacture a finished firearm in a single building.[103] Output rose from 300 pieces in 1850 to 7,000 in the early 1880s, when the workforce reached 180. Around half the firm's production was exported to European and other markets (above all the Levant and northern Africa) and achieved new levels of excellence in both quantity and quality thanks to a 1,000-sq.m. plant equipped with modern machinery.[104]

In the 1870s the head of the family, Giuseppe Antonio Beretta, consolidated the transition from craft to industrial manufacturing by adopting the most advanced technology. Beretta invested in the ASM, adopting specialized machine tools for mass production with interchangeable parts made by Pratt & Whitney. Contradicting the generally poor reputation of local gun-making, Beretta opted for this system around the same time as its main European competitors.[105]

The gun-making district had to cope with new problems around the turn of the century, when for political reasons other government factories were favored at the expense of Brescia and the local system

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[102] P. Roffia, "La Pietro Beretta Fabbrica d'Armi e l'egemonia dei paesi nord-europei nella produzione di armi", in G. Bruni, B. Campedelli, P. Roffia (eds.), *Saggi Storici di ragioneria. Ricerche e analisi di imprese longeve*. Vol. I. *Pietro Beretta Fabbrica d'Armi*, Verona, 1997, pp. 135-176.

[103] C. Simoni, *La via del ferro e delle miniere in Valtrompia. Un itinerario nel passato produttivo e nel patrimonio storico-industriale di un territorio minerario e siderurgico*, Gardone Val Trompia, 2010, p. 55.

[104] Morin and Held, *Beretta*, cit., p. 205; Bonetti, *I canali industriali di Gardone Val Trompia*, cit., p. 85.

[105] Bohn and Jaikumar, *From Filing and Fitting to Flexible Manufacturing*, cit., p. 54; S. Onger, I. Paris, "Giuseppe Beretta: una lunga storia dentro un secolo breve (1906-1993)", in A. Porteri (ed.), *Cultura, ricerca e società. Da Giuseppe Beretta (1906-1993) all'intervento delle fondazioni*, Rome-Bari, 2012, pp. 36-39.

lost major military contracts. As a consequence, the arsenal's propulsive effect waned and Glisenti – already weighed down by debt and some failed attempts at diversification – began to downsize and finally, in 1907, closed its plants entirely.[106] Until the significant changes brought about by the Italo-Turkish war and the industrial mobilization of World War I,[107] the local production system had to follow the leadership of Beretta and Bernardelli, which were now the local leaders in small arms, both commercial and military.[108]

4. Conclusion

This study has addressed the topic of resilience of industrial districts, considering the four fundamental questions posed by Martin and Sunley: "resilience of what, to what, by what means, and with what outcome?"[109] The paper retraces the decline and recovery of the Italian gun-making district in the nineteenth century, in order to verify the role played by public authorities and factories in relaunching the local production system in the light of the historical literature on industrial districts and the transformation of similar manufacturing poles – Birmingham and Eibar – in the same period.

The nineteenth century confronted the European gun-making districts with a delicate phase of renewal and transformation: from labor-intensive craft production, their distinctive trait for centuries, they were obliged to take up the challenge of mechanization. In addition to the technological hurdles, producers also faced pressures from governments, naturally the leading, traditional customers for firearms, which were eager to improve their armies' equipment.[110]

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[106] Onger, "L'industria privata di armi da guerra", cit., pp. 72-73.
[107] On the years of the Great War see R. Semeraro, "'Col miraggio di mirabolanti ordinazioni'. Brescia e lo sviluppo industriale negli anni della Guerra europea", in S. Onger (ed.), *Brescia e la Grande Guerra*, Brescia, 2019, pp. 209-238
[108] Del Barba, *Storia del distretto armiero gardonese*, cit., pp. 47-51.
[109] Martin and Sunley, "On the Notion of Regional Economic Resilience", cit., p. 12.
[110] Smith, *Harpers Ferry Armory and the New Technology*, cit.; Gaier, *Four Centuries of Liège Gunmakin*g, cit., pp. 117-126; Bacher et al., *La Manufacture d'Armes de Saint-Étienne*, cit., pp. 45-65.

During the first half of the century the Italian gun-making district suffered a prolonged crisis, with a contraction of output and a decline in quality.[111] This situation, brought about by the opportunistic course of the Austrian government and local producers' resistance to change, was turned around by the creation of the Kingdom of Italy, which relaunched local production for military procurement.[112] Several factors lay behind the revitalization and consequent transformation of the district: public investment, the coordination of intermediate institutions, and the propulsive role of factories.

As to role of the central government and its investment, we have seen that after national unification the government set national rules and costs for arms production, thus integrating the gun-making district into a broader national production system. In addition, the public resources invested in Gardone first to reopen and then to enlarge the local arsenal were substantial, and indeed fundamental.

The coordination provided by intermediate institutions came both from the arsenal itself and from the town government. The former outsourced production to local manufacturers, provided raw materials, introduced machinery (rudimental, to be sure), performed logistical services, and inspected the quality of the weapons.[113] The latter voiced the gunsmiths' interests and mediated potential conflicts within the district: it represented the gunmakers before the national government and above all served as facilitator in the negotiations for the acquisition of the Bertarini forge.[114]

The propulsive role of the factories in the district's recovery depended, once again, on the productive activity of the arsenal, but also on the action of three private producers: Glisenti, Beretta and

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[111] Marchesi, *Quei laboriosi valligiani*, cit., p. 223; G. Gregorini, "La siderurgia dalla Restaurazione al decennio '80: localizzazioni, livelli produttivi, tecniche", in L. Trezzi (ed.), *Per una storia della Valle Camonica nei secoli XIX e XX. Attività di base e vie di comunicazione*, Breno, 1993, pp. 39-41.
[112] Montanari, "Nato con Napoleone", cit.
[113] Montanari, "L'arsenale della nazione", cit.
[114] Guizzetti, *La produzione armiera*, cit.

Bernardelli. These factories, which relied on production integration and mechanization, became the drivers of the district, fostering the transition from craftsmanship to the factory system and consequently expanding production capacity.[115]

The recovery inevitably had repercussions on the production structure. To apply the categories of Markusen, the Italian gun-making district had a configuration intermediate between the state-anchored and the hub-and-spoke structure.[116] In practice the government plant was the key anchor tenant, and its activity – strongly dependent on political dynamics – was a factor in the growth of some companies, offering opportunities for profit, stimulating improvement in production quality and greater punctuality.[117] The dynamism of local production was associated with the national and international market position of these anchor organizations, which came to play the dual role of contractors and outsourcers. Other local firms tended to have subordinate relationships to them.[118] There was cooperation within the district, but on the terms of the hub firms. There were personnel exchanges and substantial intradistrict trade between suppliers and hub firms, but there was a marked lack of cooperation among competitor firms to share risk, stabilize the market, or share innovations.[119] The labor market was internal to both large hub firms and to the district at large, with hub companies drawing new labor.[120] Workers' loyalty was first to the core businesses, then to the district, and only after that to small enterprises. If jobs opened up in hub firms, workers would often leave smaller employers to get onto the larger ones' payroll.[121] Around the

[115] Onger, "L'industria privata di armi da guerra", cit.; Onger and Paris, "Giuseppe Beretta", cit.
[116] A. Markusen, "Sticky Places in Slippery Space: A Typology of Industrial Districts", in *Economic Geography*, 72, 1996, pp. 293-313
[117] Montanari, "Produzione d'armi da guerra su commessa pubblica", cit.
[118] Del Barba, *Storia del distretto armiero gardonese,* cit; Morin and Held, *Beretta*, cit.
[119] Onger, "L'industria privata di armi da guerra", cit.; Onger and Paris, "Giuseppe Beretta", cit.
[120] Bonetti and Pagani, *Il movimento operaio in Valtrompia*, cit.
[121] Markusen, "Sticky Places in Slippery Space", cit., pp. 302-304 and 306-307.

turn of the century, owing to the strong influence of politics,[122] the Italian gun-making district faced recurrent periods of downsizing and had trouble catching up with foreign arms manufacturers.[123] The local production system managed to secure a future thanks to the persistence and foresight of Beretta and Bernardelli.[124]

The British and Spanish districts followed different paths, with consequently different changes to production structure. The Birmingham district saw the birth of a series of private companies of significant size, oriented to the most modern production standards. By investing in another production site, namely Enfield, and subsequently fostering the spread of technology and know-how, the government overcame the resistance of the Birmingham producers. Faced with competition from a national state plant, the British district opened up to industrialization through a hub-and-spoke structure.[125] Some vertically integrated companies acquired a prominent position in local production, and around them a number of SMEs specialized in supply tasks and carved out market niches.[126]

In Spain, the liberalization of arms production and the reduction of government military orders pushed the Eibar district to further fragmentation of production and the typical Marshallian structure.[127] A handful of assembly firms took the lead in the production system, and vertical integration and quality improvement were ac-

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[122] Politics represented a transverse factor in Italian industrialization, which the literature has defined as "political capitalism". On the latter concept, see F. Amatori, "L'Italia. Il tormentato sviluppo delle capacità organizzative tra Stato e famiglie", in A.D. Chandler jr., F. Amatori, T. Hikino (eds.), *Grande impresa e ricchezza delle nazioni*, Bologna, 1999, pp. 341-375.

[123] Roffia, "La Pietro Beretta Fabbrica d'Armi e l'egemonia", cit.; Segreto, *Marte e Mercurio*, cit.; Degli Esposti, *Le armi proprie*, cit.

[124] P. Roffia, "La Pietro Beretta Fabbrica d'Armi dai primi del 1900 ai giorni nostri: la definitiva conquista della leadership italiana e le basi per il ruolo di competitor mondiale", in Bruni et al. (eds.), *Saggi Storici di ragioneria*, cit., pp. 177-230; Del Barba, *Storia del distretto armiero gardonese*, cit.; Onger and Paris, "Giuseppe Beretta", cit.

[125] Markusen, "Sticky Places in Slippery Space", cit., p. 302.

[126] Fries, "British Response to the American System", cit., pp. 388-393; Williams, *The Birmingham Gun Trade*, cit., pp. 137-140.

[127] Markusen, "Sticky Places in Slippery Space", cit., p. 297.

cordingly rare objectives. Thus despite the growth in production units, labor, and output, the district inevitably relapsed into low-quality products and commercial ruses designed to conceal the origin of the weapons.[128]

The paper has shown that in the late nineteenth century the gun-making districts were all somewhat resilient. They successfully overcame shocks and disturbances, as is demonstrated by the expansion of output, their entrepreneurial dynamism, and their adaptation to the new context. In any event, it was the British district that achieved the most significant results, with a new configuration of production characterized by the leadership of a few private factories. The public authorities played a decisive role, to be sure, but their intervention yielded the best results under two conditions:

1. it had to be aimed at fostering the growth of private factories; and
2. it had to be exercised through intermediate institutions, such as municipalities and local arsenals.

To conclude, this reconstruction of the processes of the districts' internal adaptation to external changes[129] demonstrates the significant role that both governments and factories can play within districts in particular phases of their life cycle.[130] The study shows that these actors can promote, in different ways, the dissemination of know-how and technology, can train technicians and new entrepreneurs, and can resolve conflicts. As regards the debate on resilience, the paper demonstrates that despite increasing political interest in and promotion of economic localism, local and regional

[128] Goñi Mendizabal, "La internacionalización de la industria armera vasca", cit.; Id., "Eibar y la industria armera", cit.

[129] Such processes were common to other cases; see P. Alonso Villa, M. Álvarez Martín, P.P. Ortúñez Goicolea, "Formación y desarrollo de un distrito metalúrgico en Valladolid (c. 1842-1951)", in *Investigaciones de Historia Económica - Economic History Research*, 15, 2019, p. 187.

[130] Viesti, *Come nascono i distretti*, cit; A. Popp, *Business Structure, Business Culture, and the Industrial District: The Potteries, c. 1850-1914*, Ashgate, 2001; J. Wilson, A. Popp (eds.), *Industrial Clusters and Regional Business Networks in England, 1750-1970*, Abingdon, 2003, p. 8.

economies do not exist in isolation: resilience cannot be simply reduced to inherent and endogenous. When local companies, workforce and institutions lack the necessary resources and capabilities, external support – including from central government – can be crucial to rebounding from shocks and molding the path of this process.[131]

References

Archival sources

Archivio di Stato di Brescia (ASBS):
- *Carte Zanardelli*, bb. 46 and 805.

Archivio Storico del Comune di Gardone Val Trompia (ASCG):
- b. 69, f. 1;
- b. 180, ff. 1-2, 4-5;
- b. 183, f. 1;
- b. 382, f. 9.1.

Archivio Storico del Comune di Lumezzane Sant'Apollonio (ASCL):
- b. 43, ff. 1-3;
- b. 171, f. 3.

Archivio Storico del Comune di Magno (ASCM):
- b. 28, ff. 1-15.

Official bulletins

Giornale militare, 1859-1860 and 1865.

Bibliography

Albesio A. (1969), "Dall'Arsenale alla S.F.A.E.", in G. Zucca (ed.), *Antologia gardonese*, Apollonio, Brescia, pp. 235-238.

Alonso Villa P., Álvarez Martín M., Ortúñez Goicolea P.P. (2019), "Formación y desarrollo de un distrito metalúrgico en Valladolid

[131] Martin and Sunley, "On the Notion of Regional Economic Resilience", cit., pp. 36-37.

(c. 1842-1951)", in *Investigaciones de Historia Económica - Economic History Research*, 15, pp. 177-189.

Arrighetti A., Seravalli G. (eds.) (1999), *Istituzioni intermedie e sviluppo locale*, Donzelli, Rome.

Amatori F. (1999), "L'Italia. Il tormentato sviluppo delle capacità organizzative tra Stato e famiglie", in A.D. Chandler jr., F. Amatori, T. Hikino (eds.), *Grande impresa e ricchezza delle nazioni*, il Mulino, Bologna, pp. 341-375.

Ansiaux M. (1899), "L'industrie armuriere liégeoise", in *Les Industries à Domicilie en Belgique*, Office du Travail de Belgique, Bruxelles.

Bacher B., Brun J.F., Perrin É. (2014), *La Manufacture d'Armes de Saint-Étienne: la Révolution des Machines, 1850-1870*, Un, Deux... Quatre, Clermont-Ferrand.

Bagnasco A. (1977), *Tre Italie. La problematica territoriale dello sviluppo italiano*, il Mulino, Bologna.

– (1979), "Ancora sul modello delle tre Italie", in *Economia e Politica Internazionale*, 22.

Becattini G. (1975) (ed.), *Lo sviluppo economico della Toscana con particolare riguardo all'industrializzazione leggera*, IRPET - Guaraldi, Florence.

– (1979), "Dal 'settore industriale' al 'distretto industriale'. Alcune riflessioni sull'unità di indagine nell'economia industriale", in *Rivista di Economia e Politica Industriale*, 1:1, pp. 7-21.

– (1987), *Mercato e forze locali: il distretto industriale*, il Mulino, Bologna.

– (1989), "Riflessioni sul distretto industriale marshalliano come concetto socio-economico", in *Stato e mercato*, 25:1, pp. 111-128.

– (2000), *Il bruco e la farfalla. Prato: una storia esemplare dell'Italia dei distretti*, Le Monnier, Florence.

– (2002), "From Marshall's to the Italian 'Industrial Districts'. A Brief Critical Reconstruction", in A. Quadrio Curzio, M. Fortis (eds.), *Complexity and Industrial Clusters. Dynamics and Models in Theory and Practice*, Springer, Heidelberg-New York, pp. 83-106.

– (2004), *Industrial Districts: A New Approach to Industrial Change*, Edward Elgar, Cheltenham.

– (2015), "Beyond geo-sectoriality: the productive chorality of places", in *Investigaciones Regionales - Journal of Regional Research*, 32, pp. 31-41.

Becattini G., Bellandi M., De Propris L. (eds.) (2009), *A Handbook of Industrial Districts*, Edward Elgar, Cheltenham.

Behagg C. (1998), "Mass Production without the Factory: Craft Producers, Guns and Small Firm Innovation, 1790-1815", in *Business History*, 40:3, pp. 1-15.

Belfanti C.M. (1998), "A Chain of Skills: the Production Cycle of Firearms Manufacture in the Brescia Area from the Sixteenth to the Eighteenth Centuries", in A. Guenzi, P. Massa, F. Piola Caselli (eds.), *Guilds, Markets and Work Regulations in Italy, 16th-19th Centuries*, Routledge, London, pp. 266-283.

– (2009), "The Genesis of a Hybrid: Early Industrial Districts between Craft Culture and Factory Training", in G. Becattini, M. Bellandi, L. De Propris (eds.), *A Handbook of Industrial Districts*, Edward Elgar, Cheltenham, pp. 10-18.

Belussi F., Caldari K. (2009), "At the Origin of the Industrial District: Alfred Marshall and the Cambridge school", in *Cambridge Journal of Economics*, 33, pp. 335-355.

Belussi F., Hervás-Oliver J.L. (2017), *Unfolding Cluster Evolution*, Routledge, London-New York.

Belussi F., Sedita S.R. (eds.) (2009), "Life Cycle vs. Multiple Path Dependency in Industrial Districts", in *European Planning Studies*, 17:4, pp. 505-528.

Bohn R., Jaikumar R. (2005), *From Filing and Fitting to Flexible Manufacturing*, Now Publishers, Hanover-Delft.

Bonardi M. (1889), *Il ferro bresciano. Note storiche e statistiche*, Unione Tipo-Litografica Bresciana, Brescia.

Bonelli F. (1989), "Spesa militare e sviluppo industriale in Italia", in Ministero per i Beni Culturali e Ambientali, *Esercito e città dall'Unità agli anni Trenta*. Atti del Convegno di studi, Perugia, 11-14 maggio 1988, Vol. II, Rome.

Bonetti P. (2004), *I canali industriali di Gardone Val Trompia. Storia del Consorzio sponda destra del Mella*, La Compagnia della Stampa Massetti Rodella, Roccafranca.

Bonetti P., Pagani P. (1987), *Il movimento operaio in Valtrompia dal 1860 all'avvento del fascismo*, Squassina, Brescia.

Braudel F. (1983), *Civilization and Capitalism: 15th-18th Century*. Vol. II: *The Wheels of Commerce*, Book Club Associates, London.

Brusco S. (1982), "The Emilian Model: Productive Decentralisation and Social Integration", in *Cambridge Journal of Economics*, 6:2, pp. 167-184.

– (1989), *Piccole imprese e distretti industriali*, Rosenberg & Sellier, Turin.

Calvó J.L. (1997), *La industria armera nacional 1830-1940. Fábricas, privilegios, patentes y marcas*, Comisión Ego Ibarra, Eibar.

Colli A. (2009), "Industrial Districts and Large Firms: The Stubborn Persistence of a 'Weak' Productive Model", in G. Becattini, M. Bellandi, L. De Propris (eds.), *A Handbook of Industrial Districts*, Edward Elgar, Cheltenham, pp. 58-68.

Colt S. (1852), "On the Application of Machinery to the Manufacture of Rotating Chambered-Breech Fire-Arms, and other Peculiarities of those Arms (Including Plates)", in *Minutes of the Proceedings of the Institution of Civil Engineers*, 11:1852, pp. 30-50.

Cominazzi M. (1861), *Cenni sulla fabbrica d'armi in Gardone di Valtrompia*, Tipografia della Sentinella, Brescia.

Degli Esposti F. (1997), *Le Fabbriche di Marte. Gli Arsenali del Regno di Sardegna tra Restaurazione e Risorgimento: Organizzazione, Economia, Tecnologia*. Vol. 1 - *Gli stabilimenti piemontesi*, Titanio, San Marino.

– (2000), *Le Fabbriche di Marte. Gli Arsenali del Regno di Sardegna tra Restaurazione e Risorgimento: Organizzazione, Economia, Tecnologia*. Vol. 2 - *Gli stabilimenti liguri*, Titanio, San Marino.

– (2006), *Le armi proprie. Spesa pubblica, politica militare e sviluppo industriale nell'Italia Liberale*, Unicopli, Milan.

– (2009), "Stabilimenti Industriali o Falansteri? La Lunga Parabola degli Arsenali", in N. Labanca and P.P. Poggio (eds.), *Storie di armi*, Unicopli, Milan.

Del Barba M. (2008), *Storia del distretto armiero gardonese. Il caso della Vincenzo Bernardelli (1865-1997)*, Fondazione Luigi Micheletti, Brescia.

DUBESSY R. (1900), *Historique de la Manufacture d'armes de guerre de Saint-Etienne*.

DUNHAM K. (1955), *The Gun Trade of Birmingham. A Short Historical Note of the More Interesting Features of a Long-Established Industry*, The City of Birmingham Museum and Art Gallery, Birmingham.

EPSTEIN S.R. (1998), "Craft Guilds, Apprenticeship, and Technological Change in Preindustrial Europe", in *Journal of Economic History*, 58:3, pp. 684-713.

FERNÁNDEZ DE PINEDO E. (2001), "De la primera industrialización a la reconversion industrial: la economía vasca entre 1841 y 1990", in L. Germán, E. Llopis, J. Maluquer de Motes, S. Zapata (eds.), *Historia Económica Regional de España, siglos XIX y XX*, Crítica, Barcelona.

FOCCOLI G. (1969), "La cittadella delle armi", in G. Zucca (ed.), *Antologia Gardonese*, Apollonio, Brescia, pp. 170-183.

FORISSIER M. (2005), *L'Armurerie de Saint-Étienne au XX^e Siècle*, Editions du Portail, La Tour du Pin.

FRIES R.I. (1972), *A Comparative Study of the British and American Arms Industry, 1790-1890*, Ph.D. Dissertation, Johns Hopkins University.

– (1975), "British Response to the American System: The Case of the Small-Arms Industry after 1850", in *Technology and Culture*, 16:3, pp. 377-403.

FUÀ G. (1980), P*roblemi dello sviluppo tardivo in Europa*, il Mulino, Bologna.

FUÀ G., ZACCHIA C. (eds.) (1983), *Industrializzazione senza fratture*, il Mulino, Bologna.

GAIER C. (1985), *Four Centuries of Liège Gunmaking*, Eugène Wahle, Liège.

GARCÍA MANRIQUE E. (1961), *Eibar, inmigración y desarrollo urbano e industrial*, Departamento de Geografía Aplicada del Instituto Elcano, Zaragoza.

GOÑI MENDIZABAL I. (2007), "Evolución de la industria armera vasca (1876 y 1969): un enfoque a largo plazo", in P. Pascual Domènech, P. Fernández Pérez (eds.), *Del metal al motor. Inno-*

vación y atraso en la historia de la industria metal-mecánica española, Fundación BBVA, Barcelona, pp. 385-432.
– (2008), "Imitación, innovación y apoyo institucional. Estrategias de penetración en los mercados internacionales de las empresas vascas durante el Siglo XX", in *Revista de la Historia de la Economía y de la Empresa*, 2, pp. 207-236.
– (2009), "De Esperanza y Unceta a Astra-Unceta y Cía., Una empresa armera ante el mercado internacional", in *Revista de Historia Industrial*, 40, pp. 40-51.
– (2009), "La internacionalización de la industria armera vasca 1867-1970. El distrito industrial de Eibar y sus empresas", in *Información Comercial Española*, 849, pp. 79-95.
– (2010), "Eibar y la industria armera: evidencias de un distrito industrial", in *Investigaciones de Historia Económica*, 6:16, pp. 101-133.

Goodman J.D. (1886), "The Birmingham Gun Trade", in S. Timmins (ed.), *The Resources, Products, and Industrial History of Birmingham and the Midland Hardware District*, Robert Hardwicke, London.

Grandi A. (2007), *Tessuti compatti. Distretti e istituzioni intermedie nello sviluppo italiano*, Rosenberg & Sellier, Turin.

Gregorini G. (1993), "La siderurgia dalla Restaurazione al decennio '80: localizzazioni, livelli produttivi, tecniche", in L. Trezzi (ed.), *Per una storia della Valle Camonica nei secoli XIX e XX. Attività di base e vie di comunicazione*, Tip. Camuna, Breno.

Guenzi A. (1997), "La storia economica e i distretti industriali marshalliani: qualche considerazione su approcci e risultati", in C.M. Belfanti, T. Maccabelli (eds.), *Un paradigma per i distretti industriali, Radici Storiche, attualità e sfide future*, Grafo, Brescia.
– (2009), "Early Industrial Districts. Introduction", in G. Becattini, M. Bellandi, L. De Propris (eds.), *A Handbook of Industrial Districts*, Edward Elgar, Cheltenham, pp. 3-9.
– (2010), "Le origini corporative del distretto industriale marshalliano. Primi risultati di una ricerca in corso", in *Storia Economica*, 1-2, pp. 187-203.
– (2014), *Cutlery Trade. Le Origini Corporative dei Distretti Industriali in Europa (secoli XV-XX)*, Rosenberg & Sellier, Turin.

Guizzetti M. (1995), *La produzione armiera nell'economia valtrumplina tra il 1825 e il 1875*, Graduation Dissertation, Università degli studi di Brescia, academic year 1994-1995.

Gustafsson B. (1987), "The Rise and Economic Behaviour of Medieval Craft Guilds", in *Scandinavian Economic History Review*, 35, pp. 1-40.

Hounshell D.A. (1984), *From the American System to Mass Production, 1800-1932*, Johns Hopkins University Press, Baltimore.

Larrañaga R., Gorrochategui S. (1990), *500 años de armería vasca*, Ayuntamiento de Eibar, Eibar.

Lewis J.H. (1996), *The Development of the Royal Small Arms Factory (Enfield Lock) and its Influence upon Mass Production Technology and Product Design c1820-c1880*, Ph.D. Dissertation, Middlesex University.

Lumley R. (1989), "'The American System of Manufactures' in Birmingham: Production Methods at the Birmingham Small Arms Co. in the Nineteenth Century", in *Business History*, 31:1, pp. 29-43.

Marchesi G. (2003), *Quei laboriosi valligiani. Economia e società nella montagna bresciana tra il tardo Settecento e gli anni postunitari*, Grafo, Brescia.

– (2004), "Francesco Glisenti e l'inchiesta industriale del 1870-1874", in *I Glisenti. Cinquecento Anni di storia: industria, arte, politica, cultura*, Negri, Brescia.

Markusen A. (1996), "Sticky Places in Slippery Space: A Typology of Industrial Districts", in *Economic Geography*, 72, pp. 293-313.

Marshall A. (1890), *Principles of Economics*, Macmillan, London.

– (1919), *Industry and Trade*, Macmillan, London.

Martin R., Sunley P. (2015), "On the Notion of Regional Economic Resilience: Conceptualisation and Explanation", in *Journal of Economic Geography*, 15:1, pp. 1-42.

Mocarelli L., Ongaro G. (2017), "Weapons production in the Republic of Venice in the Early Modern Period: The Manufacturing Centre of Brescia between Military Needs and Economic Equilibrium", in *Scandinavian Economic History Review*, 65:3, pp. 231-242.

Montanari D. (1982), "Produzione d'armi da guerra su commessa pubblica. La vicenda di Gardone Val Trompia nei secoli XVI-XIX", in *Atlante valtrumplino. Uomini, vicende e paesi delle valli del Mella e del Gobbia*, Grafo, Brescia.
– (1983), "Nato con Napoleone, chiuso con il ritorno degli austriaci, riaperto dopo l'Unità", in *La Banca Credito Agrario Bresciano e un secolo di sviluppo*, Credito Agrario Bresciano, Brescia.
– (1983), "Miniere, forni e officine meccaniche: da Bovegno a Carcina il patriota Francesco Glisenti costruisce con tenacia il primo gruppo 'integrato' della storia industriale bresciana", in *La Banca Credito Agrario Bresciano e un secolo di sviluppo*, Credito Agrario Bresciano, Brescia.
– (1985), "Giuseppe Zanardelli e il decollo dell'industria bresciana: il caso dell'arsenale di Brescia e di Gardone Valtrompia", in M. Cattini, M.A. Romani (eds.), *Maestri e imprenditori. Un secolo di trasformazioni nell'industria a Brescia*, Credito Agrario Bresciano, Brescia.
– (1999), "Le armi della Repubblica. Le fabbriche militari bresciane dalla Serenissima all'Italia napoleonica", in D. Montanari, S. Onger, M. Pegrari (eds.), *1797. Il punto di svolta. Brescia e la Lombardia veneta da Venezia a Vienna (1780-1830*), Morcelliana, Brescia.
– (2001), "L'arsenale della nazione. Zanardelli e il decollo dell'industria armiera bresciana", in S. Onger (ed.), *Brescia 1849. Il popolo in rivolta*, Morcelliana, Brescia.
Morin M., Held R. (1980), *Beretta. La dinastia industriale più antica al mondo. The World's Oldest Industrial Dynasty*, Acquafresca, Chiasso.
Motta G.P. (2013), "Le innovazioni delle armi portatili", in *Il Contributo italiano alla storia del Pensiero - Tecnica*, Treccani, URL: <https://bit.ly/2mocnLd>.
Mújica G. (1984), *Monografía histórica de la Villa de Eibar*, Ayuntamento de Eibar, Eibar.
Ogilvie S. (2004), "Guilds, efficiency, and social capital: evidence from German proto-industry", in *Economic History Review*, 62:2, pp. 286-333.

– (2014), "The Economics of Guilds", in *Journal of Economic Perspectives*, 28:4, pp. 169-192.
Onger S. (2001), "Glisenti", in *Dizionario biografico degli italiani*, 57, Treccani, Rome, p. 403.
– (2009), "L'industria privata di armi da guerra. Il caso della Glisenti (1859-1907)", in N. Labanca and P.P. Poggio (eds.), *Storie di armi*, Unicopli, Milan, pp. 57-73.
Onger S., Paris I. (2012), "Giuseppe Beretta: una lunga storia dentro un secolo breve (1906-1993)", in A. Porteri (ed.), *Cultura, ricerca e società. Da Giuseppe Beretta (1906-1993) all'intervento delle fondazioni*, Laterza, Rome-Bari, pp. 25-178.
Pfister U. (1998), "Craft Guilds and Proto-Industrialization in Europe, 16th to 18th Centuries", in S.R. Epstein, H.G. Haupt, C. Poni, H. Soly (eds.), *Guilds, Economy and Society*, Universidad de Sevilla, Seville, pp. 11-24.
Popp A. (2001), *Business Structure, Business Culture, and the Industrial District: The Potteries, c. 1850-1914*, Aldershot, Ashgate.
Putnam R.D., Leonardi R., Nanetti R.Y. (1993), *Making Democracy Work: Civic Traditions in Modern Italy*, Princeton University Press, Princeton.
Raiser M. (2001), "Informal Institutions, Social Capital and Economic Transition", in G.A. Cornia, V. Popov (eds.), *Transition and Institutions: The Experience of Gradual and Late Reformers*, Oxford University Press, Oxford, pp. 218-239.
Reith R. (2000), "Technische Innovation im Handwerk der frühen Neuzeit? Traditionen, Probleme und Perspektiven der Forschung", in K.H. Kaufhold, W. Reininghaus, (eds.), *Stadt und Handwerk in Mittelalter und Früher Neuzeit*, Böhlau, Cologne, pp. 21-60.
Roffia P. (1997), "La Pietro Beretta Fabbrica d'Armi e l'Egemonia dei Paesi Nord-Europei nella Produzione di Armi", in G. Bruni, B. Campedelli, P. Roffia (eds.), *Saggi Storici di Ragioneria. Ricerche e Analisi di Imprese Longeve*. Vol. I. *Pietro Beretta Fabbrica d'Armi*, Università di Verona, Verona, pp. 135-176.
– (1997), "La Pietro Beretta Fabbrica d'Armi dai Primi del 1900 ai

Giorni Nostri: la Definitiva Conquista della Leadership Italiana e le Basi per il Ruolo di Competitor Mondiale", in G. Bruni, B. Campedelli, P. Roffia (eds.), *Saggi Storici di Ragioneria. Ricerche e Analisi di Imprese Longeve*. Vol. I. *Pietro Beretta Fabbrica d'Armi*, Università di Verona, Verona, pp. 177-230.

Rosenbloom J.L. (1993), "Anglo-American Technological Differences in Small Arms Manufacturing", in *Journal of Interdisciplinary History*, 23:4, pp. 683-698.

Segreto L. (1997), *Marte e Mercurio. Industria Bellica e Sviluppo Economico in Italia (1861-1940)*, Franco Angeli, Milan.

Semeraro R. (2019), "'Col miraggio di mirabolanti ordinazioni'. Brescia e lo sviluppo industriale negli anni della Guerra europea", in S. Onger (ed.), *Brescia e la Grande Guerra*, Grafo, Brescia, pp. 209-238.

Sforzi F. (2015), "Rethinking the Industrial District: 35 Years Later", in *Investigaciones Regionales - Journal of Regional Research*, 32, pp. 11-29.

Simoni C. (2010), *La via del ferro e delle miniere in Valtrompia. Un itinerario nel passato produttivo e nel patrimonio storico-industriale di un territorio minerario e siderurgico*, Comunità Montana di Valle Trompia, Gardone Val Trompia.

Smith M.R. (1977), *Harpers Ferry Armory and the New Technology: The Challenge of Change*, Cornell University Press, Ithaca.

– (1985), "Army Ordnance and the 'American system' of Manufacturing, 1815-1861", in M. Roe Smith (ed.), *Military Enterprise and Technological Change: Perspectives on the American Experience*, The MIT Press, Cambridge.

Smithurst P. (2019), "France, Russia and Early Interchangeability in Firearms", in *Arms & Armour*, https://doi.org/10.1080/17416124.2019.1660468.

Tattara G. (2001), *Il piccolo che nasce dal grande. Le molteplici facce dei distretti industriali veneti*, Franco Angeli, Milan.

Urdangarín C., Izaga J.M., Lizarralde K. (1994), *Antzinako Lanbideak-Oficios Tradicionales*, Cámara de Guipúzcoa, San Sebastián.

Varini V., Onger S. (2005), "Cultura imprenditoriale e sviluppo eco-

nomico lombardo: la famiglia Glisenti tra Otto e Novecento", in *Imprese e Storia*, 32, pp. 245-283.

VIESTI G. (2003), *Come nascono i distretti industriali*, Laterza, Rome-Bari.

WILLIAMS D. (2009), *The Birmingham Gun Trade*, The History Press, Stroud.

WILSON J., POPP A. (eds.) (2003), *Industrial Clusters and Regional Business Networks in England, 1750-1970*, Routledge, Abingdon.

ZEITLIN J. (2007), "Industrial Districts and Regional Clusters", in G. Jones, J. Zeitlin (eds.), *The Oxford Handbook of Business History*, Oxford University Press, Oxford, pp. 219-243.