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THE DEVELOPMENT OF ACCOUNTING IN EUROPE IN THE ERA OF SCIENTIFIC MANAGEMENT: THE ITALIAN ENGINEERING CONGLOMERATE, ANSALDO, 1918-1940

Abstract: Utilizing archival materials, this paper examines the case of the Genoa-based firm, Ansaldo, which, by the early decades of the 20th century, had emerged as a major force in the inter-related fields of engineering, shipbuilding, and metal and steel manufacture in Italy. Following financial problems immediately after World War I and during the 1920s, the company was subsequently taken under the umbrella of the Italian State's financial holding unit, the Institute for Industrial Reconstruction (IRI), in the 1930s. Utilizing Lewin's theory of change as a framework for investigating change in management accounting, the paper examines the internal and external factors influencing the development of cost/management accounting at the company. These are also examined against the background of the development of scientific management, both in Italy and elsewhere.

INTRODUCTION

It has recently been stated that management accounting is "not simply a technical activity but a set of practices that produce and reproduce not just organizational life but also social and economic life at a more macro level." Thus, it is appropriate to "fully understand management accounting," that one should "examine its social, economic and political context and

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recognize the role of power and conflict" [Cooper and Hopper, 2007, p. 208]. This is not to deny the need to examine events and factors at play within an individual context, but rather to emphasize that individual organizations do not exist in a vacuum, and that changes in accounting for managerial purposes will be influenced by factors both internal and external to the organization. This is particularly the case in relation to the focus of this study, the Italian engineering conglomerate Ansaldo during the period between the two world wars.

The interwar years were a period when scientific management began to come of age, not only in America but also in Europe. While there has been much research on the development of scientific management in different countries [Nelson, 1980, 1992; Moutet, 1992], the relationship between the growth of a scientific approach to management and the development of cost and management accounting is little understood. In the American context, Chandler [1977, 1990] has pointed to the growth of large, multidivisional M-form corporations between the wars with the development of managerial hierarchies and accounting techniques such as standard costing and budgeting. While Chandler has suggested that it was the growth of the former which gave rise to the latter, Johnson and Kaplan [1987, p. 21] argue that the link was possibly the other way around, that the development of these accounting techniques may have made possible the growth of the large, M-form corporation. In work relating to the Dowlais Iron Company in the mid-19th century, Boyns and Edwards [1997] have suggested that the relationship between the emergence of large firms and the development of cost/management accounting may have been the result of a symbiotic, rather than a causal, relationship [see also, Alford, 1976].

A key element in the link between the growth of large businesses and developments in accounting in the early 20th century would therefore appear to be the development of a more scientific approach to business management. Thus, accounting historians have seen the early decades of the 20th century as a crucial period for the advancement of cost accounting, not the least due to the development of costing systems, the use of more scientific methods of overhead allocation, and the introduction of standard costing and budgeting [Solomons, 1952; Garner, 1954; Sowell, 1973; Chatfield, 1977; Epstein, 1978]. While budgeting and standard costing have been seen as an essentially American phenomenon [Wells, 1978; Locke, 1984; Johnson and Kaplan, 1987], the extent of their adoption in the U.S. is not known with any degree of accuracy. Indeed, Fleischman [2000]

has questioned the extent of the adoption of scientific management by 1920, suggesting that even by 1940 its use in the U.S. was limited.

In Europe, research into the links between scientific management and the development of cost/management accounting has generated a somewhat confused picture. In Britain, Loft [1986, 1990] has suggested that, in the 1920s, scientific management reinforced the positive impact of World War I on costing systems in British firms. However, the extent to which scientific management was adopted in Britain in the interwar period is still far from being known with any degree of accuracy, though there was clearly an increasing emphasis on the use of piecework systems and, from the mid-1920s, the Bedaux system [Littler, 1982; Whitston, 1996, 1997; Smith and Boyns, 2005]. Nevertheless, examples do exist of companies adopting either standard costing or budgeting [Boyns, 1998a, b] or both, sometimes in conjunction with the adoption of scientific management, such as the case of Hans Renold Ltd. [Boyns et al., 2000; Boyns, 2003]. The adoption of standard costing and budgetary control in the interwar years, however, was patchy with no clear link emerging as to company size or ownership/governance structure [see Quail, 1996, 1997; Boyns et al., 2000] or industrial sector. Boyns et al. [2004] found some limited evidence of a growing interest in standard costing in the British chemical industry before World War II, while in the iron and steel industry, Edwards et al. [2002, 2003] found a reluctance to adopt such techniques among most, though not all, companies before the 1950s and 1960s. In the engineering industry in the west of Scotland, evidence suggests a similar reticence [see McKinstry, 1999; Fleming et al., 2000].

In France, despite the interest shown in scientific management by vehicle manufacturers such as Louis Renault and Marius Berliet, standard costing failed to be implemented in any French business before World War II, though an increasing number adopted budgeting from the mid-1920s [Berland, 1999; Berland and Boyns, 2002]. According to Zimnovitch [1997], the failure of standard costing to appear in France until the late 1950s and early 1960s, in part reflects the attitudes of French accountants. Concerned as they were during the interwar years to secure professional status for themselves, French accountants favored the *prix de revient* method – full costing based on the integration of costing within the financial accounting system – thereby effectively establishing a barrier to the implementation of standard costing which was depicted as a “non-account-

ing” method. It is possible that similar forces were at work in Germany where Coenenberg and Schoenfeld [1990, p. 97] have noted that, during the period 1900-1933, internal and external accounting within firms was coming to be viewed as part of a single, unified system.

Against this background, this paper attempts to throw light on the link between the development of scientific management and that of cost/management accounting in Italy between the two world wars through an examination of the case of Ansaldo, a major Italian engineering, shipbuilding, and metal manufacturing conglomerate. This company constitutes a particularly interesting case study for many reasons. First, the company was one of the most important firms on the Italian industrial scene throughout the early decades of the 20th century as the largest and most important business in Italy during World War I. Furthermore, at various times it was involved in relationships with both European and non-European companies.¹ Second, its story is particularly representative of a particular way of doing business; namely, close links with government, a method which was characteristic of the early stages of industrialization in Italy and which impacted the development of management techniques within the company. Third, Ansaldo belongs to a sector which, in many countries, was in the forefront of the development of cost accounting techniques and the use of cost information for internal management purposes. Thus, a study of Ansaldo can reveal not only what happened in a major Italian firm during the early decades of the 20th century, it can possibly shed light more generally on developments that can be contrasted with those in other countries, both in Europe and in America.

Our analysis of management accounting change at Ansaldo is underpinned by the framework provided by Kurt Lewin’s theory of change and will proceed as follows. In the next section, we examine the issue of management accounting change generally, illustrating how Lewin’s theory provides a potential framework for historical research into this topic, enabling as it does the inclusion of the role of human agents and contextualizing influences in such change. This is followed by an examination of the development of scientific management in Europe during

¹In April 1930, the *Mechanical Engineer*, the official Journal of the American Society of Mechanical Engineers, published a special edition in order to celebrate the 50th anniversary of the Association. It published a Hall of Fame comprising 106 distinguished engineers, including F.W. Taylor, A. Carnegie, H. Bessemer, etc., among whom only Pio Perrone, sometime chairman of Ansaldo, was Italian [quoted in Fasce, 1993].

the study period to provide the contextual background for our case study of Ansaldo. The case study is split into two sub-sections, corresponding to the periods 1918-1933 and 1933-1940. The year 1933 represented an important landmark for Ansaldo as it came under the control of the State's new industrial holding arm, the IRI (*Istituto per la Ricostruzione Industriale*), an event which led in 1935 to the appointment of Agostino Rocca as chief executive. For each period, we examine the archival evidence to determine the key factors related to the development of both scientific management and cost/management accounting and the links, if any, between them. We then review our findings in the light of European and American contexts.

CHANGE IN MANAGEMENT ACCOUNTING

In the last six years, two special editions devoted to the theme of management accounting change have appeared in *Management Accounting Research*. In the first, editors Burns and Vaivio [2001, p. 392] pointed out that, "Change is an exciting but problematic concept, defying definition and structured analysis." In the more recent, Busco et al. [2007, p. 125] suggest that, as a result of the proliferation of studies over recent years, the time has come for "systematizing the analysis of management accounting change along some key dimensions which can prompt some further reflection." In this pursuit, they suggest four dimensions: "the agents and objects of change; the forms and ratio of change; the space and time of change; and the interplay between change and stability." Given the rapid development of this literature, it is not surprising that there is no single, generally accepted theory of change in management accounting. Indeed, some authors have queried whether the emphasis should even be on change. Quattrone and Hopper [2001] suggest that perhaps it ought to be on "drift," while Granlund [2001, p. 161] is more concerned with "stability." Granlund went on to note that stability and change can co-exist, while "continuity of accounting practices over time is a result of a large number of issues that take effect on various levels of organizational operations."

One framework which can be used to analyze such change or stability is Kurt Lewin's theory of change. Although this theory relates to a planned approach to managing proposed change, his ideas can be used to understand and interpret, retrospectively, developments that have already occurred. Lewin's model comprises three stages – "unfreezing" of the current equilibrium or status quo, a necessity if people are going to be

motivated towards change; “moving” to a new equilibrium by changing what needs to be changed; and “refreezing,” making the new equilibrium permanent. Unfreezing is necessary in order to overcome the strains of individual resistance and group conformity and can be achieved in three ways: (1) increasing the forces driving change, (2) reducing the forces resisting change, or (3) some combination of (1) and (2). Moving can also be encouraged in three ways: (1) persuading employees that the current status quo is not beneficial to them and encouraging them to explore new possibilities; (2) getting them to work together on a quest for new and relevant information; and (3) connecting the group view to that of a well-respected, powerful leader or leaders who support(s) change. Refreezing is vital to successful change. Without it, there is the strong possibility that there may be a reversion to the previous status quo. Hence, it is vital that the new values generated are integrated into the community’s traditions and a balance achieved between the driving forces and the resisting/restraining forces. If there is such a balance, then the new position will be an equilibrium since change only occurs when the strength of one set of forces (either driving change or resisting it) is greater than that of the other set of forces.

Although Lewin’s theory was advanced in the 1940s, with many other theories of change developed since (e.g., complexity theories), it can be argued that it forms the basis of all modern approaches to change [Burnes, 2004]. Indeed, it has been argued that most theories of change are essentially variations on Lewin’s basic model. “Scratch any account of creating and managing change and the idea that change is a three-stage process which necessarily begins with a process of unfreezing will not be far below the surface” [Hendry, 1996, p. 624]. Lewin’s articulation of a stage model of change is particularly useful for historians since it enables a whole range of potential factors to play a role. For Busco et al., the key issue that has to be addressed by scholars is “to locate the agency prompting the whole process” of management accounting change. Previous authors on the subject have suggested a wide range of possible agencies for change, from human actors to non-human actants, sometimes placed within “broader contextual issues, related to certain institutional pressures, political decisions, economic imperatives, and some combination of them” [Busco et al., 2007, pp. 129-130].

Although it may not be as all-embracing as social cognitive theory which recognizes the potential impact of environmental influences, personal factors, and attributes of the behavior itself, Lewin’s theory does allow for the possible influence of

key persons or groups; “change agents” in the terminology of Niehoff. Granlund [2001], for example, emphasized the importance of a key individual, one of the firm’s financial managers, in producing change at a Finnish food manufacturer. Individuals, however, can act both as a barrier to change and as a focal point for change, with the same individual possibly acting as a barrier on one occasion and a focal point on another. Management accounting change, however, rarely takes place in a vacuum. As Otley [2001, p. 260] has pointed out, “Accounting systems are often implicated in the wider processes of organizational change, providing both a vehicle through which such changes can be promoted but also a potential rigidity and barrier to change.” Research in management accounting has suggested that major developments in organizational structure and accounting systems require motivators, catalysts, and facilitators, but are often held back by barriers [Innes and Mitchell, 1990; Cobb et al., 1995], including the attitude of personnel and existing organizational structures and cultures [Markus and Pfeffer, 1983; Roberts and Silvester, 1996]. To become established, new systems of accounting have to secure legitimacy, and they must develop a workable relationship between the languages of production and accounting [Scapens and Roberts, 1993]. Such ideas clearly resonate with the framework suggested by Lewin. Hence, we adopt his theory as a framework for our discussion of management accounting developments at Ansaldo during the study period.

THE DEVELOPMENT OF SCIENTIFIC MANAGEMENT IN EUROPE, 1918-1940

As Nelson [1992, p. 16] has indicated, there were only a few stirrings of scientific management in Europe before World War I, with change being uncoordinated and gradual. The war and its aftermath, however, provided something of a stimulus with industrialists, unions, and governments in most countries all coming to view scientific management in a more positive light. Most noticeably, post-war, pre-Depression Europe was characterized by a new tolerance among workers and union leaders and by the emergence of associations dedicated to the promotion of scientific management. In many countries, most notably in Germany [Nelson, 1992, pp. 2, 23-24], this found expression in the idea of rationalization, a broad social concept aimed at leading to a “better society.” However, the Great Depression appears to have diminished the attraction of American ideas and its European surrogate, rationalization.

The development of rationalization movements after 1918 was widespread throughout Europe, in countries like the U.K. still generally committed to laissez-faire economics, in ones like Germany where the state played a guiding role, and in those such as Russia with virtually total state control. Italy clearly was in the last category as the State played a significant role in economic, political, and social affairs. While the early stages of Italian industrialization, through 1920, took place in a “politico-industrial setting which left space for political and trade union liberties and for the development of forms of economic democracy, ...[d]uring the 20 years of fascism [from 1922 to 1943], that liberty and development were sacrificed” [Bonelli, 1994, p. 629]. Fascism was both a bureaucratic and political system, designed not only to control the working classes through influencing everyday life, but also to reduce foreign competition, thereby sustaining national capitalism [Costa et al., 1978]. Overall, it is commonly agreed that Fascism operated as a strong institutional mechanism which protected the large national corporations due to the state’s close connections with big financial interests.

As in other European countries, with the notable exception of Britain, a national organization dedicated to the promotion of scientific management was established in Italy in January 1926. This organization, *Ente nazionale italiano per l'organizzazione scientifica del lavoro* (ENIOS), represented the institutionalization of the introduction of scientific management principles. It was promoted following changes in Mussolini’s cabinet in 1925 and the appointment of the engineer, Professor Giuseppe Belluzzo, as Minister of National Economy. A major supporter of Taylorism in the interwar period [Fauri, 1999, p. 101], Belluzzo started a campaign for industrial reorganization which favored concentration of industry, increasing the size of business units, and encouraging internal reorganization. In 1926-1927, the *Consiglio Superiore dell'Economia Nazionale* (Supreme Council of National Economy) decided to make instruction in scientific management compulsory in all technical schools and institutes in Italy and to “introduce the most modern methods of industrial organization into the chief Government departments and the State industrial undertakings, by way of setting an example to the nation as a whole” [Devinat, 1927, p. 85].

Although Belluzzo’s campaign was supported by *L'organizzazione scientifica del lavoro*, a review published by ENIOS which enjoyed widespread circulation with 15,966 subscribers in 1930, mainly in northern Italy, his approach

did not find sympathy with northern industrialists. In 1928, the newspaper, *L'informazione industriale*, an emanation of Turin industrialists, wrote that [quoted in Fauri, 1999, p. 102]: “rationalization...means demolishing our premises and building new ones, changing all our machinery and concentrating factories producing similar products...even though we are not in the least financial experts, we can promptly and surely say no.” Indeed, Sapelli [1978, p. 62] has suggested that within the “standardization” process of this period, the accent was more on “unification” of materials and equipment than on “normalization”, i.e., the growth of large-scale mass production.

Thus, in Italy, as in other countries across Europe, many industrialists remained skeptical of scientific management during the 1920s despite the existence of national and international organizations dedicated to its promotion. The rationalization movement, which was already beginning to falter by the end of the 1920s, was effectively silenced during the Depression era as Americanization no longer appeared the path to follow. Some in Europe were completely disenchanted with the whole scientific movement. Thus, Ernst Poensgen, iron and steel industrialist and head of the German Steel Association, stated in exasperation to a colleague in 1931 [quoted in Nolan, 1994, p. 228]:

Don't mention science to me! We've been pumped full with science: scientific technology, scientific management, scientific market research, scientific accountancy, and so on and so on. And where has all this science brought us?

Despite the problem with rationalization as a broad social concept, not all industrialists were turned away from every aspect of scientific management. Many were happy to apply Taylor's ideas at the shop-floor level, as exemplified by the Europe-wide success of the Bedaux consultancy in selling its simplified version of Taylorism to businessmen desperate to cut costs as a means of ensuring survival [Kipping, 1999]. As Table 1 shows, the Bedaux consultancy was very successful in both France and Britain during the 1930s, but less so in Germany where its office was closed in 1933 following Hitler's rise to power, although it was allowed to re-open in 1937 under a different name.

In Italy in the 1930s, there was a backlash against scientific management generally and the Bedaux system in particular. As noted in Table 1, the adoption of the Bedaux system grew much more slowly in Italy than in any other country between 1931 and 1937. Although attempts to apply the system had been made

TABLE 1
The International Expansion of the
Bedaux Consultancy during the 1930s

Country	Office opened	Plants using the Bedaux system	
		1931	1937
United States	1916/18	52	500
British Isles	1926	30	225
Germany	1927	5	25
Italy	1927	21	49
France	1929	16	144

Source: Kipping [1999, p. 198]

since 1927, as in other countries, such attempts had met with strong resistance from workers. Concerns over wage reductions and intensification of work rhythms led to strike action on numerous occasions by the Fascist unions despite strikes being illegal in Italy at the time [Volpato, 1978, pp. 214-216]. Concerns over the nature of piecework agreements made under the Bedaux system led, on November 9, 1934, to a motion being adopted by the Central Corporation Committee (*Comitato Centrale delle Corporazioni*) requiring that every piecework agreement must have been collectively bargained (*contrattazione collettiva*). The passing of this motion has led Lavista [2003] to declare that Bedauxism (*Bedonismo*) had been abolished, while Kipping [1999, p. 200] has claimed that the Bedaux consultancy in Italy was banned by the State in 1936. The impact of the 1934 motion, however, was that, in early 1935 in those businesses which operated piecework systems, managements and unions were forced to renegotiate their agreements [Sapelli, 1978, pp. 235-236]. In practice, however, the new bonus-related schemes that emerged were merely variations of the previous Bedaux arrangements, most particularly because the Bedaux system found general ideological acceptance among Fascist industrialists [Fauri, 1999, p. 104]. Indeed, its emphasis on the human power factor, ignoring the type of machinery or working methods, meant that there was no need for any major investment by firms to assess standard outputs and bonus rates; that is, it was a “ready to use” system [Musso, 1987, p. 107]. Nevertheless, there were mixed feelings towards the new systems, varying from enthusiastic imitation to scornful refusal.

The growing politicization of the debate around scientific management in Italy in the 1930s, in particular the fact that the policy of high wages proposed by Taylor was considered politi-

cally unacceptable at this time, was reflected in *L'organizzazione scientifica del lavoro*. From 1934 on, the articles published in ENIOS's own organ indicate a shift in focus, referring merely to the introduction of new plant and machinery, the review acting as more of a marketing showcase for certain companies than as a device for fostering debate on specific topics. Fauri [1999, p. 113] also notes that, as in other countries within Europe in the 1930s, the American model of productivity lost its catalytic inspiration as autarchy and protectionism prevailed.

SOURCE MATERIALS

The study of Ansaldo which is conducted in the next two sections of the paper is based on archival material and published secondary sources. The source of the archival material is the Ansaldo archive (*Archivio Storico Ansaldo*, hereafter ASA, located in Genoa) which was opened in 1980 and contains all of the surviving records of the company over a period of 150 years. Over the last 25 years, the Ansaldo archives have been extensively examined by economic and business historians,² resulting in the publication of a number of major studies of various aspects of the company's history, particularly works by Rugafiori [1981, 1992], Doria [1989], and Falchero [1990]. Nevertheless, until now, no management or accounting historian has yet examined the company's records for evidence of links between accounting change and scientific management developments during the interwar period.

Although the survival of cost accounting records for Ansaldo has not been as great as one might have hoped, it is possible from those extant and other documentary sources, especially records deposited by various top managers from the study period, to piece together key aspects of the cost system and how it changed over time. As with many such historical studies, it is not always possible to provide precise details of the use made of the cost information generated. However, the relationship between changes in managerial approach and accounting is clearly observable from the surviving archival records, supported by secondary literature.

²Bigatti [1998, p. 121] has indicated that the Ansaldo archive, the functions of which now extend far beyond records maintenance, has become an important center for Italian business history research.

ANSALDO: ACCOUNTING AND MANAGEMENT DEVELOPMENTS, 1918-1933

Overview: World War I saw massive growth at Ansaldo as the company continued to pursue its policy of vertical integration which had begun to take shape before hostilities commenced. Numerous acquisitions resulted in the capital of the company rising from 30 million lira in 1914 to 500 million in 1918 and employment growing from 10,432 in 1914 to 47,163 in 1917 (see Table 2). By the end of the war the company comprised, among other things, steel foundries and factories, shipbuilding yards, various mechanical engineering departments, lignite mines in Tuscany, the Cogne iron ore mines, and an electricity generating company, Impianti Elettrici Valdostani [Falchero, 1986].

TABLE 2
Key Statistics, Ansaldo during World War I

	1914	1915	1916	1917	1918
Stated capital (lira)	30,000,000	30,000,000	45,000,000	100,000,000	500,000,000
Investments (lira)		20,002,444	68,015,772	126,571,621	373,765,510
Employment	10,432	18,322	33,908	47,163	30,397
Airplane production (no.)		63	126	768	2,064
Airplane engines production (no.)				203	389
Production of steel (tons)	19,176	26,415	31,341	40,275	52,631

Source: ASA SSNB 532/7

The expansion of Ansaldo reflected a twin desire on the part of the company's owners, Mario and Pio Perrone, to make the company less reliant on external suppliers, whether Italian or foreign, while simultaneously satisfying their thirst for an industrial, economic, and political power base. This latter desire was reflected in the Perrone family's various other activities, most notably the acquisition of a number of newspapers and the establishment of the Banca Italiana di Sconto in 1914 [Falchero, 1990; Galli della Loggia, 1970].³ With this development, Ansaldo became one of the major Italian industrial-financial complexes of the time although remaining heavily reliant on the Italian State as before World War I.

³ According to Falchero [1983], Italian nationalism provided the basis for the establishment of the Banca Italiana di Sconto, its main purpose being to undermine the influence of the "German Bank" (*Banca Commerciale*) in key sectors of the Italian economy.

Indeed, the war brought Ansaldo even closer to the Italian State with production, which increased dramatically (see Table 2), becoming increasingly focused on war materials, including airplanes. Not surprisingly, Ansaldo's turnover and profits grew during the war, although this would subsequently lead to accusations of profiteering and consequent legal action by the State once the war ended [Falchero, 1990]. The ending of hostilities created additional problems for the firm, not the least of which was a concern over payment for job orders in progress and how to convert production back to peacetime requirements. While Ansaldo subsequently received payment for job orders in progress, the amount was somewhat lower than the value of the work completed, compounding the problem of falling revenues consequent upon the economic problems of the immediate post-war years.

Financial problems coincided with recognition that there was a major need for investment and restructuring to stem growing labor costs. During the war, the emphasis within Ansaldo had been on securing production at all costs; little by way of any rationalization of production processes had occurred. During 1918-1919, efforts were undertaken in this direction by the Perrone brothers, but it proved to be too little, too late. Cash flow problems; a lack of financial support from the Banca Italiana di Sconto, which itself failed in the early 1920s; the loss of political support from the Nitti government; legal problems in respect of war profiteering; and difficulties with the workforce during the period which became known as the "red biennium,"⁴ pushed Ansaldo into a major crisis. In 1921, Ansaldo recorded a loss of just over 180 million lira (see Table 3) and found itself in major financial difficulties. As a result, at the beginning of 1922, the Perrone family was forced out and ownership of the business passed to a branch of the Bank of Italy. A new company was formed with capital of 200 million lira, divided between the Banca Nazionale di Credito, a member of the Credito Italiano group, one of the most powerful former opponents of the Perrone family, and the former Gio Ansaldo company [Rugafiori, 1978]. In 1925, Banca Nazionale di Credito became the sole owner of the concern.

⁴The "red biennium" refers to a period immediately following World War I when there occurred a large number of strikes among the working classes throughout Italy. The term "red" is used to reflect the fact that the strikes are considered to have been inspired by communist ideology.

TABLE 3
Ansaldo Profits and Losses (in lira), 1919-1940

Year	Profit/(Loss)	Year	Profit/(Loss)
1919	35,590,802	1930	6,664,075
1920	5,947,763	1931	153,177
1921	(180,884,987)	1932	119,045
1922	(331,027,455)	1933	(90,448.622)
1923	3,705,812	1934	1,243,024
1924	4,923,403	1935	(8,980,747)
1925	6,666,612	1936	316,736
1926	(15,958,823)	1937	552,332
1927	(24,981,193)	1938	1,494,869
1928	503,758	1939	9,925,557
1929	6,566,103	1940	14,459,835

Source: Vasta [1998, Table 9, p. 210; 1999, Table 8, p. 268].

On the change of ownership in 1922, the Perrones' strategy of vertical integration was reversed and virtually the entire managerial hierarchy was dismissed. Many factories and plants were closed or sold, resulting in employment falling to about 10,000 workers in 1922. Under the partial, and subsequently full, control of the bank, Ansaldo's financial position was stabilized but remained weak, with the company recording a mixture of small profits and losses through the 1920s (see Table 3). With the 1929 world slump, there was a further significant reduction in activity at Ansaldo [Degli Esposti, 1993], with employment falling from 13,400 in 1930 to 9,230 in 1932. The company once again recorded a major financial loss in 1933.

Organizational Change and Scientific Management to 1933: Before World War I, Ansaldo had suffered from organizational and managerial problems [Guagnini, 1997], both within its larger departments and with respect to a lack of coordination between departments. Directors of the company were sent to visit some of the most important firms in the engineering and steel sectors, such as Ford, Bethlehem Steel, Krupps, etc., in order to study new methods of (scientific) management, as yet largely unknown in Italy. However, with the emphasis of the company's production comprising one-off jobs or small batch production, these methods, more suited to mass production scenarios, failed to be implemented before the war [ASA, F. Puri 7/13].

During World War I, Ansaldo acquired plants located in Turin formerly operated by Fiat (Ansaldo San Giorgio) where, prior to the takeover, Fiat personnel had been engaged in the first experimental applications of Fordist methods in Italy [Volpato, 1995]. While these methods continued to be applied after the takeover, and despite being an improvement on the practices used at Ansaldo's departments in Genoa, no attempt was made to apply them to the company's other factories before the end of the war [ASA, AP SNB, 128/24]. Nevertheless, a new system of labor organization involving greater standardization, the division of productive processes, the employment of non-qualified labor, and the general introduction of piecework was implemented at Ansaldo during the war [Molinari, 1997]. However, as Dewerpe [1985] has argued, the piecework systems introduced at this time were *ad hoc*, the piece rates being determined in a non-scientific manner. Even so, there is evidence of support for major reorganization among some sections of the company's management during 1918-1921, including the application of Fordism to improve efficiency and reduce production costs [ASA, AP, SSNB 128/24]. The strength of such support, however, proved insufficient to affect an unfreezing of the status quo, not the least because the company's board remained unconvinced of the potential benefits of the proposed changes. The Perrone brothers, in particular, took the view that the company's diverse range of products, the widespread geographical spread of its factories, the distance from suppliers, and the fluctuating nature of demand presented obstacles to the application of these new techniques [ASA, AP SSNB 128/24; ASA, F. Puri, 7/13].

The forced departure of the Perrones and much of their top management team in 1922 clearly presented a scenario in which change could occur since a number of existing barriers to change were removed. However, little change was effected for several reasons. First, the managers appointed to replace those of the former era were largely from a military or political background⁵ and had little by way of business skills or knowledge

⁵An example of the chief executive officers during the period following the Perrone era is Colonel Ugo Cavallero, who was in charge at Ansaldo from 1928-1933. Born in 1880, he was a captain in the Italian Royal Army during World War I and chief of the Italian Army delegation at Versailles in 1919. Between 1920 and 1925, having left the army, he managed some Italian firms. From 1925 to 1928, as a close friend of Benito Mussolini, he was appointed Minister of War (the Italian Army was reorganized under his control), Senator of the Reign, Count, and Major-General of the Italian Royal Army.

of new managerial structures and techniques. Second, the key managerial emphasis for many years after 1922 was merely to avoid bankruptcy. Third, there was the company's relationship with the State, which was a major customer. Under Mussolini, the nature and power of the Italian State developed greatly and this, together with the increasing likelihood of the State taking a major stake in or even control of the company, militated against the development of a stable and powerful system of governance within the firm. Commenting on the productive organization of the company during the war and immediately after, Sarli, manager of Elettrotecnico from 1925, considered the company very weak and uncoordinated [Gibelli, 1998].

Nevertheless, despite such strong forces militating against any change, local managerial initiatives can be noted at Ansaldo during the second half of the 1920s. At the Third International Congress on Scientific Management, held in Rome in September 1927, for example, Mario Fossati presented a paper entitled, *L'organisation scientifique du travail dans les mines et les usines electrosiderurgique Ansaldo Cogne Aosta*, in which he described the application of new management techniques inspired by Taylorism at the Cogne complex of iron ore mines and steel factories where he was director. Although the main focus of the paper is the introduction of new plant and equipment, including a new railway, new elevators, and electric furnaces, Fossati [1927, pp. 8-9] reports that significant increases in productivity and efficiency had been achieved as a result of the managerial and technical changes implemented. That this was not an isolated example is made clear by Pellegrini [1929] in his description of organizational changes inspired by Taylor's scientific management at the Ansaldo Lorenz telephone factory at Cornigliano from 1926. Such local initiatives in respect to the utilization of scientific management within Ansaldo once again emphasize the possibility of limited change occurring within parts of the business, but also suggest that the forces acting against change within the organization as a whole were stronger, resulting in only a partial unfreezing of existing methods.

A similar occurrence took place in the late 1920s and early 1930s at the company's electro-technical department where an attempt was made to implement the Bedaux system. A document dated April 14, 1930, written by the "director/vice-director" of Elettrotecnico, notes that, "in the electro-technical factory, by means of a 'manufacturing time and analysis office,' we are strongly pursuing the reduction of labor costs using the Bedaux method, which we began to adopt experimentally last summer"

[ASA FSB 24/26 f.1]. With this development, Ansaldo shows itself to have been in the forefront of such developments within Italy,⁶ although there is no evidence that the Bedaux system was introduced more widely within the company at this time. Once again, this development seems to have represented a partial unfreezing at a local level which failed to generate permanent change throughout the organization.

Cost Accounting and Management Control: Throughout the troubled times from 1918 to the early/mid-1930s, there was one notable change to the cost system utilized at Ansaldo. At the beginning of the 20th century, the company operated an historical cost system in which the costs of job orders were linked to the financial accounting system [see, for example, ASA AP SSN 33/1]. Within the cost system, overheads were allocated to departments largely on the basis of pre-determined percentages, partly reflecting the size of departments as measured by the amount of capital invested in them. In 1912 [ASA AP SSB 963/17], changes to the 1904 accounting rules, suggested by Ricci, a member of Ansaldo's *collegio sindacale*,⁷ included the charging of a part of overheads on the basis of direct costs. Further moves were made in this direction with the issuance of a new set of accounting rules in 1921 [ASA FSB 27/2].

Dewerpe [1985] has suggested that budgets were being used at Ansaldo by 1914, but he seems to have been referring to statements drawn up monthly by each production department entitled, "Estimates of purchased materials, planned and actual expenses and invoices" [ASA AP SSR 559/1]. The basis on which these statements were drawn up is far from clear, but taken together with the large variances shown when aggregated for all departments and the lack of explanation for such variances (see Table 4) suggests that they did not constitute a serious attempt at budgeting. However, other surviving documents, particularly the monthly "*Preventivi di spesa*" (budgeted expenses) for various periods up to 1935, do provide comparisons of planned and actual expenditure [see, e.g., ASA AP SSR 558/2].

⁶Molinari [1999] incorrectly puts the first application of the Bedaux system as occurring at Ansaldo in 1940.

⁷At that time, the *collegio sindacale* comprised, with the board and the general meeting of the shareholders, one of three main organs within Italian companies. The *collegio sindacale* was responsible for ensuring that directors complied with legal requirements and that the bookkeeping was correct.

TABLE 4**Variations between Actual and Planned Expenses, July 1916**

Planned expenses for all departments	L. 9,287,015.50
Actual expenses	L. 15,380,131.26
Variance	L. 6,093,115.76

Source: ASA AP SSR 559/1.

Limited knowledge of cost systems at other Italian companies during the early decades of the 20th century makes it difficult to judge whether the one utilized at Ansaldo was advanced or not. There were limitations as recognized by Pio Perrone in a letter written to the directors on January 31, 1920: "in our company we are really far from knowing exactly the cost of our products in all their constituent elements" [ASA AP SSN 778/5]. A major deficiency of the Ansaldo cost system stemmed from the manner in which overheads were allocated. The allocation method utilized coefficients which failed to reflect the effective absorption of overheads [ASA AP SSN 513], the use of appropriate cost drivers being lacking. Furthermore, price setting was conducted merely on the basis of adding various percentages to direct costs to represent general expenses and "profit," a system which failed to reflect how production levels interfaced with costs.

Such concerns were clearly influenced by the perilous state of the company's financial position at the end of World War I. Thus, in 1919, the Perrone brothers established a General Inspectorate at Ansaldo in an attempt to increase efficiency. Accounting was part of the remit of the administrative arm of the Inspectorate, while among the duties of the technical arm were cost prevention, distribution of work, and the scientific organization of production. Although the General Inspectorate was disbanded in 1921, it did establish a new set of accounting rules. These differed from the earlier rules of 1904, modified in 1912, in an attempt to classify costs using cost drivers linked to the volume of productive activity.

The specific purpose behind this change was the attempt "to know the minimum price at which to accept orders at a loss...when orders are not sufficient to absorb all the productive capacity" [ASAFSB27/2, March 1921, f.6], a clear recognition of the importance of direct costs in determining whether to produce or not. A second important and novel feature of the

1921 rules was the classification of costs on three levels [ASA FSB27/2, ff. 4-5]:

1. overheads *tout court* (*spese generali*)
2. manufacturing costs (*spese di lavorazione*)
 - 2.1 direct manufacturing costs (*spese di lavorazione*)
 - 2.2 shop-floor overheads (*spese d'officina*)

The manufacturing costs were considered to be those costs which could be decreased in the case of a reduction of production. Direct manufacturing costs were those costs specifically allocated to job orders (generally, labor and raw materials). Shop-floor overheads, which were considered not to be “directly allocable to job orders,” were to “be debited to transitory accounts for statistical purposes, and then allocated to job orders, by means of hourly rates, actual or theoretical, or by means of other criteria, according to the situation; such criteria being established by the technical office, with the agreement of the administrative office” [ASAFSB27/2, f.5].⁸ The second part of the 1921 rules comprises a list of the “overhead *tout court* accounts” and a list of the shop-floor overhead accounts.

Thus, while the Perrones may have acted as a barrier to the implementation of certain managerial changes within Ansaldo after World War I, in particular the introduction of Fordist methods, they did oversee the implementation of important changes in cost accounting. The increased emphasis on efficiency enshrined in the new accounting rules was to be a legacy which the Perrones were to leave for their successors upon which they were able to build. The unfreezing and change introduced by the Perrones became re-frozen by successive managements throughout the 1920s. Thus, from 1925, the production units were required to send reports to the central management on the “fundamental indexes of production and the economic trend of the production units.” Basic indicators contained in these reports were total cost of manufacturing labor, which was considered an index of manufacturing intensity [ASA FSB 24/52]; job-order portfolio; monthly expenses for personnel and auxiliary manpower; the ratios between total general expenses and the total labor costs, both direct and auxiliary, considered as indicators of the use of productive capacity; profit or loss on completed job orders, with an explanation given for each loss;

⁸The ideas underlying these developments clearly stemmed from the work of A.H. Church. According to Fasce [1993], the only translation of his book, *Production Factors in Cost Accounting and Works Management* into Italian (as *I fattori della produzione*), was carried out by the General Inspectorate of Ansaldo.

and the value of cash inflows and outflows.

Cost control in the 1920s therefore seems to have been directed towards efficiency, the emphasis oriented towards controlling and reducing the cost of direct factors. Following the experimental adoption of the Bedaux method in 1929, the exploitation of productive capacity was analyzed by means of a single indirect indicator, i.e., the ratio between the theoretical and actual working hours. While there is evidence of the introduction at this time of responsibility accounting, it was of an extremely limited kind, effected only at the level of departments and departmental directors, not within the departments themselves. Cost determination thus remained centered on the productive units with no reference to the analysis of individual or group performance, while variance analysis of budgeted expenses continued to be carried on in the same way as before [e.g., ASA FSB 24/24, ASA FSB 24/17].

ANSALDO: ACCOUNTING AND MANAGEMENT DEVELOPMENTS, 1933-1940

Overview: During the 1920s and early 1930s, Ansaldo had suffered from weak market forces, the Wall Street crash, the inadequacy of its organizational and productive structures, and the interference of politicians [Rugafiori, 1978]. As a result, in 1933, a year in which the company exhibited a major loss of almost 100 million lira after years of negligible profits (see Table 3), Ansaldo found itself one of the first companies to be taken under the wing of the State's new industrial holding arm, the IRI. Founded in 1933 by the technocrat Alberto Beneduce, the IRI took over the industrial securities held by those "mixed banks," such as the Banca Commerciale Italiana and Credito Italiano, which had fallen into a deep financial crisis [Amatori and Bigatti, 2003, p. 224]. Beneduce designed a structure in which firms under State ownership operated in a market environment rather than as a nationalized monopoly. Initially designed as a temporary measure, the IRI was declared a permanent institution in 1937 [Ciocca and Toniolo, 1994, p. 585]. The IRI takeover of Ansaldo guaranteed the survival of the firm, which became a central plank in the rearmament policy of the Fascist government. Indeed, in 1936, the Italian State accounted for 85% of Ansaldo's turnover [Rugafiori, 1999, p. 89].

The IRI, Agostino Rocca, and the Implementation of Scientific Management: On July 7, 1933, Mario Barenghi, formerly president of Ansaldo, became its chief executive officer (CEO) but, in

1935, he was replaced by Agostino Rocca. With a military and engineering background,⁹ Rocca had gained business experience during the 1920s and early 1930s through his close links with Banca Commerciale Italiana,¹⁰ one of the most important “mixed banks” of the time. After joining the Fascist party in 1923, Rocca became increasingly interested in scientific management¹¹ and a member of ENIOS in 1929. He became closely associated with the IRI upon its formation and was appointed in 1933 the general manager of Dalmine, an iron company where he had been employed as an engineer in August 1922. In 1935, he became general manager not only of Ansaldo but also of Siac. From 1938 to 1940, Rocca was also general manager of Finsider, the organization which controlled the iron industry holdings of the IRI.

When Rocca took over the reins at Ansaldo in 1935, the business was in a poor shape. Profits were non-existent, the plant and machinery were outdated, the organizational structure was old-fashioned and confused, enterprise was lacking, and the implementation of modern managerial techniques had long been delayed. There was little coordination between the various parts of the business. Production remained artisan-based with the engineer as the “shop-floor hero,” solving day-to-day problems as they arose. In order to effect the changes in organizational structure and culture which he saw as necessary, Rocca had to remove as many of the existing barriers to such change as possible while simultaneously enhancing

⁹Rocca attended a military high school and the Reale Accademia di Torino. After serving as an officer in the Italian Army from May 1915 to December 1919, he graduated from the Politecnico di Milano, as an electrical/industrial engineer in May 1921.

¹⁰Links with Banca Commerciale Italiana began in 1921 when Rocca married Maria Queirazza, daughter of one of the bank’s managers. In 1926, Giuseppe Toeplitz, general manager of the Banca Commerciale, appointed Rocca as administrative inspector of many important Italian companies, such as Mira Lanza, a factory producing detergents, where he supposedly implemented a cost accounting system based on those used in the U.S. [Rugafiori, 1999, p. 81]. Details of this system are unfortunately unknown. In 1929, Rocca became an employee of the technical-industrial office of the Banca Commerciale where he worked as an inspector and/or consultant for the companies controlled by the bank. From 1930, he participated in Sofinid, an operation established by the Banca Commerciale in that year to oversee the bank’s portfolio of industrial companies, which included important concerns such as Terni, Sip, and Italgas. Sofinid attempted to sell off parts of the portfolio to other investors [Rugafiori, 1984].

¹¹In the early 1920s, Rocca undertook various journeys throughout Europe and the U.S. during which he learned about scientific management.

the forces driving change. Thus, in an attempt to apply managerial ideas and concepts with which he was familiar, Rocca introduced managers from other firms, firing many foremen he identified as a barrier to the implementation of new ideas. Nevertheless, despite the support of these new managers and Ansaldo's position of power within a stable governance system (IRI as the sole shareholder and Fascism firmly established), Rocca faced stiff resistance to the implementation of new ideas at all levels within the company.

Following an in-depth analysis of the business, Rocca embarked on a program of restructuring and rationalization focused around a functionally based organizational structure in an attempt to generate major efficiency gains at the factories [ASA F.SB 3/7c]. One of the first developments and one which was to play an important role in these early changes was the creation in August 1935 of the *Organizzazione nuovi impianti*, the central office for the organization of new plants (ONI). Under Enrico Vandone, one of the most active members of ENIOS who had been brought by Rocca from Fiat, ONI was charged with establishing a new organizational structure. In particular, ONI promoted studies and elaborated programs incorporating Taylorist methods. While these helped to improve efficiency, they also served to increase the bureaucratic structure of the company's organization and its information needs [ASA F.SB 25/48]. Furthermore, Vandone's methods did not meet with universal approval as they were considered too complex and bureaucratic. Opposition from managers hostile to the application of scientific management principles first forced him to be moved from the ONI to the position of director of the mechanical department and ultimately in 1940 to be fired for excessive authoritarianism [Molinari, 1999].

It was under the auspices of ONI that the first systematic attempt was made to introduce piecework systems throughout Ansaldo. Thus, a document dated October 15, 1937 notes a continuing concern within Ansaldo over the organization of labor on the shop-floor, together with resistance to new systems from within the ranks of management [ASA FSB 24/46]. In it, Sarli [ASA FSB 24/46], the director of the elettrotecnico department, refers to "systems of technical-bureaucratic elaboration and the preparation of manufactures":

these systems are constituted by a complex of specific 'modules' – whose conformation (which should be as appropriate as possible) has a very big influence on the validity of the systems – and related compilation rules.

These systems are something which cannot be – and which have never been – created suddenly by someone but which have to be the result of an evolution coming from the experience of a specific department over the years.... Substituting, within a specific department, a new system to the one currently in use is like trying to substitute, within a population, the existing language with a new, rationally created one... It has to be noted that the nature of production (in particular mass- and non-mass production) has a great influence on the nature of the system.... We classify: SYSTEM A, the system which was in use in these departments until 18 months ago; SYSTEM B, the system introduced by ONI 18 months ago and gradually applied; SYSTEM C, the system we wish to propose as definitive.

Sarli was highly critical of system B, noting that under it, the technical staff, despite an increase in number from 35 to 57, had been unable to perform the functions that it had carried out 18 months before with fewer personnel. This, together with the increased difficulty in organizing production programs, led Sarli to advocate a move to the new arrangement, system C.¹²

In 1939, Rocca decided to move from a centralized, functional structure for the company to a divisional organization with each manufacturing department controlling its own marketing, production, and capital budgeting. Planning, however, remained a centralized function with managerial control partially implemented through target setting, budgeted expenses, and the allocation of investment funds, although we have found no evidence of the use of ROI at Ansaldo at this time. The new organizational structure was set out in Rocca's CIRCOLARE A.D. N. 66 [ASA FSB 3/7], dated January 5, 1940, and the accompanying organizational chart [ASA FSB 3/7C]. At the top of the managerial hierarchy was to be a general director; a directors' committee comprising the CEO (Rocca), the general director, and all departmental directors; and a departmental committee, comprising the general director and the managers of each department. The management of the departments was under the charge of the directors, while central management was in charge of inspection, administration, and other staffing functions, such as the building and plant repair section, the operations management section, the commercial section, the administrative section, the personnel section, and the general secretary's office.

¹² Unfortunately, precise details of the various systems are not provided.

The Development of Management Accounting during the Rocca Period: Although an engineer, Rocca had a clear understanding of both financial and management accounting, which he had developed abroad [Rugafiori, 1984; Lussana, 1996]. When appointed general manager, he made a first attempt at implementing scientific management techniques across the business and instituted a responsibility accounting system [ASA D. SB 3/7 C]. Initially, while the business was organized on a functional basis, direct (productive) and indirect (non-productive and auxiliary) cost centers were created. Cost accounting was conducted within each production unit by a separate COI (cost accounting) office responsible for recording materials, purchase and sales invoices, and cost accounting. The various COI offices were coordinated by the *Direzione servizi amministrativi* (management administration service).

During the late 1930s and early 1940s, Rocca established many accounting and costing norms which not only influenced the method adopted but reflected changes in the managerial structure of the business. On the more technical accounting side, Norm 62000 of January 16, 1936, for example, stated that the closing cost balances were to be debited only with direct costs (material, direct labor, and expenses). All other cost elements were to be considered indirect and part of general expenses which, for each department, were to be allocated on the basis of direct labor, the percentage being calculated for each department using established rules. Only auxiliary services (e.g., power, water, steam, transportation, etc.) were to be allocated on the basis of consumption, actual or theoretical [Avalone, 2002]. Norm 000631, dated October 11, 1938, classified direct labor as the cost for the laborers who manufactured the product, while auxiliary labor comprised the cost for services, such as repairing, building equipment, plant transformation, etc. Together, direct and auxiliary labor were considered productive labor, while unproductive labor, such as cleaning, foremen, machine preparers, etc., was not directly related to production. Norm 640000 of July 3, 1936, meanwhile, demonstrates the links between cost and financial accounting at Ansaldo. Inventories were determined in the same way by the COI for all productive units and credited to account COI/10 (inventory) and debited to COI/30 (direct job order expenses).

Under Rocca's various norms, responsibility for the planning, production scheduling, and overhead cost control was divided between headquarters staff and the various COI. An internal audit office was established in July 1937. Industrial

accounting remained within the productive units. Norm 63003 of October 1939 defined the basic duties of each COI office as the bookkeeping for and the control of (1) the movement of material, (2) direct costs, (3) labor cost, (4) overheads for every cost pool, (5) product cost, and (6) monthly data for financial accounting purposes. Each COI was also required to provide the general and departmental management with reports through which they could control activities. Such reports covered the expenses of individual departments, offices, and services, and the cost of each product. Further, they should offer judgments regarding actual and estimated figures. Under CIRCOLARE A.D. N. 66 [ASA FSB 3/7], dated January 5, 1940, industrial accounting remained the responsibility of departments subject to checking, audit, and approval by the company's central management.

SUMMARY AND CONCLUSION

Conditions within most Italian firms during the 1920s were not especially conducive to the implementation of scientific management. Despite the formation of ENIOS in 1926, many elements of Taylorism were either anathema to Italian industrialists or impossible to implement in Italian firms due to political and socio-cultural factors which influenced the customs and traditions that pervaded Italian industry. Not the least of these was the rise of Fascism immediately after a long period of social hardship, class struggles, and strong reaction by entrepreneurs to the problems resulting from the labor troubles of the "red biennium." Another contributing factor was the lack of managerialism in Italian businesses, partly reflecting a high concentration of family ownership. The lack of a strong, dynamic engineering profession or an entrepreneurial culture, as well as heavy reliance on the State by firms, meant that scientific management innovations lacked the fertile soil within Italy in which to establish themselves between the wars. Nevertheless, companies such as Fiat, Magneti Marelli, Cantiere Navale Triestino, Officine Meccaniche di Novara, Olivetti, Manifatture Cotoniere Meridionali, Manifattura pellami e calzature, Perugia, and Cirio did begin to adopt some scientific management practices in the 1920s and early 1930s [Volpato, 1978, pp. 192-193]. Our case study firm, Ansaldo, a leading player in the iron and steel, engineering, and shipbuilding sectors in Italy in the early decades of the 20th century, also shows evidence of piecemeal experimentation with scientific management before 1930,

antecedent to embracing it more whole-heartedly in the second half of the 1930s.

Events such as the implementation of Taylorite techniques at the Cogne iron mines about 1927 and the Bedaux system at the electro-technical factory in 1929/1930, however, represented simply local management initiatives that did not spread more widely. Widespread adoption of scientific management only occurred when an individual in a key management position, Rocca as chief executive, was convinced of the potential benefits. Even so, the changes introduced by Rocca represented the implementation of a narrow version of scientific management, focusing on the rationalization of production techniques and procedures. In this, however, Ansaldo was little different from many companies throughout the world in both Europe and America [Hoxie, 1920], which often selected only those parts of Taylorism which they thought useful while rejecting or pushing aside other, less palatable, more contentious, or potentially more disruptive aspects [see, Smith and Boyns, 2005 on Britain].

To be successful in this narrow implementation, however, Rocca had to address the problem of significant barriers to change enshrined with the existing organizational structure of the company and the incumbent management culture. Deliberate steps were taken to reduce the barriers to change (e.g., existing foremen), while simultaneously enhancing the driving forces for change (e.g., bringing in outside managers well-versed in the ideas of scientific management). Despite this, the process was by no means a smooth one. Vandone, for example, was brought in as an important driver of change, but his methods on occasion served only to reinforce resistance, resulting in his removal from the center of events and eventual dismissal from the company altogether. Nevertheless, the organization which spearheaded the implementation of the new methods and which he had helped establish, the ONI, continued to be an important driving force even after his removal.

While aspects of scientific management were gradually adopted at Ansaldo throughout the interwar period, there is also evidence of changes in cost accounting identified in two periods – 1919-1922 and post-1935. In the first, a key role was played by the owners of the business, the Perrone brothers. Although the Perrones acted as a barrier to the introduction of Fordist methods at Ansaldo immediately after World War I, despite their knowledge of and interest in scientific management, they did represent a positive force in respect to cost accounting developments. The company's worsening financial plight in 1919

fueled a growing concern with efficiency, leading the Perrones to establish the General Inspectorate which introduced new costing rules in 1921 that focused on direct costs. Although the Perrones lost control of the company in 1922, the changes they set in motion proved beneficial to the firm's management during the 1920s. In the post-Perrone era, successive managements utilized costs for purposes of managerial control, contrary to the view of Benjamin Barabato et al. [1996] who have expressed the view that the lack of competition and closeness of many large businesses to the State militated against the use of costs for purposes of managerial control and efficiency in Italy between the wars.

The second significant episode of change in cost accounting, including the adoption of elements of responsibility accounting, coincided with the more widespread development of scientific management following the appointment of Rocca as chief executive. The clear link between these two developments from 1935 onwards supports the idea put forward by Boyns and Edwards [1997] that changes in cost/management accounting often occur as part of a symbiotic process of change within organizational structures and management systems rather than as part of a causal mechanism, as suggested by Chandler [1977, 1990] and Johnson and Kaplan [1987]. Perhaps it was the failure to implement scientific management in its widest sense which explains the lack of development of the Chandlerian M-form structure and the failure to adopt accounting techniques associated therewith, especially budgeting and standard costing. But, once again, in this respect during the interwar period, Ansaldo was no different from companies such as the Sperry Corporation in the U.S. [Fleischman and Marquette, 2003], Thyssens in Germany [Fear, 2005], Renault and Berliet in France [Moutet, 1992; Zimnovitch, 1997; Berland, 1999], or many firms in the British chemical and iron and steel industries [Edwards et al., 2002; Boyns et al., 2004].

If Ansaldo was not different from many other companies across the industrialized world, what lessons can we learn from it in relation to the issue of identifying the key factors which influence change in organizational structures and cost/management accounting? According to Lewin's theory, change can only occur when the forces promoting change outweigh those resisting it. This study has found that the balance of forces for and against change can ebb and flow over time, and that it is not necessarily the case that all changes will become permanent or widespread throughout an organization. While both internal

and external factors have been found significant in influencing change, the Ansaldo case emphasizes the importance of key individuals in effecting permanent change, especially in the area of cost accounting, therefore supporting the work of Granlund [2001]. From the perspective of Busco et al. [2007], the Perrones played an important role during the 1919-1921 period, while Rocca represented the key agency through which management accounting change was effected in the late 1930s. Both the Perrones and Rocca, however, carried out this role within a broader context, comprising a combination of institutional pressures, reflecting the socio-political and economic influences of the time. This study suggests that while accounting historians need to understand the contextualizing forces surrounding change, it might be more useful to focus more closely on the role of individuals in overcoming resistance to change and, thus, enabling it to take place.

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